maxon

Precision Drive Systems

Product Range 2025/26





View the entire range of products online

shop.maxongroup.com

- Wide selection of brushed and brushless DC motors, compact drives, gearheads, sensors, controllers and drive systems
- Easy to configure

maxon selection guide

Get an overview of the extensive range of DC brushed and brushless motors, drives, encoders, control electronics, and the variety of possible combinations. Make a preliminary selection based on the power and size, commutation, or bearings. Quickly find what you're looking for, including sterilizable drives for use under special ambient conditions or drives with integrated electronics.

Accessories overview

Easily find the accessories you need for connecting maxon DC motors to maxon controllers.

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64–88_Technology – short and to the point

89–91_Standard Specification

93–188_maxon DC motor
Brushed DC motors with ironless winding.

189–348_maxon EC motor (BLDC)
Brushless DC motors with ironless or iron core winding.

349–366_maxon compact drive
Compact drives with integrated positioning/speed controller.

367–461_maxon gear
Precision planetary, spur, strain wave and angular gearheads.

463–485_maxon screw drive
Compact screw drives with steel or ceramic screws.

487–543_maxon sensor
Magnetic, optical, and inductive encoders, DC tachometers, and resolvers.

545–582_maxon motor & motion control
4-Q PWM servo controllers, 1-Q-EC amplifiers, positioning controllers, and multi-axis motion controllers.

583–598_maxon accessories
Brakes, end caps and connecting cables.

599–609_maxon ceramic
Custom ceramic components and standard components such as ceramic axles, shafts, or screws.

611–614_Contact
Headquarters, business units, labs, production companies, sales companies and sales partners.

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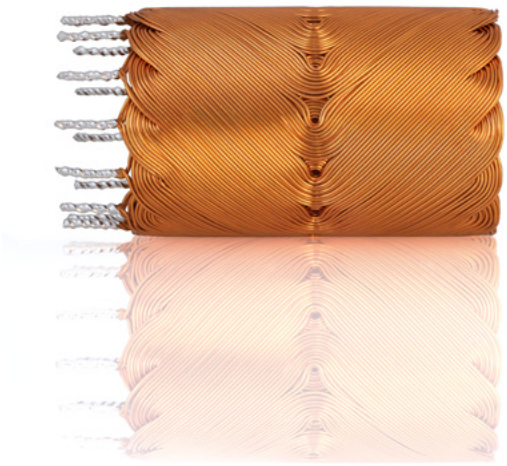
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We are maxon

As a family-owned company, we develop and manufacture precision electric drives that are among the best in the world. We combine brushed and brushless DC motors, gearheads, sensors, and controllers into high-quality mechatronic drive systems – from tailor-made single units to series production.

Since 1961, medical technology, robotics, industrial automation, mobility, and aerospace companies have trusted our drive systems for their quality and reliability. Maximum precision and uncompromising performance are required, whether on Earth or on Mars.

Our long-standing partnerships are built on trust. We work hand in hand with our customers to create solutions that deliver and stand the test of time.



Quality and innovation as guiding principles



“Our customers are our motivation.”
Eugen Elmiger, CEO of the maxon Group

Welcome to the world of maxon

For over 60 years, we have stood for precision, reliability, and innovation – values deeply rooted in our history as a family-owned Swiss company. In a world of constant change, our products deliver lasting quality and performance.

One example is the **High Efficiency Joint (HEJ),** a compact robotics solution with exceptional efficiency. This system combines precision and modularity in the smallest of spaces, making even the most demanding applications possible. With new models like the HEJ 90, we are actively shaping the future of automation.

Our customers and partners are at the heart of everything we do. We highly value longterm relationships built on trust, quality, and innovation. Working hand in hand with our customers, we develop tailored solutions that help our customers overcome their challenges and reach their goals. Their success is our motivation.

System solutions – Drives and more

With our thoughtfully engineered system solutions, we create new possibilities. The expanded **ESCON2 controller line** stands out for its efficiency and flexibility, spanning applications from basic ventilation systems to autonomous driving. The optimized **Motion Studio software** provides perfect control over every component.

Additional innovations include the high-torque drives of the **ECX FLAT platform,** which are now available with integrated electronics. Paired with a Parvalux gearhead, the **IDX 70 industrial motor** is ideal for applications in agriculture, medical technology, and warehouse automation.

Shaping the future together

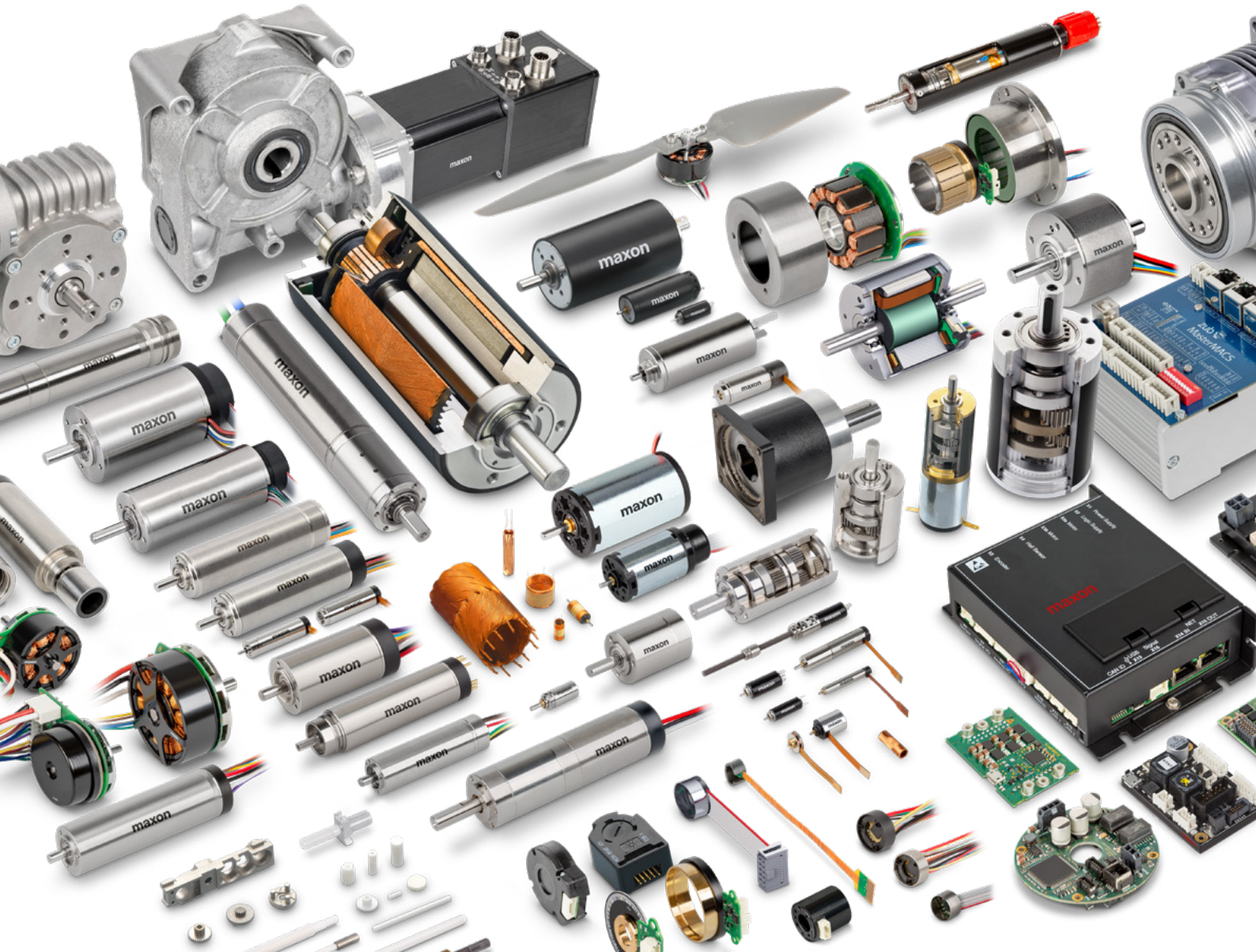
This catalog also features other new and time-tested products. Find inspiration for your application! Our customers are our motivation – we support you with innovative solutions that meet the highest demands. If you have any questions or individual requirements, please contact us. Together, we shape the world of tomorrow: precise, efficient, and with proven quality.

maxon

Minimal space. Maximum power.

maxon is a global leading provider of electric drive systems.
We develop technology that is the basis for success.

- → High acceleration
- → Long service life
- → Low energy consumption
- → Short-term overload capacity
- → Unsurpassed reliability
- → Excellent control properties



Compact drives

Compact. Dynamic. Precise.

Cutting-edge technology inside a compact drive solution: The brushless EC-i motor combined with an EPOS4 positioning controller results in a maintenance-free compact drive with field-oriented control (FOC) in a high-quality industrial housing with connectors and IP65 protection class.

Brushed DC motors

The perfect combination of technology and power

Our brushed DC motors are equipped with powerful permanent magnets and the globally patented ironless rotor. The modular DCX and DC-max programs can be individually configured in accordance with customer specifications.

Brushless DC motors

Setting new standards for precision and service life

Key features that set the brushless DC motors (EC motors) from maxon apart are their excellent torque performance, extremely wide speed range, and unrivaled service life.

Gearheads

Power and speed with precision

We develop and manufacture high-precision spur and planetary gearheads as well as screw drives that perfectly match maxon electric motors with respect to speed, torque, or inertia.

Planetary gearheads, spur gearheads and screw drives

For perfect power transmission

Our high-precision planetary gearheads, spur gearheads, and screw drives with steel or ceramic spindles offer a high degree of power transmission, while boasting a very short design. They optimally complement maxon motors. The modular design and scaled stages provide the basis for customer-specific drive solutions.

Sensors

Strong pulses

Interference-free, high-precision performance even at high loads: We offer precise digital encoders, DC tachometers, and resolvers with a high degree of accuracy and high signal resolution. These devices have to be fitted to the motors at the supplying factory, as the installation process is fine-tuned to the corresponding motor.

Motor & Motion Control

Smart control electronics

maxon controllers and multi-axis controllers allow for accurate coordination even with complex motion sequences. All current, speed, and positioning controllers are specifically designed for DC and EC motors with up to 1000 W. CANopen or EtherCAT enable fast networking and the controllers meet the highest requirements with regard to power and precision.

Cables, software & brakes

Perfect down to the smallest detail

Brakes. Connection cables. Front plates. Motor chokes. Adapters. Shunt regulators. As well as the right software – when we think of drive technology, we think of the complete solution. When developing our drive systems, we pay attention to every last detail and provide all key components from a single source.

Industrial ceramics

A unique material

High-performance industrial ceramic components are extremely wear resistant, hard, and temperature resistant. They are used in areas where conventional materials have failed. maxon develops and manufactures ceramic precision spindles, axles, and shafts as well as complex customer-specific components.

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When it really matters

For over 60 years, we have been developing our technology with a focus on the future. We refuse to be bound by the limits of what others deem possible or impossible. We view transformative technologies as a chance to create sustainable value for the world of tomorrow. To accomplish this, we make targeted investments in research and innovation, and have our own test laboratories, innovation labs at renowned universities, and state-of-the-art assembly and automation technologies.

We turn ideas into sustainable and value-driven solutions and help our customers to move the world forward. Together, we redefine the boundaries of technology and precision to build next-generation drive systems that propel people today and tomorrow.



Drive solutions for medical technology

The demands on technical components are nowhere as high as in medicine: Absolute precision, sterilizability, minimal vibration, power density with a compact size, and low heating of the motors are essential. maxon drives are successfully used in numerous medical applications.



People. Medicine. Technology.

The rapid progress in medical technology is truly astonishing. Devices are getting smaller and more precise, robots assist surgeons during procedures, and cutting-edge prosthetics allow for natural movements. maxon's drives power these innovative technologies, helping people worldwide achieve a better quality of life.

Our solutions for medical technology
We are proud of our collaborations with leading medical companies, innovative startups, and scientific institutions that make important advances in research, surgery, and therapy possible. From simple modifications to new customized designs, maxon offers everything from a single source.

Up to
2000 x
our medical drives can be autoclaved.

We understand the needs of the medical technology sector
Few industries have requirements as demanding as those in the medical technology sector. Our medical business unit develops and produces drive systems that meet these requirements for a variety of medical applications – and can also be fully customized.

- → Sterilizable
- → Minimal vibration
- → Low heat build-up
- → High power density with a compact size

Almost
4.4 million
particles are filtered out of our clean room.

Up to
30 x
30 times per hour the air in our clean rooms is exchanged.

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Drives for surgical systems

Efficient surgery

Surgical tools must be highly precise, reliable, and able to withstand many sterilization cycles. Our drive systems guarantee optimum performance as well as increased durability and service life, to maximize the potential of powered surgical hand tools.

With their high power density, low-noise and low-vibration operation, and compact size, maxon drives are utilized in surgical robots and hand tools across various specialist disciplines. They are also employed in ventilators and intensive care systems.



Drive systems for active implants

Inside the body

With active implants, the focus is on the health and long-term quality of life of the patient. Our drives are therefore developed with patient safety, reliability over the entire life cycle, biocompatibility, and biostability in mind as well as compatibility with other medical devices.

With maximum efficiency and precision, maxon drives enable targeted medication delivery inside the body or reliable support of heart and muscle function.



Drives for pumps and medication delivery

When microliters matter

The medical technology sector needs devices that can deliver vital medicines with pinpoint accuracy. Compact and reliable maxon drives in combination with quiet gearheads and encoders ensure maximum precision in pumps and medication delivery systems.

For the delivery of vital medicines, maxon supplies customized solutions for infusion and insulin pumps as well as for implantable pumps that drain fluids from a patient's body.



Drives for rehabilitation and prosthetics

Mastering movement

Climbing stairs, tying shoelaces, grabbing a fork – the emulation of human movements with mechatronic systems is one of the greatest challenges for engineers. Highly innovative companies rely on drive systems from maxon for precise movements.

maxon products help to significantly improve the quality of life of many people around the world. Our compact, powerful drives are used in many different prostheses.

medical.maxongroup.com

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Drive systems for industrial automation

Our drive systems are essential to modern industrial automation, playing a pivotal role in connected and automated production processes. By meticulously fine-tuning all components for optimal synergy, we ensure maximum precision and reliability while maintaining cost efficiency.



Ready for the future

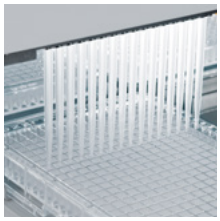
Electric drives are crucial for the performance of machines, robots, and power tools. For advanced drive technology in industrial automation and robotics, maxon provides not only individual components but also complete, compact mechatronic drive systems. These systems are perfectly matched, scalable, and economical.

Our solutions for industrial automation
We develop, build, and supply highly efficient drive technology for world-leading industrial companies. From standard solutions and simple modifications to completely new custom designs, maxon offers everything from a single source.

Around
200 experts
worldwide are working on the development of our drive components for industrial automation.

Almost
9 micrometers
is the resolution for the stroke of our smallest micro linear drives for the semiconductor industry.

Over
2 million
drives produced per year for industrial automation.



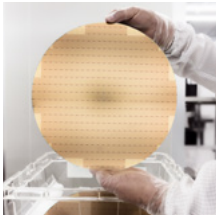
Drive systems for laboratory automation

Reliable diagnostics and research

Drive systems from maxon ensure reliable processes in laboratory applications – and thus consistent results. Because in the laboratory, accuracy is key. Highest quality and reliability enable reproducible results in diagnostics, life sciences, and analytics.

industrialautomation.maxongroup.com

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Drive systems for the semiconductor industry

The raw material for digitalization

Industrial systems in the semiconductor industry operate with cycle times of a second or less, making high dynamics and precision essential for success. We develop and produce application-optimized drive systems to maximize production output in wafer and microchip manufacturing.



Drive systems for the oil and gas industry

Designed for extremely harsh operating conditions

maxon Heavy Duty drives for the oil and gas industry withstand temperatures up to 200 °C as well as pressure, shocks, and vibrations. This makes them ideal for extreme operating conditions in a wide variety of oil drilling applications such as hydraulic valve controllers, communication mechanisms, and measuring instruments.



Drive systems for measuring and testing technology

Unrivaled measuring performance

maxon drives perform reliably across various fields of measuring technology. Whether it's high-precision measurements in mechanical production or surface technology applications, or construction site and landscape surveying in rainy, snowy, and cold conditions, we provide ideal solutions for every measuring application.



Drive systems for power tools

Indispensable helpers

As power tools become more widely used and increasingly complex, the requirements for electric drive systems are rising. They need to be powerful, dynamic, light, and efficient. Drives from maxon are true powerhouses, which meet these expectations with an efficiency level of over 90% and excellent closed-loop controllability.



Drives for safety systems

An eye on safety and costs

Locking systems or surveillance cameras require solutions which are not only high quality, but also cost effective. With the modular maxon product portfolio, we always find an optimal solution without compromising on quality and performance.



Drives for optical systems

Capture the light

From making bacteria visible to the human eye to revealing the wonders in the vastness of outer space, optical systems from the field of photonics, such as microscopy, laser technology, machine vision, sensors, and analytics, need reliable drives which perform each movement with the highest precision.

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Drive systems for the aerospace industry

Whether long-distance aircraft, UAV, or Mars probe, hundreds of powerful drive systems are required for take off. Our certified components maintain their high precision even in extreme environments, advance scientific progress, and enhance the passenger experience.



Your reliable partner in the air

Uncompromising quality, innovative technology, and thousands of flight hours. Our aim is to be the most reliable partner in the skies. Electric drive systems from maxon for the aerospace industry assist pilots in the cockpit and power drones, satellites, and rovers on Mars.

For more than twenty years, maxon's technology has been driving the Mars rovers on the Red Planet. Today, hundreds of drive systems can be found in modern long-haul aircraft. Back here on the ground, maxon and its customers develop drive solutions consisting of individual components or sophisticated technical systems for passenger aircraft, helicopters, spacecrafts and unmanned aerial vehicles. maxon guarantees the unrivaled quality of its efficient, reliable and powerful drive systems for the aerospace industry. maxon has been EN 9100 certified (equivalent to AS 9100) since 2012. This standard was created especially for companies that develop and produce components for the aerospace industry. In our in-house laboratories, we test our drives for resistance to vibration, shock, cold, heat and vacuum.

The name maxon is synonymous with customized precision and stands for an extensive support network that guarantees the highest Swiss standards all over the world. Our dedicated aerospace team assists customers with simple applications as well as complex, multi-year development projects.

The maxon aerospace team have used the knowledge they have gained from numerous special projects, such as the drives for the Mars missions, to other aerospace projects and have further developed this expertise for serial production. Our state-of-the-art technology and extensive laboratory tests make this possible. We never stand still. We are forever expanding the possibilities of aerospace technology, whether for passenger spacecrafts, helicopters or spacecrafts.

Our solutions for the aerospace industry
maxon is a global leader in the design, development, and production of electric drive systems in four aerospace technology segments:

In
2010
maxon established a dedicated business unit for the aerospace industry.

For
20 years
Mars rovers powered by maxon drive technology have been exploring on the Red Planet.

Over
7000
possible configurations specifically for the aerospace industry.

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Drive systems for aviation

Ready for take off

Drives from maxon ensure reliable safety and greater comfort in the air. Our aviation business unit develops specific drive solutions comprising individual components or complex technical systems for civil aviation.
Maximum safety and greater efficiency. Our team develops custom drive solutions comprising individual components or complex technical systems for aircraft control systems, on-board communication and cabin equipment in civil aviation.



Drive systems for urban air mobility

Future of commute with maxon on board

In dense, high populated urban areas, so called air taxis will soon play an important role. Combining automotive and aerospace technologies, they'll lead the way in how people commute in the future. With its vast experiences in both industries, maxon is the ideal partner to discuss motion control projects with. maxon actuators used today in larger aircraft will fit well into air taxis as fulfil the stringent aerospace requirements.
With solutions that have already been tested thousands of times in civil aviation and the development of new compact and energy-saving drives and actuators, we are developing products for the future urban air mobility market.



UAV and drone propulsion systems

Fly longer and safer

maxon guarantees the highest quality in its products, processes, and certifications for the drone market. maxon's UAV propulsion systems consist of brushless DC motors, electronic speed controllers (ESCs), and propellers built for the utmost safety and efficiency.
Our UAV propulsion systems provide high thrust, high power density, optimal efficiency, and long lifetime for the best environment resistance.



Drive systems for space

Ready for the space age

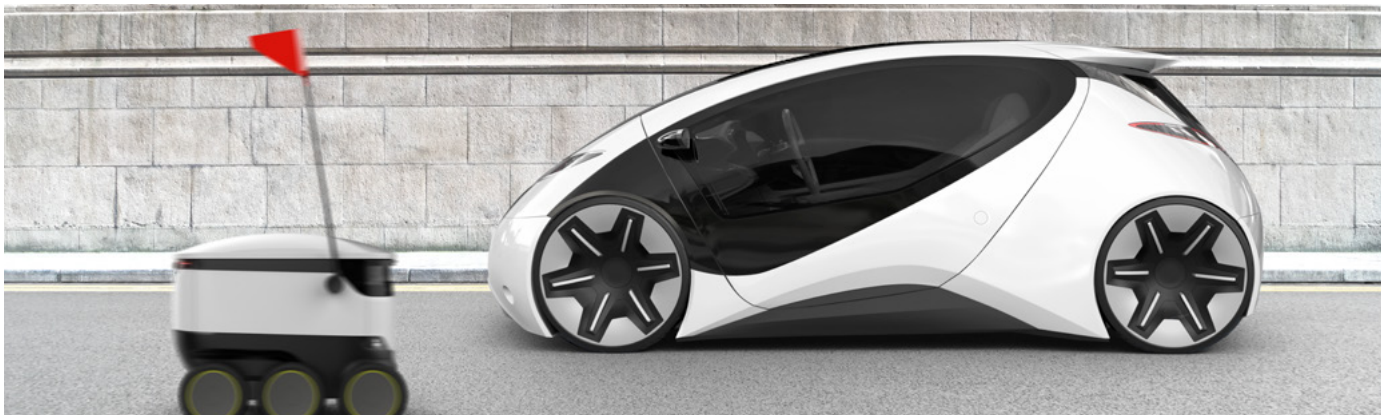
maxon drive systems are among the most flown drives in space research, and in space they power some of the most complex robotic systems that humans have ever built.
On the moon, on mars, to the sun, and deep in outer space – drive systems from maxon SpaceLab for customers such as Nasa, ESA, and Jaxa are among the most flown in space research and commercial spaceflight.

aerospace.maxongroup.com

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Drive systems for mobility solutions

The future of mobility is electric. Our market-tailored system solutions provide the foundation for complex applications such as autonomous logistics robots, humanoid robots, adaptive chassis systems, or e-bikes.



For a mobile world

It is hard to imagine today's everyday life without mobility. Whether on the road, the bike path, in the logistics sector, or under water, maxon drive systems get things moving reliably and efficiently.

Our mobility solutions
Modern mobility is unimaginable without powerful electric drive systems. maxon develops and produces market-tailored system solutions that power applications with precision and safety.

Since
2012
we have been developing and manufacturing components for Formula 1.

Just under
1.9 kg
is the weight of our Bikedrive Air e-bike drive.

Up to
5 kW
is the peak power delivered by our drives for active suspension control.



Drive systems for logistics

For intelligent logistics robots

Equipped with powerful electric motors and sensors, and connected with artificial intelligence, today's autonomous mobile robots are able to perform many tasks in the logistics sector. These smart and efficient Industry 4.0 logistics systems need drive solutions that combine compact design with low energy consumption. maxon provides a single source for complete drive systems for such shuttles and AGVs.

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Drive systems for robotics

Machine. Helper. Rescuer. Friend.

Robots assemble devices, explore space, and perform surgeries on people. For motions and behaviors that come close to human capabilities they need powerful and highly precise drives. maxon develops and manufactures custom components for autonomous mobile and industrial machines, including humanoid, quadruped, and collaborative robots, as well as agricultural and service robots.



Drive systems for the automotive industry

For safety and efficiency

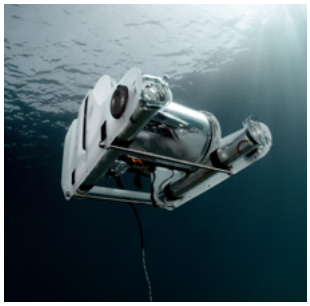
The need for greater safety and the rise of semi-autonomous driving are presenting automotive manufacturers with new challenges. maxon develops electric motors specifically qualified for use in the automotive industry, featuring exceptional power density. Our drive systems are found in various parts of a vehicle, including active suspension systems, gasoline and injection pumps, or x-by-wire systems.



Drive solutions for electromobility

Lightweight and efficient e-bike systems

Our lightweight e-bike motors, efficient batteries, and state-of-the-art interfaces and apps offer a perfectly coordinated e-bike system. maxon technology is designed to deliver maximum power in the smallest of spaces. Efficient and reliable.



Drive technology for underwater vehicles

Ultimate performance underwater

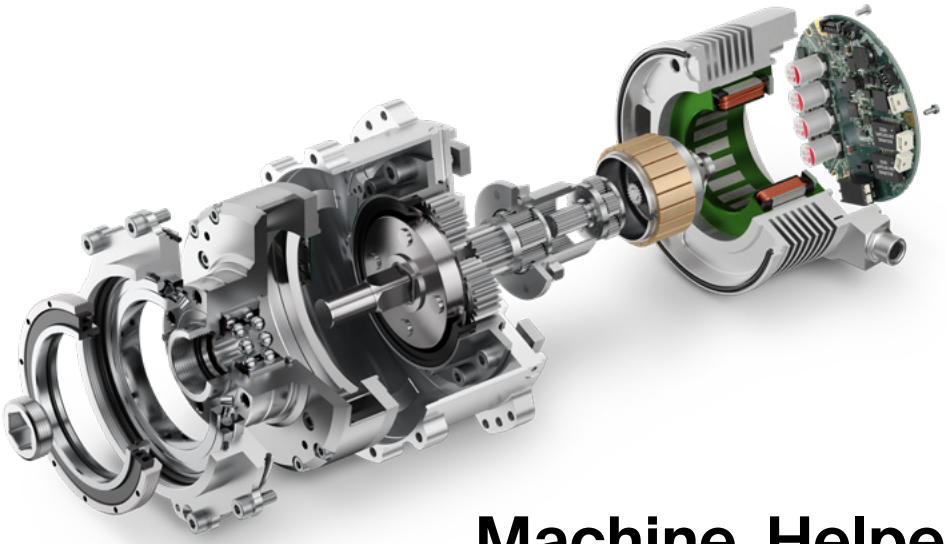
Deep below sea level, our propeller drives and actuators show what they can really do: maxon thrusters are reliable and durable drive systems for use in crewed and uncrewed underwater vehicles. They are specially designed for depths of up to 6000 meters.

mobilitysolutions.maxongroup.com

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Drive systems for robotics

In the coming years, robots will noticeably change our daily lives. Millions of them will handle monotonous, dirty, and dangerous jobs.



Machine. Helper. Rescuer. Friend.

Robots handle assembly tasks, provide support, automate processes, explore space and perform surgery on humans. They rely on powerful, highly integrated drive systems to achieve human-like motion and capabilities.

maxon develops and manufactures drive systems for autonomous mobile and industrial robots, including humanoid and quadruped robots, agricultural robots, collaborative robots, mobile manipulators, and service robots.

Our knowledge makes a difference
Backed by more than 60 years of expertise in drive system development – from motors and gearheads to encoders and electronics – we are leaders in crafting innovative, adaptable systems optimized for power and scalability. Our in-depth knowledge of modern robotics allows us to create drive systems ranging from advanced robotic simulations to precise actuator control and robust hardware.

We enable robotics engineers to focus on their key tasks while we take care of the challenges surrounding actuators. Our focus is on the following core values:

- → **Production scalability:** Rapid scaling for complex robotic drive systems with annual quantities in the high tens of thousands.
- → **Reliability:** Our drive systems are designed for harsh, unstructured environments and meet the highest quality and reliability standards.
- → **Reduction of complexity:** We simplify complex drive subsystems – including electronics, motors, and gearheads – to ensure seamless integration.
- → **Total cost analysis:** By leveraging vertical integration, we lower costs, accelerate the time to market, and maximize the operating time of robots with highly reliable systems.

Impressive performance data

Torque: Our strongest robotic drives generate up to

484 Nm

of torque.

Service life: Our most robust drives can handle over

12 million

load cycles.

Efficiency: Our powerful robotic actuators achieve around

93%

gearhead efficiency.

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Solutions for autonomous mobile robots

Highly efficient joints

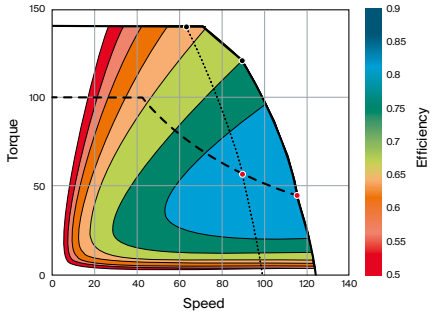
Our growing family of quasi-direct drives ensures reliable locomotion and mobile manipulation in unstructured environments. A high torque density ratio, full integration, protection against environmental influences, sophisticated impedance control with an integrated torque sensor, and planetary gearheads with overload capability make these systems ideal for modern, dynamic robots.



Industrial building blocks

Precision parts

A versatile range of torque-dense actuators with high-resolution absolute output encoders, large hollow shafts, and backlash-free drives. These systems are ideally suited for custom robotic and industrial motion solutions, from surgical robots to pan/tilt applications.



For the optimal system

Simulation and design

We offer comprehensive system simulations and optimization services to ensure you get the right solution for your problem. Our offering includes:

- Simulation models for complete drive systems
- Kinematics simulations
- Integrated system engineering and optimization
- Consultation on functional safety and risk assessments



More than actuators

Subsystems and customization

We merge our manufacturing expertise with the development of complete subsystems – in close collaboration with you. This allows us to achieve maximum integration density and scalability – crucial factors for success in robotics.

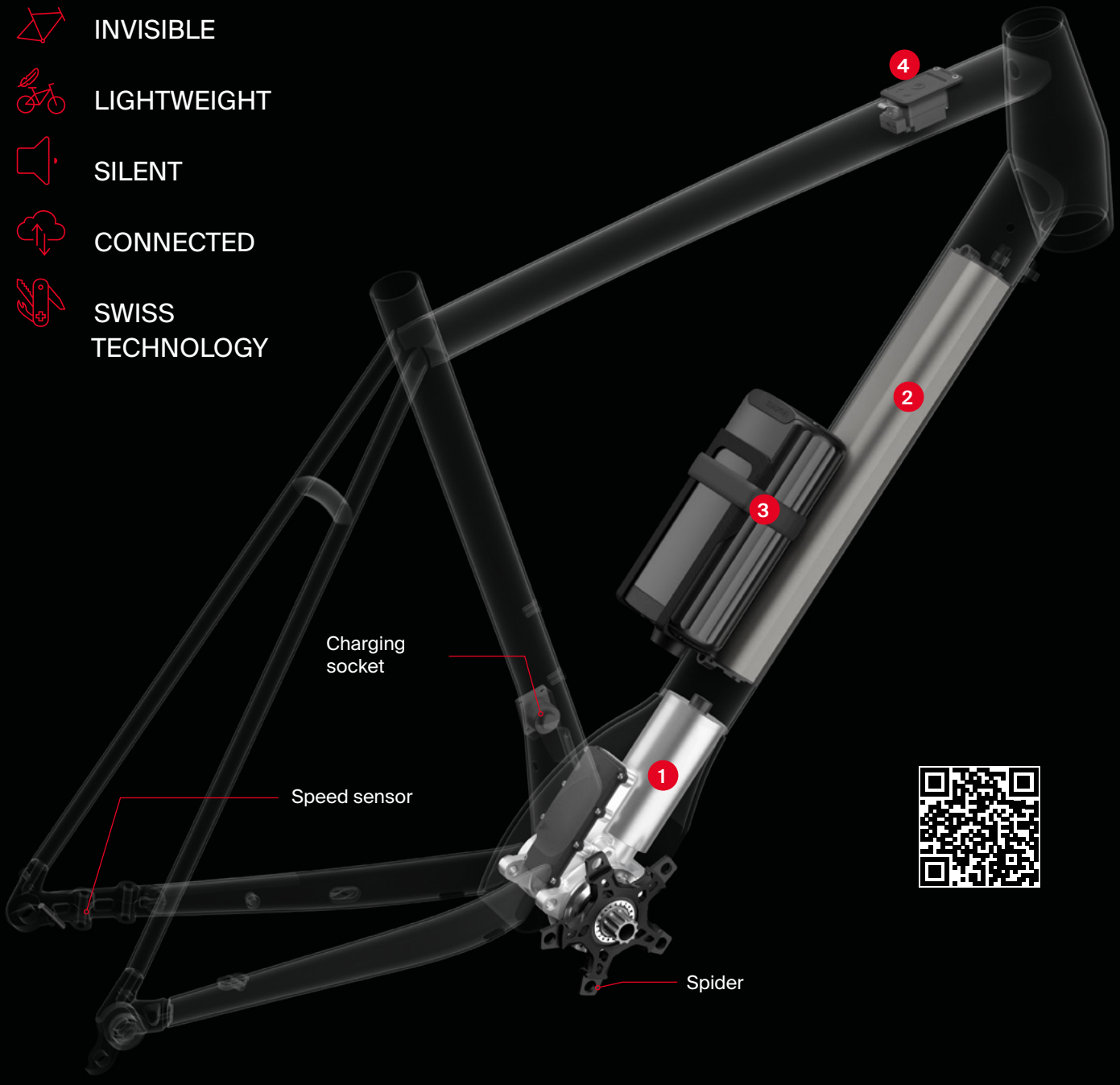
robotics.maxongroup.com

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The invisible E-Bike drive

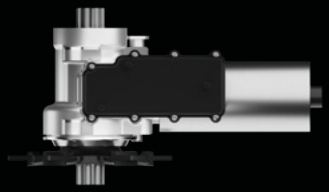
The maxon BIKEDRIVE AIR e-bike system is mounted out of sight inside the frame. Only an inconspicuously integrated control element on the top tube hints at the extra power hidden within the bike. A system weight of 3.5 kg, torque of max. 40 Nm, more than 300 W of power, 250 Wh or 360 Wh in the main battery, optionally 250 Wh in the Range Extender. The maxon BIKEDRIVE AIR is suitable for electric racing bikes weighing up to 10.5 kg and e-MTB trail full-sussers weighing up to 15.5 kg. The system is suitable for all bike types.

- NATURAL CYCLING EXPERIENCE
- INVISIBLE
- LIGHTWEIGHT
- SILENT
- CONNECTED
- SWISS TECHNOLOGY



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1 Drive unit

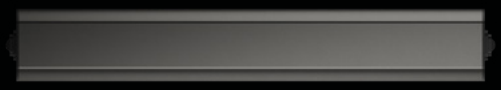


MX AIR

Description		Data
Max. torque	Nm	40
Max. supported cadence	rpm	115
Max. speed	km/h	25/33
Weight of motor unit	kg	1.9
Weight of complete system	kg	3.5
Patented freewheel technology		
Integrated torque measurement on both sides		
Min. diameter of down tube	mm	60
Width of bottom bracket	mm	97.5
Chainline: racing bike 2x	mm	47
Chainline: racing bike 1x	mm	46
Chainline: MTB boost, 148 mm	mm	52/55
Q-factor	mm	≥ 155*

*depending on frame design and crank selection

2 Battery



BX250I

Description		Data
Nominal voltage	V	36
Watt-hours	Wh	250
Charging time with 2 A charger	h	3.5
Weight	kg	1.4

BX360I

Description		Data
Nominal voltage	V	36
Watt-hours	Wh	360
Charging time with 3.5 A charger	h	2.8
Weight	kg	1.8

3 Range Extender



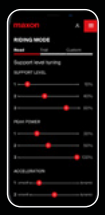
BX250E

Description		Data
Nominal voltage	V	36
Watt-hours	Wh	250
Charging time with 2 A charger	h	3.5
Weight	kg	1.5

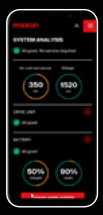
4 Control unit



Connect app



Service app



HMI POWERTAB

Description
Level adjustment
Battery charge indicator
BLE / ANT+
Light

Part numbers

Part numbers	Description*
826240	MX AIR motor unit incl. cabling
699584	POWERTAB control unit
770624	BX 250 I battery incl. cabling / 250 Wh
801249	BX 360 I battery incl. cabling / 360 Wh
784579	Range Extender BX 250 e
735990	Charger, Li-ion, 2 A/36 VDC 230 VAC / 90° outlet
801857	Li-ion charger 3.5 A / 36 V 110–230 V
801859	Li-ion charger 2 A / 12 V car charging socket
831542	Charging socket, complete with cover and cable, ST-10 right, 190 mm
831471	Charging socket, complete with cover and cable, ST-10 left, 190 mm
724125	Dropout speed sensor, HIGO connector, 734 mm
710994	Magnet holder for center lock brake disks / internal thread
710995	Magnet holder for 6-hole brake disks
710996	Magnet holder for centerlock brake disks with thru axles
741375	Chain ring holder BCD104
735310	Chain ring holder BCD110

*The BIKEDRIVE AIR system is only available as complete system.

maxonbikedrive.com

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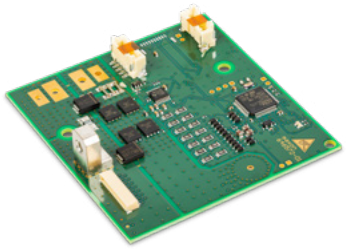
Ready for the next step

At maxon we develop customized mechatronic drive systems, of the highest quality from a single source.

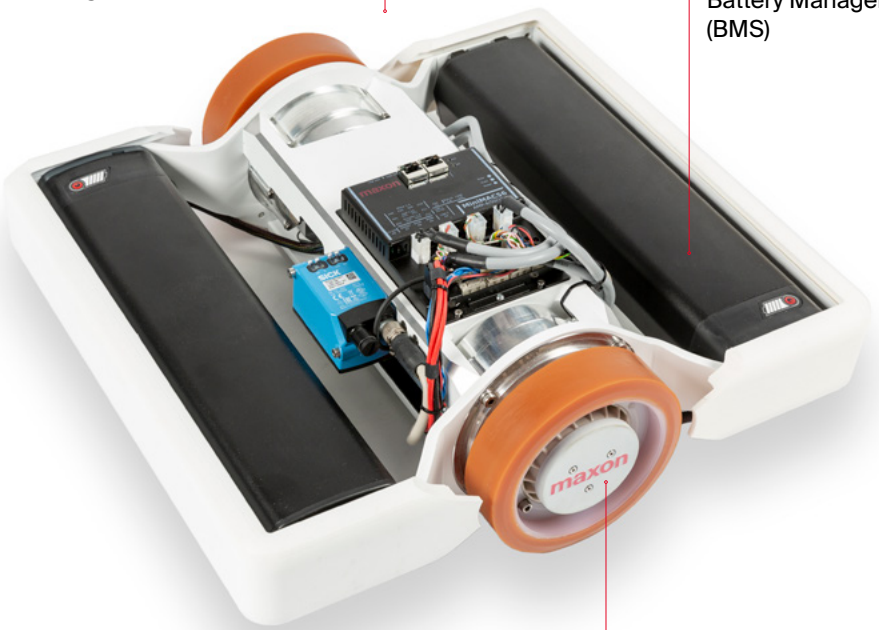
maxon not only develops and produces DC and BLDC motors, gearheads, sensors, and controllers, but we can also combine these drive components in a housing as a customized mechatronic unit.



maxon Master Controller / Multi-Axis Motion Controller
Page 545



Battery Management System (BMS)





Wheel drives for autonomous transport systems and self-driving vehicles

Read more about drive systems for logistics

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Space catalog

Optimized drive solutions and services for space applications

In 2020, maxon founded SpaceLab – a specialized unit that offers tailor-made services for customers in the space industry. The SpaceLab team supports customers with highly reliable products and services that have been developed specifically for meeting the challenges faced in space. Our space catalog offers a wide selection of proven solutions that have already been successfully used in various space missions and stand out for their exceptional quality and durability.

Get the download here

Discover new products

Learn about our latest product introductions in this short video.
Have fun with it!

Scan code to view new products



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maxon X drives

Configure your drive online – according to your individual needs

When configured online, you can download your specific mechanical and electrical data, dimensional drawings and CAD files immediately, and within 11 working days your drive system will be ready to ship.

Brushed DC motors



DCX

The powerful drive available in a variety of versions.



DC-max

The cost-optimized drive with a very good price/performance ratio.

Brushless DC motors



ECX SPEED

The high-speed drive for grinders, fans, sterilizable hand-held tools, etc.



ECX PRIME

The high-performance drive with outstanding speed-torque gradient.



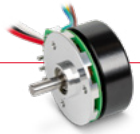
ECX TORQUE

The high-torque drive for power tools like screw drivers, pruning shears, etc.



IDX MOTOR

The industrial solution with IP65 protection and integrated incremental or absolute encoder.



ECX FLAT

The flat, space-saving drive with lots of torque.

Drives with integrated positioning/speed controller



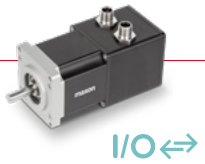
IDX – CO

COMPACT DRIVE

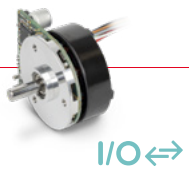
The intelligent drive system with IP65 protection, integrated controller, and optional holding brake.



IDX – ET



IDX – i/O



ECX FLAT

The flat compact drive with integrated speed controller that can be configured online.

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Produced within 11 days

Lean, automated processes ensure that all drive versions are ready for shipment within 11 days

Assemble your individual brushed or brushless DC drive: You can configure the gear stages, the motor bearings, the shafts, the encoder and much more. Design your custom drive online today and your finished drive will ship from Switzerland in 11 working days.

Planetary gearhead



GPX A, C, LN, LZ

Planetary gearhead
A: Standard
C: Ceramic axes
LN: Reduced noise level
LZ: Reduced backlash



GPX SPEED

High-speed, sterilizable gearhead for surgical applications.



GPX HP

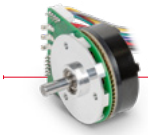
High-power planetary gearhead with reinforced output. Also available as a sterilizable version.



GPX UP

Ultra-performance planetary gearhead with optimal efficiency and reinforced output.

Encoder



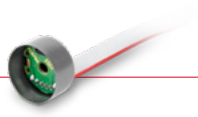
ENX MILE

High-resolution and high-precision inductive encoder integrated in ECX FLAT.



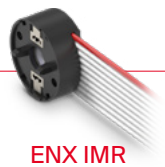
ENX MAG

Magnetic incremental encoder, 3-channel, for small motor diameters.



ENX GAMA

Radiation-resistant, magnetic incremental encoder, 2-channel.



ENX IMR

Magnetic incremental encoder, 2 or 3-channel differential.



ENX EASY

Magnetic incremental encoder, 3-channel, differential.



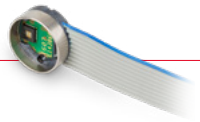
ENX EASY Abs

Absolute single-turn encoder (SSI/BiSS-C)



ENX EMT

Absolute multi-turn encoder (SSI/BiSS-C)



ENX RIO

High-resolution, optical incremental encoder, 3-channel, differential.

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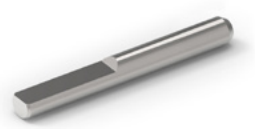
Select. Configure. Purchase.

Find the perfect drive solution in the maxon online shop

Assemble your individual maxon drive. To optimally tailor the drive system to the respective application, select the shaft, flange, bearing, or electrical connections directly online. You can then download the mechanical and electrical data, dimensional drawings, and CAD files directly.

For further customization options, such as hollow shafts, special lubricants, or special windings, please contact our sales team.

Shaft
Length
Diameter
Surface
Cross bore



Bearings
Ball bearing
Sleeve bearing
Lubrication



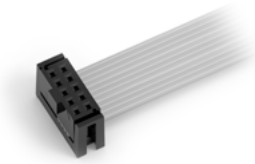
Flange
Centering collar
Bolt circle
Thread



Winding
Nominal voltage
Temperature range



Electrical connection
Terminals or cables
Cable length
Connection alignment
Connector



Output component
Pinion
Pulley



www.maxongroup.com

On our website, you can find general news and information on our products and services, as well as an integrated online shop and the maxon online configurator.

maxon online shop

In the maxon online shop, we provide a complete overview of all maxon products. You can also order your drive solution, download detailed product specifications and 3D CAD drawings immediately.

maxon online configurator

Configure and combine brushed and brushless DC motors, gearheads and compact drives according to your individual requirements. Fast, easy, and online. We guide you through our configurator step-by-step.

Click here to go to the online shop

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Combine

The maxon modular system

The motors, gearheads, sensors, brakes, and controllers of maxon are perfectly matched to each other and can be combined in a number of ways. Our modular system makes it easy to find suitable components for your motor – in the catalog and in the online shop.



Gear
Planetary Gearhead
Spur Gearhead
Right-angle Gearhead
Screw Drive
Strain wave Gearhead

Motor
DC Motors
EC Motors (BLDC)

Sensor
Encoder
Resolver
DC-Tacho

Controller
Servo Controller
Positioning Control Unit
Motion Control

Accessories

Great choice, easy ordering

The diversity of motors and product combinations offered by maxon is unmatched worldwide. The maxon modular system and the numerous options for windings offer even more possibilities for variation. To make the delivery times as short as possible for our customers, we organized our products into program groups.

Stock program
The market-oriented selection from our extensive product portfolio offers you short delivery times.

Standard program
In the comprehensive standard program, products are included which can be produced and delivered in a short time. The plenitude of versions in this program offer tried and tested standard products for optimized application.

Special program
A wide range of motors and combinations is available on request.

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Good is not good enough for us

Our goal is to produce and distribute the best quality, and constantly improve it. We aspire to achieve the highest standards through technical excellence and exceptional service.

1200 qm of cleanliness

When implantable systems are used in the human body, no mistakes are allowed. For this reason, these drives are assembled in the GMP area: In this clean room class, the particle concentration and microbiological contamination of surfaces and air are measured and examined for traces of spores, bacteria, or fungi.

The maxon quality mindset

Technical features, design standards, and meticulous process control are essential – however, maxon quality goes beyond the objective characteristics of our products and influences the mindset and actions of the entire team.

- → Swiss quality – worldwide
- → Ingenuity, development, and research
- → Making the good even better

Consistent standards on quality, safety, and procedures ensure that only premium products leave our factories. The business and production processes fulfill international standards such as ISO 9001 and ISO 14001. maxon medical has ISO 13485 certification and products for the aerospace industry have EN 9100 certification.

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The foundation for our success

maxon constantly pushes the boundaries of what is technologically possible. To this end, we make targeted investments in research and innovation. We develop products that significantly enhance the quality of life for our fellow human beings, advance science, and protect our planet.

Our core technologies are based on 60 years of experience in combining mechanical micro-components and electrical systems for generating, controlling, and transmitting motion. Through our expertise in mechanical engineering, electrical engineering, electronics, thermodynamics, structural analysis, and material science, our drives are ready for use in a new era of technology.

- → Design and optimization of mechatronic systems
- → Winding technology
- → Standard and special gearheads
- → Electronics and systems technology
- → Encoder technology
- → Sensors
- → Installation and automation technology
- → Injection molding processes for plastics as well as ceramic and metal powder





Scalable manufacturing

In modern industrial mass production, quality, reproducibility, adherence to deadlines, and flexibility are crucial – or in other words: cost-effectiveness. For this reason, we prioritize the scalability of our drives as early as the conceptual phase and carry out in-house production for our customers, from small to large-scale production. Worldwide.

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Our certifications



SN EN ISO 9001

The quality management standard ISO 9001 defines quality as the degree to which given requirements are fulfilled. It establishes the requirements for a quality management system that an organization needs to comply with in order to provide products and services that meet customer expectations and regulatory requirements. Among these requirements is the need for the management system to undergo a continuous improvement process.



SN EN ISO 14001

The internationally accepted quality standard for environmental management systems addresses environmentally relevant processes and procedures within an organization, and obliges management and employees to adhere to environmentally responsible behavior and continuously improve operations while minimizing emissions into the environment.



EN 9100

maxon has been certified in accordance with EN 9100 since 2012. The standard has been drawn up especially for companies that develop and produce components for the aerospace industry. At maxon, this standard is applied to customer-specific products on request – except for A-max motors and controllers.



SN EN ISO 13485

The international quality standard for medical devices confirms that maxon Medical complies with the fundamental requirements of medical technology, minimizing potential risks for patients. All processes and procedures are documented. This guarantees traceability. This standard is implemented at our Switzerland and Germany locations upon request for customer-specific products.



IATF 16949

The IATF (International Automotive Task Force) is a group of automotive manufacturers and associations that defines the quality requirements in the automotive industry. The IATF 16949 standard is an international technical specification and quality management standard for the entire supply chain of the automotive industry. It is based on the EN ISO 9001 standard and describes the special requirements that apply for the development and manufacturing of products for the automotive market. At maxon, it is implemented within the scope of customer-specific projects.



ISO/IEC 27001

ISO/IEC 27001 is the globally recognized standard for information security management systems (ISMS). It specifies requirements for the development and operation of a structured framework of policies, procedures, processes, practices, roles, responsibilities, controls, and resources, collectively referred to as an information security management system (ISMS). The ultimate goal of an ISMS is to manage risks to the confidentiality, integrity, and availability of information assets in line with organizational objectives. ISO 27001 includes a set of best practice controls for the mitigation of the risks associated with the information assets which the organization seeks to protect through its ISMS.

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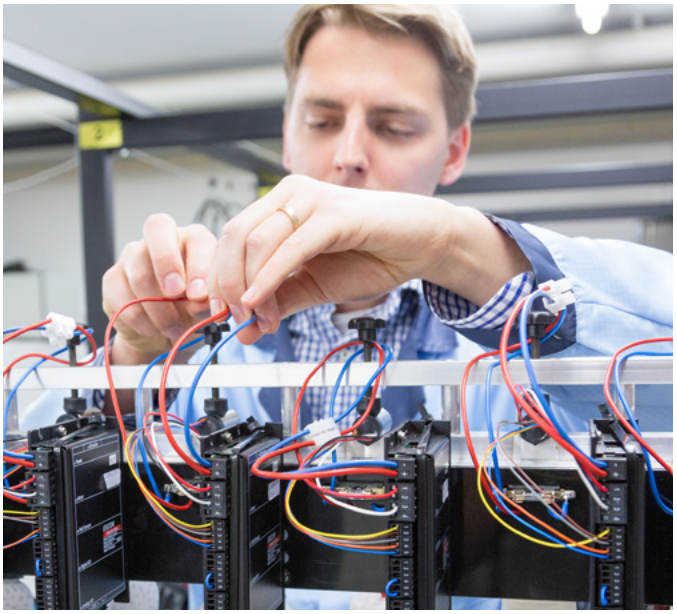
Quality is tradition

Quality is tradition at maxon: since 1988, we have been ISO 9001 certified in Switzerland and operate a comprehensive quality management system. Regular audits of our products, structures, and processes from an external viewpoint guarantee adherence to international standards and reinforce our commitment to quality. Our certifications streamline our customers' own approval procedures and risk evaluations.

Overview of the maxon certifications

		ISO 9001	ISO 14001	EN 9100	ISO 13485	IATF 16949	ISO/IEC 27001
Switzerland / mint	since	2019	2019	2019	2019	2022	2024
Switzerland / mmag	since	1988	2006	2012	2008	2022	
Switzerland / mch	since	2020					
Switzerland / zub	since	2024					
Germany / Sexau	since	1996	2006		2021		
Hungary	since	2009	2009			2022	
South Korea	since	2013	2013				
USA	since	2014					
China	since	2014	2023				
France	since	2000					
Netherlands	since	1997	1997				
Great Britain, parvalux	since	2009					





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Quality management

Only performance counts

Drives manufactured by maxon can be absolutely relied upon even under the most difficult conditions – they have for example been in use on Mars for years. But maxon DC motors do not only do their job in space, they also function in tough conditions on and deep below the surface of the Earth flawlessly and efficiently.

The quality management system of maxon is an integral part of the overall management system. The operational and organizational structures, the powers and responsibilities, as well as the process and procedure assessments are documented for all employees. The quality management system is enacted, maintained and periodically verified.

View certificates: **quality.maxongroup.com**

EU Directives

2006/42/EC Machinery Directive

maxon products are designed for installation in complete devices and are considered incomplete machines according to EU Directive 2006/42/EC (Machinery Directive). They are designed to be installed in machines or other incomplete machines and are therefore not CE marked. It is the responsibility of the end device manufacturer to identify the relevant directives and issue a declaration of conformity.

2011/65/EU RoHS

Directive 2011/65/EU and (EU) 2017/2102 incl. 2015/863/EU (RoHS) on the restriction of the use of certain hazardous substances in electrical and electronic equipment regulates certain prerequisites for placing electrical and electronic equipment on the market. The RoHS directive restricts the use of certain substances in electrical and electronic equipment. The substances listed in Annex II of the directive must not exceed a specified maximum concentration, unless an exemption under Annex III and IV of the directive is applicable to be respective application. The RoHS directives are not directly applicable to components. Irrespective of this, maxon complies with the substance restrictions of this directive – taking into account the exemptions listed in Annex III and IV (e.g. 6a, 6b, 6c ...) – for most of the catalog products. Those maxon products that do not correspond to the directive are identified on the respective product page. A detailed conformity assessment is available from maxon upon request. It is the responsibility of the distributor of the electrical or electronic equipment to assess whether the exemption approvals are applicable for the end product.

1907/2006/EU REACH

All chemical substances used in maxon products conform to Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). Corresponding REACH certificates can be requested from maxon.

UL and CSA

Certain applications and markets require UL- or CSA-certified motors and drives. maxon's standard catalog products do not have such certification. However, we are able to certify our motors and drives in accordance with UL or CSA standards. Please contact your local maxon partner for more information.

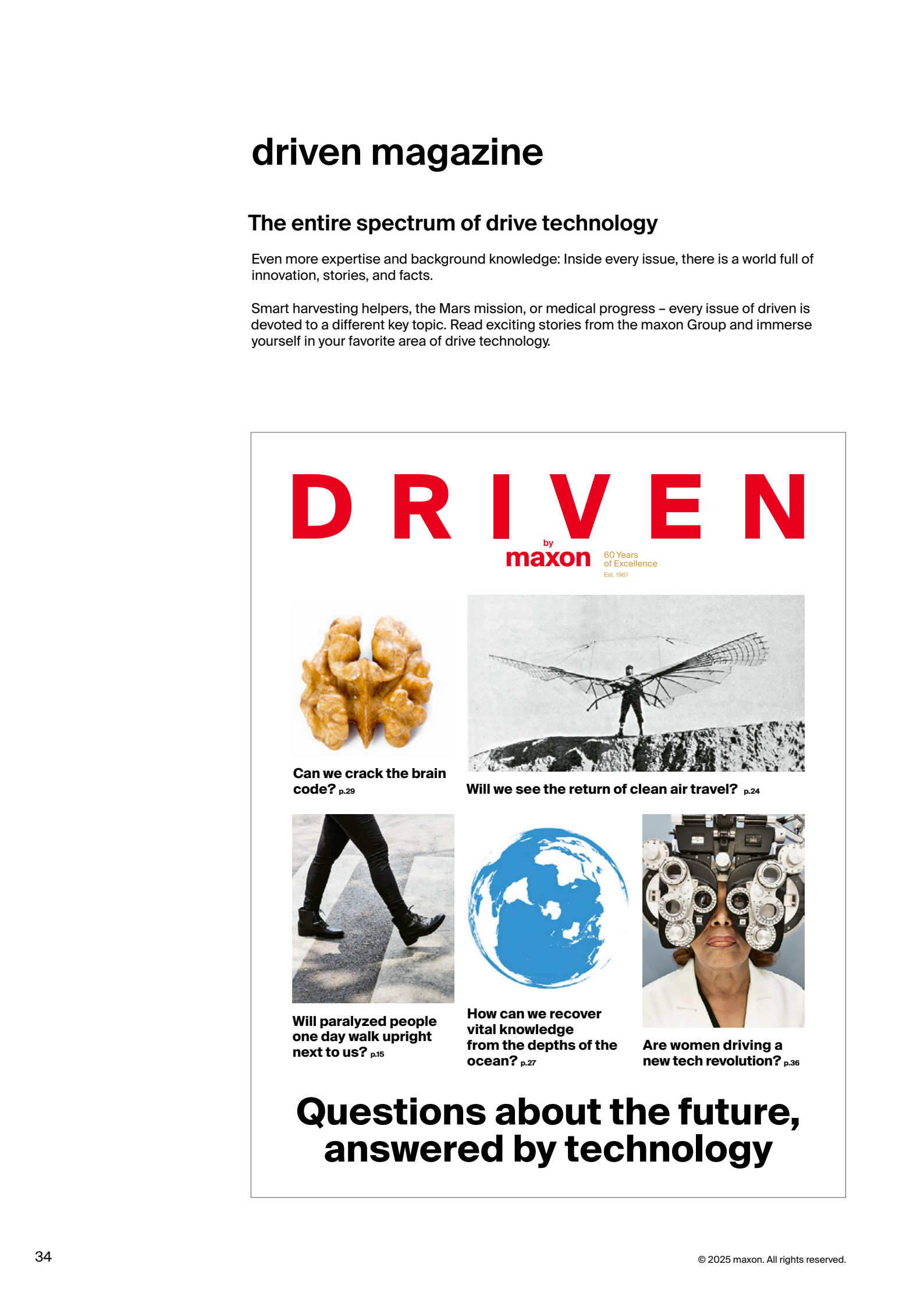
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driven magazine

The entire spectrum of drive technology

Even more expertise and background knowledge: Inside every issue, there is a world full of innovation, stories, and facts.

Smart harvesting helpers, the Mars mission, or medical progress – every issue of driven is devoted to a different key topic. Read exciting stories from the maxon Group and immerse yourself in your favorite area of drive technology.



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Here you can download all issues of driven as PDF versions.

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maxon Academy

Tutorials, technical articles, and e-learning modules

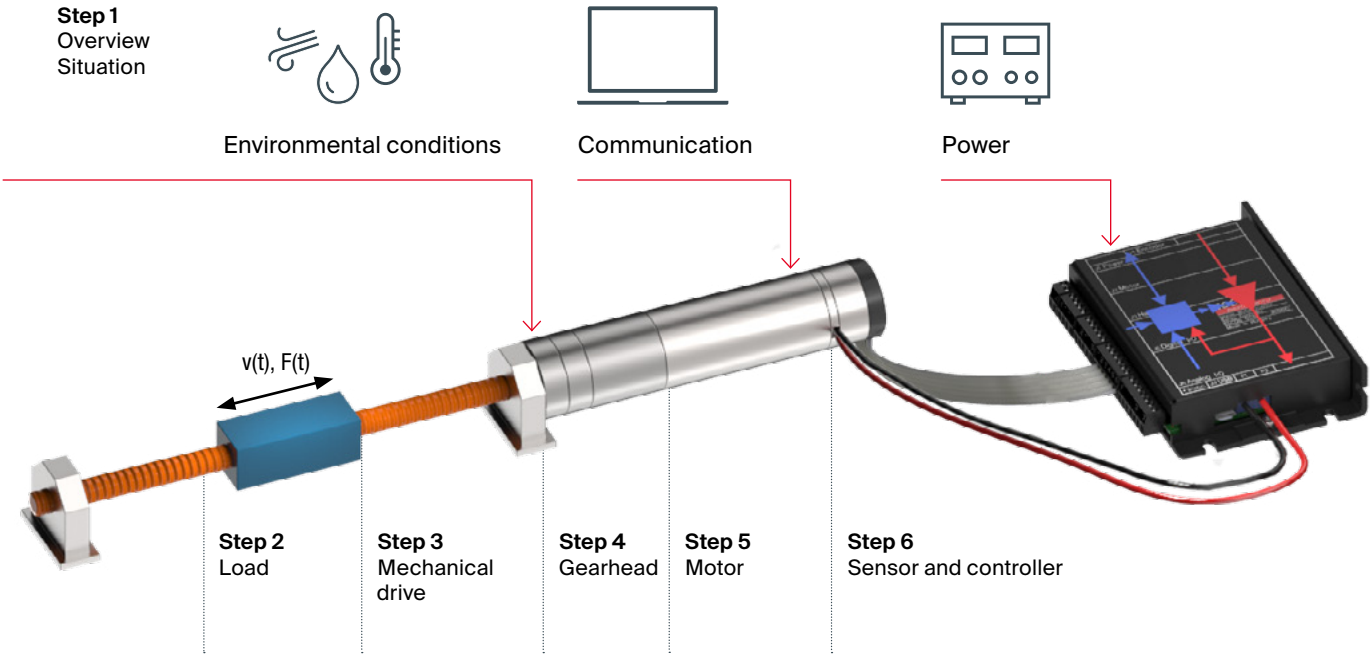
For thinkers. For doers. For discoverers. The maxon Academy aims to drive technical innovation through knowledge, education, and curiosity.

The maxon Academy offers clearly structured content to deepen your knowledge of drive technology. Our experts share their specialist knowledge of the workings of our drive systems, energy efficiency, and selecting the right components.

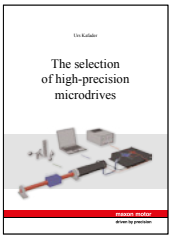


Understanding products and parameters

The maxon Academy imparts basic knowledge, but always with a focus on current customer requirements and market trends. With our digital resources you can expand your technical knowledge and keep it up to date. Benefit from practical tutorials and e-learning modules from our experts.

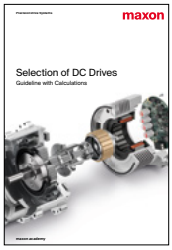


Publications



The selection of high-precision microdrives

Step by step from the specific formulation of the drive problem to its solution. Numerous tips and explanations, focusing only on theory where required for greater understanding. Various examples of applications deal with the practical aspects of drive technology. (Author: Dr. Urs Kafader, 149 pages, ISBN 978-3-9523654-5-8)



Selection of DC Drives, Guideline with Calculations

This extensive collection with illustrations and descriptions includes formulas, terminology, and explanations of the calculations that are relevant for drive systems. A flow chart provides assistance in selecting the right drive for each purpose.

academy.maxongroup.com

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New products

200	ECX SPEED 10 L, ∅10 mm, brushless, 16 watts, High Power	NEW
236	ECX PRIME 16 M, ∅16 mm, brushless, 25 watts	NEW
239	ECX PRIME 22 L, ∅22 mm, brushless, 90 watts	NEW
240	ECX PRIME 22 L, ∅22 mm, brushless, 100 watts, sterilizable, ceramic	NEW
361	ECX FLAT 22 S, ∅22 mm, brushless, 16.7 watts, High Torque, IE	NEW
362	ECX FLAT 22 L, ∅22 mm, brushless, 29 watts, High Torque, IE	NEW
365	ECX FLAT 42 S, ∅42 mm, brushless, 90 watts, High Torque, IE	NEW
366	ECX FLAT 42 M, ∅42 mm, brushless, 120 watts, High Torque, IE	NEW
436	GP 42 A, ∅42 mm, planetary gearhead	NEW
455	GSW 55 A, ∅55 mm, strain wave gearhead, zero backlash	NEW
456	GSW 62 A, ∅62 mm, strain wave gearhead, zero backlash	NEW
499	ENX 8 IMR, ∅8 mm, encoder, 100 cpt	NEW
500	ENX 10 IMR, ∅10 mm, encoder, 64–256 cpt	NEW
501	ENX 13 IMR, ∅13 mm, encoder, 64–256 cpt	NEW
502	ENX 16 IMR, ∅16 mm, encoder, 128–512 cpt	NEW
503	ENX 19 IMR, ∅19 mm, encoder, 128–512 cpt	NEW
504	ENX 22 IMR, ∅22 mm, encoder, 128–512 cpt	NEW
505	ENX 25 IMR, ∅25 mm, encoder, 128–1000 cpt	NEW
506	ENX 32 IMR, ∅32 mm, encoder, 256–1024 cpt	NEW
557	ESCON2 Nano 24/2, servo controller up to 48/144 watts	NEW
557	ESCON2 Micro 60/5, servo controller up to 300/900 watts	NEW
558	ESCON2 Module 60/12, servo controller up to 720/1800 watts	NEW
559	ESCON2 Compact 60/12, servo controller up to 720/1800 watts	NEW
575	MicroMACS6 Module, programmable Motion Controller, 6 axes	NEW

maxon selection guide

X drives	40–46
compact drive	44–46
DC motor	48–50
EC motor	52–58
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sensor	60
gear	62
screw drive	62



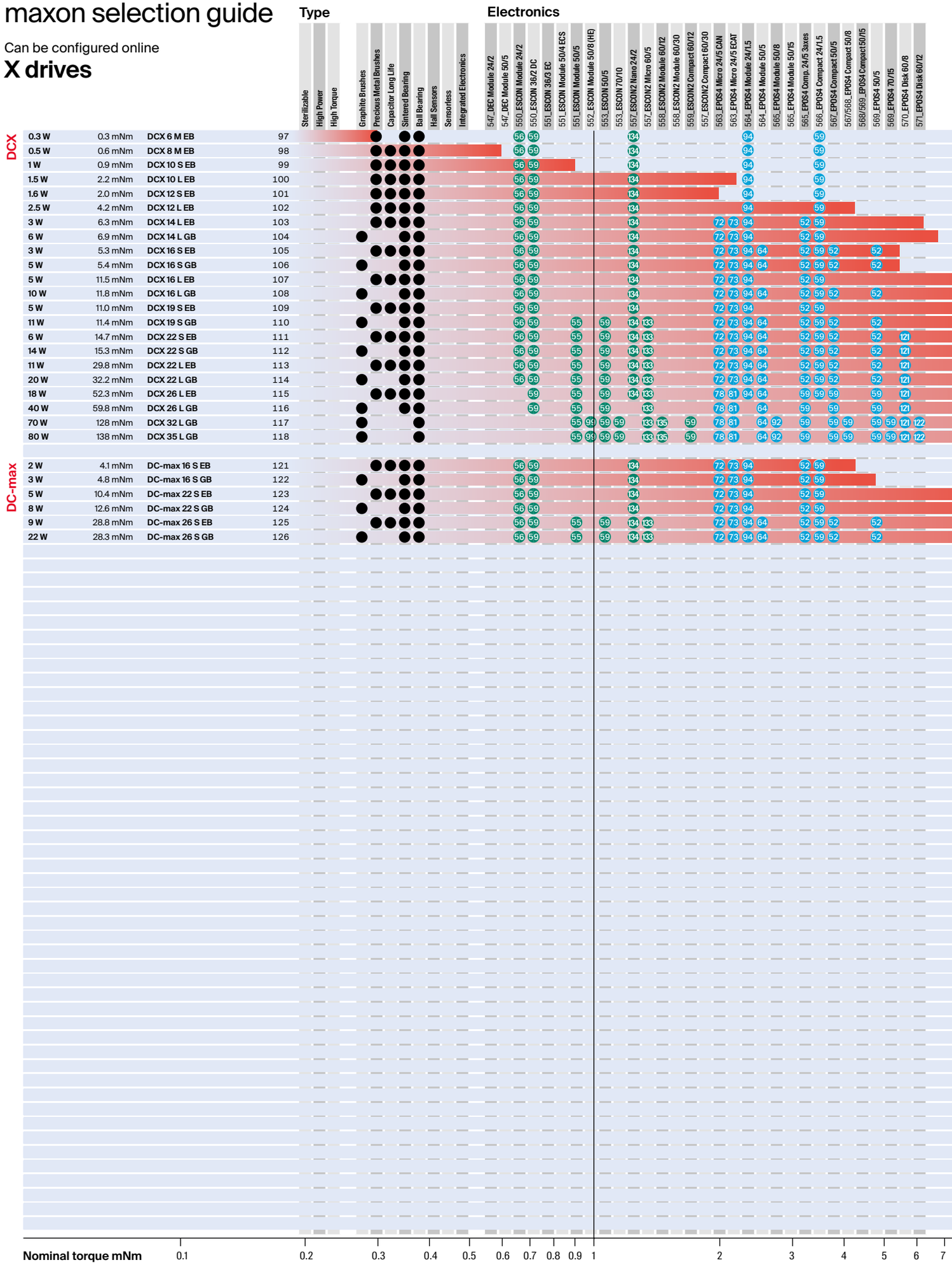
Classification of the maxon ranges according to performance classes. Performance, also in conjunction with size, is frequently a central requirement when considering drive systems. A preliminary size-related selection can be made from the different product ranges with the maxon selection guide. Our data sheets provide detailed specifications related to individual motors. Should you need any additional information, simply call us!

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maxon selection guide

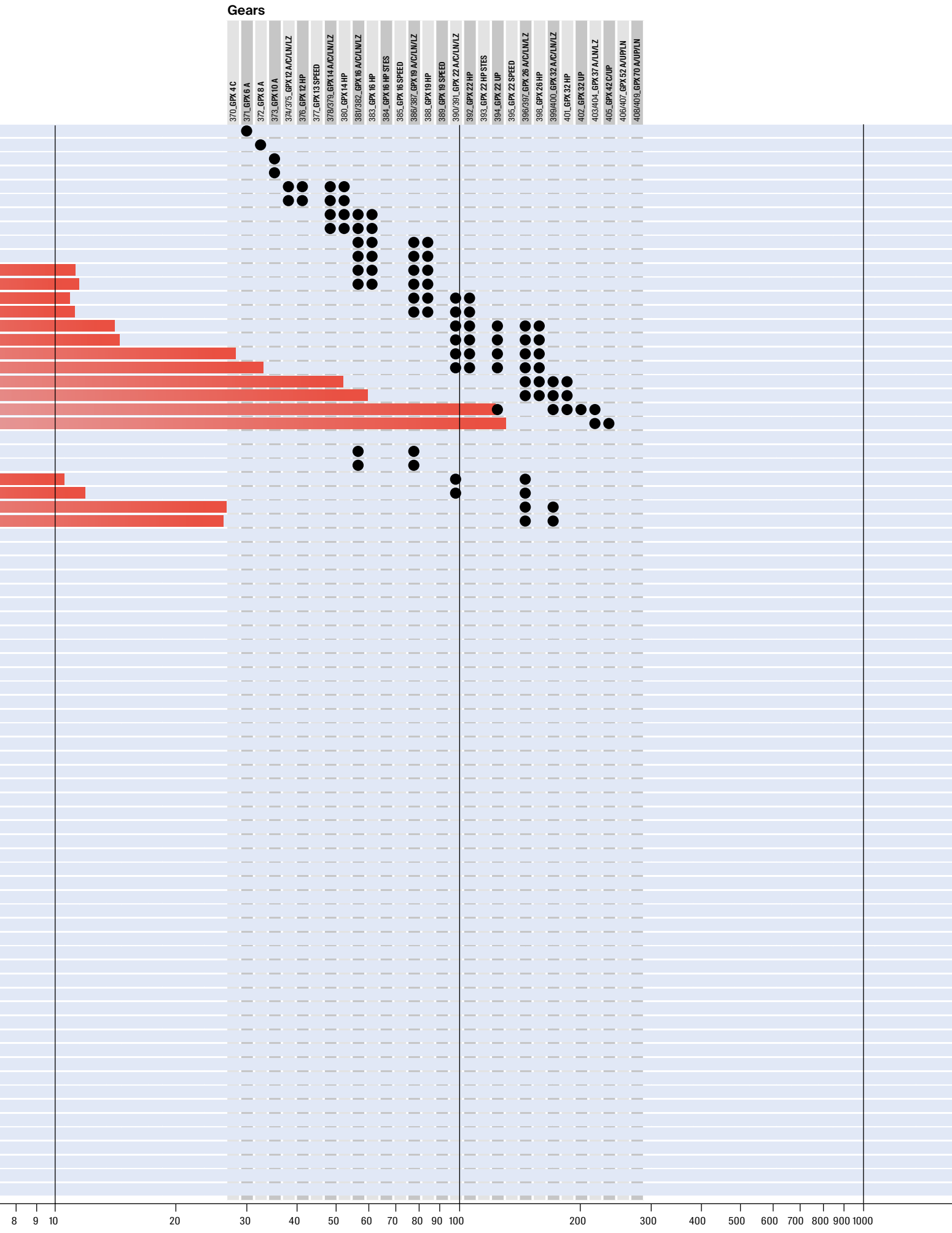
Can be configured online

X drives



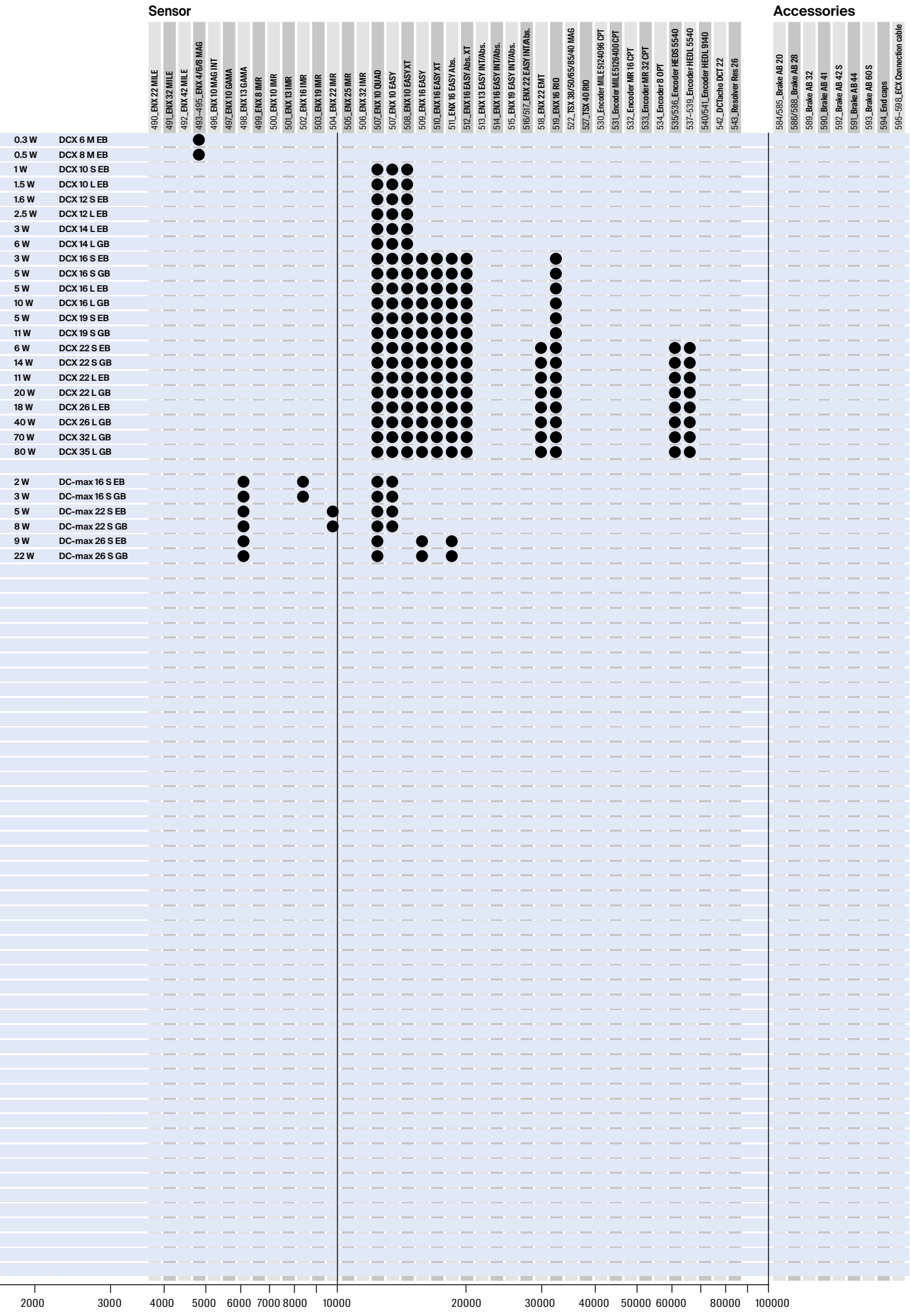
● Standard ○ Option / on request

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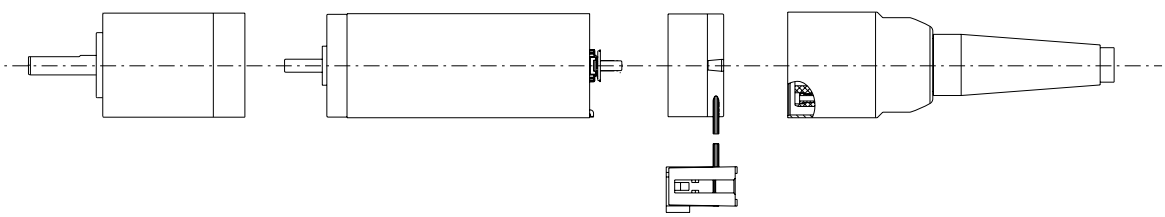
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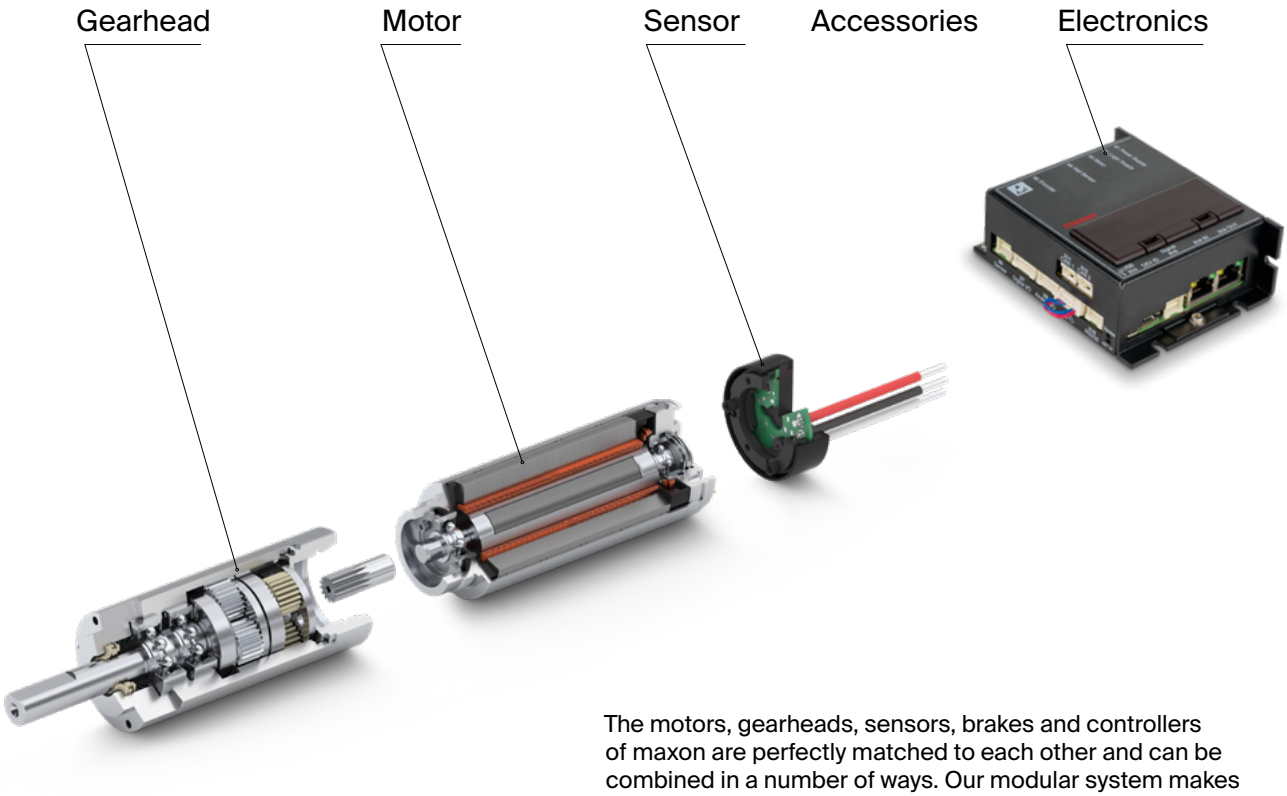
Description of numbers with detailed information about the connection on page 59



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The right drive based on just a few parameters





The motors, gearheads, sensors, brakes and controllers of maxon are perfectly matched to each other and can be combined in a number of ways. Our modular system makes it easy to find suitable components for your motor.

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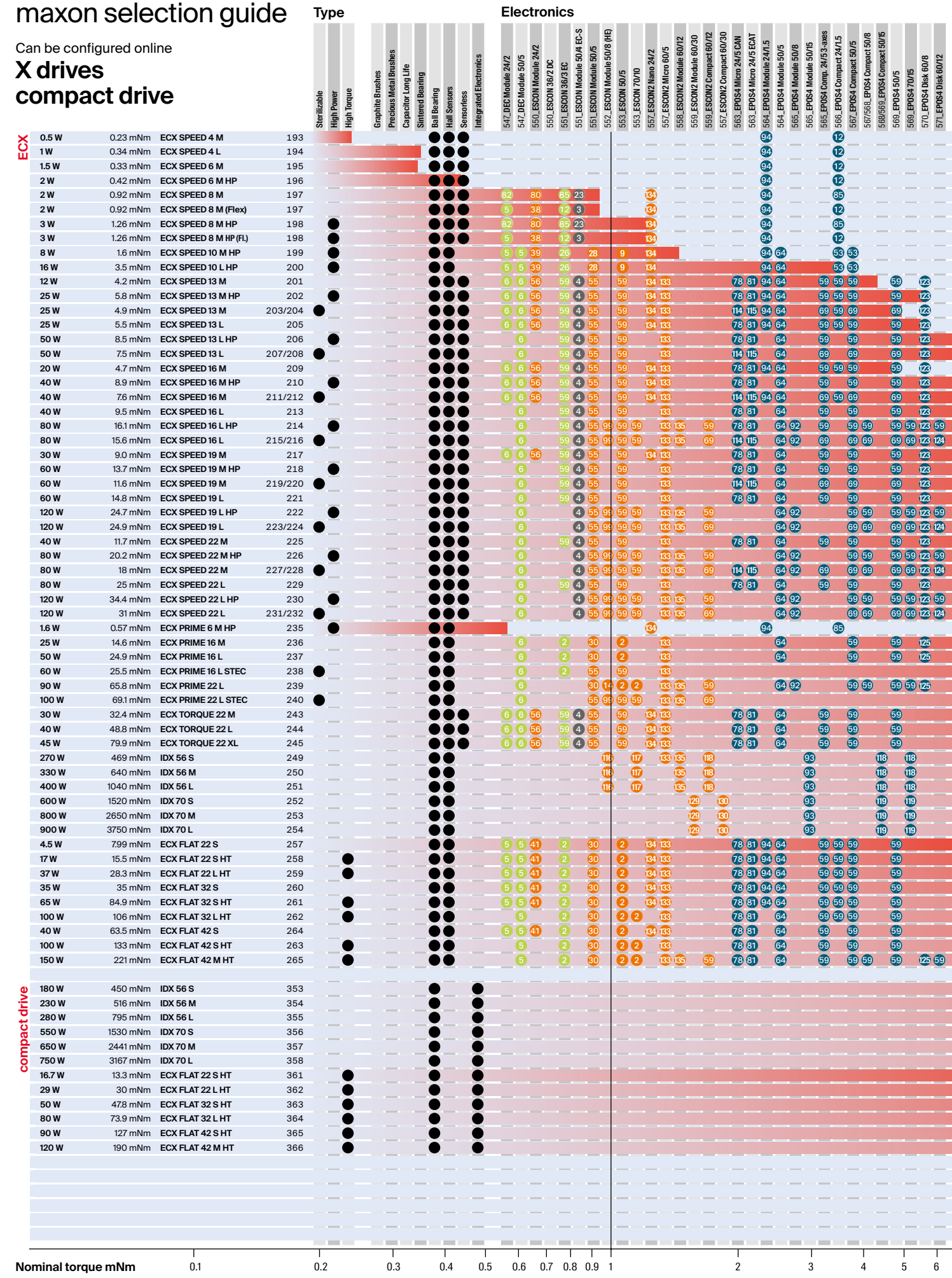
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maxon selection guide

Can be configured online

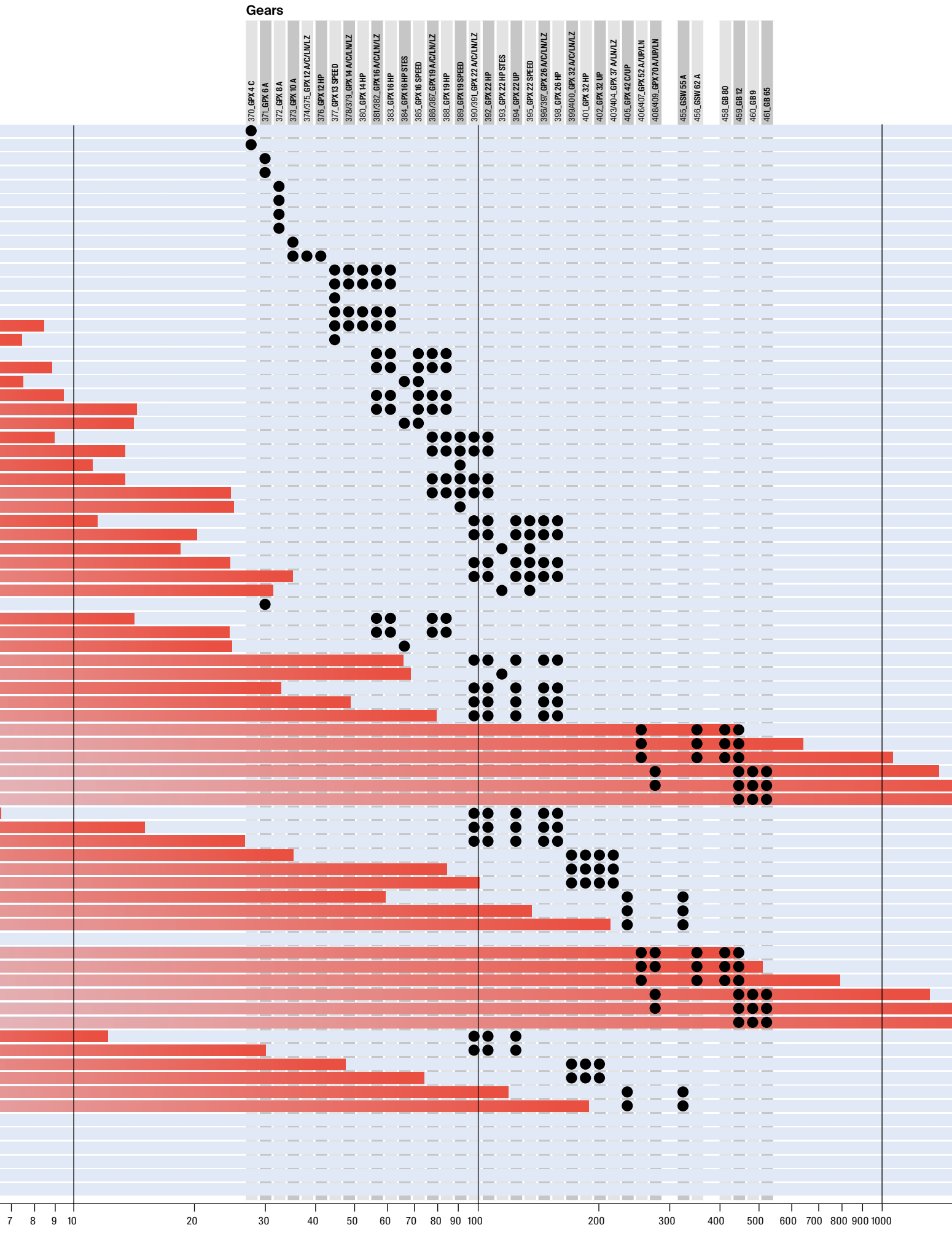
X drives compact drive



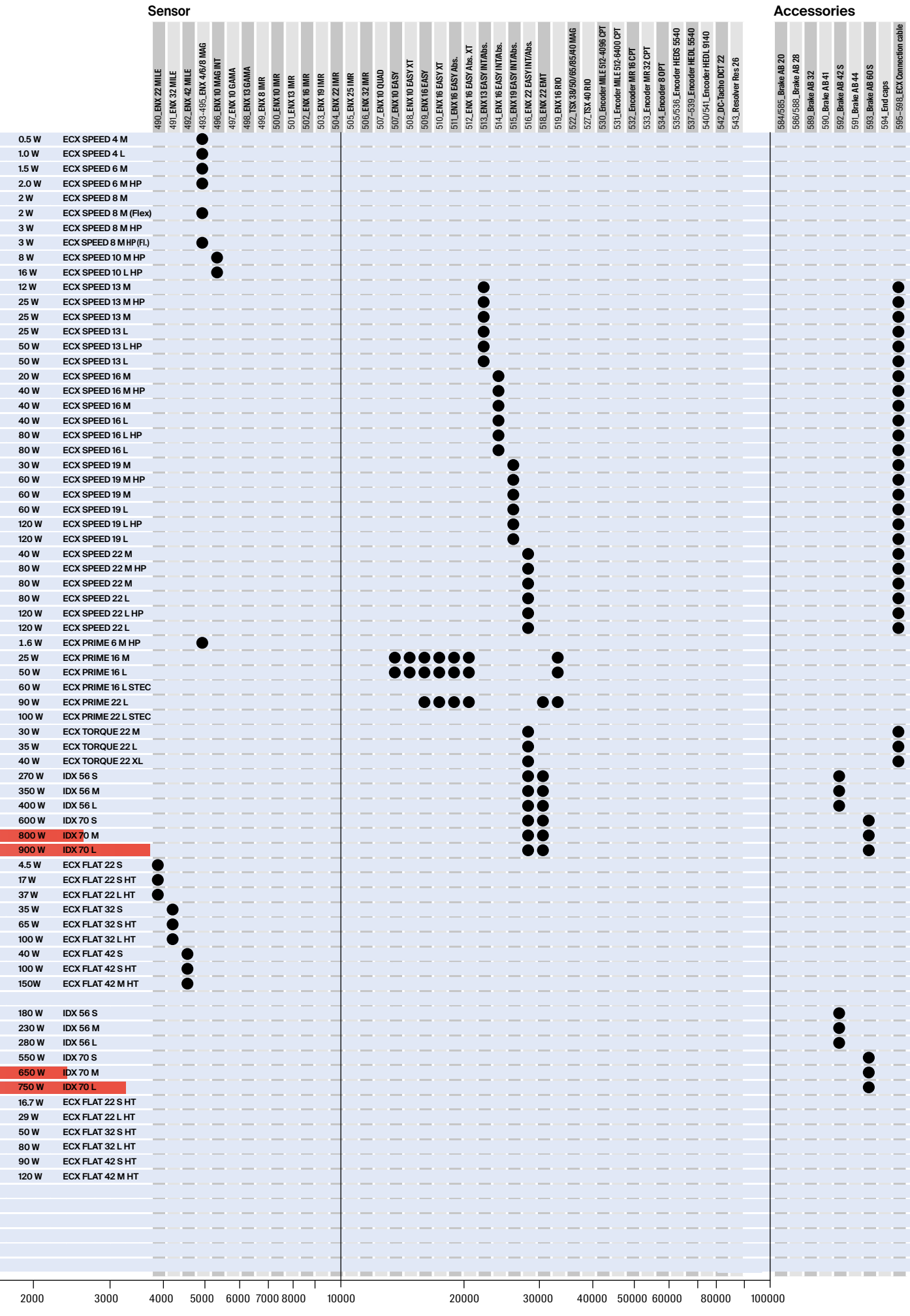
ECX	0.5 W	0.23 mNm	ECX SPEED 4 M	193
	1 W	0.34 mNm	ECX SPEED 4 L	194
	1.5 W	0.33 mNm	ECX SPEED 6 M	195
	2 W	0.42 mNm	ECX SPEED 6 M HP	196
	2 W	0.92 mNm	ECX SPEED 8 M	197
	2 W	0.92 mNm	ECX SPEED 8 M (Flex)	197
	3 W	1.26 mNm	ECX SPEED 8 M HP	198
	3 W	1.26 mNm	ECX SPEED 8 M HP (Fl.)	198
	8 W	1.6 mNm	ECX SPEED 10 M HP	199
	16 W	3.5 mNm	ECX SPEED 10 L HP	200
	12 W	4.2 mNm	ECX SPEED 13 M	201
	25 W	5.8 mNm	ECX SPEED 13 M HP	202
	25 W	4.9 mNm	ECX SPEED 13 M	203/204
	25 W	5.5 mNm	ECX SPEED 13 L	205
	50 W	8.5 mNm	ECX SPEED 13 L HP	206
	50 W	7.5 mNm	ECX SPEED 13 L	207/208
	20 W	4.7 mNm	ECX SPEED 16 M	209
	40 W	8.9 mNm	ECX SPEED 16 M HP	210
	40 W	7.6 mNm	ECX SPEED 16 M	211/212
	40 W	9.5 mNm	ECX SPEED 16 L	213
	80 W	16.1 mNm	ECX SPEED 16 L HP	214
	80 W	15.6 mNm	ECX SPEED 16 L	215/216
	30 W	9.0 mNm	ECX SPEED 19 M	217
	60 W	13.7 mNm	ECX SPEED 19 M HP	218
	60 W	11.6 mNm	ECX SPEED 19 M	219/220
	60 W	14.8 mNm	ECX SPEED 19 L	221
	120 W	24.7 mNm	ECX SPEED 19 L HP	222
	120 W	24.9 mNm	ECX SPEED 19 L	223/224
	40 W	11.7 mNm	ECX SPEED 22 M	225
	80 W	20.2 mNm	ECX SPEED 22 M HP	226
	80 W	18 mNm	ECX SPEED 22 M	227/228
	80 W	25 mNm	ECX SPEED 22 L	229
	120 W	34.4 mNm	ECX SPEED 22 L HP	230
	120 W	31 mNm	ECX SPEED 22 L	231/232
	1.6 W	0.57 mNm	ECX PRIME 6 M HP	235
	25 W	14.6 mNm	ECX PRIME 16 M	236
	50 W	24.9 mNm	ECX PRIME 16 L	237
	60 W	25.5 mNm	ECX PRIME 16 L STEC	238
	90 W	65.8 mNm	ECX PRIME 22 L	239
	100 W	69.1 mNm	ECX PRIME 22 L STEC	240
	30 W	32.4 mNm	ECX TORQUE 22 M	243
	40 W	48.8 mNm	ECX TORQUE 22 L	244
	45 W	79.9 mNm	ECX TORQUE 22 XL	245
	270 W	469 mNm	IDX 56 S	249
	330 W	640 mNm	IDX 56 M	250
	400 W	1040 mNm	IDX 56 L	251
	600 W	1520 mNm	IDX 70 S	252
	800 W	2650 mNm	IDX 70 M	253
	900 W	3750 mNm	IDX 70 L	254
	4.5 W	7.99 mNm	ECX FLAT 22 S	257
	17 W	15.5 mNm	ECX FLAT 22 S HT	258
	37 W	28.3 mNm	ECX FLAT 22 L HT	259
	35 W	35 mNm	ECX FLAT 32 S	260
	65 W	84.9 mNm	ECX FLAT 32 S HT	261
	100 W	106 mNm	ECX FLAT 32 L HT	262
	40 W	63.5 mNm	ECX FLAT 42 S	264
	100 W	133 mNm	ECX FLAT 42 S HT	263
	150 W	221 mNm	ECX FLAT 42 M HT	265
compact drive	180 W	450 mNm	IDX 56 S	353
	230 W	516 mNm	IDX 56 M	354
	280 W	795 mNm	IDX 56 L	355
	550 W	1530 mNm	IDX 70 S	356
	650 W	2441 mNm	IDX 70 M	357
	750 W	3167 mNm	IDX 70 L	358
	16.7 W	13.3 mNm	ECX FLAT 22 S HT	361
	29 W	30 mNm	ECX FLAT 22 L HT	362
	50 W	47.8 mNm	ECX FLAT 32 S HT	363
	80 W	73.9 mNm	ECX FLAT 32 L HT	364
	90 W	127 mNm	ECX FLAT 42 S HT	365
	120 W	190 mNm	ECX FLAT 42 M HT	366

● Standard ○ Option / on request

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Description of numbers with detailed information about the connection on page 59



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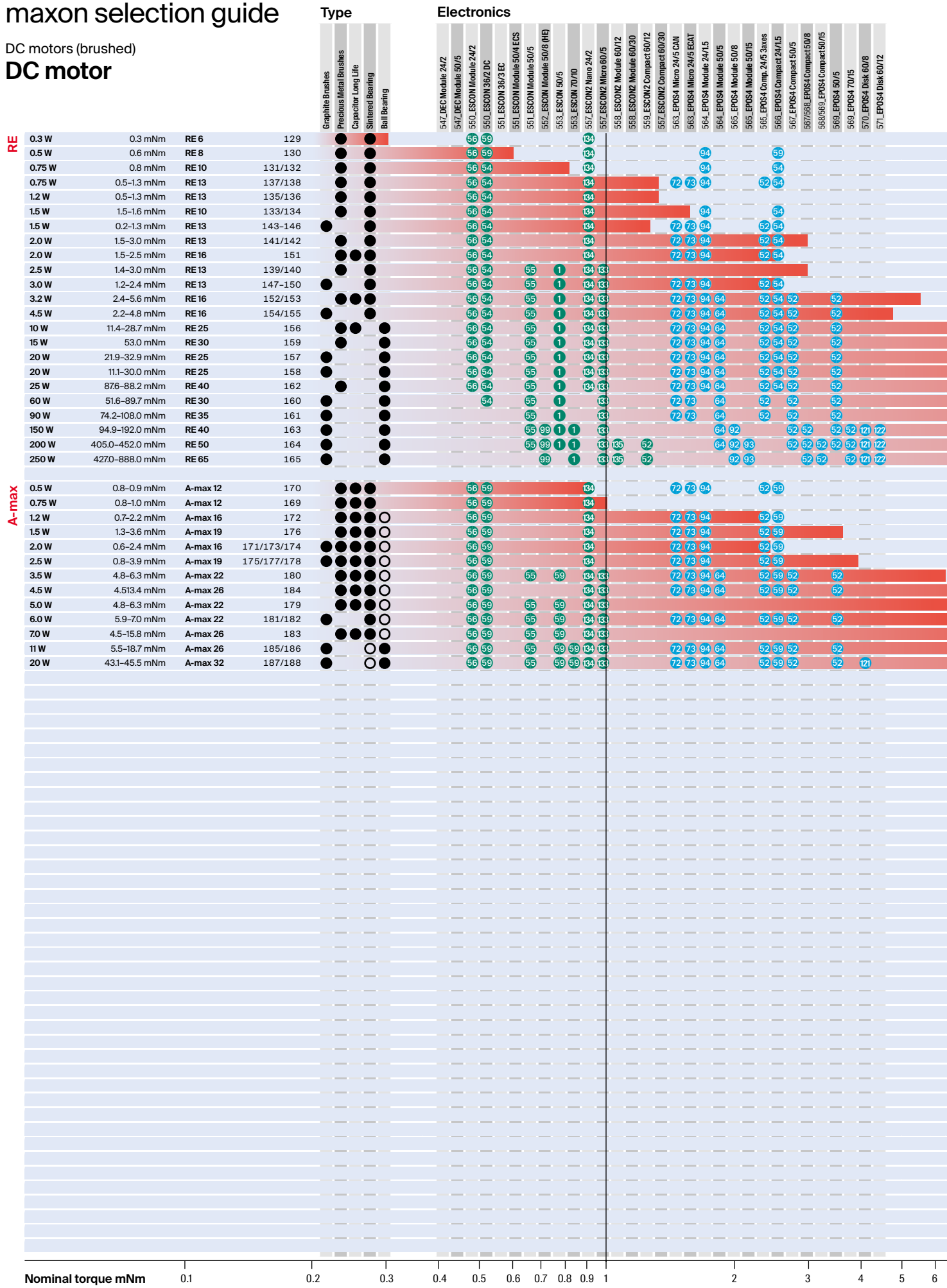
We want to design a product that is a good fit for our system developer strategy.

Fabian Vogel, Managing Director of maxon | zub

maxon selection guide

DC motors (brushed)

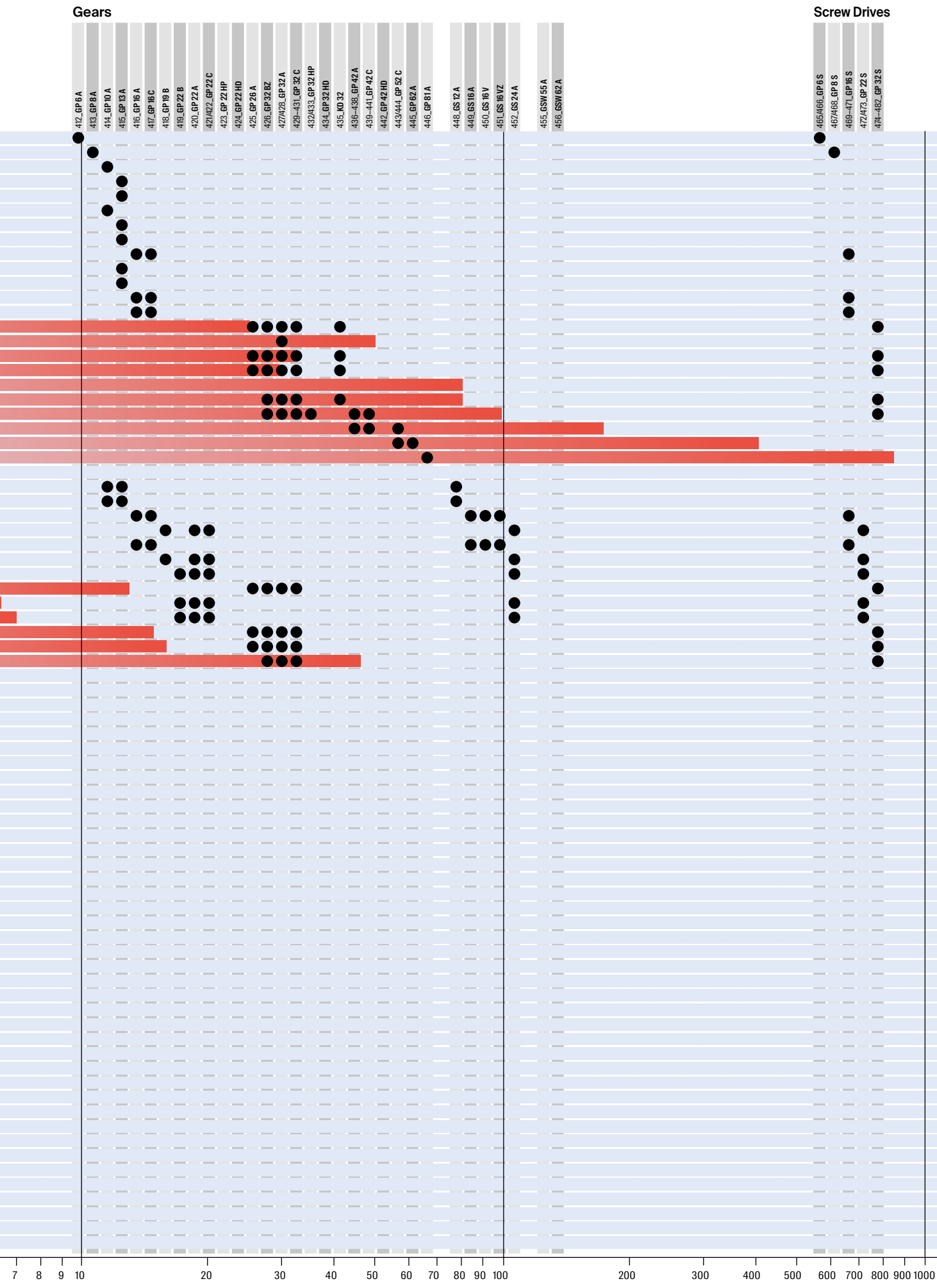
DC motor



RE	0.3 W	0.3 mNm	RE 6	129
	0.5 W	0.6 mNm	RE 8	130
	0.75 W	0.8 mNm	RE 10	131/132
	0.75 W	0.5–1.3 mNm	RE 13	137/138
	1.2 W	0.5–1.3 mNm	RE 13	135/136
	1.5 W	1.5–1.6 mNm	RE 10	133/134
	1.5 W	0.2–1.3 mNm	RE 13	143–146
	2.0 W	1.5–3.0 mNm	RE 13	141/142
	2.0 W	1.5–2.5 mNm	RE 16	151
	2.5 W	1.4–3.0 mNm	RE 13	139/140
	3.0 W	1.2–2.4 mNm	RE 13	147–150
	3.2 W	2.4–5.6 mNm	RE 16	152/153
	4.5 W	2.2–4.8 mNm	RE 16	154/155
	10 W	11.4–28.7 mNm	RE 25	156
	15 W	53.0 mNm	RE 30	159
	20 W	21.9–32.9 mNm	RE 25	157
	20 W	11.1–30.0 mNm	RE 25	158
	25 W	87.6–88.2 mNm	RE 40	162
	60 W	51.6–89.7 mNm	RE 30	160
	90 W	74.2–108.0 mNm	RE 35	161
	150 W	94.9–192.0 mNm	RE 40	163
	200 W	405.0–452.0 mNm	RE 50	164
	250 W	427.0–888.0 mNm	RE 65	165
A-max	0.5 W	0.8–0.9 mNm	A-max 12	170
	0.75 W	0.8–1.0 mNm	A-max 12	169
	1.2 W	0.7–2.2 mNm	A-max 16	172
	1.5 W	1.3–3.6 mNm	A-max 19	176
	2.0 W	0.6–2.4 mNm	A-max 16	171/173/174
	2.5 W	0.8–3.9 mNm	A-max 19	175/177/178
	3.5 W	4.8–6.3 mNm	A-max 22	180
	4.5 W	4.513.4 mNm	A-max 26	184
	5.0 W	4.8–6.3 mNm	A-max 22	179
	6.0 W	5.9–7.0 mNm	A-max 22	181/182
	7.0 W	4.5–15.8 mNm	A-max 26	183
	11 W	5.5–18.7 mNm	A-max 26	185/186
	20 W	43.1–45.5 mNm	A-max 32	187/188

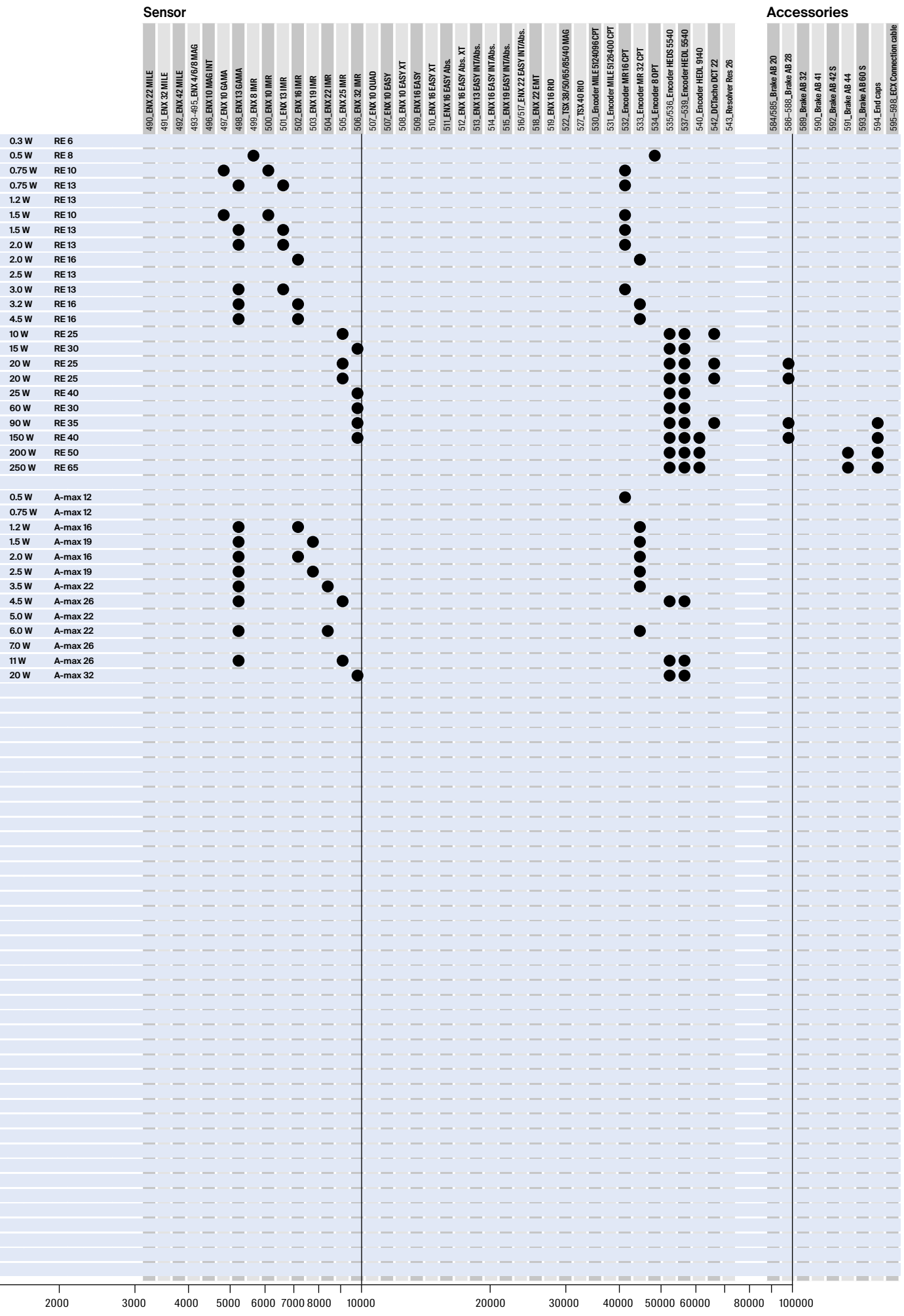
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We are curious.
We act intelligently.
We work with precision.
Virginie Mialane Lacroix, Sales Engineer maxon France

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BLDC motors (brushless)

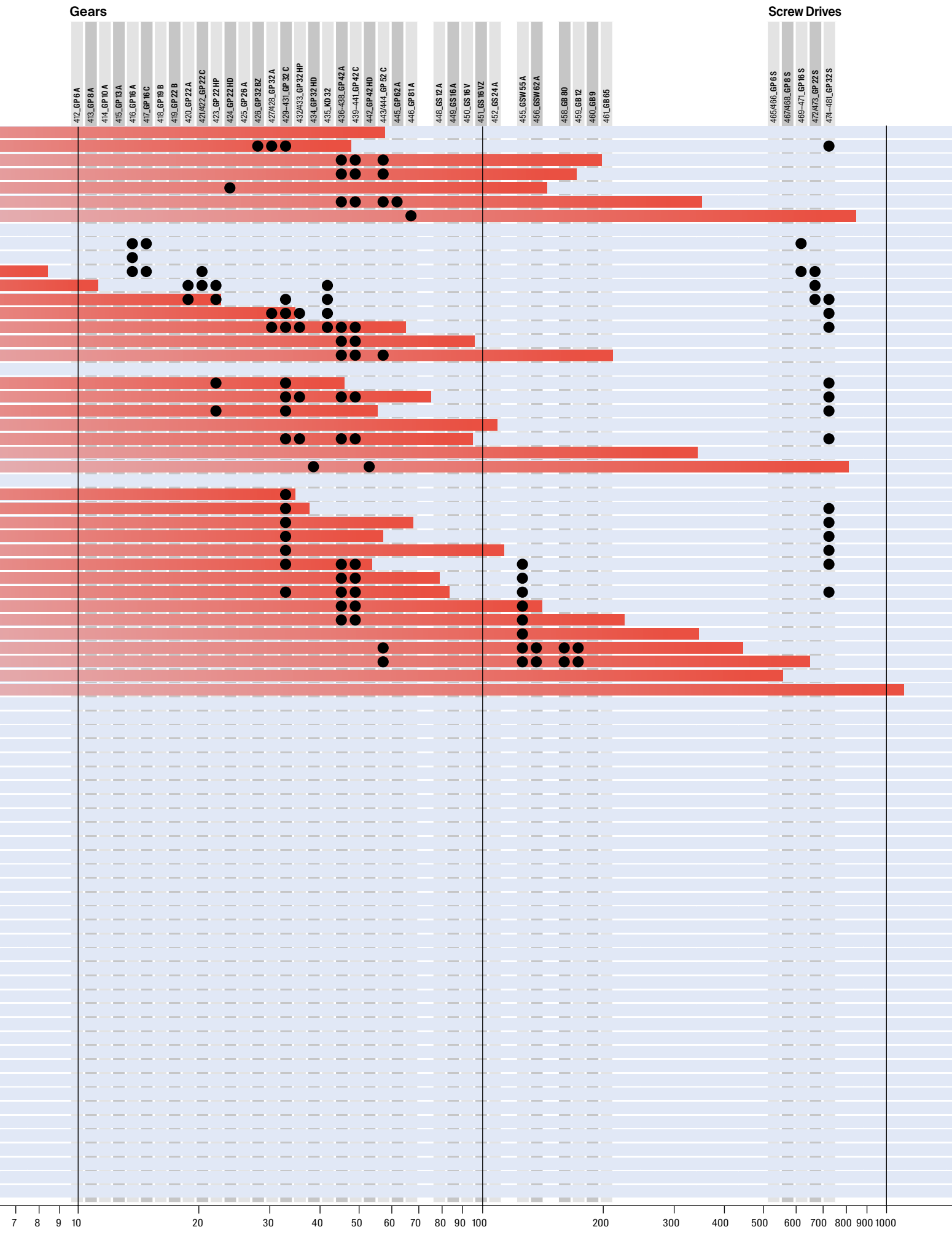
EC motor



EC	80 W	14.9–56.6 mNm	EC 22 HD	269
	80 W	43.8–47.2 mNm	EC 32	271
	150 W	169–191 mNm	EC 45	273
	170 W	160–169 mNm	EC 40	272
	240 W	55.8–149 mNm	EC 22 HD	270
	250 W	311–347 mNm	EC 45	274
	400 W	768–843 mNm	EC 60	275
EC-max	5.0 W	3.2–3.3 mNm	EC-max 16	279
	5.0 W	2.2–2.3 mNm	EC-max 16, 2-w IE	280
	8.0 W	7.6–8.2 mNm	EC-max 16	281
	12 W	10.2–11 mNm	EC-max 22	282
	25 W	21.8–23.2 mNm	EC-max 22	283
	40 W	33.3–34.9 mNm	EC-max 30	284
	60 W	60.7–64.1 mNm	EC-max 30	284
	70 W	89.7–95 mNm	EC-max 40	286
	120 W	170–211 mNm	EC-max 40	287
EC-4pole	90 W	42.6–45.1 mNm	EC-4pole 22 HP	291
	100 W	68.8–74.3 mNm	EC-4pole 30 HP	293
	120 W	54–54.6 mNm	EC-4pole 22 HP	292
	150 W	84.6–106 mNm	EC-4pole 30	294
	200 W	92.9–95.6 mNm	EC-4pole 30 HP	295
	220 W	104–334 mNm	EC-4pole 32 HD	296
	480 W	379–804 mNm	EC-4pole 32 HD	297
EC-i	20 W	32.6 mNm	EC-i 30 IE	300
	30 W	35.9–37.4 mNm	EC-i 30	301
	45 W	63.8–67.7 mNm	EC-i 30 HT	302
	50 W	53.1–58.4 mNm	EC-i 30	303
	75 W	104–110 mNm	EC-i 30 HT	304
	50 W	43.3–52.8 mNm	EC-i 40	306
	50 W	64.6–78.2 mNm	EC-i 40 HT	307
	70 W	68.7–83.4 mNm	EC-i 40	308
	70 W	105–151 mNm	EC-i 40 HT	309
	100 W	207–222 mNm	EC-i 40 HT	310
	130 W	276–340 mNm	EC-i 40 HT	311
	180 W	388–438 mNm	EC-i 52 HT	312
	200 W	622–649 mNm	EC-i 52 HT	313
	250 W	520–564 mNm	EC-i 52 OM	314
	420 W	896–1040 mNm	EC-i 52 VEN	315

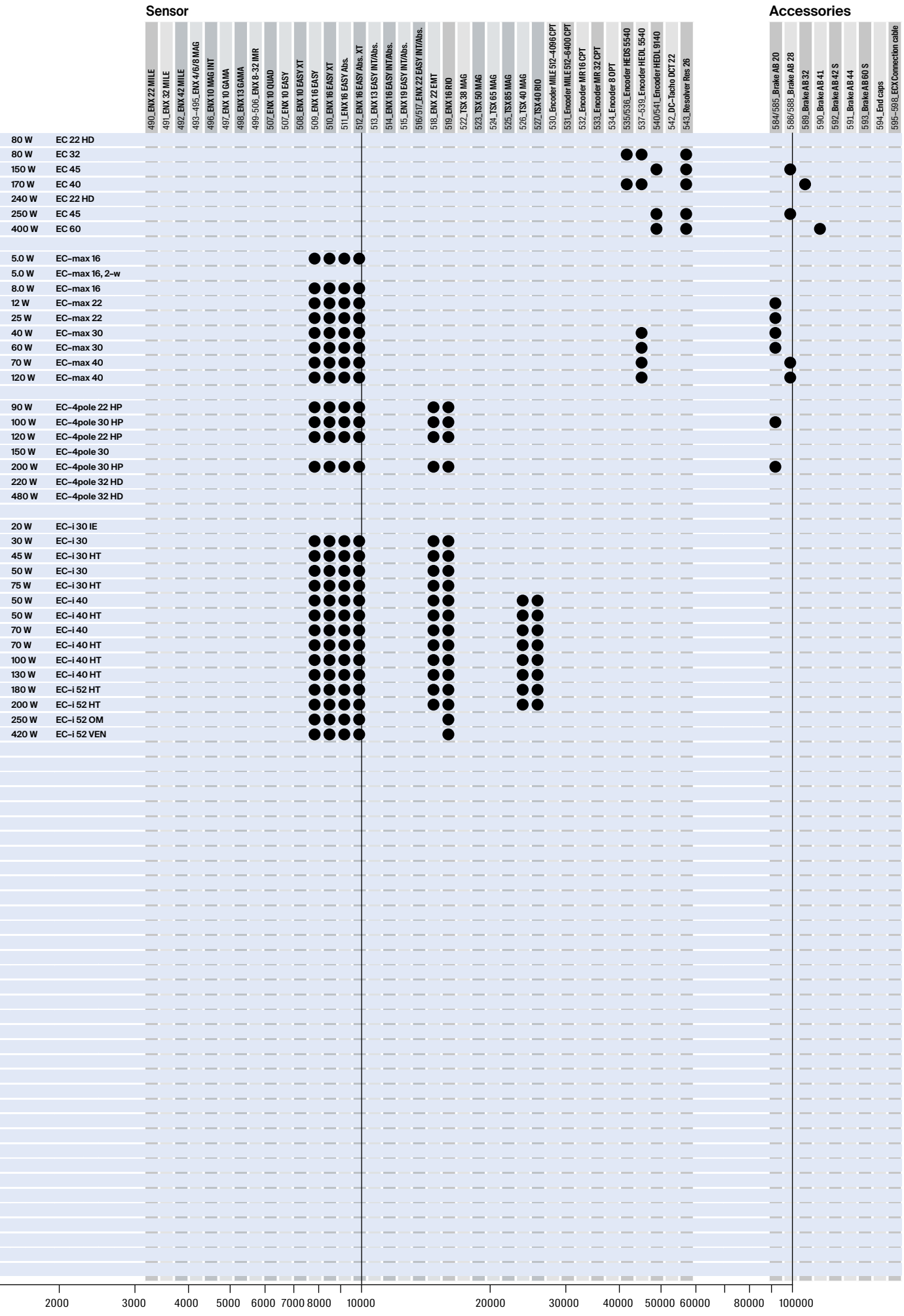
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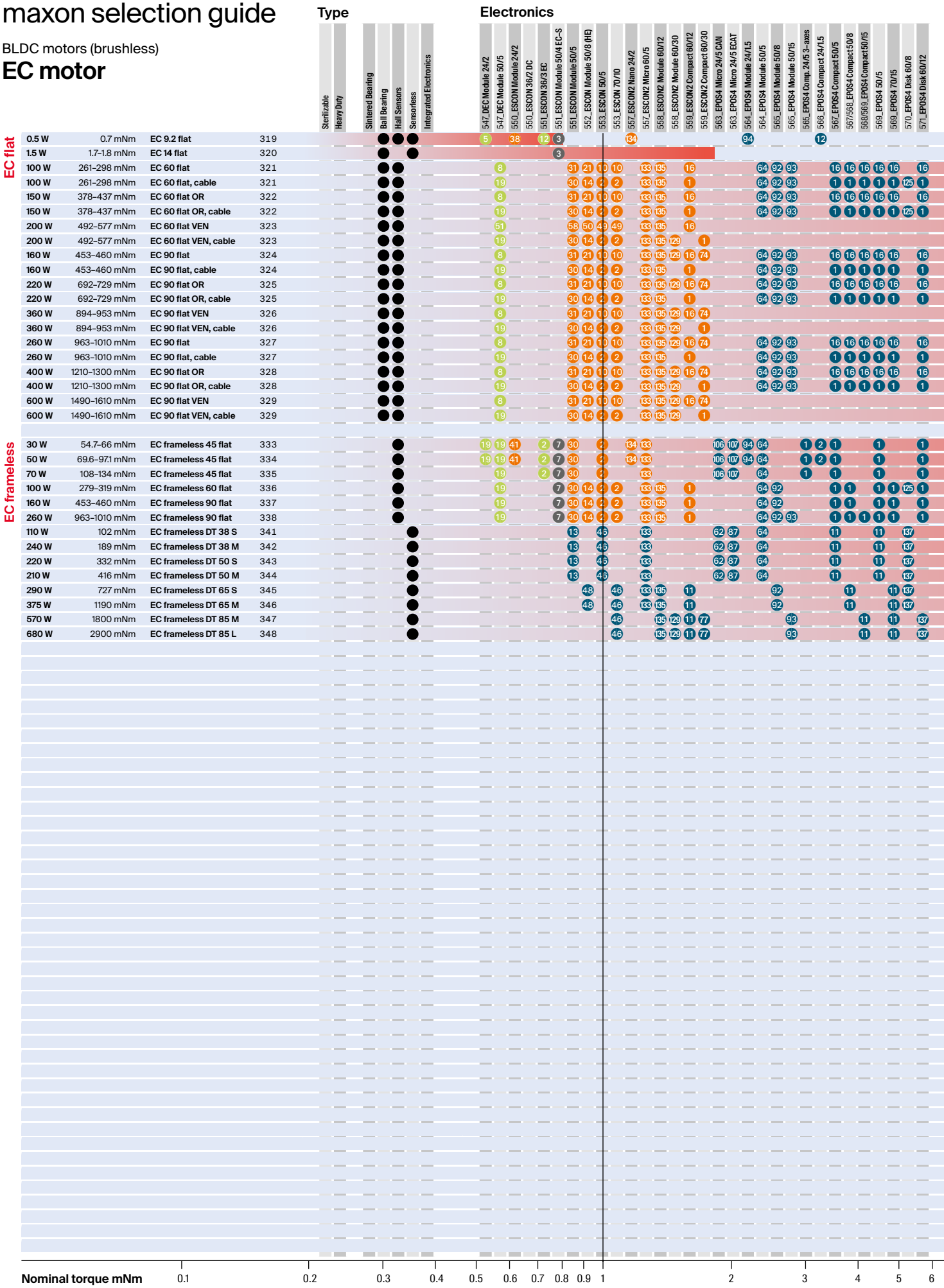
Inspiration doesn’t come from a blank sheet of paper

Robin Phillips, Director of SpaceLab

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BLDC motors (brushless)

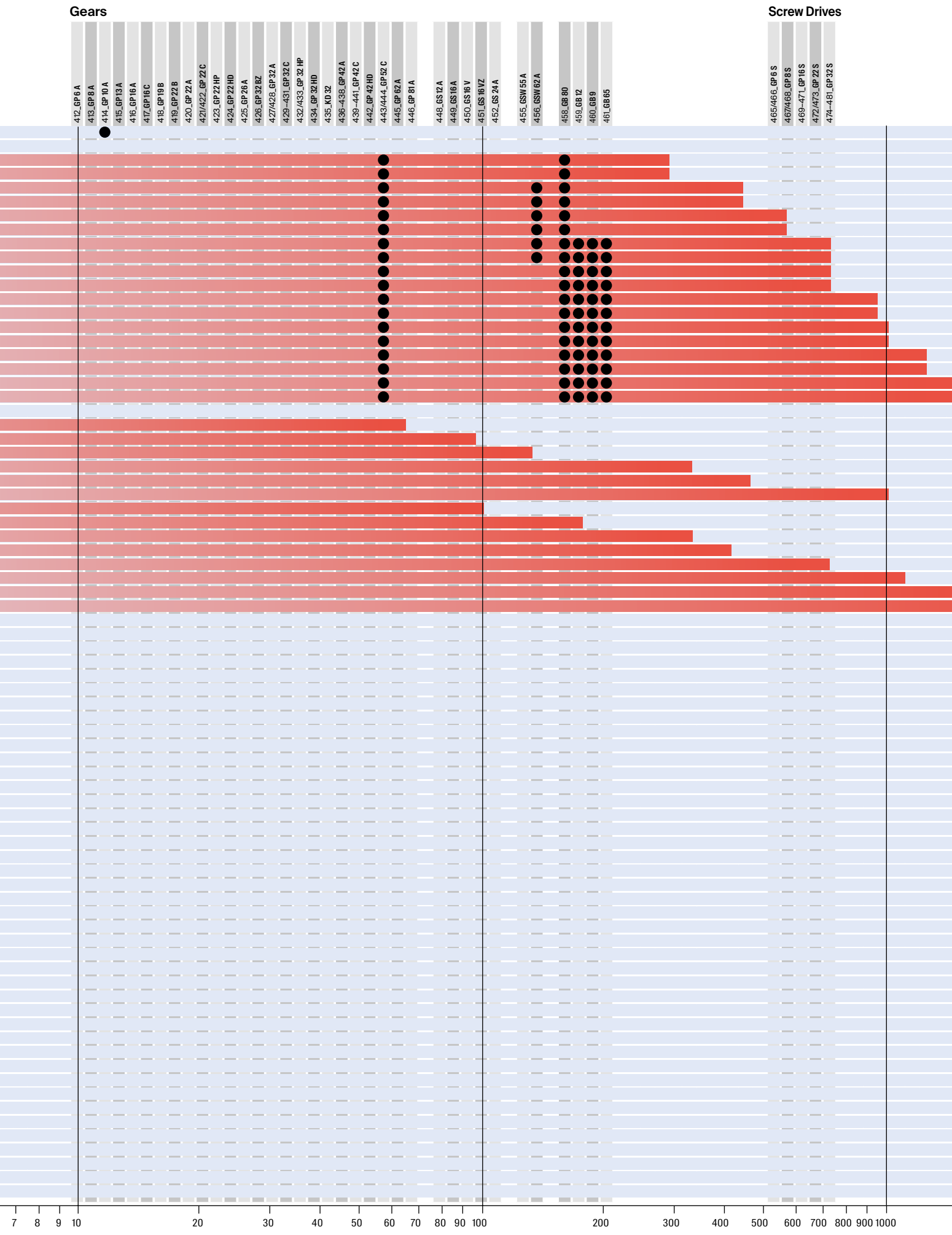
EC motor



EC flat	0.5 W	0.7 mNm	EC 9.2 flat	319
	1.5 W	1.7–1.8 mNm	EC 14 flat	320
	100 W	261–298 mNm	EC 60 flat	321
	100 W	261–298 mNm	EC 60 flat, cable	321
	150 W	378–437 mNm	EC 60 flat OR	322
	150 W	378–437 mNm	EC 60 flat OR, cable	322
	200 W	492–577 mNm	EC 60 flat VEN	323
	200 W	492–577 mNm	EC 60 flat VEN, cable	323
	160 W	453–460 mNm	EC 90 flat	324
	160 W	453–460 mNm	EC 90 flat, cable	324
	220 W	692–729 mNm	EC 90 flat OR	325
	220 W	692–729 mNm	EC 90 flat OR, cable	325
	360 W	894–953 mNm	EC 90 flat VEN	326
	360 W	894–953 mNm	EC 90 flat VEN, cable	326
	260 W	963–1010 mNm	EC 90 flat	327
	260 W	963–1010 mNm	EC 90 flat, cable	327
	400 W	1210–1300 mNm	EC 90 flat OR	328
	400 W	1210–1300 mNm	EC 90 flat OR, cable	328
	600 W	1490–1610 mNm	EC 90 flat VEN	329
	600 W	1490–1610 mNm	EC 90 flat VEN, cable	329
EC frameless	30 W	54.7–66 mNm	EC frameless 45 flat	333
	50 W	69.6–97.1 mNm	EC frameless 45 flat	334
	70 W	108–134 mNm	EC frameless 45 flat	335
	100 W	279–319 mNm	EC frameless 60 flat	336
	160 W	453–460 mNm	EC frameless 90 flat	337
	260 W	963–1010 mNm	EC frameless 90 flat	338
	110 W	102 mNm	EC frameless DT 38 S	341
	240 W	189 mNm	EC frameless DT 38 M	342
	220 W	332 mNm	EC frameless DT 50 S	343
	210 W	416 mNm	EC frameless DT 50 M	344
	290 W	727 mNm	EC frameless DT 65 S	345
	375 W	1190 mNm	EC frameless DT 65 M	346
	570 W	1800 mNm	EC frameless DT 85 M	347
	680 W	2900 mNm	EC frameless DT 85 L	348

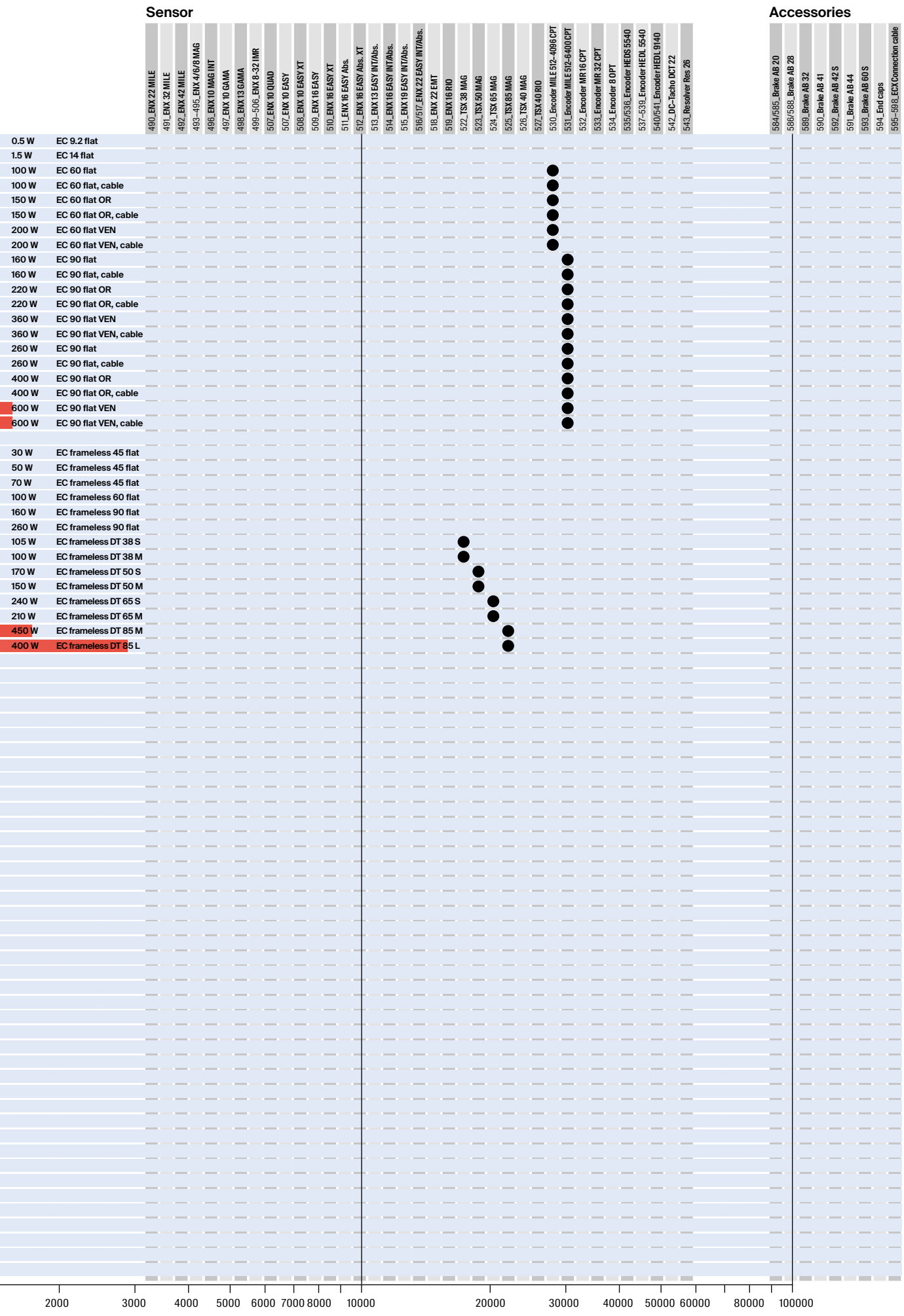
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Description of numbers with detailed information about the connection on page 59



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Accessories overview

The following table contains information on connecting maxon motors with maxon controllers. All listed adapters, plugs, evaluation boards, etc. must be ordered separately. The numbers refer to the Selection Guide pages 40–62.

1 Can be connected directly. No accessories required.
2 Can be connected directly. Plug must be removed.
3 ESCON Module Motherboard sensorless 450237 and adapter 220310 required.
4 ESCON Module Motherboard sensorless 450237 required. Can be connected directly with suitable configuration.
5 Evaluation board 370652 required.
6 Evaluation board 370652 required. Can be connected directly with suitable configuration.
7 ESCON Module Motherboard sensorless 450237 required. Plug must be removed.
8 Evaluation board 370652 and extension cable 339380 required.
9 Adapter 220300 required.
10 Extension cable 339380 required.
11 Cable 708583 or cable 708586 required.
12 Adapter 418723 required.
13 ESCON Module Motherboard 438779 and cable 708584 or cable 708587 required.
14 ESCON Module 50/8 Motherboard 586048 required. Connectors at the motor need to be removed.
16 Extension cable 354045 required.
17 Cable 708583 required.
18 Cable 708586 required.
19 Evaluation board 370652 required. Connectors at the motor need to be removed.
20 ESCON Module 50/8 Motherboard 586048 required.
21 ESCON Module 50/8 Motherboard 586048 and extension cable 339380 required.
23 ESCON Module Motherboard sensorless 450237 and adapter 498157 required.
24 ESCON Module 24/2 Motherboard 486400 required.
25 ESCON Module Motherboard 438779 and cable 708584 required.
26 Adapter 418719 required.
27 Adapter 425931 and cable 354046 (remove connector on one end) required. Install solder bridge (jumper) on circuit board.
29 Adapter 459875 required.
30 ESCON Module Motherboard 438779 required. Plug must be removed.
31 ESCON Module Motherboard 438779 and extension cable 339380 required.
33 ESCON Module Motherboard 438779 and cable 708587 required.
34 Cable 708584 required.
35 Adapter 262359, cable 354046 and extension cable 3409.506 (6-pin connector needs to be removed) required.
36 ESCON Module Motherboard 586048, adapter 223774, and extension cable 3409.506 (6-pin connector needs to be removed) required.
37 ESCON Module Motherboard 586048 and adapter 223774 required. Connector needs to be removed.
38 ESCON Module 24/2 Motherboard 486400 and adapter 425931 required.
39 ESCON Module 24/2 Motherboard 486400 and adapter 220300 required.
40 ESCON Module 24/2 Motherboard 486400 and adapter 405120 required.
41 ESCON Module 24/2 Motherboard 486400 required; connector needs to be removed.
42 ESCON Module 50/8 Motherboard 586048 and extension cable 354046 required.
44 ESCON Module 24/2 Motherboard 486400 and adapter 459875 required.
45 Cable 708587 required.
46 Cable 708584 or 708587 required.
47 Adapter 327086 required.
48 ESCON Module Motherboard 586048 and cable 708584 or cable 708587 required.
49 Cable 520851 and 275878 required.
50 ESCON Module 50/8 Motherboard 546048 and cable 520851 and 275878 required.
51 EVA Board 370652 and extension cable 442086 required.
52 Extension cable 275851 required.
53 Connection information for sensor/encoder taken into account.
54 Extension cable 403962 required for motors with terminals.
55 ESCON Module Motherboard 438779 required. Can be connected directly with suitable configuration.
56 ESCON Module 24/2 Motherboard 486400 required. Can be connected directly with suitable configuration.
57 ESCON Module 24/2 Motherboard 486400 and adapter 223774 required. Connector needs to be removed.
58 ESCON Module Motherboard 438779 and cable 520851 and 275878 required.
59 Can be connected directly with suitable configuration.
60 Adapter 223774 or 262359 and cable 354046.
61 Adapter 223774 and extension cable 3409.506 (6 poles plug must be removed) required.
62 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Connector set 520859 required. Connector needs to be removed.
63 ESCON Module Motherboard 438779 and adapter 459875 required.
64 Intended for use with customer-specific Motherboard. Combination with EPOS4 CB 50/5 CAN (534133) yields EPOS4 Compact 50/5 CAN (541718).
65 Can be connected directly. Attach solder bridges (jumpers) to printed circuit board.
66 Adapter 223774 or 262359 and cable 354046. Connector needs to be removed.
67 Extension cable 403964 required.
68 Adapter 425931 and extension cable 354046 required. Connector needs to be removed.
69 Cable 275851 and cable 275878 required.
70 Extension cable 354046 required.
72 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Extension cable 275851 required.
73 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Extension cable 275851 required.
74 Cable 339380 and connector set 846645 required.
75 ESCON Module Motherboard 438779 and extension cable 354046 required.
76 ESCON Module Motherboard 438779 and adapter 223774 required. Plug must be removed.
77 Connector set 846645 and cable 708583 or 708586 required.
78 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Can be connected directly when combined with Molex connector.
79 ESCON Module Motherboard 438779, adapter 223774 and extension cable 3409.506 (6-pin plug must be removed) are required.
80 ESCON Module 24/2 Motherboard 486400 and adapter 498157 required.
81 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Can be connected directly when combined with Molex connector.
82 DEC Module Evaluation board 370652 and adapter 498157 required.
83 ESCON Module Motherboard 586048 and cable 708584 required.
84 ESCON Module Motherboard 586048 and cable 708587 required.
85 Adapter 498157 required.
86 Connector set 846645 required.
87 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Connector set 520859 required. Connector needs to be removed.
88 ESCON Module Motherboard 438779 required.
89 Plug set 520859 required. Plug must be removed.
90 Plug set 520859 required.
91 Adapter 488167 and cable 520852 required.
92 Intended for use with customer-specific Motherboard. Combination with EPOS4 CB Power CAN (520884) yields EPOS4 Compact 50/8 CAN (520885).
93 Intended for use with customer-specific Motherboard. Combination with EPOS4 CB Power CAN (520884) yields EPOS4 Compact 50/15 CAN (520886).
94 Intended for use with customer-specific Motherboard. Combination with EPOS4 CB 24/1.5 CAN (536997) yields EPOS4 Compact 24/1.5 CAN (546714).
95 Adapter 804420 required.
97 Adapter 549609 required.
98 ESCON Module Motherboard 438779 and adapter 549609 required.
99 ESCON Module 50/8 Motherboard 586048 required. Can be connected directly with suitable configuration.
104 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Adapter 405120 required.
105 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Adapter 405120 required.
106 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Can be connected directly.
107 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Can be connected directly.
108 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Adapter 488167 and cable 520852 required.
109 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Adapter 488167 and cable 520852 required.
110 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Extension cable 354046 required.
111 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Extension cable 354046 required.
112 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Adapter 223774 or 262359 and cable 354046. Connector needs to be removed.
113 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Adapter 223774 or 262359 and cable 354046. Connector needs to be removed.
114 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Motor with cable configured. Cable 275851 and cable 275878 required.
115 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Motor with cable configured. Cable 275851 and cable 275878 required.
116 IDX power cable (684644, 684646, 684647 or 684648) and IDX sensor cable (684650 or 684651) required. Motherboard 586048, adapter 262359 and cable 354046 required.
117 IDX power cable (684644, 684646, 684647 or 684648) and IDX sensor cable (684650 or 684651) required. Adapter 262359 and cable 354046 required.
118 IDX power cable (684644, 684646, 684647 or 684648) and IDX sensor cable (684650 or 684651) required. Connector set 520859, adapter 262359 and cable 354046 required.
119 IDX power cable (711319) and IDX sensor cable (684650 or 684651) required. Extension cable 696283 and connector set 520859, adapter 262359 and cable 354046 required.
120 Adapter cable 693573 required.
121 Extension cable 696283 required.
122 Extension cable 710930 required.
123 Cable 696283 and cable 696284 required.
124 Cable 710930 and cable 696284 required.
125 Connector set 710926 required. Connector needs to be removed.
126 Connector set 710926 required.
127 Adapter 488167 and cable 696285 required.
128 Cable 708590 required.
129 Intended for use with customer-specific motherboard. Combination with ESCON2 CB 60/30 (783729) yields ESCON2 Compact 60/30 (783734).
130 IDX power cable (711319) and IDX sensor cable (684650 or 684651) required. Connector set 846645 required.
131 Cable 708582 required.
132 Cable 708582 required.
133 Intended for use with customer-specific motherboard. Combination with ESCON2 EB Micro (809646) möglich.
134 Intended for use with customer-specific motherboard. Combination with ESCON2 EB Nano (834838) möglich.
135 Intended for use with customer-specific motherboard. Combination with ESCON2 CB 60/12 (854800) yields ESCON2 Compact 60/12 (854801).
136 Connector set 846644 required.
137 Cable 865360 or cable 865359 required.
138 Cable 865360 required.
139 Cable 865359 required.
140 Cable 865363 required.
141 Cable 865362 required.
142 ESCON Module 24/2 Motherboard 486400 and adapter 804420 required. Plug must be removed.
143 ESCON Module 50/5 Motherboard 438779 and adapter 804420 required. Plug must be removed.
144 Adapter 804420 and cable 354046 (remove connector on one end) required.

EC motor

- For motors with absolute encoder (SSI) or with Hall sensors and incremental encoder (line driver recommended)
- For motors with Hall sensors, with or without encoders
- For motors with Hall sensors, without encoders
- For motors without Hall sensors, without encoders

DC motor

- For motors with or without encoder
- For motors with encoder (line driver recommended)

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maxon selection guide

Encoder, DC tacho, resolver

sensor

Recommended Electronics

				Sterilizable	Radiation-resistant	547_DEC Module 24/2	547_DEC Module 50/5	550_ESCON Module 24/2	550_ESCON 36/2 DC	551_ESCON 36/3 EC	551_ESCON Module 50/4 ECS	551_ESCON Module 50/5	552_ESCON Module 50/8 (HE)	553_ESCON 50/5	553_ESCON 70/10	557_ESCON2 Nano 24/2	557_ESCON2 Micro 60/5	558_ESCON2 Module 60/12	558_ESCON2 Module 60/30	559_ESCON2 Compact 60/12	559_ESCON2 Compact 60/30	563_EPOS4 Micro 24/5 CAN	563_EPOS4 Micro 24/5 ECAT	564_EPOS4 Module 24/1.5	564_EPOS4 Module 50/5	565_EPOS4 Module 50/8	565_EPOS4 Module 50/15	566_EPOS4 Comp. 24/5 3axes	566_EPOS4 Compact 24/1.5	567_EPOS4 Compact 50/5	567/568_EPOS4 Compact 50/8	568/569_EPOS4 Compact 50/15	569_EPOS4 50/5	569_EPOS4 70/15	570_EPOS4 Disk 60/8	571_EPOS4 Disk 60/12
ENX	**ENX 22 MILE**	1024 CPT, 2 channel	490					24				88		1		134	133					106	107	94	64			120	1	1			1		127	
	ENX 32 MILE	2048 CPT, 2 channel	491					24				88		1		134	133					106	107	94	64			120	1	1			1		127	
	ENX 42 MILE	2048 CPT, 2 channel	492									88		1	1		133	135		1		106	107		64			120		1	1		1		127	127
	ENX 4/6/8 MAG	1–256 CPT, 3 channel	493-495					80	85															94						85						
	ENX 10 MAG INT	1–256 CPT, 3 channel	496					142				143		95		134								94	64					144	144					
	ENX 10 GAMA	12 CPT, 2 channel	497	●																																
	ENX 13 GAMA	16 CPT, 2 channel	498	●				67	66			76		66																						
	ENX 8 IMR	100 CPT, 2 channel	499						68																	94					27					
	ENX 10/13 IMR	64-256 CPT, 2 channel, differential	500/501						47																	94					53					
	ENX 13 IMR	64-256 CPT, 2 channel, single-ended	501					67	66			76		66												94					66					
	ENX 16/19/22 IMR	128-512 CPT, 2/3 channel	502-504					44	65			63		29				135		29						94	64			65	65		65			
	ENX 25 IMR	128-1000 CPT, 3 channel	505					24	1			88		1		134	133	135		1		106	107	94	64	92	93	120	1	1	1	1	1	1	127	127
	ENX 32 IMR	256-1024 CPT, 3 channel	506					24	1			88	20	1	1	134	133	135		1		106	107	94	64	92	93	120	1	1	1	1	1	1	127	127
	ENX 10 EASY	1–1024 CPT, 3 channel	507					40	1			98		97	97	134	133					104	105	94	64	92		91	97	97	97		97		127	127
	ENX 10 QUAD	4 CPT, 2 channel	507																																	
	ENX 10 EASY XT	1–1024 CPT, 3 channel	508					24	1			88		1	1			135				106	107	94	64	92		120	1	1	1		1		127	127
	ENX 16 EASY	1–1024 CPT, 3 channel	509					24	1			88	20	1	1	134	133	135	129	1	1	106	107	94	64	92	93	120	1	1	1	1	1	1	127	127
	ENX 16 EASY XT	1–1024 CPT, 3 channel	510					24	1			88		1	1	134	133	135	129	1	1	106	107	94	64	92	93	120	1	1	1	1	1	1	127	127
	ENX 16 EASY Absolute	4096 steps, Single Turn	511																			106	107	94	64	92	93	91	91	91	91	91	91	91	127	127
	ENX 16 EASY Absolute XT	4096 steps, Single Turn	512																			106	107	94	64	92	93	120	1	1	1	1	1	1	125	1
	ENX 13 EASY INT	1–1024 CPT, 3 channel	513	●				24				88		1								106	107	94	64			120	1	1			1		127	127
	ENX 13 EASY INT Absolute	4096 steps, Single Turn	513	●																		62	87	94	64			90	94	90			90		126	126
	ENX 16 EASY INT	1–1024 CPT, 3 channel	514	●				24				88	20	1	1			135		1		106	107	94	64	92		120	1	1	1		1		127	127
	ENX 16 EASY INT Absolute	4096 steps, Single Turn	514	●																		62	87	94	64	92		90	90	90	90		90		126	126
	ENX 19 EASY INT	1–1024 CPT, 3 channel	515	●				24				88	20	1	1			135		1		106	107	94	64	92		120	1	1	1		1		127	127
	ENX 19 EASY INT Absolute	4096 steps, Single Turn	515	●																		62	87	94	64	92		90	90	90	90		90		126	126
	ENX 22 EASY INT	1–1024 CPT, 3 channel	516	●				24				88	20	1	1			135		1		106	107	94	64	92		120	1	1	1		1		127	127
	ENX 22 EASY INT Absolute	4096 steps, Single Turn	517	●																		62	87	94	64	92		90	90	90	90		90		126	126
	ENX 22 EMT Absolute	65536 turns, Multi Turn	518																									128		128	128		128	128		128
	ENX 16 RIO	512–65536 CPT, 3 channel	519					24	1			88	20	1	1	134	133	135	129	1	1	106	107	94	64	92	93	120	1	1	1	1	1	1	127	127
	TSX 38 MAG axial	1792 CPT, 2 channel	522									25		34			133								64					17		17		138	
	TSX 38 MAG radial	1792 CPT, 2 channel	522									33		45			133								64					18		18		139	
	TSX 50 MAG axial	2560 CPT, 2 channel	523									25		34			133								64					17		17		138	
	TSX 50 MAG radial	2560 CPT, 2 channel	523									33		45			133								64					18		18		139	
	TSX 65 MAG axial	2560 CPT, 2 channel	524										83		34			135		17						92				17		17		138	
	TSX 65 MAG radial	2560 CPT, 2 channel	524										84		45			135		18						92				18		18		139	
	TSX 85 MAG axial	2560 CPT, 2 channel	525												34			135	129	17	17						93				17		17		138
	TSX 85 MAG radial	2560 CPT, 2 channel	525												45			135	129	18	18						93				18		18		139
	TSX 40 MAG axial	1792–2048 CPT, 2 channel	526									25		34			133								64					17		17		138	
	TSX 40 MAG radial	1792–2048 CPT, 2 channel	526									33		45			133								64					18		18		139	
	TSX 40 RIO axial	1...524 288 CPT, 3 channel	527														133	135		131					64	92	93			131	131	131	131	131	140	
	TSX 40 RIO axial	1...524 288 CPT, 3 channel	527														133	135		132					64	92	93			132	132	132	132	132	141	
sensor |	**Encoder MILE**	512–4096 CPT, 2 channel, LD	530									75	42	70	70			135		70		110	111		64	92	93			70	70	70	70	70		
	Encoder MILE	512–4096 CPT, 2 channel, LD, cable	530									88	20	1	1			135		1		106	107		64	92	93	120		1	1	1	1	1	127	127
	Encoder MILE	512–6400 CPT, 2 channel, LD	531									75	42	70	70			135		70		110	111		64	92	93			70	70	70	70	70		
	Encoder MILE	512–6400 CPT, 2 channel, LD, cable	531									88	20	1	1			135		1		106	107		64	92	93	120		1	1	1	1	1	127	127
	Encoder MR, type S	16 CPT, 2 channel	532					67	66			76		66																						
	Encoder MR, type M	32 CPT, 2 channel	533					67	66			76		66								112	113	94	64			66	66		66					
	Encoder 8 OPT	50 CPT, 2 channel	534																																	
	Encoder HEDS 5540	500 CPT, 3 channel	535–536					79	61			79	36	35	35																					
	Encoder HEDL 5540	500 CPT, 3 channel	537–539					24	1			88	20	1	1			135		1		106	107	94	64	92	93	120	1	1	1	1	1	1	127	127
	Encoder HEDL 9140	500 CPT, 3 channel	540–541									76	37	66	66	134	133	135	129	60	86	112	113		64	92	93			60	60	60		60		
	DCTacho DCT 22	0.52 V	542					24	67			88	20	1	1																					

Description of numbers with detailed information about the connection on page 59

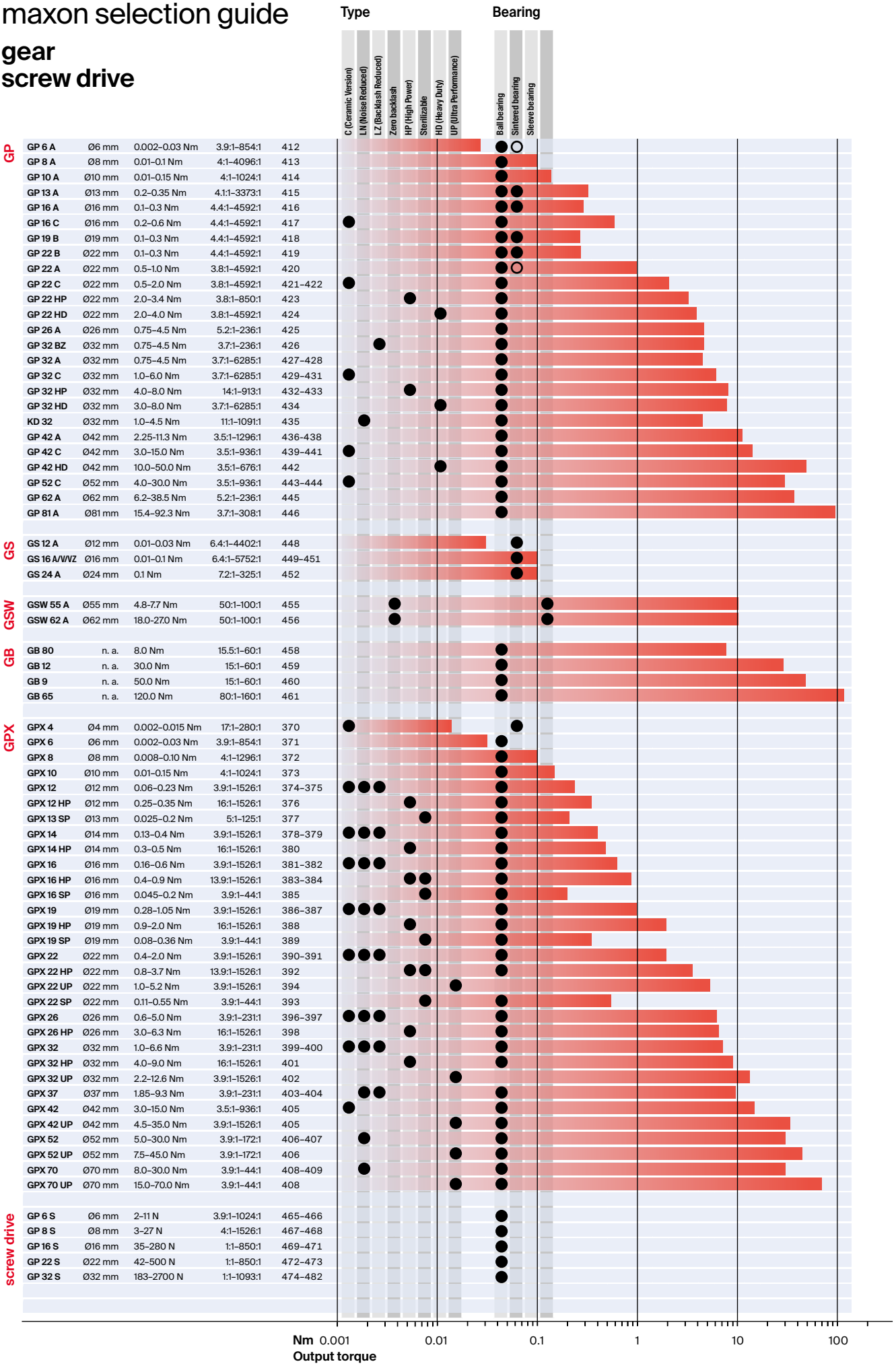
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“Sometimes, you have to take the first step alone.”

Ursula von der Leyen

maxon selection guide

gear
screw drive



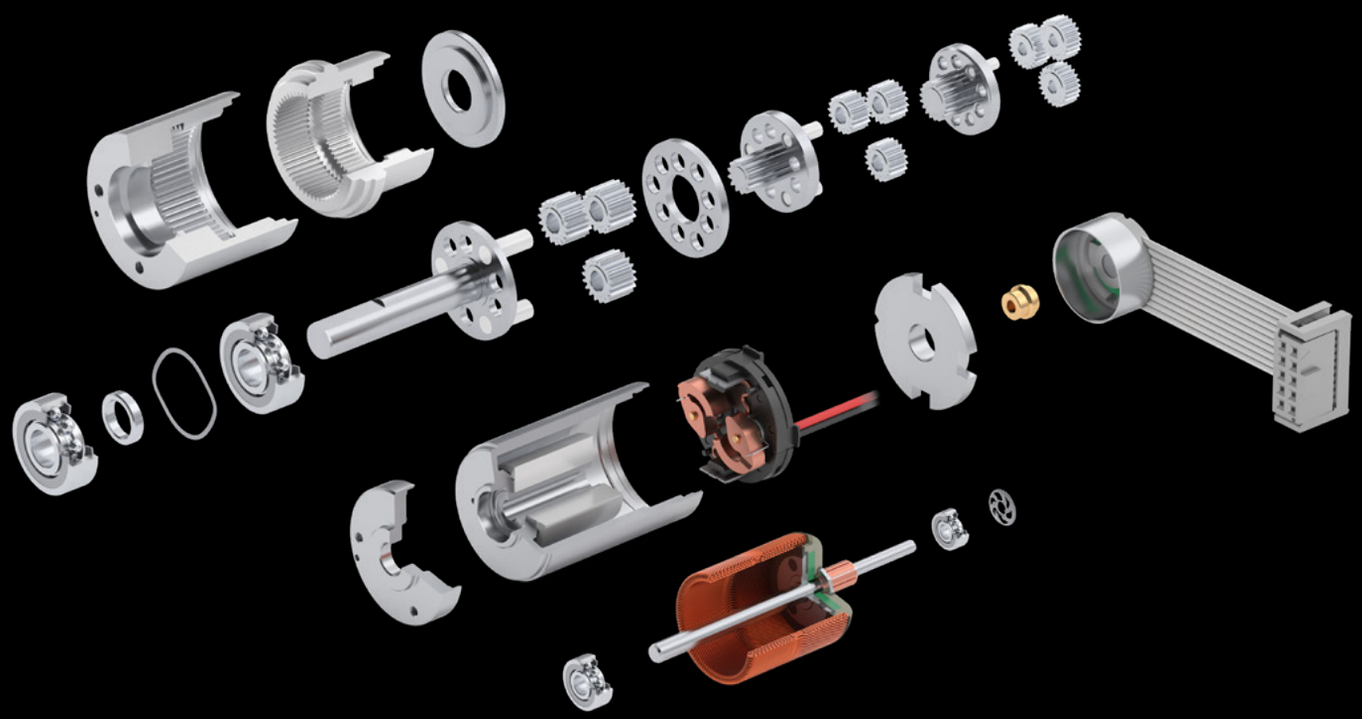
GP	GP 6 A	Ø6 mm	0.002–0.03 Nm	3.9:1–854:1	412
	GP 8 A	Ø8 mm	0.01–0.1 Nm	4:1–4096:1	413
	GP 10 A	Ø10 mm	0.01–0.15 Nm	4:1–1024:1	414
	GP 13 A	Ø13 mm	0.2–0.35 Nm	4.1:1–3373:1	415
	GP 16 A	Ø16 mm	0.1–0.3 Nm	4.4:1–4592:1	416
	GP 16 C	Ø16 mm	0.2–0.6 Nm	4.4:1–4592:1	417
	GP 19 B	Ø19 mm	0.1–0.3 Nm	4.4:1–4592:1	418
	GP 22 B	Ø22 mm	0.1–0.3 Nm	4.4:1–4592:1	419
	GP 22 A	Ø22 mm	0.5–1.0 Nm	3.8:1–4592:1	420
	GP 22 C	Ø22 mm	0.5–2.0 Nm	3.8:1–4592:1	421–422
	GP 22 HP	Ø22 mm	2.0–3.4 Nm	3.8:1–850:1	423
	GP 22 HD	Ø22 mm	2.0–4.0 Nm	3.8:1–4592:1	424
	GP 26 A	Ø26 mm	0.75–4.5 Nm	5.2:1–236:1	425
	GP 32 BZ	Ø32 mm	0.75–4.5 Nm	3.7:1–236:1	426
	GP 32 A	Ø32 mm	0.75–4.5 Nm	3.7:1–6285:1	427–428
	GP 32 C	Ø32 mm	1.0–6.0 Nm	3.7:1–6285:1	429–431
	GP 32 HP	Ø32 mm	4.0–8.0 Nm	14:1–913:1	432–433
	GP 32 HD	Ø32 mm	3.0–8.0 Nm	3.7:1–6285:1	434
	KD 32	Ø32 mm	1.0–4.5 Nm	11:1–1091:1	435
	GP 42 A	Ø42 mm	2.25–11.3 Nm	3.5:1–1296:1	436–438
	GP 42 C	Ø42 mm	3.0–15.0 Nm	3.5:1–936:1	439–441
	GP 42 HD	Ø42 mm	10.0–50.0 Nm	3.5:1–676:1	442
	GP 52 C	Ø52 mm	4.0–30.0 Nm	3.5:1–936:1	443–444
	GP 62 A	Ø62 mm	6.2–38.5 Nm	5.2:1–236:1	445
	GP 81 A	Ø81 mm	15.4–92.3 Nm	3.7:1–308:1	446
GS	GS 12 A	Ø12 mm	0.01–0.03 Nm	6.4:1–4402:1	448
	GS 16 A/W/WZ	Ø16 mm	0.01–0.1 Nm	6.4:1–5752:1	449–451
	GS 24 A	Ø24 mm	0.1 Nm	7.2:1–325:1	452
GSW	GSW 55 A	Ø55 mm	4.8-7.7 Nm	50:1–100:1	455
	GSW 62 A	Ø62 mm	18.0-27.0 Nm	50:1–100:1	456
GB	GB 80	n. a.	8.0 Nm	15.5:1–60:1	458
	GB 12	n. a.	30.0 Nm	15:1–60:1	459
	GB 9	n. a.	50.0 Nm	15:1–60:1	460
	GB 65	n. a.	120.0 Nm	80:1–160:1	461
GPX	GPX 4	Ø4 mm	0.002–0.015 Nm	17:1–280:1	370
	GPX 6	Ø6 mm	0.002–0.03 Nm	3.9:1–854:1	371
	GPX 8	Ø8 mm	0.008–0.10 Nm	4:1–1296:1	372
	GPX 10	Ø10 mm	0.01–0.15 Nm	4:1–1024:1	373
	GPX 12	Ø12 mm	0.06–0.23 Nm	3.9:1–1526:1	374–375
	GPX 12 HP	Ø12 mm	0.25–0.35 Nm	16:1–1526:1	376
	GPX 13 SP	Ø13 mm	0.025–0.2 Nm	5:1–125:1	377
	GPX 14	Ø14 mm	0.13–0.4 Nm	3.9:1–1526:1	378–379
	GPX 14 HP	Ø14 mm	0.3–0.5 Nm	16:1–1526:1	380
	GPX 16	Ø16 mm	0.16–0.6 Nm	3.9:1–1526:1	381–382
	GPX 16 HP	Ø16 mm	0.4–0.9 Nm	13.9:1–1526:1	383–384
	GPX 16 SP	Ø16 mm	0.045–0.2 Nm	3.9:1–44:1	385
	GPX 19	Ø19 mm	0.28–1.05 Nm	3.9:1–1526:1	386–387
	GPX 19 HP	Ø19 mm	0.9–2.0 Nm	16:1–1526:1	388
	GPX 19 SP	Ø19 mm	0.08–0.36 Nm	3.9:1–44:1	389
	GPX 22	Ø22 mm	0.4–2.0 Nm	3.9:1–1526:1	390–391
	GPX 22 HP	Ø22 mm	0.8–3.7 Nm	13.9:1–1526:1	392
	GPX 22 UP	Ø22 mm	1.0–5.2 Nm	3.9:1–1526:1	394
	GPX 22 SP	Ø22 mm	0.11–0.55 Nm	3.9:1–44:1	393
	GPX 26	Ø26 mm	0.6–5.0 Nm	3.9:1–231:1	396–397
	GPX 26 HP	Ø26 mm	3.0–6.3 Nm	16:1–1526:1	398
	GPX 32	Ø32 mm	1.0–6.6 Nm	3.9:1–231:1	399–400
	GPX 32 HP	Ø32 mm	4.0–9.0 Nm	16:1–1526:1	401
	GPX 32 UP	Ø32 mm	2.2–12.6 Nm	3.9:1–1526:1	402
	GPX 37	Ø37 mm	1.85–9.3 Nm	3.9:1–231:1	403–404
	GPX 42	Ø42 mm	3.0–15.0 Nm	3.5:1–936:1	405
	GPX 42 UP	Ø42 mm	4.5–35.0 Nm	3.9:1–1526:1	405
	GPX 52	Ø52 mm	5.0–30.0 Nm	3.9:1–172:1	406–407
	GPX 52 UP	Ø52 mm	7.5–45.0 Nm	3.9:1–172:1	406
	GPX 70	Ø70 mm	8.0–30.0 Nm	3.9:1–44:1	408–409
	GPX 70 UP	Ø70 mm	15.0–70.0 Nm	3.9:1–44:1	408
screw drive	GP 6 S	Ø6 mm	2–11 N	3.9:1–1024:1	465–466
	GP 8 S	Ø8 mm	3–27 N	4:1–1526:1	467–468
	GP 16 S	Ø16 mm	35–280 N	1:1–850:1	469–471
	GP 22 S	Ø22 mm	42–500 N	1:1–850:1	472–473
	GP 32 S	Ø32 mm	183–2700 N	1:1–1093:1	474–482

● Standard ○ Option / on request

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Technology short and to the point

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Here you can find short descriptions of the structure and technology of maxon products. Under "key information", you will find details about characteristics and diagrams, motor properties, motor selection, and many other important details.

The outstanding technical features of **maxon DC motors:**
- No magnetic cogging
- High acceleration thanks to a low mass inertia
- Low electromagnetic interference
- Low inductance
- High efficiency
- Linearity between voltage and speed
- Linearity between load and speed
- Linearity between load and current
- Small torque ripple thanks to multi-segment commutator
- Able to bear high overloads for short periods
- Compact design – small dimensions
- Multiple combination possibilities with gears as well as DC tachometers and encoders

Characteristics of the **maxon DCX** range:
- High power density
- High-quality DC motor with NdFeB magnet
- High speeds and torques
- Robust design (metal flange)
- Easily configured online
- Fast delivery

Characteristics of the **maxon DC-max** range:
- High-performance at low cost
- Combines rational manufacturing and design of the A-max motors with the higher power density of the NdFeB magnets
- Automated manufacturing process
- Easily configured online
- Fast delivery

Characteristics of the **maxon RE** range:
- High power density
- High-quality DC motor with NdFeB magnet
- High speeds and torques
- Robust design (metal flange)

Characteristics of the **maxon A-max** range:
- Good price-performance ratio
- DC motor with AlNiCo magnet
- Automated manufacturing process

Turning speed

The optimal operating speeds are between 4000 rpm and 9000 rpm depending on the motor size. Speeds of more than 20 000 rpm have been attained with some special versions.

A physical property of a DC motor is that, at a constant voltage, the speed is reduced with increasing loads. A good adaptation to the desired conditions is possible thanks to a variety of winding variants.

At lower speeds, a gear combination is often more favorable than a slowly turning motor.

Program

- **DCX**
- **DC-max**
- **RE**
- **A-max**

1	Flange, front
2	Permanent magnet
3	Housing (magnetic return)
4	Shaft
5	Winding
6	Commutator plate
7	Commutator
8	Graphite brushes
9	Precious metal brushes
10	Cover
11	Electrical connection
12	Ball bearing
13	Sintered sleeve bearing
14	Flange, rear

The maxon winding

The “heart” of the maxon motor is the worldwide patented ironless winding, System maxon. This motor principle has very specific advantages. There is no magnetic detent and minimal electromagnetic interference. The efficiency of up to 90% exceeds that of other motor systems.

There are numerous winding variants for each motor type (see motor data sheets). They are differentiated by the wire diameter and number of turns. This results in various motor terminal resistances. The wire sizes used are between 32 µm and 0.45 mm, resulting in the different terminal resistances of the motors.
This influences the motor parameters that describe the transformation of electrical and mechanical energy (torque and speed constants). It allows you to select the motor that is best suited to your application.

Effects of wire gauge and number of windings are:

Low terminal resistance
- Low resistance winding
- Thick wire, few turns
- High starting currents
- High specific speed (rpm per volt)

High terminal resistance
- High resistance winding
- Thin wire, many turns
- Low starting currents
- Low specific speed (rpm per volt)

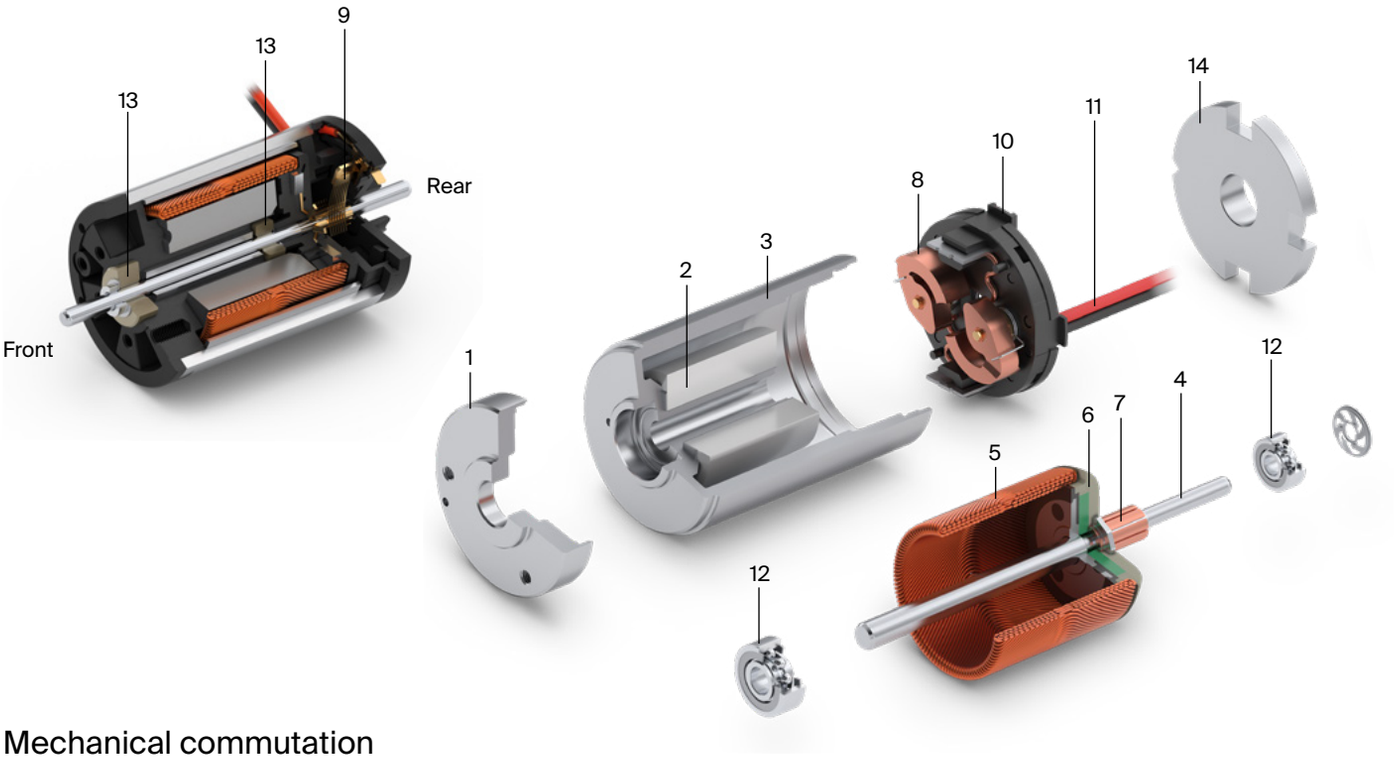
The maximum permissible winding temperature in high-temperature applications is 125°C (155°C in special cases), otherwise 100°C or 85°C.

Service life

A general statement about service life cannot be made due to many influencing factors. Service life can vary between more than 20 000 hours under favorable conditions, and less than 100 hours under extreme conditions (in rare cases). Roughly 1000 to 3000 hours are attained with average requirements.

The following have an influence:
1. The electric load: higher current loads result in greater electric wear. Therefore, it may be advisable to select a somewhat stronger motor for certain applications. We would be happy to advise you.
2. Speed: the higher the speed, the greater the mechanical wear.
3. Type of operation: extreme start/stop, left/right operation leads to a reduction in service life.
4. Environmental influences: temperature, humidity, vibration, type of installation, etc.
5. In the case of precious metal brushes, **the CLL concept** increases service life at higher loads and the benefits of precious metal brushes are retained.
6. Combinations of **graphite brushes** and ball bearings lead to a long service life, even under extreme conditions.

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Mechanical commutation

Graphite brushes
In combination with copper commutators for the most rigorous applications.
More than 10 million cycles were attained in different applications.

Graphite brushes are typically used:
- In larger motors
- With high current loads
- In start/stop operation
- In reverse operation
- While controlling at pulsed power stage (PWM)

The special properties of **graphite brushes** can cause so-called spikes. They are visible in the commutation pattern. Despite the high-frequency interference caused by the spikes, these motors have become popular in applications with electronic controls. Please note, that the contact resistance of the graphite brushes changes dependent on load.

Precious metal brushes and commutator
Our precious metal combinations ensure a highly constant and low contact resistance, even after a prolonged standstill time. The motors work with very low starting voltages and electromagnetic interferences.

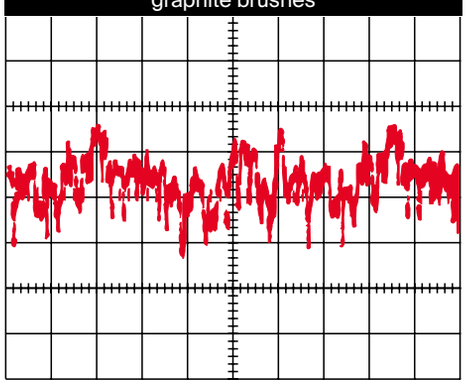
Precious metal brushes are typically used:
- In small motors
- In continuous operation
- With small current loads
- With battery operation
- In DC tachometers

The commutation pattern is uniform and free of spikes, as opposed to that of other motors. The combination of precious metal brushes and maxon rotor system results in minimum of high-frequency interference, which otherwise leads to major problems in electronical circuits. The motors need practically no interference suppression.

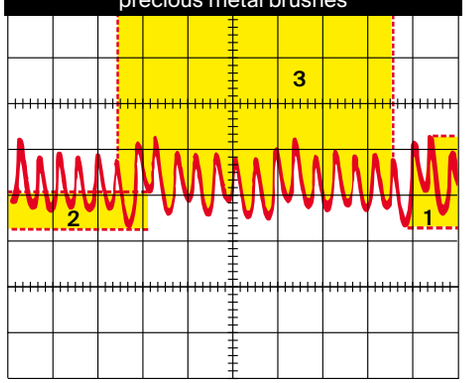
CLL concept
With precious metal commutation, the wear on commutators and brushes is caused mainly by sparks. The CLL concept suppresses spark generation to a large extent, thus greatly extending service life.
When driven with a pulsed power stage (PWM) higher no load currents occur and an unwanted motor heating can result. Additional inductance (chokes) in the motor supply lines help.

For further explanations, please see page 94 or “The selection of high-precision microdrives” by Dr. Urs Kafader.

Commutation pattern with graphite brushes



Commutation pattern with precious metal brushes



Commutation pattern
The commutation pattern shows the current pattern of a maxon DC motor over one motor revolution.
Please place a low-ohm series resistor in series with the motor (approx. 50 times smaller than the motor resistance). Observe the voltage drop over the resistor on the oscilloscope.

Legend
1 Ripple, actual peak-to-peak ripple
2 Modulation, attributable mainly to asymmetry in the magnetic field and in the winding.
3 Signal pattern within a revolution (number of peaks = twice the number of commutator segments)

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maxon EC motor ironless winding
Technology – short and to the point

Characteristics of the **maxon EC motors** with ironless winding:
- Brushless DC motor (BLDC)
- Long service life
- Highly efficient
- Linear motor characteristics, excellent control properties
- Ironless winding system maxon with three phases in the stator
- Lowest electrical time constant and low inductance
- No detent
- Good heat dissipation, high overload capacity
- Rotating NdFeB permanent magnet with 1 or 2 pole pairs

Characteristics of the **maxon ECX SPEED** range:
- Power optimized, with high speeds up to 120 000 rpm
- Robust design
- Various types: e.g. short/long, sterilizable
- Lowest residual imbalance
- Easily configured online
- Fast delivery

Characteristics of the **maxon EC** range:
- Power-optimized, with high speeds of up to 25,000 rpm
- Robust design
- Lowest residual imbalance

Characteristics of the **maxon EC-max** range:
- attractive price-performance ratio
- robust steel casing
- speeds of up to 20 000 rpm
- rotor with 1 pole pair

Characteristics of the **maxon ECX PRIME and EC-4pole** range:
- Highest power density thanks to rotor with 2 pole pairs
- Knitted winding system maxon with optimised interconnection of the partial windings
- Speeds of up to 50 000 rpm
- High-quality magnetic return material to reduce eddy current losses
- Mechanical time constants below 3 ms
- Special version

Program

- **ECX SPEED**
- **ECX PRIME**
- **EC**
- **EC-max**
- **EC-4pole**

- **with Hall sensors**
- **sensorless**
- **with integrated electronics**
- **sterilizable**
- **heavy duty**

1	Flange, front
2	Housing
3	Laminated steel stack
4	Winding
5	Permanent magnet
6	Shaft
7	Print with Hall sensors
8	Control magnet
9	Ball bearing
10	Flange, rear

Electronical commutation

Block commutation
Rotor position is reported by three in-built Hall sensors. The Hall sensors arranged offset by 120° provide six different signal combinations per revolution. The three partial windings are now supplied in six different conducting phases in accordance with the sensor information. The current and voltage curves are block-shaped. The switching position of each electronic commutation is offset by 30° from the respective torque maximum.

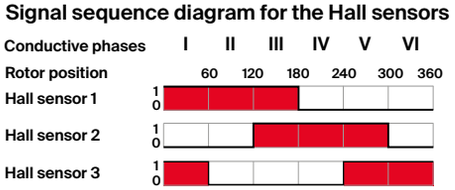
Properties of block commutation
- Relatively simple and favorably priced electronics
- Torque ripple of 14%
- Controlled motor start-up
- High starting torques and accelerations possible
- Servo drives, Start/stop operation
- Positioning tasks
- The data of the maxon EC motors are determined with block commutation.

Sensorless block commutation
The rotor position is determined using the progression of the induced voltage. The electronics evaluate the zero crossing of the induced voltage (EMF) and commute the motor current after a speed dependent pause (30°e after EMF zero crossing).
When stalled or at low speed, the voltage signal is too small and the zero crossing cannot be detected precisely. This is why special algorithms are required for starting (similar to stepper motor control).
To allow EC motors to be commuted without sensors in a Δ arrangement, a virtual star point is usually created in the electronics.

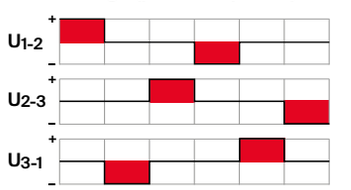
Properties of sensorless commutation
- Torque ripple of 14% (block commutation)
- No defined start-up
- Not suitable for low speeds and for dynamic applications
- Continuous operation at higher speeds (Fans, mills, drills)

Block commutation

Signal sequence diagram for the Hall sensors



Supplied motor voltage (phase to phase)



Sensorless commutation

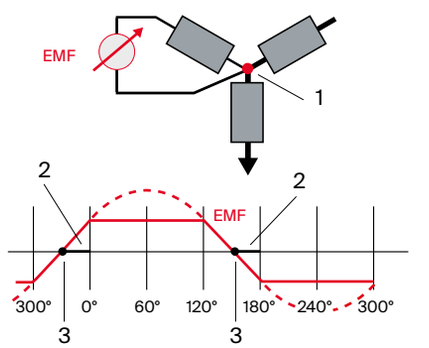
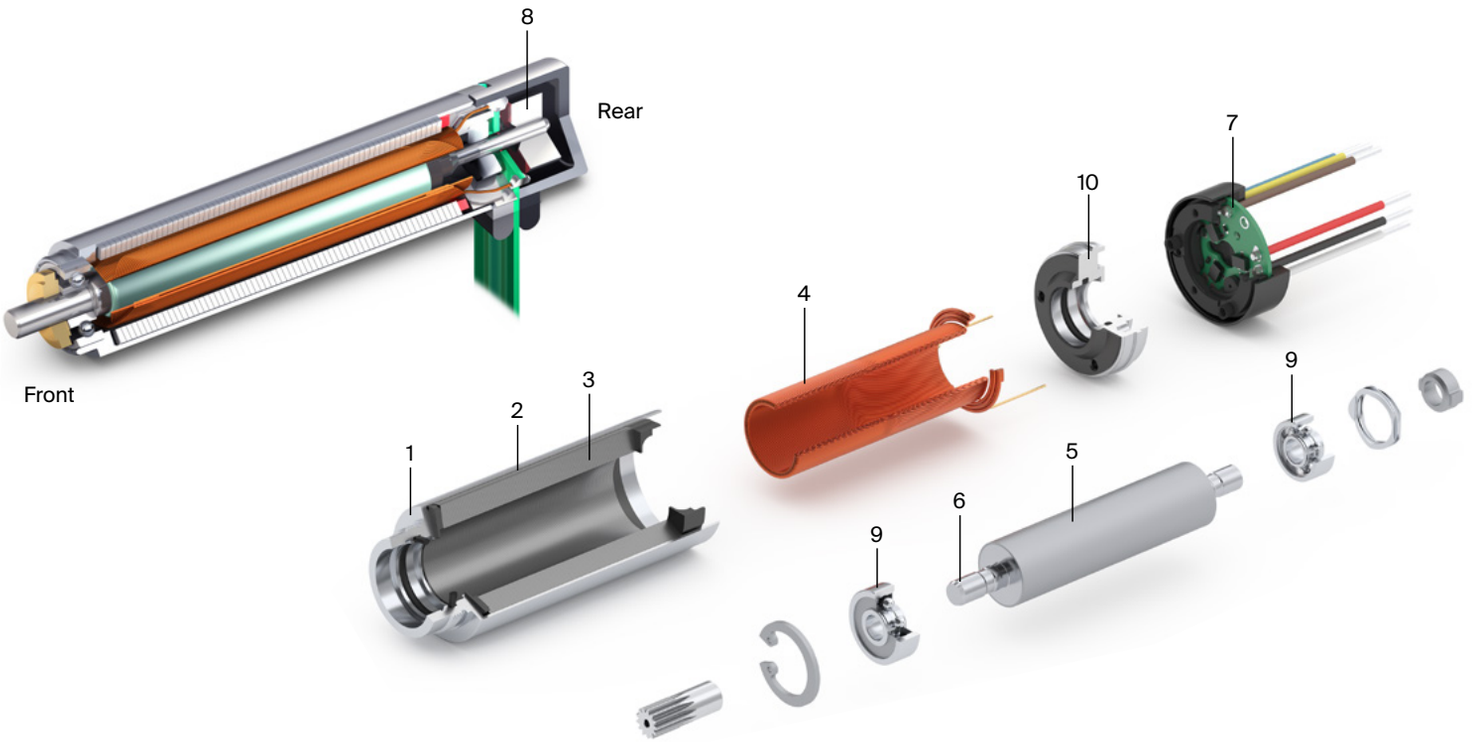


Diagram applies to phase 1

Legend
The commutation angle is based on the length of a full commutation sequence (360°e). The length of a commutation interval is therefore 60°e.
The commutation rotor position is identical to the motor shaft position for motors with 1 pole pair. The values of the shaft position are halved for motors with 2 pole pairs.

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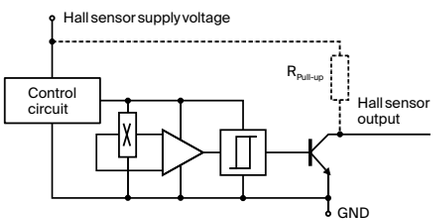
Sinusoidal commutation
The high resolution signals from the encoder or resolver are used for generating sine-shape motor currents in the electronics. The currents through the three motor windings are related to the rotor position and are shifted at each phase by 120° (sinusoidal commutation). This results in the very smooth, precise running of the motor and, in a very precise, high quality control.

Properties of sinusoidal commutation
- More expensive electronics
- Field-oriented control (FOC)
- No torque ripple
- Very smooth running, even at very low speeds
- Approx. 5% more continuous torque compared to block commutation
- Highly dynamic servo drives
- Positioning tasks

Hall sensor circuit

The open collector output of Hall sensors does not normally have its own pull-up resistance, as this is integral in maxon controllers. Any exceptions are specifically mentioned in the relevant motor data sheets.

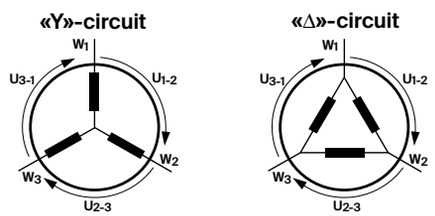
Wiring diagram for Hall sensors



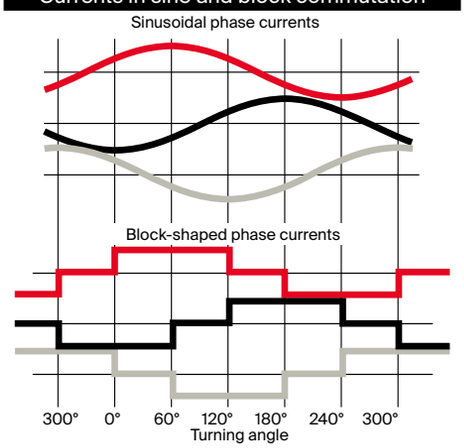
The power consumption of a Hall sensor is typically 4 mA (for output of Hall sensor = “HI”).

Winding arrangement

The maxon rhombic winding is divided into three partial windings, each shifted by 120°. The partial windings can be connected in two different manners - “Y” or “Δ”. This changes the speed and torque inversely proportional by the factor $\sqrt{3}$.
However, the winding arrangement does not play a decisive role in the selection of the motor. It is important that the motor-specific parameters (speed and torque constants) are in line with requirements.



Currents in sine and block commutation



Bearings and service life

The long service life of the brushless design can only be properly exploited by using pre-loaded ball bearings.
- Bearings designed for tens of thousands of hours
- Service life is affected by maximum speed, residual unbalance and bearing load

Legend
1 Star point
2 Time delay 30°e
3 Zero crossing of EMF

For further explanations, please see page 190 or “The selection of high-precision microdrives” by Dr. Urs Kafader.

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maxon EC motor iron-cored winding
Technology – short and to the point

Characteristics of the **maxon EC motors** with iron winding:
- Brushless DC motor (BLDC)
- Long service life
- Comparatively high inertia
- Motor characteristics may vary from the strongly linear behaviour
- Hall sensor signals utilizable for simple speed and position control
- Multipole NdFeB permanent magnet
- Smaller commutation steps
- Winding with iron core and several teeth per phase in the stator
- Low detent torque
- Good heat dissipation, high overload capacity

Properties of the **maxon ECX TORQUE**-Programs:
- Highly dynamic due to internal, multipole rotor
- Mechanical time constants below one millisecond
- High torque density
- Easily configured online
- Fast delivery

Properties of the **maxon IDX** program:
- High continuous torque
- High power density
- IP65-protected design
- Easily configured online

Characteristics of the **maxon EC-i** program:
- Highly dynamic due to internal, multipole rotor
- Mechanical time constants below 3 ms
- High torque density
- Speeds of up to 15,000 rpm

Properties of the **maxon ECX-FLAT** and **EC-flat** programs:
- Attractive price-performance ratio
- High torques due to external, multipole rotor
- Excellent heat dissipation at higher speeds thanks to open design
- Variants with open rotor or fan for even higher torques
- Flat design for when space is limited

Program

- **ECX TORQUE**
- **IDX**
- **ECX FLAT**
- **EC-i**
- **EC flat**

- **with Hall sensors**
- **sensorless**
- **with integrated electronics**

1	Flange, front
2	Housing
3	Laminated steel stack
4	Winding
5	Permanent magnet
6	Shaft
7	Print with Hall sensors
8	Ball bearing
9	Spring (bearing preload)
10	Flange, rear

Electronical commutation

Block commutation
Rotor position is reported by three built-in Hall sensors which deliver six different signal combinations per commutation sequence. The three phases are powered in six different conducting phases in line with this sensor information. The current and voltage curves are block-shaped. The switching position of every electronic commutation lies symmetrically around the respective torque maximum.

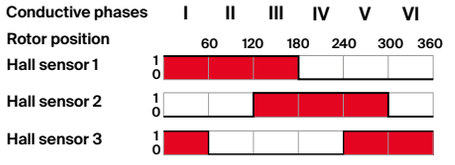
Properties of block commutation
- Relatively simple and favorably priced electronics
- Controlled motor start-up
- High starting torques and accelerations possible
- Servo drives, start/stop operation
- Positioning tasks
- The data of the maxon EC motors are determined with block commutation.

Sensorless block commutation
The rotor position is determined using the progression of the induced voltage. The electronics evaluate the zero crossing of the induced voltage (EMF) and commute the motor current after a speed dependent pause (30°e after EMF zero crossing).
When stalled or at low speed, the voltage signal is too small and the zero crossing cannot be detected precisely. This is why special algorithms are required for starting (similar to stepper motor control). To allow EC motors to be commuted without sensors in a Δ arrangement, a virtual star point is usually created in the electronics.

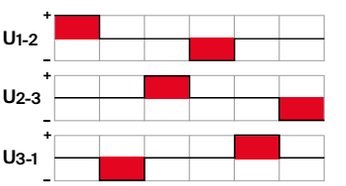
Properties of sensorless commutation
- No defined start-up
- Not suitable for low speeds and for dynamic applications
- Continuous operation at higher speeds (Fans, pumps)

Block commutation

Signal sequence diagram for the Hall sensors



Supplied motor voltage (phase to phase)



Sensorless commutation

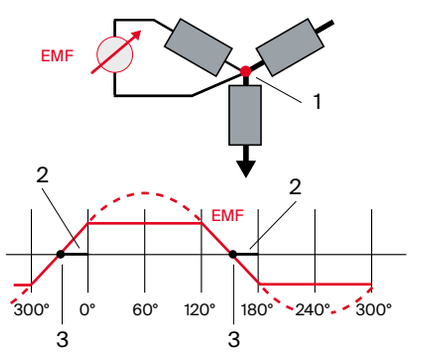
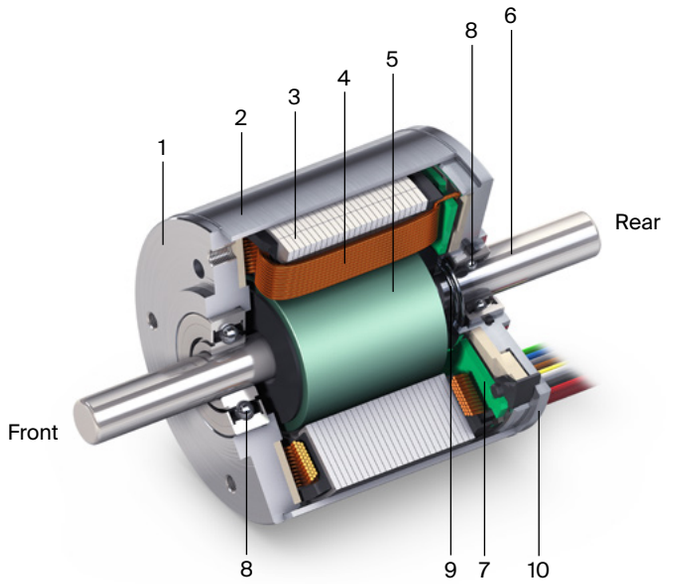
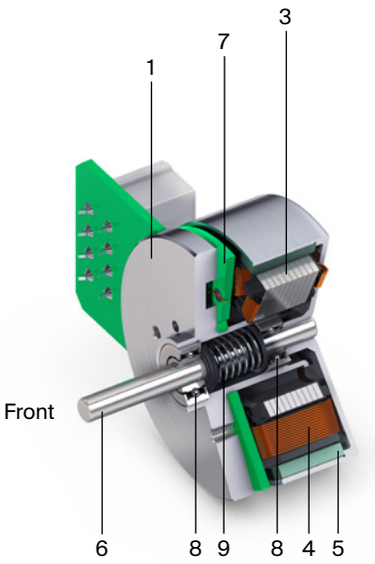


Diagram applies to phase 1

Legend
The commutation angle is based on the length of a full commutation sequence (360°e). The length of a commutation interval is therefore 60°e.
The values of the shaft position can be calculated from the commutation angle divided by the number of pole pairs.

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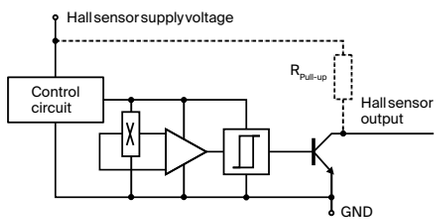


Sinusoidal commutation
Sinusoidal commutation or field-oriented control (FOC) for EC motors with grooved winding is possible. The main benefit of sinusoidal commutation – the smooth operation – only comes into play to a limited degree due to the detent.

Hall sensor circuit

The open collector output of Hall sensors does not normally have its own pull-up resistance, as this is integral in maxon controllers. Any exceptions are specifically mentioned in the relevant motor data sheets.

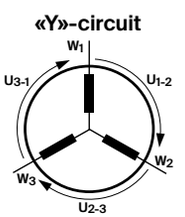
Wiring diagram for Hall sensors

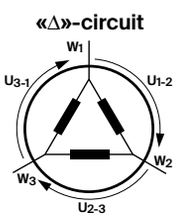


The power consumption of a Hall sensor is typically 4 mA (for output of Hall sensor = “HI”).

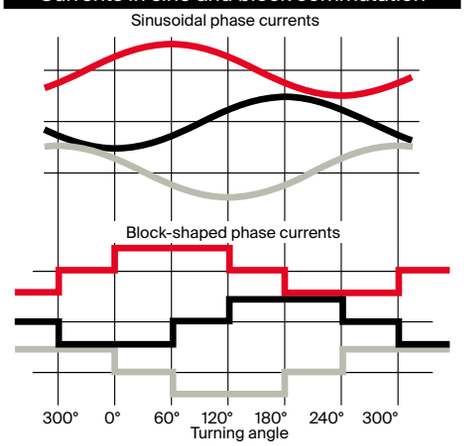
Winding arrangement

The winding is divided into 3 partial windings which have several stator teeth each. The partial windings can be connected in two different manners - “Y” or “Δ”. This changes the speed and torque inversely proportional by the factor $\sqrt{3}$.
However, the winding arrangement does not play a decisive role in the selection of the motor. It is important that the motor-specific parameters (speed and torque constants) are in line with requiremenats.





Currents in sine and block commutation



Bearings and service life

The long service life of the brushless design can only be properly exploited by using preloaded ball bearings.
– Bearings designed for tens of thousands of hours
– Service life is affected by maximum speed, residual imbalance and bearing load

Legend
1 Star point
2 Time delay 30°
3 Zero crossing of EMF

For further explanations, please see page 190 or “The selection of high-precision microdrives” by Dr. Urs Kafader.

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maxon EC frameless motor Technology – short and to the point

In **EC frameless motor** kits, rotor and stator are delivered separately, without bearings and motor shaft. The motor is operational only when the two components are assembled

Characteristics of the **maxon EC frameless motors:**
- Brushless DC (BLDC) direct drive motor
- Long service life
- High torque grace to multi-pole motor design with NdFeB permanent magnet
- Winding with iron core and several teeth per phase in the stator
- Low detent torque
- Motor characteristics may vary from the strongly linear behavior
- Good heat dissipation, high overload capacity
- Sensor for supervising the temperature (NTC hot conductor)
- Space-saving integration into the application
- Hall sensor signals utilizable for simple speed and position control
- Flat design for space saving application integration
- Hollow shaft for transfering cables, vacuum lines, light, ...

Characteristics of the **maxon EC frameless flat** program:
- High torques due to external, multipole rotor
- Speeds of up to 10 000 rpm
- Hall sensor signals for simple speed and position control.

Properties of the maxon **EC frameless Dynamic Torque (DT)** Programs:
- Highly dynamic due to internal, multipole rotor
- Mechanical time constants below one millisecond
- High torque density
- Speeds of up to 5000 rpm
- optional TSX encoder with additional commutation signals

Program

- **EC frameless flat**
- **EC frameless DT**

- **with Hall sensors**
- **sensorless**

1 Stator packet
2 Winding
3 Rotor
4 Permanent magnet
5 Circuit board with Hall sensors

Electronical commutation

Block commutation with Hall sensors
The rotor position is reported by three built-in Hall sensors or by the optional TSX encoder. The Hall sensors are set at an angle of 120° to one another and provide six different signal combinations per turn. The three partial windings are now powered in six different conductive phases, depending on the sensor information. The current and voltage supply are block-shaped. The switching position of each electronic commutation is offset 30° from the respective torque peak.

Properties of block commutation
- Relatively simple and favorably priced electronics
- Torque ripple of 14%
- Controlled motor start-up
- High starting torques and accelerations possible
- Servo drives, Start/stop operation
- Positioning tasks
- The data of the maxon EC motors are determined with block commutation.

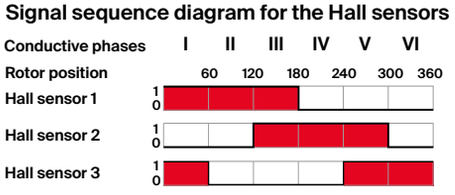
Sinusoidal commutation
Sinusoidal commutation or field-oriented control (FOC) for frameless EC motors with slotted winding is possible. However, the main benefit of sinusoidal commutation – the smooth operation – only comes into play to a limited degree due to the detent.

The high-resolution signals from the encoder are used for generating sine-shape motor currents in the electronics. The currents through the three motor windings are related to the rotor position and are shifted at each phase by 120° (sinusoidal commutation). This results in the theoretically very smooth, precise running of the motor and, in a very precise, high quality control.

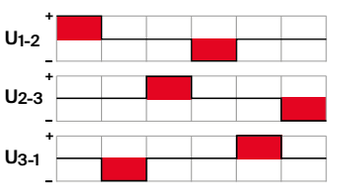
Properties of sinusoidal commutation
- More expensive electronics
- Requires an encoder
- Precise, high quality field-oriented control (FOC)
- Approx. 5% more continuous torque compared to block commutation
- Highly dynamic servo drives
- Positioning tasks

Block commutation

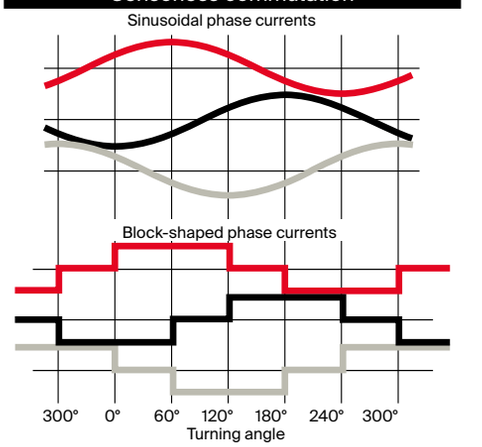
Signal sequence diagram for the Hall sensors



Supplied motor voltage (phase to phase)

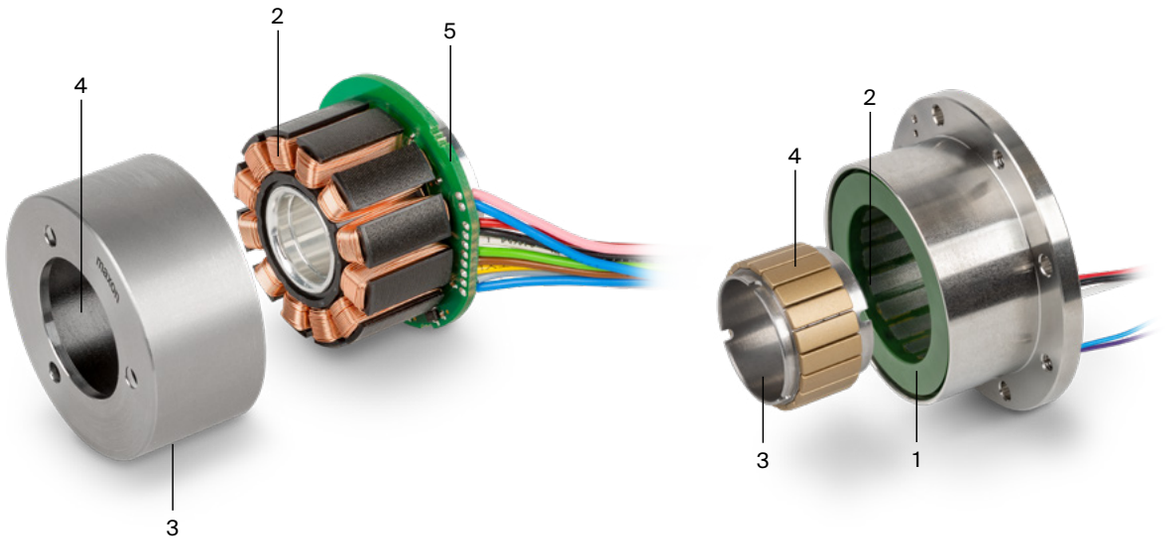


Sensorless commutation



Legend
The commutation angle is based on the length of a full commutation sequence (360°e). The length of a commutation interval is therefore 60°e.
The values of the shaft position can be calculated from the commutation angle divided by the number of pole pairs.

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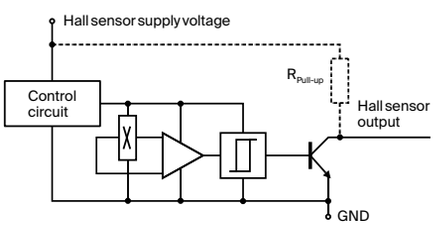
TSX MAG encoder
The optional TSX MAG encoder module can be combined with the EC frameless DT motors. The rotor of the motor needs to be equipped with an additional magnetic target ring.
The TSX MAG module will be placed on the stator leaving the hollow rotor shaft free and programmed to deliver proper commutation signals as well. Hence, rotor and stator need to be paired.



Hall sensor circuit

The open collector output of Hall sensors does not normally have its own pull-up resistance, as this is integral in maxon controllers. Any exceptions are specifically mentioned in the relevant motor data sheets.

Wiring diagram for Hall sensors



The power consumption of a Hall sensor is typically 4 mA (for output of Hall sensor = “HI”).

Integration and service life

Frameless motors are direct drives that are integrated in the application. The installation instructions available on the maxon website give detailed specification for optimum assembly.
The service life will be mainly defined by the chosen bearing assembly and the operational conditions (bearing load, speed).

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Properties of the brushless **maxon EC-max motors** with integrated electronics:
- Operated directly with DC voltage
- Integrated commutation electronics
- Ironless winding for good synchronization without cogging torque

Properties of the brushless **maxon EC-i motors** with integrated electronics:
- Can be operated directly with DC voltage
- Integrated commutation electronics with 4-Q speed control
- Separate set value input. Optionally with Enable or Direction input
- Speed monitor output
- Flat design with high torque

Properties of the brushless maxon **ECX flat motors** with integrated electronics
- Can be operated directly with DC voltage
- Integrated commutation electronics with 4Q speed control (Hall sensor feedback)
- Configurable speed range
- Configurable set value: analog voltage, fixed set value
- Configurable digital inputs and outputs: Enable, Direction, Monitor outputs for speed or current
- Short design with high torque

Properties of the **maxon IDX drives:**
- Compact drive with integrated EPOS4 positioning/speed controller
- Field-oriented control
- Command via CANopen, EtherCAT or I/Os
- Integrated absolute encoder
- High power density
- IP65-protected design
- Optional holding brake and gearhead

Program

- **EC-max with integrated electronics**
- **EC-i with integrated electronics**
- **ECX FLAT with integrated electronics**
- **IDX drives**

1	Gearhead (optional)
2	Motor
3	Holding brake (optional)
4	Encoder
5	Housing with connections
6	Electronics (EPOS4)

Integrated electronics

On motors with integrated electronics, the electronic commutation (usually block commutation with Hall sensors) is built in. Usually speed control and other functionalities (activation, reversal of direction of rotation, speed monitor) are also implemented.

Properties
- Easy operation with DC voltage
- Fewer connections than EC motor
- No additional electronics required for commutation
- Possible power loss due to space constraints and the thermal coupling in the motor



EC-max 16





EC-i 30 iE



ECX FLAT 32

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IDX drives

The maxon IDX drives consist of a motor based on EC-i technology, a magnetic absolute encoder and an EPOS4 positioning controller with integrated field-oriented control (FOC).
- IP65 protection; only the output shaft needs to be sealed by the customer.
- Integrated temperature sensors on the winding and in the controller are evaluated directly in the drive and enable optimal utilization of the operating range.

EPOS4 positioning controller
The integrated EPOS4 enables different operating modes: Positioning, speed or current control. The drive can be commanded via EtherCAT or CANopen. The IDX drive is equipped with configurable digital and analog inputs and outputs. These are matched optimally to the various functions and operating modes of the CiA-402 device profile.
- Easy commissioning due to preconfigured motor, encoder and brake parameters, as well as auto-tuning function
- EPOS Studio: Intuitive software for commissioning
- Libraries for lean integration into a wide variety of master systems
- All documentation and software is available free of charge

Alternative version without fieldbus
(I/O version)
Commands are given via the inputs and outputs. In this case, only current and speed control are supported (no position control).

Optional brake
The holding brake blocks the motor when disconnected from power. The brake is controlled by the integrated controller.
- Minimally longer drive
- Holding brake, not suitable for deceleration.
- The brake influences the temperature range and the minimum permissible supply voltage The electrical properties, performance data, dimensional drawings and CAD data of the brake with drive are available online.

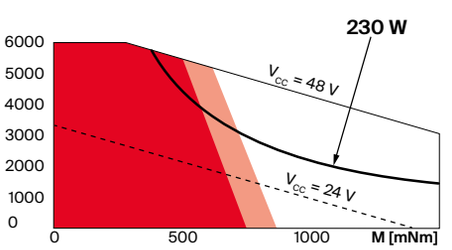
Cables
Only minimal work is needed for cabling the IDX drive, as only the power supply, command cabling and, if necessary, the I/Os have to be connected. In the online shop, maxon offers a selection of suitable cables.

Drive selection
maxon IDX drives are integrated systems that cannot be viewed and specified like separate motor-controller combinations. The supply current and supply voltage are not the currents and voltages that are present at the motor. For this reason, the data sheet does not specify motor characteristics, such as torque constant or speed constant.

For specification in an application, the nominal torque, the maximum torque (short-term), the nominal speed, as well as the maximum drive speed have to be referenced for the given supply voltage. The operating range diagrams can be useful for this.

At www.maxongroup.com, detailed documentation can be downloaded.

n [rpm] **48-V-system**



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Gears

If mechanical power is required at a high torque and correspondingly reduced speed, a maxon precision gear is recommended. According to the gear ratio the output speed is reduced while the output torque is enhanced. For a more precise determination of the latter, efficiency must be taken into consideration.

Conversion
The conversion of speed and torque of the gear output (n_L, M_L) to the motor shaft (n_{mot}, M_{mot}) follows the following equations:

$$n_{mot} = i \cdot n_L$$

$$M_{mot} = \frac{M_L}{i \cdot \eta}$$

where:
i: reduction
η: Gearhead efficiency

Program

- **GPX/GP (Planetary gearhead)**
- **GS (Spur gearhead)**
- **KD (Koaxdrive)**
- **GSW (Strain wave gearhead)**
- **GPS (Screw drives)**

1	Output shaft
2	Mounting flange
3	Bearing of the output shaft
4	Axial security
5	Intermediate plate
6	Cogwheel
7	Planetary gearwheel
8	Sun gearwheel
9	Planet carrier
10	Internal gear

Selection of gears

For the selection of the gearhead, the maximum transmittable power – the product of speed and torque – is decisive. It should be noted that the transmittable power depends on the number of gear stages.
The load torque should be below the nominal torque (max. continuous torque) of the gearhead $M_{N,G}$.

$$M_{N,G} \geq M_L$$

For short-term loading, the short-term torque of the gearhead must also be considered. Where possible, the input speed of the gear $n_{max,G}$ should not be exceeded. This limits the maximum possible reduction i_{max} at a given operating speed. The following applies to the selection of the reduction i

$$i \leq i_{max} = \frac{n_{max,G}}{n_L}$$

If the gear is selected, the data conversed to the motor axis (n_{mot}, M_{mot}) are used to select the motor. The maxon modular system defines the proper motor-gear combinations.

Service life

The gears usually achieve 1000 to 3000 operating hours in continuous operation at the maximum permissible load and recommended input speed. Service life is significantly extended if these limits are not pushed.
If the speed drops below this threshold, the gearhead may be loaded with higher torques without compromising the life span. On the other hand, higher speeds and thus higher reduction ratios can be chosen if the torque limits are not fully exploited.
Factors affecting life span include:
- Exceeding maximum torque can lead to excessive wear.
- Local temperature peaks in the area of tooth contact can destroy the lubricant.
- Massively exceeding the gear input speed reduces the service life.
- Radial and axial loads on the bearing.

Temperature/lubrication

maxon gears are lubricated for life. The lubricants used are especially effective in the recommended temperature range. At higher or lower operating temperatures we offer recommendations for special lubricants.

Spur gearhead

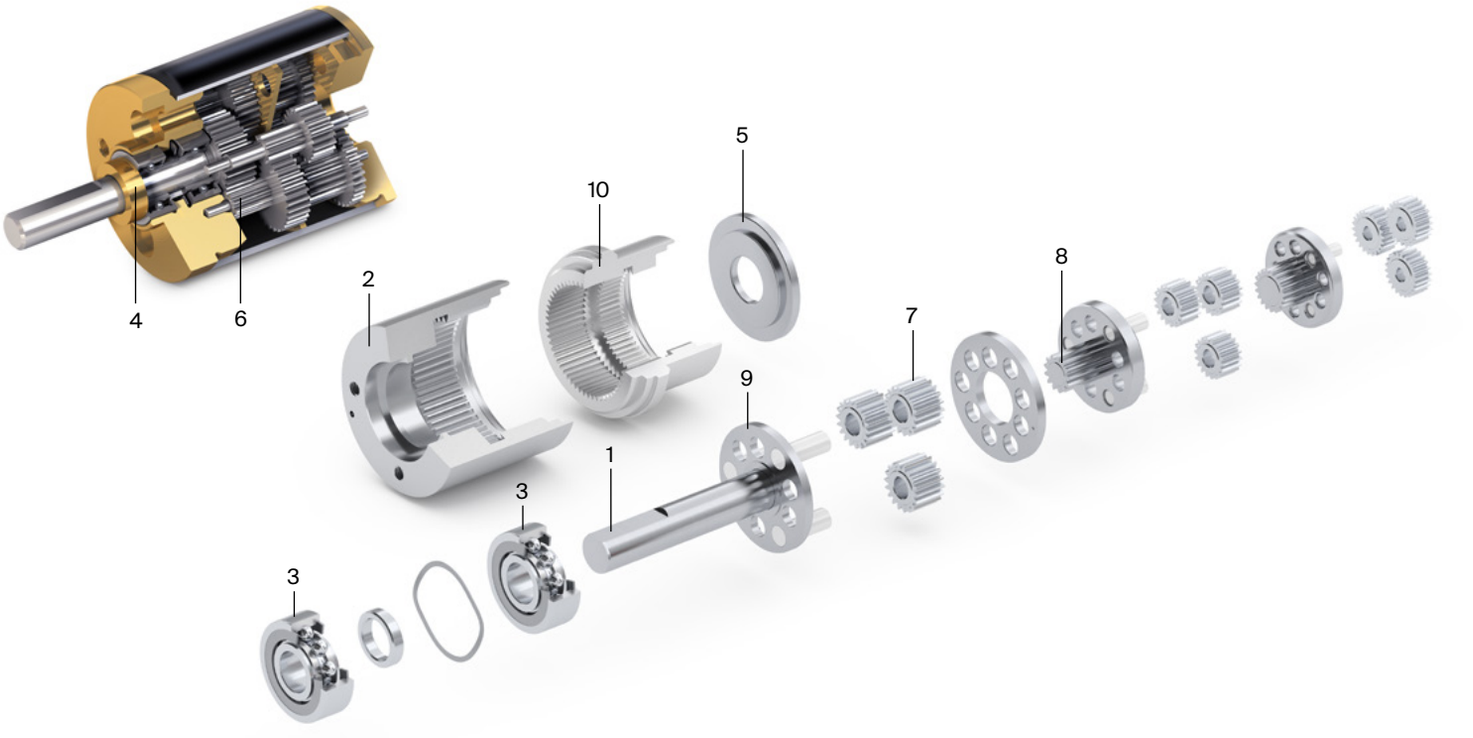
The gear consists of one or more stages. One stage represents the pairing of two cogwheels. The first cogwheel (pinion) is mounted directly on the motor shaft. The bearing of the output shaft is usually made of sintered material.
- Favorably priced
- For low torques
- Output torque up to 2 Nm
- Reduction ratios of 5:1 to 5752:1
- External – ∅12 – 45 mm
- Low noise level
- High efficiency

Planetary gearhead

Planetary gears are particularly suitable for the transfer of high torques. Large gearheads are normally fitted with ball bearings at gearhead output.
- For transferring high torques up to 180 Nm
- Reduction ratios of 4:1 to 6285:1
- External diameter 4–81 mm
- High performance in a small space
- High reduction ratio in a small space
- Concentric gear input and output

Ceramic versions
By using ceramic components in gearheads, the wear characteristics of critical components can be significantly improved. The result when compared to purely metal gearheads is:
- Longer service life
- Higher continuous torques
- Higher intermittent torques
- Higher input speeds

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Ultra-performance gearhead
The UP (Ultra Performance) gearhead uses rolling bearings in all stages. This results in a very high efficiency and thus in a higher load capacity, as well as back-drivability even with high reductions.

High power gearhead
Especially high output torques in the output stage of planetary gearheads can be achieved through the following measures
– Use of ceramic components
– 4 instead of 3 planet gears in the output stage
– Additional motor-side support of the output stage
– Reinforcement of the output bearings

Heavy duty gearhead
The HD (heavy duty) gearheads are characterized by their robust construction. The use of stainless steel and optimized welding joints enable use under the most extreme conditions.

Reduced backlash gearhead
The reduction in backlash is achieved through a preloading of the planet gears in the output stage. Despite the wear that occurs during operation, the gearhead backlash remains constantly low, unlike for gearheads in which the backlash reduction is achieved by low-tolerance manufacturing and material pairing.

Sterilizable gearhead
Sterilizable gearheads are characterized by the use of stainless steel and special lubricants. The bearing of the output shaft and the connection to the motor are designed so that fluid leaking into the gearhead is inhibited.

Koaxdrive

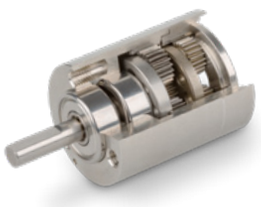
Noise reduction
Noise is primarily generated in the input stage of the gearhead. The following measures can help to reduce noise:
– Smaller input speeds and thus smaller relative velocity of the tooth flanks
– Input stage with plastic gears
– Use of a Koaxdrive gearhead

The quiet “Koaxdrive” combines worm and planetary gearing. In the first stage, a separately mounted worm drives the three offset planetary wheels which then mesh in the specially toothed internal geared wheel. All further stages are designed as a normal planetary gear:
– low noise
– high reduction ratio in the first stage
– other properties as planetary gears

Strain wave gearhead

Strain wave gearheads make use of the principle of elastic deformation and the flexibility of one component, known as the flexspline. The centerpiece of the strain wave gearhead is the wave generator, an elliptical shaft. This shaft deforms the flexspline, a thin-walled flexible ring that meshes with a rigid outer ring (circular spline). This deformation generates radial motion that is converted into rotational motion.

– Zero backlash and precise
– High torsional rigidity
– High reduction ratios
– Large hollow shaft possible







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Encoder

maxon offers a range of different encoders. Their main characteristics are:

Digital incremental encoders
- Relative position signal, suitable for positioning tasks
- Direction of rotation detection
- Speed information from number of pulses per unit of time
- Standard solution for many applications

Digital absolute encoders
- Absolute position signal, suitable for positioning without a homing procedure
- Option to generate commutation signals

DC tacho
- Analog speed signal
- Direction of rotation detection
- Not suited for positioning tasks

Resolver
- Analog signal transmission
- More complex evaluation electronics required in controller
- For special industrial solutions

Encoder signals

Digital incremental encoders
Position changes (relative position) are transmitted to the controller as square pulses. The controller evaluates these pulses for precise positioning or speed measurement. The signal transmission is implemented via two phase-shifted channels (A and B) that are compared to determine the direction of rotation. Usually the phasing of channels A and B applies for operation in a clockwise direction (CW), relative to the motor shaft seen from the outside.
The maxon controllers evaluate the signal edges. This results in a four times higher positioning resolution relative to the counts per turn of the encoder. The technical term for this is quad counts or states. The absolute position can be determined by homing to a fixed position. The signal edges of index channel I can be used for a precise reference position.

Program

- **MILE (inductive encoders)**
- **EASY, MAG, MR, IMR, GAMA, TSX (magnetic encoders)**
- **Enc, HEDS, HEDL, RIO (optical encoders)**
- **DC-Tacho, Resolver (analog sensors)**
- **EMT (magnetic absolute encoder)**

Take a look at the ENX 22 EMT encoder.

The line driver is a driver built into the encoder to improve the signal quality through steeper edges. Additionally, it generates the complementary signals $\overline{A}$, $\overline{B}$, and $\overline{I}$. Differential signals make it possible to eliminate faults during transmission.

Absolute encoders
Absolute encoders return the absolute position as a bit sequence which is transmitted at the clock rate of the controller with a suitable protocol (SSI, BiSS-C). The resolution is given as a bit length; e.g., 12-bit equals 4096 positions. Single-turn absolute encoders output the position only within one motor revolution. Multi-turn absolute encoders determine the position unambiguously over several revolutions. They are able to detect motor revolutions even without a power supply. At start-up, the motor position over multiple revolutions is thus known.

1	End cap
2	Electrical connections motor and encoder
3	PCB
4	MR sensor
5	Magnetic multi-pole wheel
6	Encoder housing
7	Graduated disk
8	Encoder fork coupler
9	Flange
10	Solid measure
11	Sensor with housing

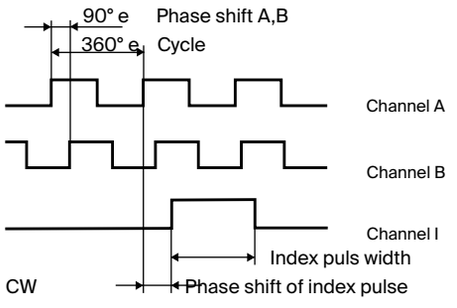
Key points for encoder selection

These are the main characteristics of maxon incremental encoders:
- Counts per turn (increments)
- Accuracy
- Use of an index channel
- Use of a line driver
- Maximum supported speed
- Suitability for special ambient conditions (dust, oil, magnetic fields, ionizing radiation)

Encoders and maxon controllers
- The input frequency of the control electronics may limit the maximum possible counts per turn of the encoder.
- The higher the counts per turn and the accuracy, the easier it is to achieve a smooth, jolt-free operation even at low speeds.
- The maxon controllers can be configured for encoders with low (at least 16 cpt) or high counts per turn.

For positioning systems, the following applies:
- The higher the counts per turn, the more accurate the positioning. At 500 counts (2000 statuses), a mechanical angle resolution of 0.18° is achieved. This is usually much higher than the precision of the mechanical drive components.
- In positioning controllers, only encoders with an integrated line driver should be used (e.g. RS422). This prevents signal loss and accumulated positioning errors due to electromagnetic interference.
- Positioning applications often required the encoder's index channel for precise determination of a reference point.

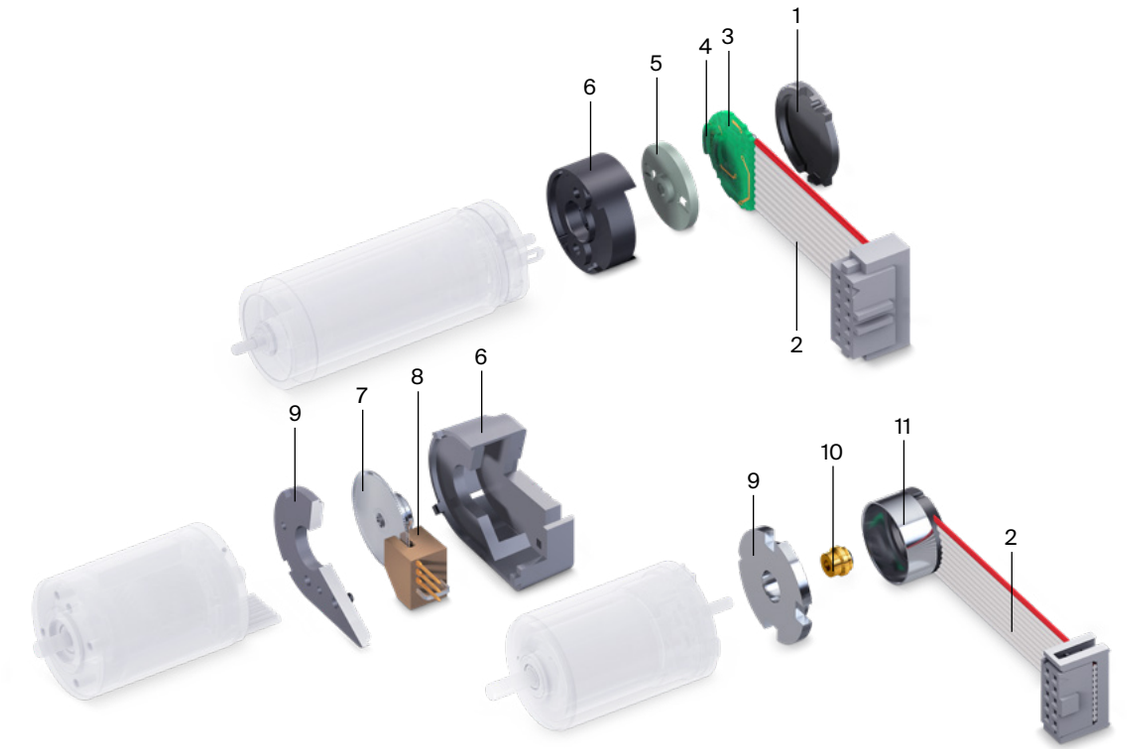
Representation of the output signal of a digital encoder



Recommendations on encoder selection

(✓) Conditionally applicable *OPT, ENC, HEDL, HEDS		QUAD	GAMA	MR	EASY/IMR	MILE	optical*	RIO
1	very high speed	✓	✓	✓	✓	(✓)		✓
2	very low speed			(✓)	(✓)	✓	✓	✓
3	precise position			(✓)	(✓)	(✓)	✓	✓
4	line driver possible			✓	✓	✓	✓	✓
5	index channel possible			✓	✓		✓	✓
6	compact design	✓	(✓)	✓	✓	✓		✓
7	dust, dirt, oil	✓	✓	✓	✓	✓		(✓)
8	external magnetic fields	(✓)	(✓)		(✓)	✓	✓	✓
9	ionising radiation		✓					

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Magnetic encoders

In magnetic encoders, a small permanent magnet is installed on the spinning motor shaft. Sensors in the stator capture the changes in the magnetic flux. The signals are evaluated in the encoder and transmitted to the controller as pulses or as an absolute signal. Magnetic encoders are typically very small and resilient to dirt.

EASY, TSX and MAG encoders
- Integrated circuit based on Hall sensors and interpolator
- EASY incremental: Factory programmable resolution from 1 to 1024 counts per turn, with index channel and line driver
- TSX incremental encoder for peripheral mounting: Programmed for specific rotor and stator; 2 channels plus commutation signals
- EASY absolute: Single-turn with 4096 states (12-bit) and Biss-C or SSI interface
- MAG incremental: Various resolutions available (up to 256 counts per turn); recommended for battery operation

MR and IMR encoder (incremental)
- Magneto-resistive Sensor with/without interpolator
- Various resolutions available (up to 1024 counts per turn)
- With/Without index channel and/or line driver
- Magnetoresistive sensor
- Up to 1024 counts
- With/without index channel and/or line driver

GAMA and QUAD encoder (incremental)
- Digital Hall sensors without interpolation
- Line driver not available
- GAMA: 12 or 16 counts per turn
- QUAD: 1 count per turn (4 states)
- Please note: For operation with maxon controllers, at least 16 counts per turn are required.

EMT (absolute)
- Multi-turn absolute encoder
- Resolution: 16-bit multi-turn, up to 17-bit single-turn
- BiSS-C or SSI interface
- Equipped with Wiegand wire technology, thus no batteries required.

Optical encoders

In optical encoders, an LED emits light through a finely structured code wheel (HEDL, HEDS) or directed at a structured reflector (RIO) attached to the motor shaft. The receiver converts the light/dark signals into electrical currents, which are amplified and turned into electrical pulses by the respective electronics. Optical encoders typically have a high resolution and high accuracy.

RIO encoder
- Reflective interpolated optical encoder
- Very high resolution (typically 4096 to 16 384 counts per turn), programmable at the factory
- With index channel and RS422 line driver
- Very small size

Encoder attachment HEDL, HEDS
- Transmissive optical encoders
- With line driver RS422 (HEDL)
- Relatively large size

Inductive encoder

With inductive MILE encoders, a high-frequency alternating field is transmitted via transformer while being modulated angle-dependently using a structured copper disk.

Characteristics
- Highly resistant to magnetic and electrical fields as well as soiling.
- High speeds possible
- High accuracy
- Line driver (can be acc. to RS422)

DC tacho

In principle, any maxon DC motor can be used as a DC tacho. For motor-tacho combinations, we offer a DC tacho that has the tacho rotor mounted directly on the motor shaft.

Characteristics
- Output DC voltage proportional to the speed due to precious metal brushes
- AlNiCo magnet for high signal stability even with temperature fluctuations
- Without additional tacho bearing; no added friction torque
- No couplings, high mechanical resonant frequency

Resolver

The resolver is attached to the continuous shaft of the motor and aligned perfectly with the rotor's magnetic field.
A high-frequency alternating voltage (10 kHz) is transmitted to the rotor via a transformer. During retransformation on two stator coils, the signal is modulated with the sine/cosine of the rotation angle. This makes it possible to derive the position of the rotor.

Characteristics
- Robust, for industrial use
- Long service life
- No mechanical wear
- Interference-free signal transmission over long distances
- No sensitive electronics
- Special signal evaluation required
- Only one encoder for position and speed information
- EC motors with resolvers are delivered without Hall sensors

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Controllers

The **maxon motor control** range includes servo amplifiers for controlling the dynamic maxon DC and EC motors.

Notable features:
- High efficiency
- High PWM frequencies (>50kHz)
- Built-in additional inductance for operation with low-inductance motors

The MACS-multi-axis motion controllers are programmable master controllers for demanding drive systems.

Notable features:
- Highly dynamic synchronization of multi-axis drives
- Curve interpolation
- Extensive functions for programming multi-axis applications

Program

- **DEC modules: 1-Q speed controllers (closed loop) for EC motors**
- **ESCON: 4-Q speed and current controllers for DC and EC motors**
- **EPOS: position controllers for DC and EC motors**
- **MicroMACS6, MiniMACS6, MasterMACS: programmable multi-axis masters**

Motor type
– maxon DC motor
– maxon EC motor
Process variables
– Current, torque
– Speed
– Position
Feedback
– Incremental encoders
– Absolute encoders
– Hall sensors
Communication
– Analog and digital inputs and outputs
– Bus systems (CANopen, EtherCAT, RS232, USB ...)

Master system

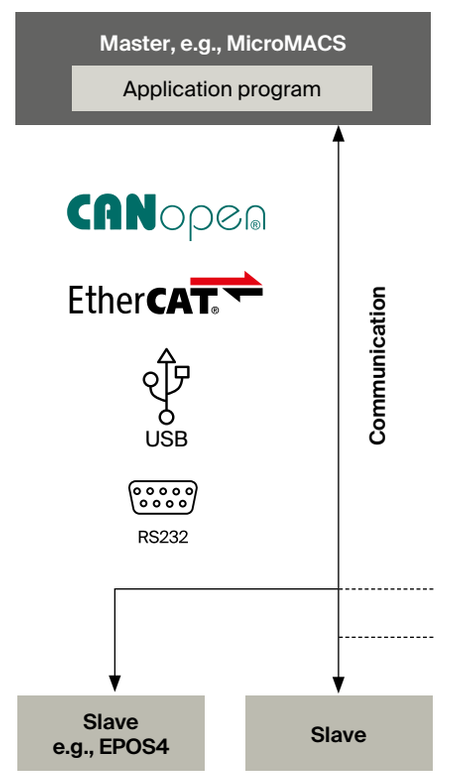
The application program runs on the higher-level master, coordinating all lower-level elements (slaves). The process control uses a suitable communication system to send commands to the motor controllers and to other slave modules in the system. Typically, the master reads the parameters of the slave modules (e.g., current position or the status of an input) and uses them to generate new commands (e.g., a new target position or setting of an output).

Possible master systems
- MasterMACS
- MiniMACS6-AMP
- MicroMACS6
- PLC
- Microcontrollers
- Personal computers

Multi-axis motion controllers

MACS (Multi-Axis Control Systems) are freely programmable master controllers that make it possible to easily synchronize coordinated movements of multiple axes. Powerful commands are available, which can easily handle tasks such as the following:
- PLC functionality as a sequential program (for cyclical processing) or as state machines that work in parallel
- Coordinated time- or path-synchronized multi-axis positioning
- Synchronized execution of CAM profiles (for cam disks) on multiple axes
- Control of freely definable path trajectories with different kinematics (X-Y tables, 3D plotters, SCARA robots, delta robots, etc.)
- Master-slave synchronization of multiple axes with marker comparison

Master-slave architecture



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Motor controllers (Slave)

EPOS
- Current, speed, and/or position controllers (slave) with CANopen or EtherCAT communication.
- Positioning with motion profile, Homing
- Cyclic Synchronous operating modes (CST, CSV, CSP)

ESCON
Current and/or speed controllers (slaves) with I/O communication. (ESCON2 also with CANopen)

Communication

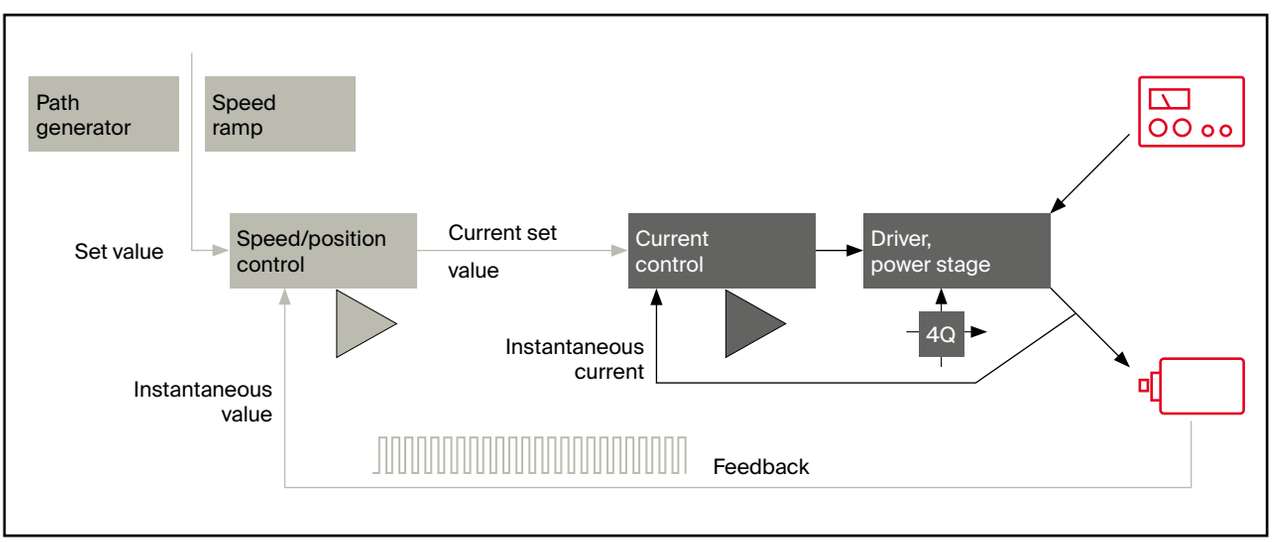
Digital and analog I/O
For simple commands such as Specifying analog set values Activation Stop Reversal of direction of rotation

RS232 and USB
For non-time-critical communication between the master and slaves. Typically up to several tens of milliseconds per command, and not in real time.

CANopen
For time-critical communication of up to 6 commands per ms. Suitable for many applications that do not have extremely high requirements in terms of speed and the number of slaves or axes.

EtherCAT
For top performance, with very fast data exchange between many slaves, even over long distances.

Motor controller (schematic diagram)



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The motor as an energy converter

The electrical motor converts electrical power P_{el} (current I_{mot} and voltage U_{mot}) into mechanical power P_{mech} (speed n and torque M). The losses that arise are divided into frictional losses, attributable to P_{mech} and in Joule power losses P_J of the winding (resistance R). Iron losses do not occur in the coreless maxon DC motors. In maxon EC motors, they are treated formally like an additional friction torque. The power balance can therefore be formulated as:

$$P_{el} = P_{mech} + P_J$$

The detailed result is as follows

$$U_{mot} \cdot I_{mot} = \frac{\pi}{30\,000} n \cdot M + R \cdot I_{mot}^2$$

Electromechanical motor constants
The geometric arrangement of the magnetic circuit and winding defines in detail how the motor converts the electrical input power (current, voltage) into mechanical output power (speed, torque). Two important characteristic values of this energy conversion are the speed constant k_n and the torque constant k_M. The speed constant combines the speed n with the voltage induced in the winding U_{ind} (= EMF). U_{ind} is proportional to the speed; the following applies:

$$n = k_n \cdot U_{ind}$$

Similarly, the torque constant links the mechanical torque M with the electrical current I_{mot}.

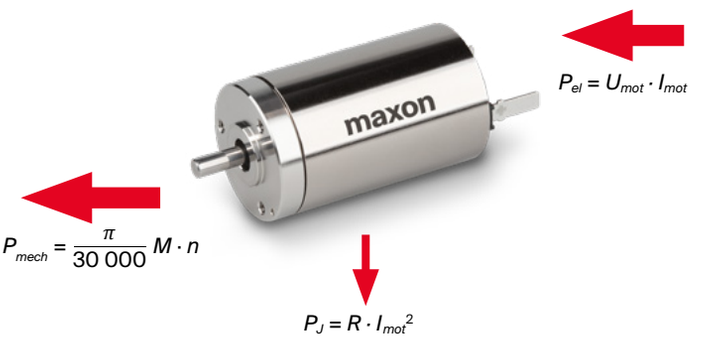
$$M = k_M \cdot I_{mot}$$

The main point of this proportionality is that torque and current are equivalent for the maxon motor.
The current axis in the motor diagrams is therefore shown as parallel to the torque axis as well.

See also: explanation of the motor

Units
In all formulas, the variables are to be used in the units according to the catalog (cf. physical variables and their units on page 86).

The following applies in particular:
– All torques in mNm
– All currents in A (even no load currents)
– Speeds (rpm) instead of angular velocity (rad/s)



Motor constants
Speed constant k_n and torque constant k_M are not independent of one another. The following applies:

$$k_n \cdot k_M = \frac{30\,000}{\pi}$$

The speed constant is also called specific speed. Specific voltage, generator or voltage constants are mainly the reciprocal value of the speed constant and describe the voltage induced in the motor per speed. The torque constant is also called specific torque. The reciprocal value is called specific current or current constant.

Motor diagrams

A diagram can be drawn for every maxon DC and EC motor, from which key motor data can be taken. Although tolerances and temperature influences are not taken into consideration, the values are sufficient for a first estimation in most applications. In the diagram, speed n, current I_{mot}, power output P_2 and efficiency η are applied as a function of torque M at constant voltage U_{mot}.

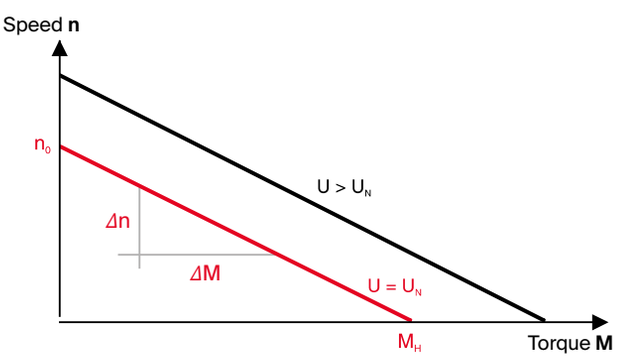
Speed-torque line
This curve describes the mechanical behavior of the motor at a constant voltage U_{mot}:
– Speed decreases linearly with increasing torque.
– The faster the motor turns, the less torque it can provide.
The curve can be described with the help of the two end points, no load speed n_0 and stall torque M_H (cf. lines 2 and 7 in the motor data).
DC motors can be operated at any voltage. No load speed and stall torque change proportionally to the applied voltage. This is equivalent to a parallel shift of the speed-torque line in the diagram. Between the no load speed and voltage, the following proportionality applies in good approximation

$$n_0 \approx k_n \cdot U_{mot}$$

where k_n is the speed constant (line 13 of the motor data).

Independent of the voltage, the speed-torque line is described most practically by the slope or gradient of the curve (line 14 of the motor data).

$$\frac{\Delta n}{\Delta M} = \frac{n_0}{M_H}$$



Derivation of the speed-torque line
The following occurs if one replaces current I_{mot} with torque M using the torque constant in the detailed power balance:

$$U_{mot} \cdot \frac{M}{k_M} = \frac{\pi}{30\,000} n \cdot M + R \cdot \left(\frac{M}{k_M}\right)^2$$

Transformed and taking account of the close relationship of k_M and k_n, an equation is produced of a straight line between speed n and torque M.

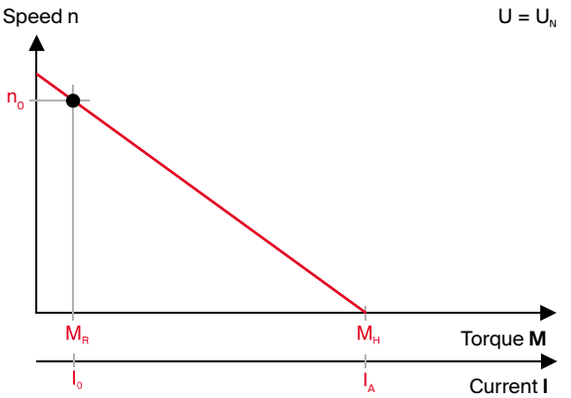
$$n = k_n \cdot U_{mot} - \frac{30\,000}{\pi} \cdot \frac{R}{k_M^2} \cdot M$$

or with the gradient and the no load speed n_0

$$n = n_0 - \frac{\Delta n}{\Delta M} \cdot M$$

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The speed-torque gradient is one of the most informative pieces of data and allows direct comparison between different motors. The smaller the speed-torque gradient, the less sensitive the speed reacts to torque (load) changes and the stronger the motor. With the maxon motor, the speed-torque gradient within the winding series of a motor type (i.e. on one catalog page) remains practically constant.



Current gradient
The equivalence of current to torque is shown by an axis parallel to the torque: more current flowing through the motor produces more torque. The current scale is determined by the two points no load current I_0 and starting current I_A (lines 3 and 8 of motor data).
The no load current is equivalent to the friction torque M_R, that describes the internal friction in the bearings and commutation system.

$M_R = k_M \cdot I_0$

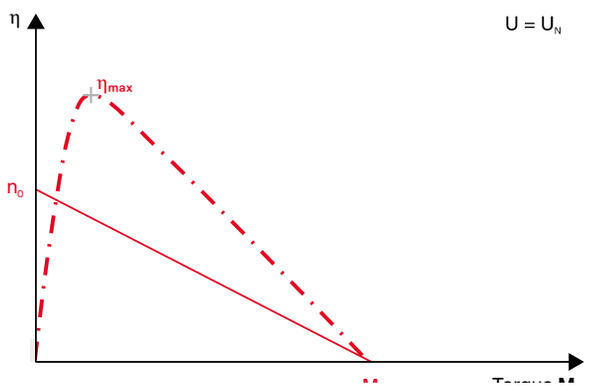
In the maxon EC motor, there are strong, speed dependent iron losses in the stator iron stack instead of friction losses in the commutation system.

The motors develop the highest torque when starting. It is many times greater than the normal operating torque, so the current uptake is the greatest as well.
The following applies for the stall torque M_H and starting current I_A

$M_H = k_M \cdot I_A$

Efficiency curve
The efficiency η describes the relationship of mechanical power delivered to electrical power consumed.

$$\eta = \frac{\pi}{30\,000} \cdot \frac{n \cdot (M - M_R)}{U_{mot} \cdot I_{mot}}$$



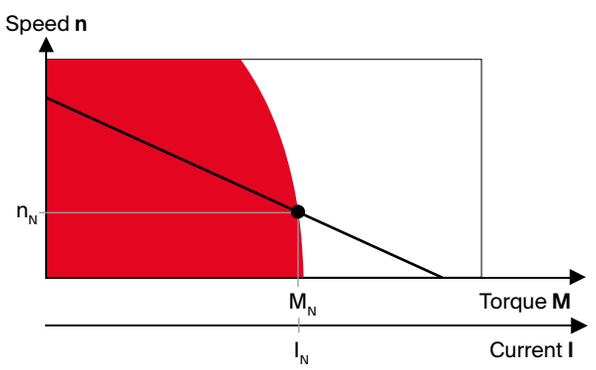
One can see that at constant applied voltage U and due to the proportionality of torque and current, the efficiency increases with increasing speed (decreasing torque). At low torques, friction losses become increasingly significant and efficiency rapidly approaches zero. Maximum efficiency (line 9 of motor data) is calculated using the starting current and no load current and is dependent on voltage.

$$\eta_{max} = \left(1 - \sqrt{\frac{I_0}{I_A}}\right)^2$$

Maximum efficiency and maximum output power do not occur at the same torque.

Rated operating point

The rated operating point is an ideal operating point for the motor and derives from operation at nominal voltage U_N (line 1 of motor data) and nominal current I_N (line 6). The nominal torque M_N produced (line 5) in this operating point follows from the equivalence of torque and current.



$M_N \cong k_M \cdot (I_N - I_0)$

Nominal speed n_N (line 4) is reached in line with the speed gradient.
The choice of nominal voltage follows from considerations of where the maximum no load speed should be. The nominal current derives from the motor's thermally maximum permissible continuous current.

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Motor diagrams, operating ranges

The catalog contains a diagram of every maxon DC and EC motor type that shows the operating ranges of the different winding types using a typical motor.

Permanent operating range
The two criteria “maximum continuous torque” and “maximum permissible speed” limit the continuous operating range. Operating points within this range are not critical thermally and do not generally cause increased wear of the commutation system.

Short-term operating range
The motor may only be loaded with the maximum continuous current for thermal reasons. However, temporary higher currents (torques) are allowed. As long as the winding temperature is below the critical value, the winding will not be damaged. Phases with increased currents are time limited. A measure of how long the temporary overload can last is provided by the thermal time constant of the winding (line 19 of the motor data). The magnitude of the times with overload ranges from several seconds for the smallest motors (6 mm to 13 mm diameter) up to roughly one minute for the largest (60 mm to 90 mm diameter). The calculation of the exact overload duration depends highly on the motor current and the winding temperature at the beginning.

Max. permissible winding temperature
Due to the winding resistance, the motor current causes the winding to heat up. To prevent the motor from overheating, this heat needs to be dissipated to the environment via the stator. The maximum winding temperature (line 22 of the motor data) must not be exceeded even for a short time. For graphite brush motors and EC motors with their usually higher current load, it is 125°C (in some cases up to 155°C). Precious metal commutated motors only allow for low current loads, so that the rotor temperature must not exceed 85°C. Precautions taken during installation, such as good air circulation or cooling plates, may significantly lower the temperature.

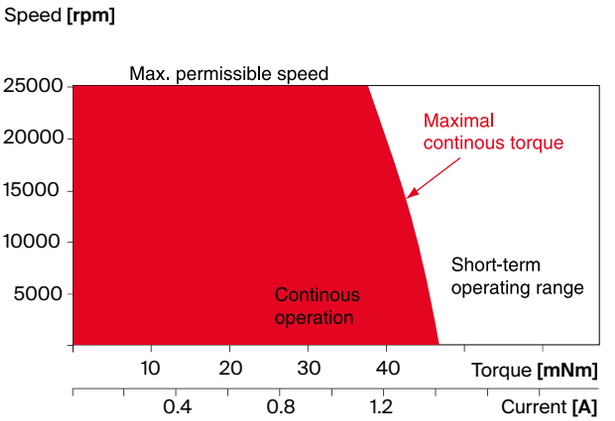
Permissible continuous current, permissible continuous torque
The electrical heat losses define the max. permissible continuous current at which the maximum winding temperature is reached under standard conditions (25°C ambient temperature, no heat dissipation via the flange, air circulating freely). Larger motor currents result in too high winding temperatures.

The nominal current is selected to correspond with this maximum permissible continuous current. It is highly dependent on the winding. Windings with thin wire have lower nominal currents than windings with thick wire. In the case of windings with very low resistance, the current capacity of the brush system can further restrict the permissible continuous current. The graphite brush motors significantly increase the friction losses at high speeds. In EC motors, the eddy current loss in the magnetic return increases when the speed increases and generates additional heat. The maximum permissible continuous current decreases at higher speeds.

The nominal current assigned to the rated torque is practically constant within the winding type of a motor type and is one of the characteristics of the motor type.

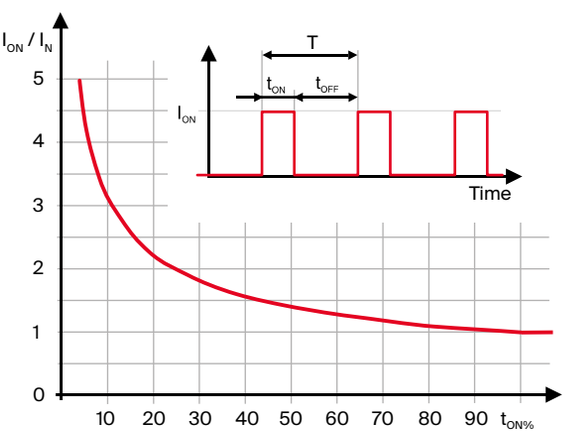
The maximum permissible speed
for DC motors is primarily limited by the commutation system. The commutator and brushes wear more rapidly at very high speeds.
The reasons are:
– Increased mechanical wear because of the large traveled path of the commutator
– Increased electro-erosion because of brush vibration and spark formation.

A further reason for limiting the speed is the rotor’s residual mechanical imbalance which shortens the service life of the bearings. Higher speeds than the limit speed n_{max} (line 23) are possible, however, they are “paid for” by a reduced service life expectancy. The maximum permissible speed for the EC motor is calculated based on service life considerations of the ball bearings (at least 20 000 hours) at the maximum residual imbalance and bearing load.



Operating range diagram

Intermittent operation
Switch-on duration and current



ON	Motor in operation
OFF	Motor stationary
I_{ON}	Max. peak current
I_N	Max. permissible continuous current (line 6)
t_{ON}	ON time *[s]*, should not exeed τ_w (line 19)
T	Cycle time $t_{ON} + t_{OFF}$ *[s]*
$t_{ON\%}$	Duty cycle as percentage of cycle time. The motor may be overloaded by the relationship I_{ON} / I_N at X % of the total cycle time.

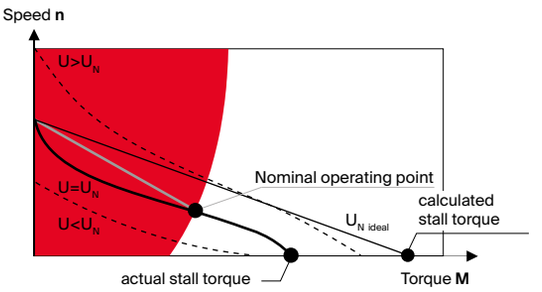
$$I_{on} = I_N \sqrt{\frac{T}{t_{ON}}}$$

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maxon EC flat and EC-i motors

Multi-pole maxon flat motors and EC-i motors require a greater number of commutation steps per revolution (6 x number of pole pairs). Due to their wound stator teeth, they have a higher terminal inductance than motors with an ironless winding. At high speeds, the current cannot fully develop due to the short commutation intervals. The torque is therefore less. In addition, some current is returned to the controller power stage. As a result, the behavior deviates from the ideal linear characteristic depending on voltage and speed: The apparent speed/torque gradient is steeper at higher speeds and flatter at very low speeds.
Mostly, flat motors are operated in the continuous operation range where the achievable speed-torque gradient at nominal voltage can be approximated by a straight line between no load speed and nominal operating point. The achievable speed-torque gradient is approximate.

$$\frac{\Delta n}{\Delta M} \approx \frac{n_0 - n_N}{M_N}$$

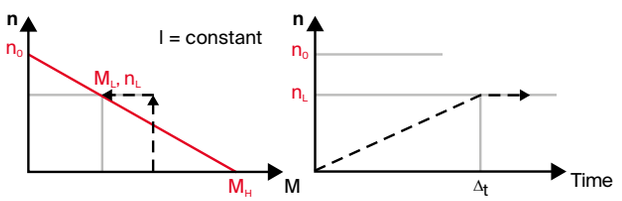


The stall torque specified on the product page is equal to the linearly calculated load torque (without magnetic saturation effect) which causes the shaft to stall at nominal voltage. With EC-flat and EC-i motors, this torque often cannot be achieved due to saturation effects.

Acceleration

In accordance with the electrical boundary conditions (power supply, control, battery), a distinction is primarily made between two different starting processes:
– Start at constant voltage (without current limitation)
– Start at constant current (with current limitation)

Start under constant current
A current limit always means that the motor can only deliver a limited torque. In the speed-torque diagram, the speed increases on a vertical line with a constant torque. Acceleration is also constant, thus simplifying the calculation. Start at constant current is usually found in applications with servo amplifiers, where acceleration torques are limited by the amplifier's peak current.



– Angular acceleration α (in rad/s²) at constant current I or constant torque M with an additional load of inertia J_L:

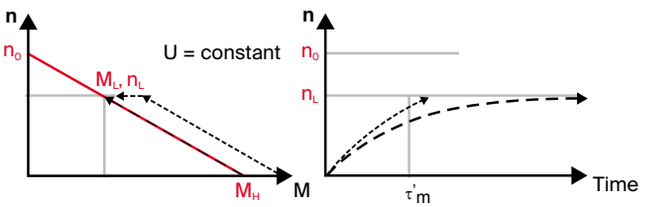
$$\alpha = 10^4 \cdot \frac{k_M \cdot I_{mot}}{J_R + J_L} = 10^4 \cdot \frac{M}{J_R + J_L}$$

– Run-up time Δt (in ms) at a speed change Δn with an additional load inertia J_L:

$$\Delta t = \frac{\pi}{300} \cdot \Delta n \cdot \frac{J_R + J_L}{k_M \cdot I_{mot}}$$

(all variables in units according to the catalog)

Start with constant terminal voltage
Here, the speed increases from the stall torque along the speed-torque line. The greatest torque and thus the greatest acceleration is effective at the start. The faster the motor turns, the lower the acceleration. The speed increases more slowly. This exponentially flattening increase is described by the mechanical time constant τ_m (line 15 of the motor data). After this time, the rotor at the free shaft end has attained 63% of the no load speed. After roughly three mechanical time constants, the rotor has almost reached the no load speed.



– Mechanical time constant τ_m (in ms) of the unloaded motor:

$$\tau_m = 100 \cdot \frac{J_R \cdot R}{k_M^{\,2}}$$

– Mechanical time constants τ_m' (in ms) with an additional load inertia J_L:

$$\tau_m' = 100 \cdot \frac{J_R \cdot R}{k_M^{\,2}} \left(1 + \frac{J_L}{J_R}\right)$$

– Maximum angular acceleration α_{max} (in rad/s²) of the unloaded motor:

$$\alpha_{max} = 10^4 \cdot \frac{M_H}{J_R}$$

– Maximum angular acceleration α_{max} (in rad/s²) with an additional load inertia J_L:

$$\alpha_{max} = 10^4 \cdot \frac{M_H}{J_R + J_L}$$

Speeding up to an operation point with constant load torque M_L and load speed n_L follows an exponential law.

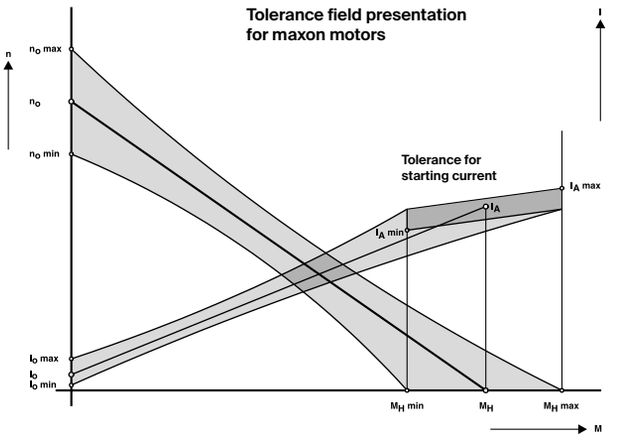
$$n(t) = n_L \left(1 - e^{-t/\tau_m'}\right)$$

The motor voltage U must be selected to achieve this operation point. Faster acceleration requires a higher voltage that eventually must be reduced for reaching the required operation speed (see the thin dashed line).

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Tolerances

Tolerances must be considered in critical ranges. The possible deviations of the mechanical dimensions can be found in the overview drawings. The motor data are average values: the adjacent diagram shows the effect of tolerances on the curve characteristics. They are mainly caused by differences in the magnetic field strength and in wire resistance, and not so much by mechanical influences. The changes are heavily exaggerated in the diagram and are simplified to improve understanding. It is clear, however, that in the motor's actual operating range, the tolerance range is more limited than at start or at no load. Our computer sheets contain all detailed specifications.



Thermal behavior

The Joule power losses P_J in the winding determine heating of the motor. This heat energy must be dissipated via the surfaces of the winding and motor. The increase ΔT_W of the winding temperature T_W with regard to the ambient temperature arises from heat losses P_J and thermal resistances R_{th1} and R_{th2}.

$$T_W - T_U = \Delta T_W = (R_{th1} + R_{th2}) \cdot P_J$$

Here, thermal resistance R_{th1} relates to the heat transfer between the winding and the stator (magnetic return and magnet), whereas R_{th2} describes the heat transfer from the housing to the environment. Mounting the motor on a heat dissipating chassis noticeably lowers thermal resistance R_{th2}. The values specified in the data sheets for thermal resistances and the maximum continuous current were determined in a series of tests, in which the motor was end-mounted onto a vertical plastic plate. The modified thermal resistance R_{th2} that occurs in a particular application must be determined using original installation and ambient conditions. Thermal resistance R_{th2} on motors with metal flanges decreases by up to 80% if the motor is coupled to a good heat-conducting (e.g. metallic) retainer.

The heating runs at different rates for the winding and stator due to the different masses. After switching on the current, the winding heats up first (with time constants from several seconds to half a minute). The stator reacts much slower, with time constants ranging from 1 to 30 minutes depending on motor size. A thermal balance is gradually established. The temperature difference of the winding compared to the ambient temperature can be determined with the value of the current I (or in intermittent operation with the effective value of the current $I = I_{RMS}$).

$$\Delta T_W \quad \frac{(R_{th1} + R_{th2}) \cdot R \cdot I_{mot}^{\,2}}{1 - \alpha_{Cu} \cdot (R_{th1} + R_{th2}) \cdot R \cdot I_{mot}^{\,2}}$$

Here, electrical resistance R must be applied at the actual ambient temperature.

Influence of temperature
An increased motor temperature affects winding resistance and magnetic characteristic values.

Winding resistance increases linearly according to the thermal resistance coefficient for copper ($\alpha_{Cu} = 0.0039$):

$$R_T = R_{25} \cdot (1 + \alpha_{Cu}\,(T - 25°C))$$

Example: a winding temperature of 75°C causes the winding resistance to increase by nearly 20%.

The magnet becomes weaker at higher temperatures. The reduction is 0.5 to 5% at 75°C depending on the magnet material.

The most important consequence of increased motor temperature is that the speed curve becomes steeper which reduces the stall torque. The changed stall torque can be calculated in first approximation from the voltage and increased winding resistance:

$$M_H = k_M \cdot I_A = k_M \cdot \frac{U_{mot}}{R_T}$$

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Motor selection

The drive requirements must be defined before proceeding to motor selection.
– How fast and at which torques does the load move?
– How long do the individual load phases last?
– What accelerations take place?
– How great are the mass inertias?
Often the drive is indirect, this means that there is a mechanical transformation of the motor output power using belts, gears, screws and the like. The drive parameters, therefore, are to be calculated to the motor shaft. Additional steps for gear selection are listed below.

Furthermore, the power supply requirements need to be checked.
– Which maximum voltage is available at the motor terminals?
– Which limitations apply with regard to current?
The current and voltage of motors supplied with batteries or solar cells are very limited. In the case of control of the unit via a servo amplifier, the amplifier's maximum current is often an important limit.

Selection of motor types
The possible motor types are selected using the required torque. On the one hand, the peak torque, M_{max}, is to be taken into consideration and on the other, the effective torque M_{RMS}. Continuous operation is characterized by a single operating or load point (M_L, n_L). The motor types in question must have a nominal torque M_N that is greater than load torque M_L.

$M_N > M_L$

In operating cycles, such as start/stop operation, the motor's nominal torque must be greater than the effective load torque (RMS). This prevents the motor from overheating.

$M_N > M_{RMS}$

The stall torque of the selected motor should usually exceed the emerging load peak torque.

$M_H > M_{max}$

Selection of the winding: electric requirement
In selecting the winding, it must be ensured that the voltage applied directly to the motor is sufficient for attaining the required speed in all operating points.

Uncontrolled operation
In applications with only one operating point, this is often achieved with a fixed voltage U. A winding is sought with a speed-torque line that passes through the operating point at the specified voltage. The calculation uses the fact that all motors of a type feature practically the same speed-torque gradient. A target no load speed $n_{0,theor}$ is calculated from operating point (n_L, M_L).

$$n_{0,\,theor} = n_L + \frac{\Delta n}{\Delta M} M_L$$

This target no load speed must be achieved with the existing voltage U, which defines the target speed constant.

$$k_{n,\,theor} = \frac{n_{0,\,theor}}{U_{mot}}$$

Those windings whose k_n is as close to $k_{n,\,theor}$ as possible, will approximate the operating point the best at the specified voltage. A somewhat larger speed constant results in a somewhat higher speed, a smaller speed constant results in a lower one. The variation of the voltage adjusts the speed to the required value, a principle that servo amplifiers also use.

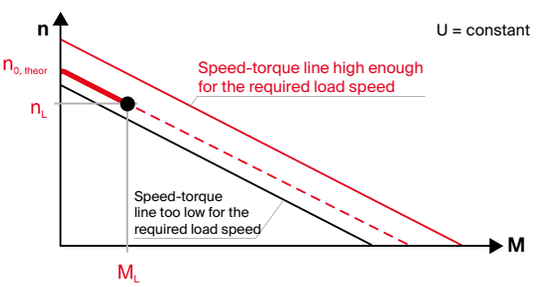
The motor current I_{mot} is calculated using the torque constant k_M of the selected winding and the load torque M_L.

$$I_{mot} = \frac{M_L}{k_M}$$

Advices for evaluating the requirements:
Often the load points (especially the torque) are not known or are difficult to determine. In such cases you can operate your device with a measuring motor roughly estimated according to size and power. Vary the voltage until the desired operating points and motion sequences have been achieved. Measure the voltage and current flow. Using these specifications and the part number of the measuring motor, our engineers can often specify the suitable motor for your application.

Additional optimization criteria are, for example:
– Mass to be accelerated (type, mass inertia)
– Type of operation (continuous, intermittent, reversing)
– Ambient conditions (temperature, humidity, medium)
– Power supply, battery

When selecting the motor type, other constraints also play a major role:
– What maximum length should the drive unit have, including gear and encoder diameter?
– What service life is expected from the motor and which commutation system should be used?
– Precious metal commutation for continuous operation at low currents (rule of thumb for longest service life: up to approx. 50% of I_N).
– Graphite commutation for high continuous currents (rule of thumb: 50% to approx. 75% of I_N) and frequent current peaks (start/stop operation, reversing operation).
– Electronic commutation for highest speeds and longest service life.
– How great are the forces on the shaft, do ball bearings have to be used or are less expensive sintered bearings sufficient?

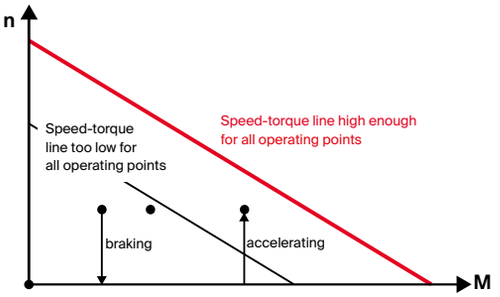


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Regulated servo drives
In operating cycles, all operating points must lie beneath the curve at a maximum voltage U_{max}. Mathematically, this means that the following must apply for all operating points (n_L, M_L):

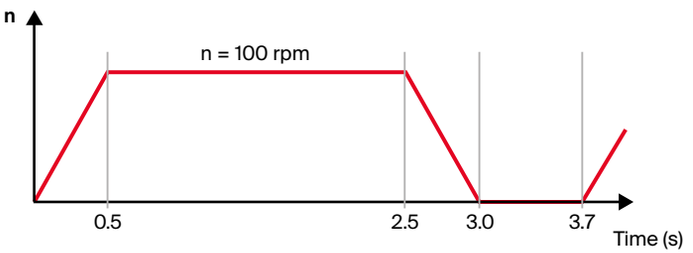
$$k_n \cdot U_{max} = n_0 > n_L + \frac{\Delta n}{\Delta M} M_L$$

When using servo amplifiers, a voltage drop occurs at the power stage, so that the effective voltage applied to the motor is lower. This must be taken into consideration when determining the maximum supply voltage U_{max}. It is recommended that a regulating reserve of some 20% be included, so that regulation is even ensured with an unfavorable tolerance situation of motor, load, amplifier and supply voltage. Finally, the average current load and peak current are calculated ensuring that the servo amplifier used can deliver these currents. In some cases, a higher resistance winding must be selected, so that the currents are lower. However, the required voltage is then increased.



Example for motor/gear selection

The following speed curve is to be repeated cyclically.



The accelerated load inertia J_L is 300 000 gcm² = 0.03 kgm². The friction torque is 400 mNm. The motor is driven with the 4-Q servo amplifier ESCON 36/2 DC for DC motors. The power supply has a maximum output of 3 A and 24 V.

Calculation of load data
The torque required for acceleration and braking are calculated as follows (motor and gearhead inertia omitted):

$$M_\alpha = J_L \cdot \frac{\pi}{30} \frac{\Delta n}{\Delta t} = 0.03 \cdot \frac{\pi}{30} \cdot \frac{100}{0.5} = 0.628 \text{ Nm} = 628 \text{ mNm}$$

Together with the friction torque, the following torques result for the different phases of motion.

– Acceleration phase	(duration 0.5 s)	1028 mNm
– Constant speed	(duration 2 s)	400 mNm
– Braking (friction brakes with 400 mNm)	(duration 0.5 s)	-228 mNm
– Standstill	(duration 0.7 s)	0 mNm

Peak torque occurs during acceleration.
The RMS determined torque of the entire operating cycle is

$$M_{RMS} = \sqrt{\frac{t_1 \cdot M^2_1 + t_2 \cdot M^2_2 + t_3 \cdot M^2_3 + t_4 \cdot M^2_4}{t_{tot}}}$$

$$= \sqrt{\frac{0.5 \cdot 1028^2 + 2 \cdot 400^2 + 0.5 \cdot (-228)^2 + 0.7 \cdot 0}{3.7}} \approx 486 \text{ mNm}$$

The maximum speed (100 rpm) occurs at the end of the acceleration phase at maximum torque (1028 mNm). Thus, the peak mechanical power is:

$$P_{max} = M_{max} \cdot \frac{\pi}{30} n_{max} = 1.028 \cdot \frac{\pi}{30} \cdot 100 \approx 11 \text{ W}$$

Physical variables		**and their units** SI	Catalog
i	Gear reduction*		
I_{mot}	Motor current	A	A, mA
I_A	Stall current*	A	A, mA
I_0	No load current*	A	mA
I_{RMS}	RMS determined current	A	A, mA
I_N	Nominal current*	A	A, mA
J_R	Moment of inertia of the rotor*	kgm²	gcm²
J_L	Moment of inertia of the load	kgm²	gcm²
k_M	Torque constant*	Nm/A	mNm/A
k_n	Speed constant*		rpm/V
M	(Motor) torque	Nm	mNm
M_L	Load torque	Nm	mNm
M_H	Stall torque*	Nm	mNm
M_{mot}	Motor torque	Nm	mNm
M_R	Moment of friction	Nm	mNm
M_{RMS}	RMS determined torque	Nm	mNm
M_N	Nominal torque*	Nm	mNm
$M_{N,G}$	Max. torque of gear*	Nm	Nm
n	Speed		rpm
n_L	Operating speed of the load		rpm
n_{max}	Limit speed of motor*		rpm
$n_{max,G}$	Limit speed of gear*		rpm
n_{mot}	Motor speed		rpm
n_0	No load speed*		rpm
P_{el}	Electrical power	W	W
P_J	Joule power loss	W	W
P_{mech}	Mechanical power	W	W
R	Terminal resistance	Ω	Ω
R_{25}	Resistance at 25°C*	Ω	Ω
R_T	Resistance at temperature T	Ω	Ω
R_{th1}	Heat resistance winding housing*		K/W
R_{th2}	Heat resistance housing/air*		K/W
t	Time	s	s
T	Temperature	K	°C
T_{max}	Max. winding temperature*	K	°C
T_U	Ambient temperature	K	°C
T_W	Winding temperature	K	°C
U_{mot}	Motor voltage	V	V
U_{ind}	Induced voltage (EMF)	V	V
U_{max}	Max. supplied voltage	V	V
U_N	Nominal voltage*	V	V
α_{Cu}	Resistance coefficient of Cu	= 0.0039	
α_{max}	Max. angle acceleration	rad/s²	
$\Delta n/\Delta M$	Curve gradient*	rpm/mNm	
ΔT_W	Temperature difference winding/ambient	K	K
Δt	Run up time	s	ms
η	(Motor) efficiency		%
η_G	(Gear) efficiency*		%
η_{max}	Max. efficiency*		%
τ_m	Mechanical time constant*	s	ms
τ_S	Therm. time constant of the motor*	s	s
τ_W	Therm. time constant of the winding*	s	s

(*Specified in the motor or gear data)

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Gear selection
We are looking for a gearhead with a maximum continuous torque of at least 0.486 Nm and a short-term torque of at least 1.028 Nm. This requirement can be fulfilled by the ceramic version of the configurable GPX 22 gearhead with 2 or 3 stages. With 2 stages, the maximum gearhead input speed of 10 000 rpm permits a maximum ratio of

$$i_{max} = \frac{n_{max,\,G}}{n_L} = \frac{10\,000}{100} = 100{:}1$$

Three-stage gearheads permit higher input speeds, and the maximum ratio is 120:1. Because of the shorter design, we decide to use the 2-stage gearhead. To keep the motor torque as small as possible, we select the highest possible ratio of 44:1. The 2-stage gearhead has an efficiency of 81%.

Motor type selection
Speed and torque are calculated to the motor shaft

$$n_{mot} = i \cdot n_L = 44 \cdot 100 = 4400 \text{ rpm}$$

$$M_{mot,\,RMS} = \frac{M_{RMS}}{i \cdot \eta} = \frac{486}{44 \cdot 0.81} \approx 13.6 \text{ mNm}$$

$$M_{mot,\,max} = \frac{M_{max}}{i \cdot \eta} = \frac{1028}{44 \cdot 0.81} \approx 28.8 \text{ mNm}$$

The possible motors, which match the selected gears in accordance with the maxon modular system, are summarized in the table opposite. The table shows only motors with graphite commutation because they are better suited for stop-and-go operation.

We select the DCX 22 S, which has sufficient continuous torque. The motor should have a torque reserve so that it will be able to function in slightly less favorable conditions.
The additional torque requirement during acceleration is no problem for the motor. The short-term peak torque is only slightly less than twice as high as the permissible continuous torque of the motor.

Selection of the winding
The DCX 22 S motor has a mean characteristic gradient of about 110 rpm/mNm. The desired idle speed is calculated as follows:

$$n_{0,\,theor} = n_{mot} + \frac{\Delta n}{\Delta M} \cdot M_{max} = 4400 + 110 \cdot 28.8 = 7570 \text{ rpm}$$

The extreme operating point should of course be used in the calculation (max. speed and max. torque), since the speed-torque line of the winding must run above all operating points in the speed / torque diagram.
This target no load speed must be achieved with the maximum voltage U = 24 V supplied by the control (ESCON 36/2), which defines the minimum target speed constant $k_{n,\,theor}$ of the motor.

$$k_{n,\,theor} = \frac{n_{0,\,theor}}{U_{mot}} = \frac{7570}{24} = 315 \frac{\text{rpm}}{V}$$

If one considers the speed constant of the windings, then the first choice would be the motor with a nominal speed of 36 V. At a speed constant of 342 rpm V^{-1} however, it has only a small speed control reserve. If the tolerances are insufficient, then the winding with the next higher speed constant (24 V nominal voltage) offers better safety.
The higher speed constant of the winding compared to the calculated value means that the motor runs faster at 24 V than required, which can be compensated with the speed controller. The motor can be equipped with an encoder to record the speed. The speed constant of the selected 24 V winding is 18.4 mNm/A. The maximum torque therefore corresponds to a peak current of

$$I_{max} = \frac{M_{max}}{k_M} + I_0 = \frac{28.8}{18.4} + 0.036 = 1.6\,A$$

This current is smaller than the maximum current (4 A) of the controller and the power supply unit (3 A).

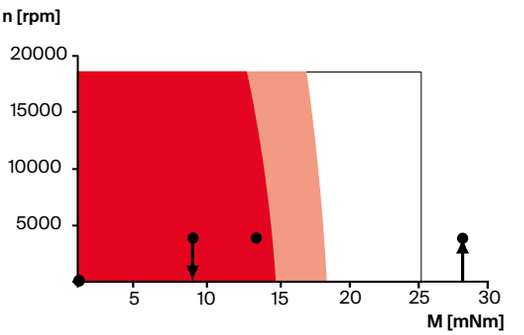
Thus, a gear motor has been found that fulfils the requirements (torque and speed) and can be operated by the controller provided.

Alternative solutions

GPX 19 ceramic gearhead
3 stages (138:1 reduction)
with motor type DCX 16 S (graphite brushes)

GPX 22 gearhead, standard configuration
3 stages (111:1 reduction)
with motor type DCX 19 S (graphite brushes)

Motor	M_N	Suitability
DCX 22 S	≈ 15 mNm	good
DCX 22 L	≈ 30 mNm	too strong, builds long
DC-max 22 S	≈ 11 mNm	too weak



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General Information

Quantities and their basic units in the International System of Measurements (SI)

Quantity	Basic-unit	Sign
Length	Meter	m
Mass	Kilogram	kg
Time	Second	s
Electrical current	Ampere	A
Thermodynamic Temperature	Kelvin	K

Conversion Example
A known unit
B unit sought

known: oz-in — multiply by sought: 7.06 — mNm

Factors used for ...

... conversions:
1 oz = $2.834952313 \cdot 10^{-2}$ kg
1 in = $2.54 \cdot 10^{-2}$ m

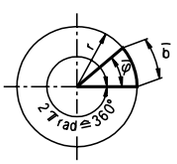
... gravitational acceleration:
g = 9.80665 m s^{-2}
= 386.08858 in s^{-2}

... derived units:
1 yd = 3 ft = 36 in
1 lb = 16 oz = 7000 gr (grains)
1 kgf = 1 kg · 9.80665 ms^{-2}
1 N = 1 $kgms^{-2}$
1 W = 1 Nms^{-1} = 1 $kgm^2 s^{-3}$
1 J = 1 Nm = 1 Ws

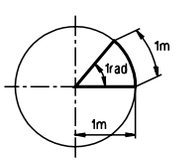
Decimal multiples and fractions of units

Prefix	Abbre-viation	Multiply	Prefix	Abbre-viation	Multiply
Deka . .	da	10^1	Dezi . .	d	10^{-1}
Hekto . .	h	10^2	Zenti . .	c	10^{-2}
Kilo . .	k	10^3	Milli . .	m	10^{-3}
Mega . .	M	10^6	Mikro . .	µ	10^{-6}
Giga . .	G	10^9	Nano . .	n	10^{-9}
Tera . .	T	10^{12}	Piko . .	p	10^{-12}

Arc definition



$\varphi = \frac{b}{r}$



$1\,rad = \frac{1m}{1m} \triangleq 57.2958°$

Units used in this brochure

Power — P [W]

B \ A	oz-in-s^{-1}	oz-in-min^{-1}	in-lbf-s^{-1}	ft-lbf-s^{-1}	W = N · ms^{-1}	mW	kgf · m/s	mNm min^{-1}
W = N · ms^{-1}	$7.06 \cdot 10^{-3}$	$1.17 \cdot 10^{-4}$	0.113	1.356	1	$1 \cdot 10^{-3}$	9.807	$2\pi/60\,000$
mW	7.06	0.117	112.9	$1.356 \cdot 10^3$	$1 \cdot 10^3$	1	$9.807 \cdot 10^3$	$2\pi/60$
oz-in-s^{-1}	1	1/60	16	192	141.6	0.142	$1.39 \cdot 10^3$	$1.48 \cdot 10^{-2}$
ft-lbf-s^{-1}	1/192	1/11520	1/12	1	0.737	$0.737 \cdot 10^{-3}$	7.233	$7.72 \cdot 10^{-5}$
kgf · m/s	$7.20 \cdot 10^{-4}$	$1.2 \cdot 10^{-5}$	$1.15 \cdot 10^{-2}$	0.138	0.102	$0.102 \cdot 10^{-3}$	1	$1.07 \cdot 10^{-5}$

Torque — M [Nm]

B \ A	oz-in	ft-lbf	Nm = Ws	Ncm	mNm	kgf · m	gf · cm	
Nm	$7.06 \cdot 10^{-3}$	1.356	1	$1 \cdot 10^{-2}$	$1 \cdot 10^{-3}$	9.807	$9.807 \cdot 10^{-5}$	
mNm	7.06	$1.356 \cdot 10^3$	$1 \cdot 10^3$	10	1	$9.807 \cdot 10^3$	$9.807 \cdot 10^{-2}$	
kgf · m	$7.20 \cdot 10^{-4}$	0.138	0.102	$0.102 \cdot 10^{-2}$	$0.102 \cdot 10^{-3}$	1	$1 \cdot 10^{-5}$	
oz-in	1	192	141.6	1.416	0.142	$1.39 \cdot 10^3$	$1.39 \cdot 10^{-2}$	
ft-lbf	1/192	1	0.737	$0.737 \cdot 10^{-2}$	$0.737 \cdot 10^{-3}$	7.233	$7.233 \cdot 10^{-5}$	

Moment of Inertia — J [kg m^2]

B \ A	oz-in^2	oz-in-s^2	lb-in^2	lb-in-s^2	Nms^2=kgm^2	mNm s^2	gcm^2	kgf · m · s^2
g cm^2	182.9	$7.06 \cdot 10^4$	$2.93 \cdot 10^3$	$1.13 \cdot 10^6$	$1 \cdot 10^7$	$1 \cdot 10^4$	1	$9.807 \cdot 10^7$
kgm^2=Nms^2	$1.83 \cdot 10^{-5}$	$7.06 \cdot 10^{-3}$	$2.93 \cdot 10^{-4}$	0.113	1	$1 \cdot 10^{-3}$	$1 \cdot 10^{-7}$	9.807
oz-in^2	1	386.08	16	$6.18 \cdot 10^3$	$5.46 \cdot 10^4$	54.6	$5.46 \cdot 10^{-3}$	$5.35 \cdot 10^5$
lb-in^2	1/16	24.130	1	386.08	$3.41 \cdot 10^3$	3.41	$3.41 \cdot 10^{-4}$	$3.35 \cdot 10^4$

Mass — m [kg]

B \ A	oz	lb	gr (grain)	kg	g
kg	$28.35 \cdot 10^{-3}$	0.454	$64.79 \cdot 10^{-6}$	1	$1 \cdot 10^{-3}$
g	28.35	$0.454 \cdot 10^3$	$64.79 \cdot 10^{-3}$	$1 \cdot 10^3$	1
oz	1	16	$2.28 \cdot 10^{-3}$	35.27	$35.27 \cdot 10^3$
lb	1/16	1	1/7000	2.205	$2.205 \cdot 10^3$
gr (grain)	437.5	7000	1	$15.43 \cdot 10^3$	15.43

Force — F [N]

B \ A	oz	lbf	N	kgf	gf
N	0.278	4.448	1	9.807	$9.807 \cdot 10^{-3}$
kgf	0.028	0.454	0.102	1	$1 \cdot 10^{-3}$
oz	1	16	3.600	35.27	$35.27 \cdot 10^{-3}$
lbf	1/16	1	0.225	2.205	$2.205 \cdot 10^{-3}$
pdl	2.011	32.17	7.233	70.93	$70.93 \cdot 10^{-3}$

Length — l [m]

B \ A	in	ft	yd	Mil	m	cm	mm	µm
m	$25.4 \cdot 10^{-3}$	0.305	0.914	$25.4 \cdot 10^{-6}$	1	0.01	$1 \cdot 10^{-3}$	$1 \cdot 10^{-6}$
cm	2.54	30.5	91.4	$25.4 \cdot 10^{-4}$	$1 \cdot 10^2$	1	0.1	$1 \cdot 10^{-4}$
mm	25.4	305	914	$25.4 \cdot 10^{-3}$	$1 \cdot 10^3$	10	1	$1 \cdot 10^{-3}$
in	1	12	36	$1 \cdot 10^{-3}$	39.37	0.394	$3.94 \cdot 10^{-2}$	$3.94 \cdot 10^{-5}$
ft	1/12	1	3	$1/12 \cdot 10^{-3}$	3.281	$3.281 \cdot 10^{-2}$	$3.281 \cdot 10^{-3}$	$3.281 \cdot 10^{-6}$

Angular Velocity — ω [s^{-1}]

B \ A	s^{-1} = Hz	rpm	rad s^{-1}
rad s^{-1}	2π	π/30	1
rpm	60	1	30/π

Angular Acceleration — α [s^{-2}]

B \ A	min^{-2}	s^{-2}	rad s^{-2}	min^{-1} s^{-1}
s^{-2}	1/3600	1	1/2π	1/60
rad s^{-2}	π/1800	2π	1	π/30

Linear Velocity — v [m s^{-1}]

B \ A	in-s^{-1}	in-min^{-1}	ft-s^{-1}	ft-min^{-1}	m s^{-1}	cm s^{-1}	mm s^{-1}	m min^{-1}
m s^{-1}	$2.54 \cdot 10^{-2}$	$4.23 \cdot 10^{-4}$	0.305	$5.08 \cdot 10^{-3}$	1	$1 \cdot 10^{-2}$	$1 \cdot 10^{-3}$	1/60
in-s^{-1}	1	60	12	720	39.37	$39.37 \cdot 10^{-2}$	$39.37 \cdot 10^{-3}$	0.656
ft-s^{-1}	1/12	5	1	60	3.281	$3.281 \cdot 10^{-2}$	$3.281 \cdot 10^{-3}$	$5.46 \cdot 10^{-2}$

Temperature — T [K]

B \ A	° Fahrenheit	° Celsius = Centigrade	Kelvin
Kelvin	(°F - 32) / 1.8 + 273.15	+ 273.15	1
° Celsius	(°F - 32) / 1.8	1	-273.15
° Fahrenheit	1	1.8 °C + 32	1.8 · (K - 273.15) + 32

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maxon standard specification

Our standard specifications gives you the means to assess the key aspects of maxon products. In our experience, the standard specifications cover normal cases. It is part of our Terms and Conditions of Delivery.



Standard specification no. 100
maxon DC motor

Standard specification no. 101
maxon EC motor

Standard specification no. 102
maxon gear
maxon screw drive

Standard specification no. 103
maxon sensor

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Standard specification no. 100
maxon DC motor

1 **Basics**
The standard specification describes tests and inspections that are performed on the finished motor and during the manufacturing process. To safeguard our high quality standard, we inspect materials, individual parts, assemblies, and the finished motor for conformity with specified dimensions and properties. The results are recorded statistically and can be viewed by the customer on request. Sampling plans in acc. with ISO 2859 and DIN/ISO 3951 are used (attribute inspection, follow-up inspection and variable inspection), as well as self-monitoring procedures of the manufacturing departments. This standard specification applies in all cases where no other specification has been agreed upon between the customer and maxon.

2. **Data**

2.1 **Electrical data** apply at temperatures between 22 and 25 °C. Data check within one minute of runtime.

Measuring voltage	±0.5% for voltages ≥ 3 V and ±0.015 V for voltages ≤ 3 V
No-load speed	±10%
No-load current	≤ maximum
Direction of rotation	cw = clockwise
Motor orientation	horizontal or vertical

Additional information: The measuring voltage may deviate from the nominal voltage listed in the catalog. The no-load current specified in the catalog is a typical value, not the maximum. If the red wire or the terminal marked + is connected to the positive terminal, then the shaft (seen from the face) turns clockwise. For counterclockwise (ccw) operation, the specified tolerances may be exceeded slightly.
Terminal resistance: Winding resistance is checked in samples during production. The terminal resistance is determined during the product qualification. Observe that the terminal resistance depends on the rotor position. Because contact resistance of graphite brushes varies with the current density, resistance measurement with an ohmmeter does not deliver meaningful results for small currents. In the case of precious metal brushes, the resistance measurements show a value that's too low when the brush bridges two commutator plates, shorting part of a coil.
The **inductance** is determined during the product qualification. The measuring frequency is 1 kHz. The terminal inductance of the motor is frequency-dependent.
Commutation: The check for neutral setting and electrical errors, e.g. winding discontinuities or winding shorts, is performed using an oscilloscope. The commutation graphs of precious metal and graphite brushes are not directly comparable. Precious metal brushes have a clearer commutation graph that remains interference-free up to the limit speed, approximately. For graphite brushes, this can only be expected at speeds up to ⅓ of the limit speed. For graphite brush motors, the brush contact resistance changes over time. The same applies to the torque constant due to the overlap between commutator plates. As a result, the no-load current and the speed change slightly. A similar effect can be observed when the motor has been run without load over a long time.

2.2 **Mechanical data** as shown in the dimensional drawing: Assembly-dependent dimensions are sampled in acc. with the sampling schedule. This does not apply to form and position tolerances. The process uses standard measurement tools (electrical length measurement, micrometers, dial gauges, calipers, plug and thread gauges, etc.). The calibration of the measuring instruments follows the standards listed below:

– EN ISO 10012:2003 Measurement management systems – Requirements for measurement processes and measuring equipment
– EN ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
– VDI/VDE/DGQ 2618 Test equipment monitoring

2.3 **Imbalance:** Rotors are balanced according to our standard during the manufacturing process.

2.4 **Noise:** Each batch is tested for outliers. The motion inside a motor causes noise and vibration depending on speed. The noise and vibrations may vary in their frequency and intensity. The noise level of an individual sample does not permit any conclusions about the noise or vibration level of a future delivery.

2.5 **Service life:** Service life tests are conducted according to unified, internal criteria as part of the product qualification. The service life of a motor primarily depends on the operating modes and ambient conditions. The great diversity of applications does not permit us to make a general statement of service life.

2.6 **Environmental testing**
Corrosion protection: Our products are tested based on DIN EN 60068-2-30 during product qualification.
Coating of the components: The finishing and coating processes are selected for best corrosion protection. Such layers are checked during product qualification, in accordance with the applicable standard.

3. Parameters that deviate from or supplement the data sheet can be determined and then become part of the systematically performed inspection, as customer specification. Inspection certificates are supplied, if agreed upon in advance.

Standard specification no. 101
maxon EC motor

1. **Basics**
The standard specification describes tests and inspections that are performed on the finished motor and during the manufacturing process. To safeguard our high quality standard, we inspect materials, individual parts, assemblies, and the finished motor for conformity with specified dimensions and properties. The results are recorded statistically and can be viewed by the customer on request. Sampling plans in acc. with ISO 2859 and DIN/ISO 3951 are used (attribute inspection, follow-up inspection and variable inspection), as well as self-monitoring procedures of the manufacturing departments. This standard specification applies in all cases where no other specification has been agreed upon between the customer and maxon.

2. **Data**

2.1 **Electrical data** apply at temperatures from 22 to 25 °C, using a 1-quadrant controller with block commutation. Data check within one minute of runtime.

Measuring voltage	±0.5% for voltages > 3 V and ±0.015 V for voltages ≤ 3 V
No-load speed	±10%
No-load current	≤ maximum
Direction of rotation	cw = clockwise
Motor orientation	horizontal or vertical

Additional information: The measuring voltage may deviate from the nominal voltage listed in the catalog. The no-load current specified in the catalog is a typical value, not the maximum. When connected as per the catalog (or marking), the shaft rotates clockwise (seen from the face side).
The **terminal resistance** is checked by sampling.
The **inductance** is determined during product qualification. The measuring frequency is 1 kHz. The terminal inductance is frequency-dependent. These measurements are sufficient to ensure compliance with electro-mechanical specifications.

2.2 **Mechanical data** as shown in the dimensional drawing: Assembly-dependent dimensions are sampled in acc. with the sampling schedule. This does not apply to form and position tolerances. The process uses standard measurement tools (electrical length measurement, micrometers, dial gauges, calipers, plug and thread gauges, etc.). The calibration of the measuring instruments follows the standards listed below:

– EN ISO 10012:2003 Measurement management systems – Requirements for measurement processes and measuring equipment
– EN ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
– VDI/VDE/DGQ 2618 Test equipment monitoring

2.3 **Imbalance:** Rotors for EC motors with air-gap windings are balanced in accordance with our standard during the manufacturing process. For EC motors with wound stator teeth, the rotors are mounted in gauges but, as a standard, are not balanced. For the finished motor, only a subjective assessment is possible, which is done by sampling.

2.4 **Following** DIN EN 60204-1 and EN 60034-1, the dielectric strength is always determined using a high-voltage tester. It is connected between motor connection (electrical) and motor housing or shaft. Parts with integrated electronics are excepted.

Test conditions for EC motors ≤ ∅13 mm
– Test voltage 250 VDC for 2 s (motor at standstill)
– Ramp time (up and down): 1 s
– Good / bad output
– Leakage current < 0.25 mA

Test conditions for EC motors > ∅13 mm
– Test voltage 500 VDC for 2 s (motor at standstill)
– Ramp time (up and down): 1 s
– Good / bad output
– Leakage current: < 0.5 mA

2.5 **Noise:** Each batch is tested for outliers. The motion inside a motor causes noise and vibration depending on speed. The noise and vibrations may vary in their frequency and intensity. The noise level of an individual sample does not permit any conclusions about the noise or vibration level of a future delivery.

2.6 **Service life:** Service life tests are conducted according to unified, internal criteria as part of the product qualification. The service life of an EC motor mainly depends on the bearing life. This is determined by the operating mode, the bearing load, and ambient conditions. The great diversity of applications does not permit us to make a general statement of service life.

2.7 **Environmental testing**
Corrosion protection: Our products are tested based on DIN EN 60068-2-30 during product qualification.
Coating of the components: The finishing and coating processes are selected for best corrosion protection. Such layers are checked during product qualification, in accordance with the applicable standard.

3. Parameters that deviate from or supplement the data sheet can be determined and then become part of the systematically performed inspection, as customer specification. Inspection certificates are supplied, if agreed upon in advance.

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Standard specification no. 102
maxon gear / maxon screw drive

1. **Basics**
The standard specification describes tests and inspections that are performed on the finished gearhead and during the manufacturing process. To safeguard our high quality standard, we inspect materials, individual parts, assemblies, and the finished gearhead for conformity with specified dimensions and properties. The results are recorded statistically and can be viewed by the customer on request. Sampling plans in acc. with ISO 2859 and DIN/ISO 3951 are used (attribute inspection, follow-up inspection and variable inspection), as well as self-monitoring procedures of the manufacturing departments. This specification applies in all cases where no other specification has been agreed upon between the customer and maxon.

2. **Data**

2.1 **Mechanical data** as shown in the dimensional drawing: Assembly-dependent dimensions are sampled in acc. with the sampling schedule. This does not apply to form and position tolerances. The process uses standard measurement tools (electrical length measurement, micrometers, dial gauges, calipers, plug and thread gauges, etc.). The calibration of the measuring instruments follows the standards listed below:

– EN ISO 10012:2003 Measurement management systems – Requirements for measurement processes and measuring equipment
– EN ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
– VDI/VDE/DGQ 2618 Test equipment monitoring

2.2 **Noise**
Each batch is tested for outliers. The motion inside a gearhead causes noise and vibration depending on speed. The noise and vibrations may vary in their frequency and intensity. The noise levels of an individual sample do not permit any conclusions about the noise or vibration level of a future delivery.

2.3 **Service life**
Service life tests are conducted according to unified, internal criteria as part of the product qualification. The service life of a gearhead primarily depends on the operating modes and ambient conditions. The great diversity of applications does not permit us to make a general statement of service life. The minimum expected service life for the relevant maxon gearheads is in reference to standard conditions.

– 25 °C
– Normal room conditions
– Horizontal orientation of unit
– No axial or radial load on the output shaft

2.4 **Environmental testing**
Corrosion protection: Our products are tested based on DIN EN 60068-2-30 during product qualification.
Coating of the components: The finishing and coating processes are selected for best corrosion protection. Such layers are checked during product qualification, in accordance with the applicable standard.

3. Parameters that deviate from or supplement the data sheet can be determined and then become part of the systematically performed inspection, as customer specification. Inspection certificates are supplied, if agreed upon in advance.

Standard specification no. 103
maxon sensor

1. **Basics**
The standard specification describes tests and inspections that are performed on the finished combination of sensor and motor (in some cases also with gearhead), as well as during the manufacturing process. To safeguard our high quality standard, we inspect materials, individual parts, assemblies and the finished combination for conformity with the specified dimensions and properties. For sensor testing, it is necessary to keep in mind that the measuring signal inevitably contains the speed fluctuations of the motor and in some cases those of the gearhead.
The results are recorded statistically. Sampling plans in acc. with ISO 2859 and DIN / ISO 3951 are used (attribute inspection, follow-up inspection and va-riable inspection), as well as self-monitoring procedures of the manufacturing departments. This standard specification applies in all cases where no other specification has been agreed upon between the customer and maxon.

2. **Data**

2.1 **Electrical data** apply at temperatures between 22 and 25 °C. Data check within one minute of runtime or a minimum of three measuring revolutions.

The conditions during the sensor measurement are:

Operating voltage	Set value ±50 mV
Direction of rotation	cw = clockwise
Motor orientation	Horizontal
Operation	No load
Measuring speed	Set value ±40%

Every **incremental** encoder is tested while installed:

Current draw	Minimum/maximum value
Signal level	For encoders without a line driver (“single-ended output”): “Low” level: maximum value; “High” level: minimum value For encoders with a line driver (“differential output”): Controlling an RS422-compatible line receiver.
Signal integrity	Signals present Counts per turn (3-channel encoder) Single unique index pulse (if applicable)
Angle information	For the angle information, one or several of the following characteristics are tested, depending on the technology: Phasing A to B, duty cycles of the incremental signals, cycle length, INL, DNL, minimum/maximum state length, jitter

Additional information: maxon testing devices have built-in glitch filters. Glitches on individual encoder signals are not recognized and are permissible.

Every absolute encoder is tested while installed:

Current draw	Minimum/maximum value
Signal integrity	CLK signals, data present Protocol in acc. with the specification (SSI, BiSS, coding) Counting direction of angle values: as listed in catalog

2.2 **Mechanical data** as shown in the dimensional drawing: Assembly-dependent dimensions are sampled in acc. with the sampling schedule. This does not apply to form and position tolerances. The process uses standard measurement tools (electrical length measurement, micrometers, dial gauges, calipers, plug and thread gauges, etc.). The calibration of the measuring instruments follows the standards listed below:

– EN ISO 10012:2003 Measurement management systems – Requirements for measurement processes and measuring equipment
– EN ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
– VDI/VDE/DGQ 2618 Test equipment monitoring

2.3 **Imbalance**
The solid measure of the sensor (target, pole wheel) is mounted on the shaft and can cause additional imbalance.

2.4 **Service life**
The service life of sensors is usually not limited by wear but by the ambient conditions. These are highly diverse, so that no general statement regarding the service life can be made.

2.5 **Environmental testing**
Humidity: Sensors consist of electronic and, in some cases, optical components. Condensation has to be prevented or removed prior to startup, even when this is not explicitly stated. In the case of optical encoders, condensation and humidity can cause stains and thus lead to signal errors.

3. Parameters that deviate from or supplement the data sheet can be determined and then become part of the systematically performed inspection, as customer specification. Inspection certificates are supplied, if agreed upon in advance.

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For your personal notes

Brushed DC motors with ironless windings

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Explanations of maxon terminology: DC motor

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Dimensional drawings
Presentation of the views according to the projection method E (ISO).  All dimensions in [mm].

Mounting in plastic
Screwed connections on motors with plastic flanges require special attention.

M_A Max. tightening torque [Ncm]
A torque screw driver may be adjusted to this value.

L Active depth of screw connection [mm]
The depth of the screw connection must be less than the usable length of the thread!

Motor Data
The values stated are based on a motor temperature of 25°C (so-called cold data).

1 Nominal voltage U_N [Volt]
is the DC voltage on the motor connections on which all nominal data are based (lines 2–9). Lower and higher voltages are permissible, provided set limits are not exceeded.

2 No load speed n_0 [rpm] ±10%
This is the speed at which the motor turns at nominal voltage and without load. It is approximately proportional to the applied voltage.

3 No load current I_0 [mA] ±50%
This is the typical current that the unloaded motor draws when operating at nominal voltage. It depends on brush friction and friction in the bearings, and also increases with rising speed. No load friction depends heavily on temperature, particularly with precious metal commutation. In extended operation, the motor heats up and the no load friction and no load current decrease.

4 Nominal speed n_N [rpm]
is the speed set for operation at nominal voltage and nominal torque at a motor temperature of 25°C.

5 Nominal torque M_N [mNm]
is the torque generated for operation at nominal voltage and nominal current at a motor temperature of 25°C. It is at the limit of the motor's continuous operation range. Higher torques heat up the winding too much.

6 Nominal current I_N [A]
is the current that, at 25°C ambient temperature, heats the winding up to the maximum permissible temperature (= max. permissible continuous current). I_N decreases as speed increases due to additional friction losses.

7 Stall torque M_H [mNm]
is the calculated load torque that causes the shaft to stop at nominal voltage. Rising motor temperatures reduce stall torque.

8 Stall current I_A [A]
is the quotient from nominal voltage and the motor's terminal resistance. Stall current is equivalent to stall torque. With larger motors, I_A can often not be reached due to the amplifier's current limits.

9 Max. efficiency η_{max} [%]
is the optimal relationship between input and output power at nominal voltage. It also doesn't always denote the optimal operating point.

10 Terminal resistance R [Ω]
is the resistance at the terminals at 25°C and determines the stall current at a given voltage. For graphite brushes, it should be noted that resistance is load-dependent and the value only applies to large currents.

11 Terminal inductance L [mH]
is the winding inductance when stationary and measured at 1 kHz, sinusoidal.

12 Torque constant k_M [mNm/A]
This may also be referred to as "specific torque" and represents the quotient from generated torque and applicable current.

13 Speed constant k_n [rpm/V]
shows the ideal no load speed per 1 volt of applied voltage. Friction losses not taken into account.

14 Speed / torque gradient
$\Delta n / \Delta M$ [rpm/mNm]
The speed / torque gradient is an indicator of the motor's performance. The smaller the value, the more powerful the motor and consequently the less motor speed varies with load variations. It is based on the quotient of ideal no load speed and ideal stall torque.

15 Mechanical time constant τ_m [ms]
is the time required for the rotor to accelerate from standstill to 63% of its no load speed.

16 Rotor inertia J_R [gcm²]
is the mass moment of inertia of the rotor, based on the axis of rotation.

17 Thermal resistance housing-ambient R_{th2} [K/W]
and
18 Thermal resistance winding-housing R_{th1} [K/W]
Characteristic values of thermal contact resistance without additional heat sinking. Lines 17 and 18 combined define the maximum heating at a given power loss (load). Thermal resistance R_{th2} on motors with metal flanges can decrease by up to 80% if the motor is coupled directly to a good heat-conducting (e.g. metallic) mounting rather than a plastic panel.

19 Thermal time constant winding τ_w [s]
and
20 Thermal time constant motor τ_s [s]
These are the typical reaction times for a temperature change of winding and motor. It can be seen that the motor reacts much more sluggishly in thermal terms than the winding.The values are calculated from the product of thermal capacity and given heat resistances.

21 Ambient temperature [°C]
Operating temperature range. This derives from the heat reliability of the materials used and viscosity of bearing lubrication.

22 Max. winding temperature [°C]
Maximum permissible winding temperature.

23 Max. speed n_{max} [rpm]
is the maximum recommended speed based on thermal and mechanical perspectives. A reduced service life can be expected at higher speeds.

24 Axial play [mm]
On motors that are not preloaded, these are the tolerance limits for the bearing play. A preload cancels out the axial play up to the specified axial force. When load is applied in the direction of the preload force (away from the flange), the axial play is always zero. The length tolerance of the shaft includes the maximum axial play.

25 Radial play [mm]
Radial play is the bearing's radial movement. A spring is utilized to preload the motor's bearings, eliminating radial play up to a given axial load.

26/27 Max. axial load [N]
Dynamic: axial load permissible in operation. If different values apply for traction and thrust, the smaller value is given.
Static: maximum axial force that does not cause permanent damage when applied to the front of the shaft at standstill.
Shaft supported: maximum axial force applying to the shaft at standstill if the force is not input at the other shaft end.This is not possible for motors with only one shaft end.

28 Max. radial load [N]
The value is given for a typical distance from the front flange. As the distance increases, this value decreases.

29 Number of pole pairs
Number of north poles of the permanent magnet. The phase streams and commutation signals pass through per revolution p cycles. Servo-controllers require the correct details of the number of pole pairs.

30 Number of commutator segments

31 Weight of motor [g]

32 Typical noise level [dBA]
is that statistical average of the noise level measured according to maxon standard (10 cm distance radially to the drive, no load operation at a speed of 6000 rpm. The drive lies freely on a plastic foam mat in the noise chamber).
The acoustic noise level depends on a number of factors, such as component tolerances, and it is greatly influenced by the overall system in which the drive is installed. When the drive is installed in an unfavorable constellation, the noise level may be significantly higher than the noise level of the drive alone.
The acoustic noise level is measured and determined during product qualification.

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maxon DCX

can be configured online

Standard specification no. 100	90
Terminology explanations	94
DCX 6 M ∅6 mm, Precious metal brushes, 0.3 Watt	97
DCX 8 M ∅8 mm, Precious metal brushes, 0.5 Watt	98
DCX 10 S ∅10 mm, Precious metal brushes, 1 Watt	99
DCX 10 L ∅10 mm, Precious metal brushes, 1.5 Watt	100
DCX 12 S ∅12 mm, Precious metal brushes, 1.6 Watt	101
DCX 12 L ∅12 mm, Precious metal brushes, 2.5 Watt	102
DCX 14 L ∅14 mm, Precious metal brushes, 3 Watt	103
DCX 14 L ∅14 mm, Graphite brushes, 6 Watt	104
DCX 16 S ∅16 mm, Precious metal brushes, 3 Watt	105
DCX 16 S ∅16 mm, Graphite brushes, 5 Watt	106
DCX 16 L ∅16 mm, Precious metal brushes, 5 Watt	107
DCX 16 L ∅16 mm, Graphite brushes, 10 Watt	108
DCX 19 S ∅19 mm, Precious metal brushes, 5 Watt	109
DCX 19 S ∅19 mm, Graphite brushes, 11 Watt	110
DCX 22 S ∅22 mm, Precious metal brushes, 6 Watt	111
DCX 22 S ∅22 mm, Graphite brushes, 14 Watt	112
DCX 22 L ∅22 mm, Precious metal brushes, 11 Watt	113
DCX 22 L ∅22 mm, Graphite brushes, 20 Watt	114
DCX 26 L ∅26 mm, Precious metal brushes, 18 Watt	115
DCX 26 L ∅26 mm, Graphite brushes, 40 Watt	116
DCX 32 L ∅32 mm, Graphite brushes, 70 Watt	117
DCX 35 L ∅35 mm, Graphite brushes, 80 Watt	118



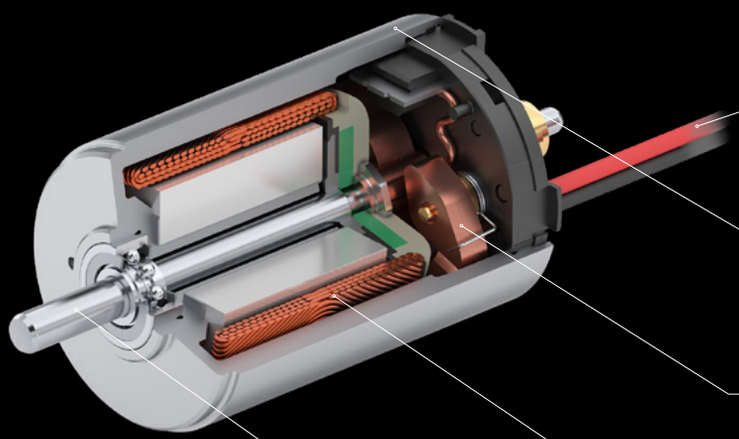
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maxon DCX program

The maxon DCX brushed motors feature unrivaled torque density and quiet running. The robust design and the ironless maxon rotor make the DCX motors a dynamic drive for almost all applications. Choose between graphite and precious metal brushes, sintered and ball bearings, and many other components.

Key data

Motor ∅	6...35 mm
Motor length	15.6...72 mm
Power	0.3...80 W
Nominal torque	up to 138 mNm
Max. permissible speed	up to 18 000 rpm



Electrical connection with terminals, cables and connectors, depending on the size.

External/internal magnetic return as a single part. Motor housing and magnet glued together. Sintered bearings or ball bearings.

Commutation with precious metal brushes for delicate rotary motion or graphite brushes for heavy-duty use.

Highly efficient ironless winding, different nominal voltages are available.

Stainless steel shaft with high stiffness; various modification options are available.

- → Compact and light design
- → Precious metal brushes guarantee a low, constant contact resistance during the entire service life
- → Easy torque control using the current
- → Low start-up voltage, even after a long period in standstill
- → Easily configured online

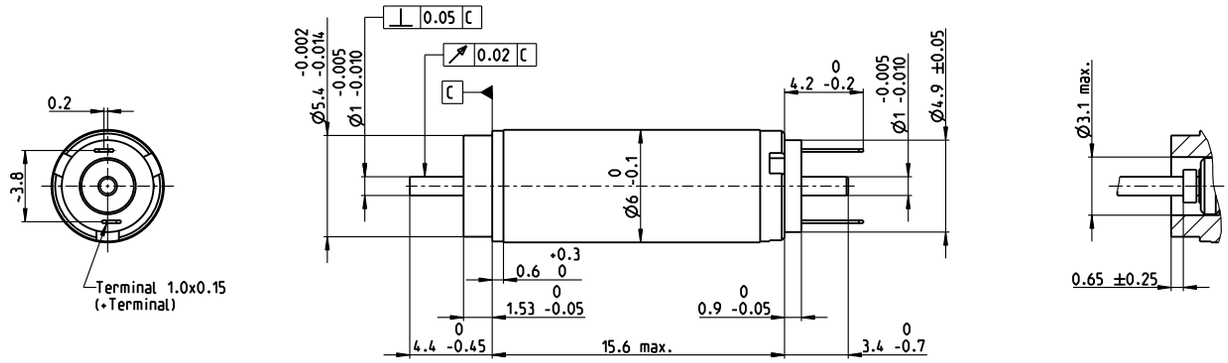
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DCX 6 M ∅6 mm, precious metal brushes, DC motor

Key data: 0.3/0.56 W, 0.3 mNm, 17300 rpm





M 5:2

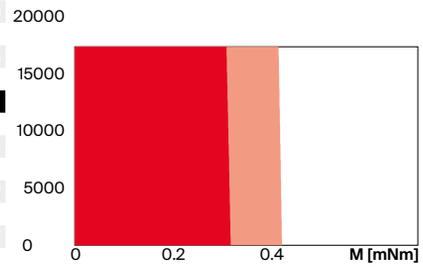
	Motor data					
1_	Nominal voltage	V	1.5	3	4.5	6
2_	No load speed	rpm	17300	17500	17400	17400
3_	No load current	mA	34.1	17.1	11.4	8.54
4_	Nominal speed	rpm	4950	5940	5730	5690
5_	Nominal torque	mNm	0.309	0.332	0.326	0.325
6_	Nominal current (max. continuous current)	A	0.425	0.228	0.149	0.111
7_	Stall torque	mNm	0.453	0.524	0.507	0.503
8_	Stall current	A	0.581	0.336	0.217	0.161
9_	Max. efficiency	%	58	61	60	60
10_	Terminal resistance	Ω	2.58	9.0	20.8	37.2
11_	Terminal inductance	mH	0.008	0.0316	0.0711	0.126
12_	Torque constant	mNm/A	0.779	1.560	2.34	3.12
13_	Speed constant	rpm/V	12300	6130	4090	3060
14_	Speed/torque gradient	rpm/mNm	40600	35100	36300	36600
15_	Mechanical time constant	ms	7.06	6.74	6.81	6.81
16_	Rotor inertia	gcm²	0.017	0.0183	0.0179	0.018

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	105
18_	Thermal resistance winding-housing	K/W	20
19_	Thermal time constant winding	s	1.71
20_	Thermal time constant motor	s	79
21_	Ambient temperature ball bearings	°C	-30...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	17300
24_	Axial play	mm	0...0.1
	Preload	N	0.5
25_	Radial play	mm	0.012
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	5
	(shaft supported)	N	100
28_	Max. radial load [mm from flange]	N	0.6 [5]

	Mechanical data sleeve bearings		
23_	Max. speed	rpm	17300
24_	Axial play	mm	0.02...0.1
	Preload	N	0
25_	Radial play	mm	0.012
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	10
	(shaft supported)	N	100
28_	Max. radial load [mm from flange]	N	0.4 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		5
31_	Weight of motor	g	2.4
32_	Typical noise level	dBA	–

Operating range

n [rpm] Winding 4.5 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
371_GPX 6 A	1–5	494_ENX 6 MAG	550_ESCON Module 24/2
			550_ESCON 36/2 DC
			557_ESCON2 Nano 24/2
			564_EPOS4 Module 24/1.5
			566_EPOS4 Compact 24/1.5

Configuration

Bearing: sleeve bearings/ball bearings preloaded
Commutation: precious metal brushes
Flange front/back: standard flange
Shaft front/back: length
Electric connection: terminals or cables (encoder always with Flex)

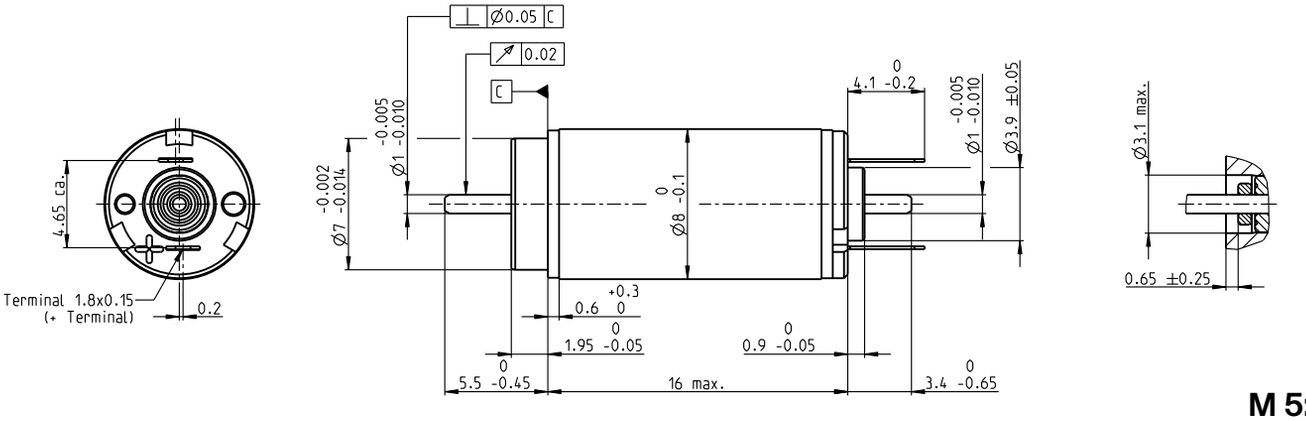
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DCX 8 M ∅8 mm, precious metal brushes, DC motor

Key data: 0.5/1.0 W, 0.65 mNm, 17300 rpm



DCX



M 5:2

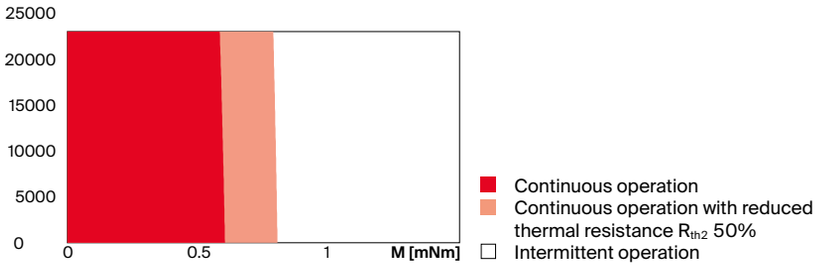
	Motor data							
1_	Nominal voltage	V	2.4	4.2	6	7.2	9	12
2_	No load speed	rpm	11500	11700	11000	11900	11900	12900
3_	No load current	mA	11.9	6.93	4.51	4.12	3.3	2.74
4_	Nominal speed	rpm	4780	4950	4190	4820	5190	5800
5_	Nominal torque	mNm	0.653	0.649	0.641	0.62	0.652	0.614
6_	Nominal current (max. continuous current)	A	0.345	0.199	0.13	0.113	0.0949	0.0728
7_	Stall torque	mNm	1.13	1.14	1.05	1.06	1.17	1.13
8_	Stall current	A	0.581	0.34	0.207	0.187	0.166	0.13
9_	Max. efficiency	%	74	74	73	73	74	74
10_	Terminal resistance	Ω	4.13	12	29	38.5	54.3	92.2
11_	Terminal inductance	mH	0.014	0.0411	0.0941	0.117	0.183	0.276
12_	Torque constant	mNm/A	1.95	3.360	5.08	5.67	7.07	8.71
13_	Speed constant	rpm/V	4900	2850	1880	1680	1350	1100
14_	Speed/torque gradient	rpm/mNm	10400	10500	10700	11400	10400	11600
15_	Mechanical time constant	ms	4.17	4.15	4.18	4.24	4.15	4.28
16_	Rotor inertia	gcm²	0.038	0.0379	0.0372	0.035	0.038	0.035

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	101
18_	Thermal resistance winding-housing	K/W	16.9
19_	Thermal time constant winding	s	2.31
20_	Thermal time constant motor	s	162
21_	Ambient temperature ball bearings	°C	-30...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	17300
24_	Axial play	mm	0...0.1
	Preload	N	0.5
25_	Radial play	mm	0.012
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	5
	(shaft supported)	N	100
28_	Max. radial load [mm from flange]	N	0.6 [5]

	Mechanical data sleeve bearings		
23_	Max. speed	rpm	17300
24_	Axial play	mm	0.02...0.1
	Preload	N	0
25_	Radial play	mm	0.012
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	10
	(shaft supported)	N	100
28_	Max. radial load [mm from flange]	N	0.4 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		5
31_	Weight of motor	g	4.4
32_	Typical noise level	dBA	–

Operating range

n [rpm] Winding 6 V



Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
372_GPX 8 A	1–5	495_ENX 8 MAG	550_ESCON Module 24/2
			550_ESCON 36/2 DC
			557_ESCON2 Nano 24/2
			564_EPOS4 Module 24/1.5
			566_EPOS4 Compact 24/1.5

Configuration

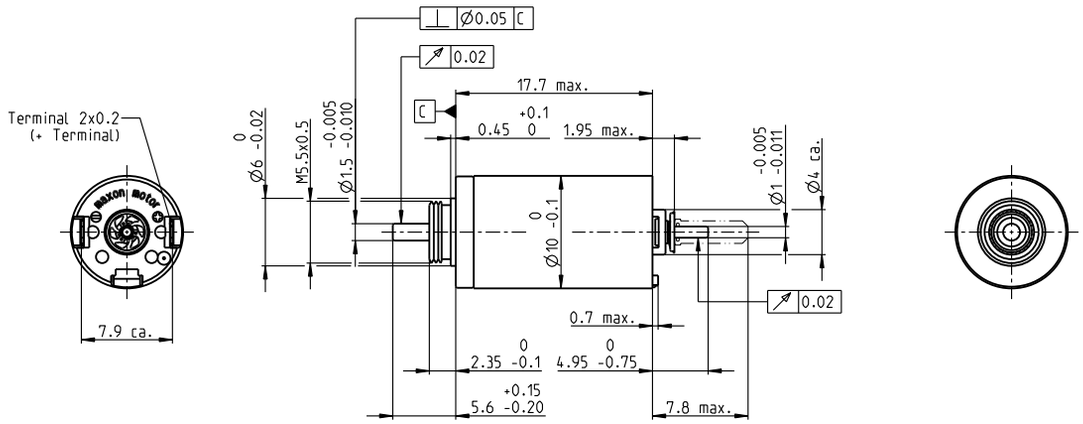
Bearing: sleeve bearings/ball bearings preloaded
Commutation: precious metal brushes with or without CLL
Flange front/back: standard flange
Shaft front/back: length
Electric connection: terminals or cables (encoder always with Flex)

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DCX 10 S ∅10 mm, precious metal brushes, DC motor

Key data: 1/1.4 W, 0.9 mNm, 14300 rpm





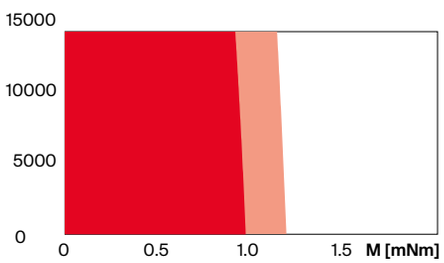
M 3:2

	Motor data							
1_	Nominal voltage	V	1.5	3	4.5	6	9	12
2_	No load speed	rpm	12600	13000	12600	11400	12600	12500
3_	No load current	mA	84.1	43.8	28	18.2	14	10.5
4_	Nominal speed	rpm	4530	4690	4270	3310	3930	3890
5_	Nominal torque	mNm	0.918	0.948	0.944	0.993	0.909	0.905
6_	Nominal current (max. continuous current)	A	0.924	0.49	0.316	0.223	0.152	0.114
7_	Stall torque	mNm	1.49	1.54	1.48	1.46	1.38	1.37
8_	Stall current	A	1.39	0.742	0.463	0.307	0.215	0.16
9_	Max. efficiency	%	58	58	58	58	56	56
10_	Terminal resistance	Ω	1.08	4.04	9.72	19.5	41.8	74.9
11_	Terminal inductance	mH	0.014	0.051	0.122	0.268	0.488	0.868
12_	Torque constant	mNm/A	1.07	2.07	3.2	4.74	6.4	8.53
13_	Speed constant	rpm/V	8950	4600	2980	2010	1490	1120
14_	Speed/torque gradient	rpm/mNm	9030	8970	9060	8290	9750	9830
15_	Mechanical time constant	ms	7.24	7.19	7.21	7.03	7.27	7.26
16_	Rotor inertia	gcm²	0.077	0.077	0.076	0.081	0.071	0.071

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	37.6
18_	Thermal resistance winding-housing	K/W	22.0
19_	Thermal time constant winding	s	4.69
20_	Thermal time constant motor	s	156
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	14300
24_	Axial play	mm	0...0.1
	Preload	N	0.5
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.5
27_	Max. force for press fits (static)	N	8.8
	(shaft supported)	N	120
28_	Max. radial load [mm from flange]	N	1.5 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	14300
24_	Axial play	mm	0...0.15
	Preload	N	0
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	120
28_	Max. radial load [mm from flange]	N	0.8 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	6.3
32_	Typical noise level	dBA	35

Operating range

n [rpm] Winding 4.5 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
373_GPX 10 A	1–5	507_ENX 10 EASY	550_ESCON Module 24/2
		507_ENX 10 QUAD	550_ESCON 36/2 DC
		508_ENX 10 EASY XT	557_ESCON2 Nano 24/2
			564_EPOS4 Module 24/1.5
			566_EPOS4 Compact 24/1.5

Configuration

Bearing: sleeve bearings/ball bearings preloaded
Commutation: precious metal brushes with or without CLL
Flange front/back: standard flange/flange with thread holes/no flange
Shaft front/back: length
Electric connection: terminals or cable/cable length/connector type

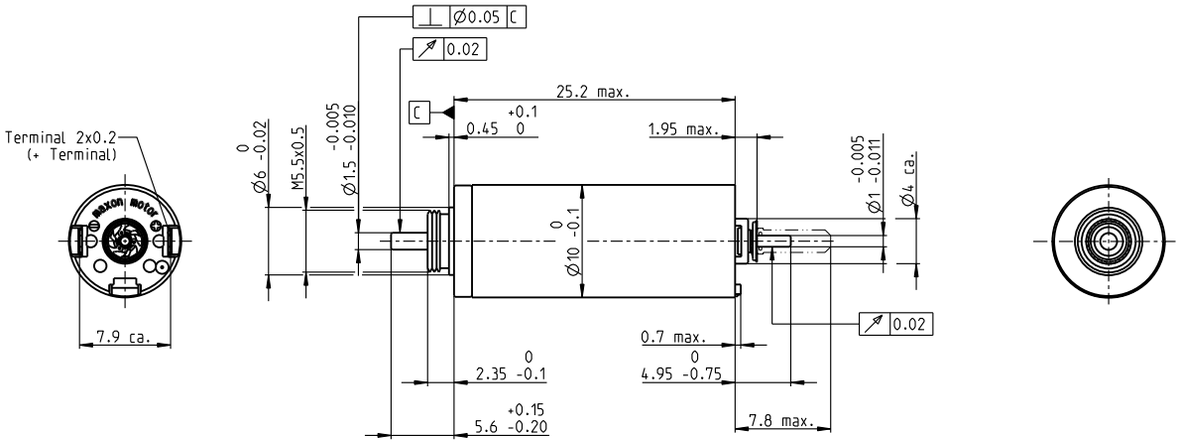
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DCX 10 L ∅10 mm, precious metal brushes, DC motor

Key data: 1.5/3 W, 2.2 mNm, 14 300 rpm



DCX



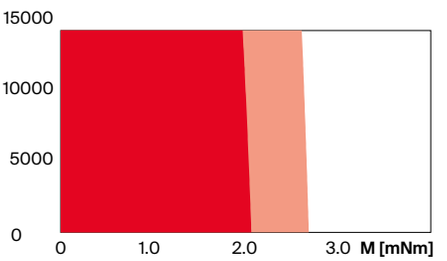
M 3:2

	Motor data							
1_	Nominal voltage	V	1.5	3	4.5	6	9	12
2_	No load speed	rpm	11600	12200	12000	12200	12000	11300
3_	No load current	mA	72.1	38.7	25.2	19.3	12.6	8.71
4_	Nominal speed	rpm	9230	6930	7110	6640	6780	5980
5_	Nominal torque	mNm	1.04	2.05	2.2	1.94	2.06	2.03
6_	Nominal current (max. continuous current)	A	0.924	0.922	0.648	0.436	0.304	0.211
7_	Stall torque	mNm	5.13	4.81	5.45	4.32	4.8	4.36
8_	Stall current	A	4.23	2.09	1.55	0.937	0.682	0.439
9_	Max. efficiency	%	75	75	77	74	75	74
10_	Terminal resistance	Ω	0.355	1.44	2.9	6.4	13.2	27.3
11_	Terminal inductance	mH	0.005	0.020	0.045	0.078	0.181	0.362
12_	Torque constant	mNm/A	1.21	2.31	3.52	4.61	7.04	10.0
13_	Speed constant	rpm/V	7870	4140	2710	2070	1360	960
14_	Speed/torque gradient	rpm/mNm	2300	2590	2240	2880	2550	2640
15_	Mechanical time constant	ms	3.68	3.57	3.54	3.58	3.56	3.59
16_	Rotor inertia	gcm²	0.153	0.132	0.151	0.119	0.134	0.130

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	36.5
18_	Thermal resistance winding-housing	K/W	10.6
19_	Thermal time constant winding	s	3.94
20_	Thermal time constant motor	s	151
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	14300
24_	Axial play	mm	0...0.1
	Preload	N	0.5
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.5
27_	Max. force for press fits (static)	N	8.8
	(shaft supported)	N	120
28_	Max. radial load [mm from flange]	N	1.5 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	14300
24_	Axial play	mm	0...0.15
	Preload	N	0
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	120
28_	Max. radial load [mm from flange]	N	0.8 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	11
32_	Typical noise level	dBA	37

Operating range

n [rpm] Winding 4.5 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
373_GPX 10 A	1–5	507_ENX 10 EASY	550_ESCON Module 24/2
		507_ENX 10 QUAD	550_ESCON 36/2 DC
		508_ENX 10 EASY XT	557_ESCON2 Nano 24/2
			564_EPOS4 Module 24/1.5
			566_EPOS4 Compact 24/1.5

Configuration

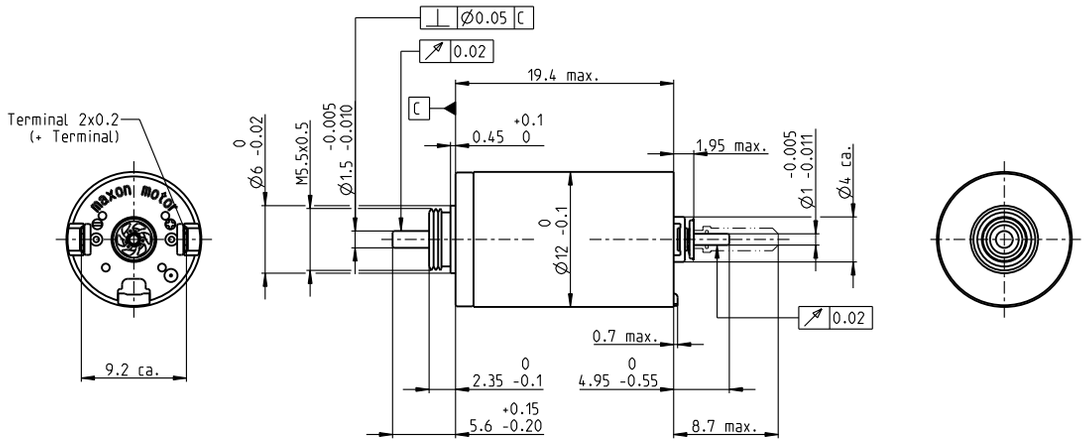
Bearing: sleeve bearings/ball bearings preloaded
Commutation: precious metal brushes with or without CLL
Flange front/back: standard flange/flange with thread holes/no flange
Shaft front/back: length
Electric connection: terminals or cable/cable length/connector type

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DCX 12 S ∅12 mm, precious metal brushes, DC motor

Key data: 1.6/2 W, 2.0 mNm, 13 000 rpm





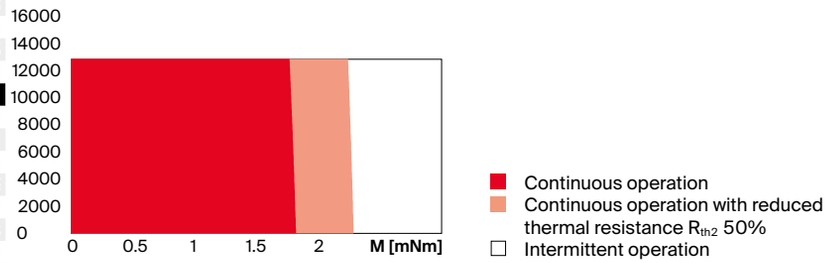
M 3:2

	Motor data						
1_	Nominal voltage	V	3	4.5	6	9	12
2_	No load speed	rpm	9090	9000	9100	9010	9020
3_	No load current	mA	31.8	20.9	15.9	10.5	7.88
4_	Nominal speed	rpm	3760	3620	3870	3700	3620
5_	Nominal torque	mNm	1.92	1.9	1.95	1.92	1.88
6_	Nominal current (max. continuous current)	A	0.655	0.427	0.332	0.216	0.159
7_	Stall torque	mNm	3.35	3.25	3.46	3.33	3.21
8_	Stall current	A	1.09	0.701	0.566	0.36	0.261
9_	Max. efficiency	%	69	69	70	69	69
10_	Terminal resistance	Ω	2.74	6.42	10.6	25	46
11_	Terminal inductance	mH	0.0724	0.166	0.29	0.664	1.17
12_	Torque constant	mNm/A	3.06	4.63	6.12	9.26	12.3
13_	Speed constant	rpm/V	3120	2060	1560	1030	775
14_	Speed/torque gradient	rpm/mNm	2800	2860	2700	2780	2890
15_	Mechanical time constant	ms	8.37	8.32	8.31	8.33	8.33
16_	Rotor inertia	gcm²	0.286	0.278	0.293	0.286	0.275

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	35
18_	Thermal resistance winding-housing	K/W	14.4
19_	Thermal time constant winding	s	7.18
20_	Thermal time constant motor	s	146
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	13 000
24_	Axial play	mm	0...0.1
	Preload	N	0.5
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.5
27_	Max. force for press fits (static)	N	8.8
	(shaft supported)	N	120
28_	Max. radial load [mm from flange]	N	1.5 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	13 000
24_	Axial play	mm	0...0.15
	Preload	N	0
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	120
28_	Max. radial load [mm from flange]	N	0.8 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	11
32_	Typical noise level	dBA	40

Operating range

n [rpm] Winding 4.5 V



Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
374_GPX 12 A/C	1–4	507_ENX 10 EASY	550_ESCON Module 24/2
375_GPX 12 LN/LZ	1–4	507_ENX 10 QUAD	550_ESCON 36/2 DC
376_GPX 12 HP	2–4	508_ENX 10 EASY XT	557_ESCON2 Nano 24/2
378_GPX 14 A/C	3–4		564_EPOS4 Module 24/1.5
379_GPX 14 LN/LZ	3–4		566_EPOS4 Compact 24/1.5
380_GPX 14 HP	4		

Configuration

Bearing: sleeve bearings/ball bearings preloaded
Commutation: precious metal brushes with CLL
Flange front/back: standard flange/flange with thread holes/no flange
Shaft front/back: length
Electric connection: terminals or cable/cable length/connector type

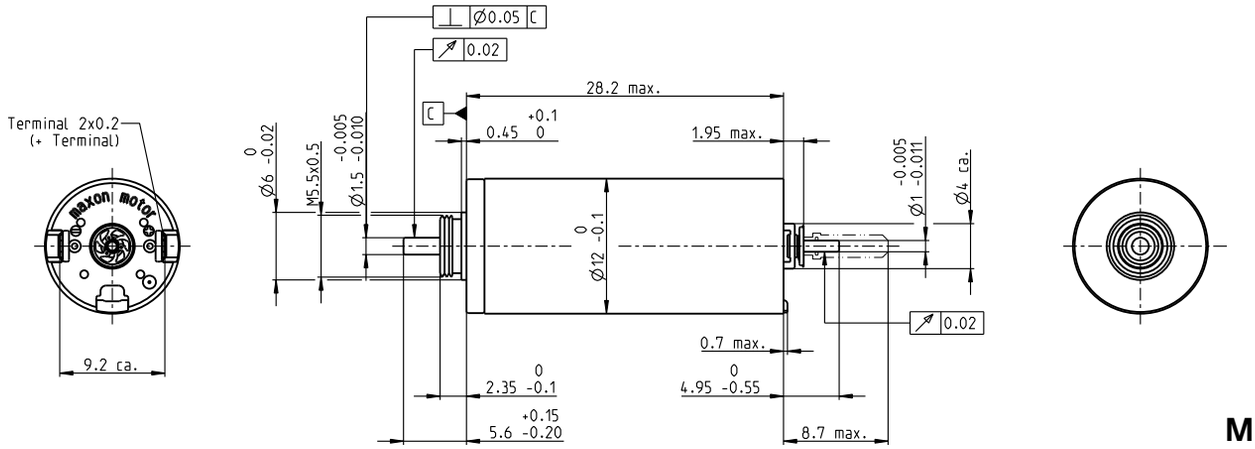
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DCX 12 L ∅12 mm, precious metal brushes, DC motor

Key data: 2.5/4.8 W, 4.2 mNm, 12 000 rpm



DCX



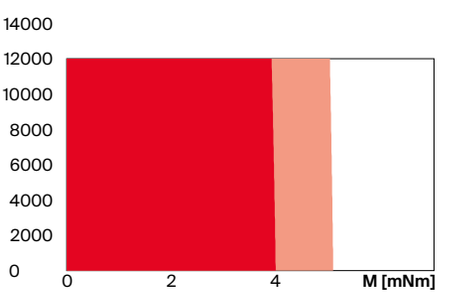
M 3:2

	Motor data							
1_	Nominal voltage	V	3	4.5	6	9	12	18
2_	No load speed	rpm	8810	8820	8810	8820	8810	8810
3_	No load current	mA	31.3	20.9	15.7	10.4	7.83	5.22
4_	Nominal speed	rpm	6230	5640	5540	5750	5560	5540
5_	Nominal torque	mNm	2.88	4.02	3.88	4.13	3.89	3.87
6_	Nominal current (max. continuous current)	A	0.924	0.851	0.616	0.437	0.309	0.205
7_	Stall torque	mNm	9.9	11.2	10.5	11.9	10.6	10.5
8_	Stall current	A	3.08	2.32	1.63	1.23	0.824	0.543
9_	Max. efficiency	%	81	82	82	83	82	82
10_	Terminal resistance	Ω	0.975	1.94	3.68	7.29	14.6	33.1
11_	Terminal inductance	mH	0.031	0.071	0.125	0.282	0.502	1.13
12_	Torque constant	mNm/A	3.22	4.83	6.44	9.66	12.9	19.3
13_	Speed constant	rpm/V	2970	1980	1480	989	741	494
14_	Speed/torque gradient	rpm/mNm	898	793	846	746	839	848
15_	Mechanical time constant	ms	4.55	4.43	4.4	4.37	4.38	4.39
16_	Rotor inertia	gcm²	0.484	0.533	0.496	0.559	0.498	0.495

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	31
18_	Thermal resistance winding-housing	K/W	10.3
19_	Thermal time constant winding	s	10.1
20_	Thermal time constant motor	s	194
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	12 000
24_	Axial play	mm	0...0.1
	Preload	N	0.5
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.5
27_	Max. force for press fits (static)	N	8.8
	(shaft supported)	N	120
28_	Max. radial load [mm from flange]	N	1.5 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	12 000
24_	Axial play	mm	0...0.15
	Preload	N	0
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	120
28_	Max. radial load [mm from flange]	N	0.8 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	16
32_	Typical noise level	dBA	44

Operating range

n [rpm] Winding 4.5 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
374_GPX 12 A/C	1–4	507_ENX 10 EASY	550_ESCON Module 24/2
375_GPX 12 LN/LZ	1–4	507_ENX 10 QUAD	550_ESCON 36/2 DC
376_GPX 12 HP	2–4	508_ENX 10 EASY XT	557_ESCON2 Nano 24/2
378_GPX 14 A/C	3–4		564_EPOS4 Module 24/1.5
379_GPX 14 LN/LZ	3–4		566_EPOS4 Compact 24/1.5
380_GPX 14 HP	4		

Configuration

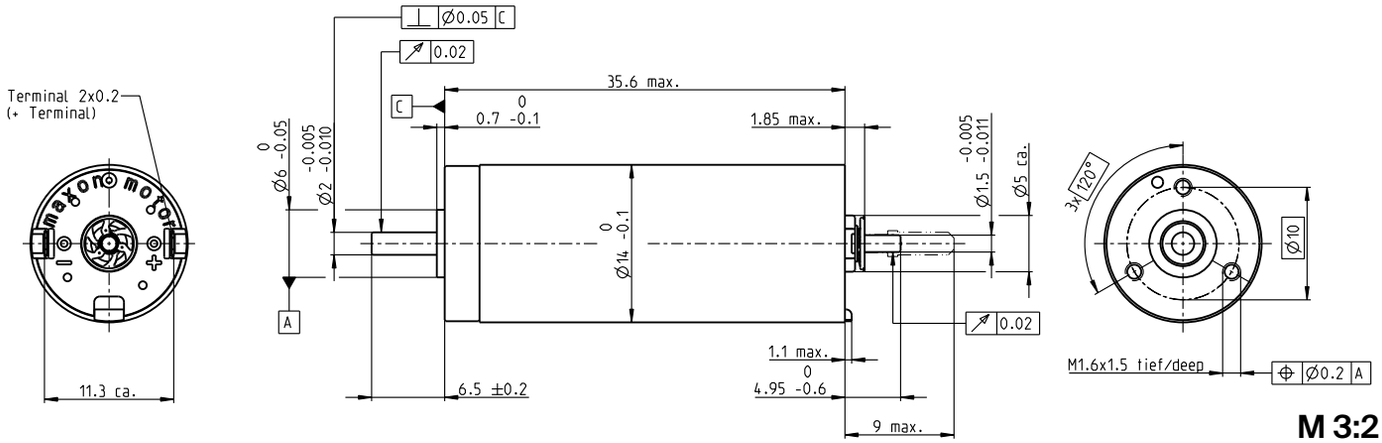
Bearing: sleeve bearings/ball bearings preloaded
Commutation: precious metal brushes with CLL
Flange front/back: standard flange/flange with thread holes/no flange
Shaft front/back: length
Electric connection: terminals or cable/cable length/connector type

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DCX 14 L ∅14 mm, precious metal brushes, DC motor

Key data: 3/5 W, 6.3 mNm, 8680 rpm





M 3:2

	Motor data								
1_	Nominal voltage	V	3	4.5	6	9	12	18	24
2_	No load speed	rpm	7720	7740	7740	7740	7740	7730	7740
3_	No load current	mA	73.6	49.1	36.8	24.5	18.4	12.2	9.2
4_	Nominal speed	rpm	5770	5160	5140	5200	5200	5040	5150
5_	Nominal torque	mNm	4.12	6.29	6.23	6.37	6.38	6.01	6.24
6_	Nominal current (max. continuous current)	A	1.2	1.2	0.889	0.605	0.454	0.286	0.223
7_	Stall torque	mNm	16.5	19.1	18.8	19.6	19.7	17.5	18.9
8_	Stall current	A	4.52	3.49	2.57	1.79	1.35	0.799	0.647
9_	Max. efficiency	%	76	77.7	77.6	78	78.1	77	77.7
10_	Terminal resistance	Ω	0.664	1.29	2.33	5.02	8.9	22.5	37.1
11_	Terminal inductance	mH	0.0252	0.0567	0.101	0.227	0.403	0.908	1.61
12_	Torque constant	mNm/A	3.65	5.47	7.3	10.9	14.6	21.9	29.2
13_	Speed constant	rpm/V	2620	1740	1310	872	654	436	327
14_	Speed/torque gradient	rpm/mNm	476	411	418	400	399	449	415
15_	Mechanical time constant	ms	4.14	4.06	4.05	4.04	4.05	4.1	4.09
16_	Rotor inertia	gcm²	0.831	0.942	0.926	0.966	0.97	0.872	0.939

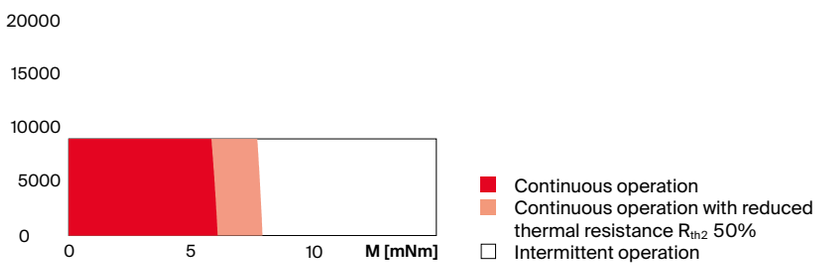
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	22.2
18_	Thermal resistance winding-housing	K/W	8.63
19_	Thermal time constant winding	s	10.3
20_	Thermal time constant motor	s	226
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	8680
24_	Axial play	mm	0...0.1
	Preload	N	0.8
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.8
27_	Max. force for press fits (static)	N	18
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	10 [5]

	Mechanical data sleeve bearings		
23_	Max. speed	rpm	8680
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	60
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	2 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	26
32_	Typical noise level	dBA	44

Operating range

n [rpm] Winding 9 V



Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
378_GPX 14 A/C	1–2 [3–4]	507_ENX 10 EASY	550_ESCON Module 24/2
379_GPX 14 LN/LZ	1–2 [3–4]	507_ENX 10 QUAD	550_ESCON 36/2 DC
380_GPX 14 HP	2–3 [4]	508_ENX 10 EASY XT	557_ESCON2 Nano 24/2
381_GPX 16 A/C	3–4		563_EPOS4 Micro 24/5
382_GPX 16 LN/LZ	3–4		564_EPOS4 Module 24/1.5
383_GPX 16 HP	4		565_EPOS4 Compact 24/5 3-axes
			566_EPOS4 Compact 24/1.5

Configuration

Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with CLL/graphite brushes
Flange front/back: standard flange/configurable flange/no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/alignment of connection/cable length/connector type

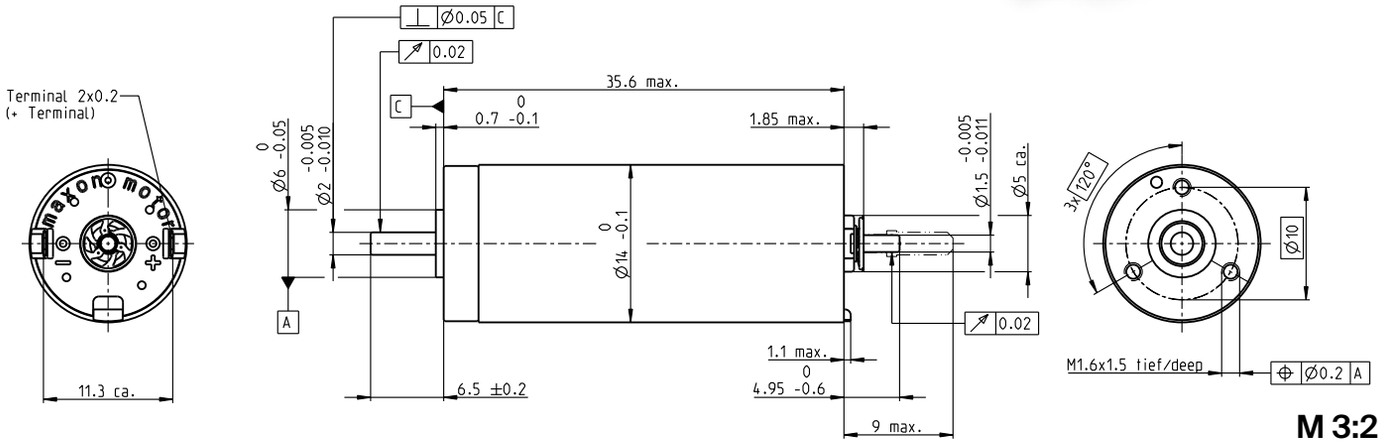
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DCX 14 L ∅14 mm, graphite brushes, DC motor

Key data: 6/10 W, 6.9 mNm, 17000 rpm



DCX



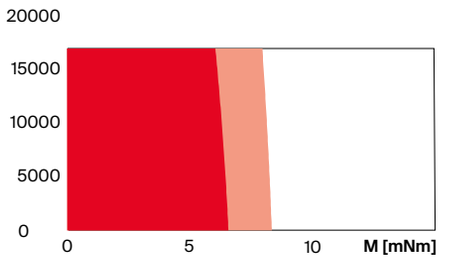
M 3:2

	Motor data							
1_	Nominal voltage	V	4.5	6	9	12	18	24
2_	No load speed	rpm	11600	10400	11700	10300	11600	10300
3_	No load current	mA	73.9	46.4	37	23.2	18.5	11.6
4_	Nominal speed	rpm	8460	7430	8750	7370	8760	7300
5_	Nominal torque	mNm	6.36	6.96	6.88	6.91	6.94	6.66
6_	Nominal current (max. continuous current)	A	1.81	1.31	0.974	0.651	0.492	0.314
7_	Stall torque	mNm	23.5	24.8	27.8	24.7	28.5	22.9
8_	Stall current	A	6.45	4.53	3.8	2.26	1.95	1.05
9_	Max. efficiency	%	79.5	80.8	81.4	80.1	81.3	80.1
10_	Terminal resistance	Ω	0.698	1.33	2.37	5.31	9.21	22.9
11_	Terminal inductance	mH	0.0252	0.0567	0.101	0.227	0.403	0.908
12_	Torque constant	mNm/A	3.65	5.47	7.3	10.9	14.6	21.9
13_	Speed constant	rpm/V	2620	1740	1310	872	654	436
14_	Speed/torque gradient	rpm/mNm	500	422	424	423	413	456
15_	Mechanical time constant	ms	4.35	4.17	4.11	4.28	4.19	4.17
16_	Rotor inertia	gcm²	0.831	0.942	0.926	0.966	0.97	0.872

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	22.2
18_	Thermal resistance winding-housing	K/W	8.63
19_	Thermal time constant winding	s	10.3
20_	Thermal time constant motor	s	226
21_	Ambient temperature ball bearings	°C	-40...+100
	Ambient temperature sleeve bearings	°C	-30...+100
22_	Max. winding temperature	°C	125
	Mechanical data ball bearings		
23_	Max. speed	rpm	17000
24_	Axial play	mm	0...0.1
	Preload	N	0.8
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.8
27_	Max. force for press fits (static)	N	18
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	10 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	15000
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	60
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	2 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	26
32_	Typical noise level	dBA	40

Operating range

n [rpm] Winding 12 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
378_GPX 14 A/C	1–2 [3–4]	507_ENX 10 EASY	550_ESCON Module 24/2
379_GPX 14 LN/LZ	1–2 [3–4]	507_ENX 10 QUAD	550_ESCON 36/2 DC
380_GPX 14 HP	2–3 [4]	508_ENX 10 EASY XT	557_ESCON2 Nano 24/2
381_GPX 16 A/C	3–4		563_EPOS4 Micro 24/5
382_GPX 16 LN/LZ	3–4		564_EPOS4 Module 24/1.5
383_GPX 16 HP	4		565_EPOS4 Compact 24/5 3-axes
			566_EPOS4 Compact 24/1.5

Configuration

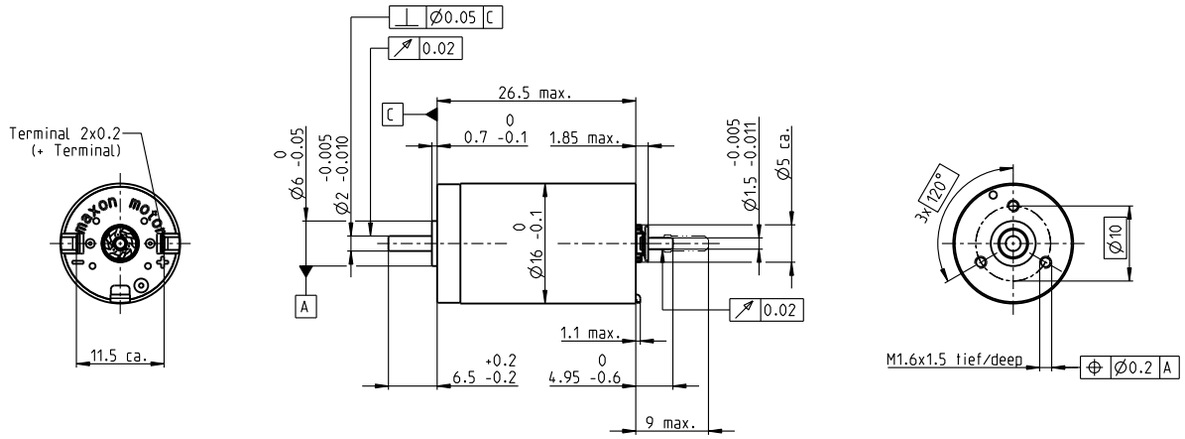
Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with CLL/graphite brushes
Flange front/back: standard flange/configurable flange/no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/alignment of connection/cable length/connector type

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DCX 16 S ∅16 mm, precious metal brushes, DC motor

Key data: 3/5 W, 5.3 mNm, 8680 rpm



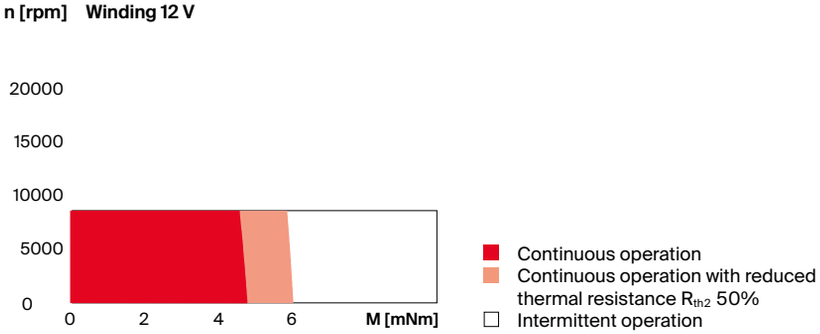


M 1:1

	Motor data								
1_	Nominal voltage	V	3	4.5	6	9	12	18	24
2_	No load speed	rpm	6320	6320	6610	6320	6260	6340	6250
3_	No load current	mA	44.6	29.7	23.4	14.9	11	7.43	5.51
4_	Nominal speed	rpm	3350	3300	3760	3270	3320	3530	3200
5_	Nominal torque	mNm	5.15	5.05	5.36	5	5.19	5.45	4.99
6_	Nominal current (max. continuous current)	A	1.20	0.784	0.65	0.389	0.299	0.211	0.144
7_	Stall torque	mNm	11.1	10.7	12.6	10.6	11.2	12.5	10.4
8_	Stall current	A	2.49	1.61	1.48	0.791	0.624	0.467	0.289
9_	Max. efficiency	%	75	75	77	75	75	77	74
10_	Terminal resistance	Ω	1.20	2.80	4.06	11.4	19.2	38.6	83.1
11_	Terminal inductance	mH	0.036	0.080	0.131	0.320	0.581	1.28	2.32
12_	Torque constant	mNm/A	4.45	6.67	8.53	13.3	18.0	26.7	36.0
13_	Speed constant	rpm/V	2150	1430	1120	715	531	358	265
14_	Speed/torque gradient	rpm/mNm	580	600	533	610	568	517	613
15_	Mechanical time constant	ms	6.09	6.09	6.05	6.13	6.11	6.08	6.17
16_	Rotor inertia	gcm²	1.00	0.97	1.08	0.959	1.03	1.12	0.960

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	23.5
18_	Thermal resistance winding-housing	K/W	9.9
19_	Thermal time constant winding	s	9.63
20_	Thermal time constant motor	s	227
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	8680
24_	Axial play	mm	0...0.1
	Preload	N	0.8
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.8
27_	Max. force for press fits (static)	N	18
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	10 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	8680
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	60
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	2 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	26
32_	Typical noise level	dBA	40

Operating range



Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
381_GPX 16 A/C	1–2 [3–4]	507_ENX 10 EASY	550_ESCON Module 24/2
382_GPX 16 LN/LZ	1–2 [3–4]	507_ENX 10 QUAD	550_ESCON 36/2 DC
383_GPX 16 HP	2–3 [4]	508_ENX 10 EASY XT	557_ESCON2 Nano 24/2
386_GPX 19 A/C	3–4	509_ENX 16 EASY	563_EPOS4 Micro 24/5
387_GPX 19 LN/LZ	3–4	510_ENX 16 EASY XT	564_EPOS4 Module 24/1.5
388_GPX 19 HP	4	511_ENX 16 EASY Abs.	565_EPOS4 Compact 24/5 3-axes
		512_ENX 16 EASY Abs. XT	566_EPOS4 Compact 24/1.5
		519_ENX 16 RIO	569_EPOS4 50/5

Configuration

Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with CLL/graphite brushes
Flange front/back: standard flange/configurable flange/no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/alignment of connection/cable length/connector type

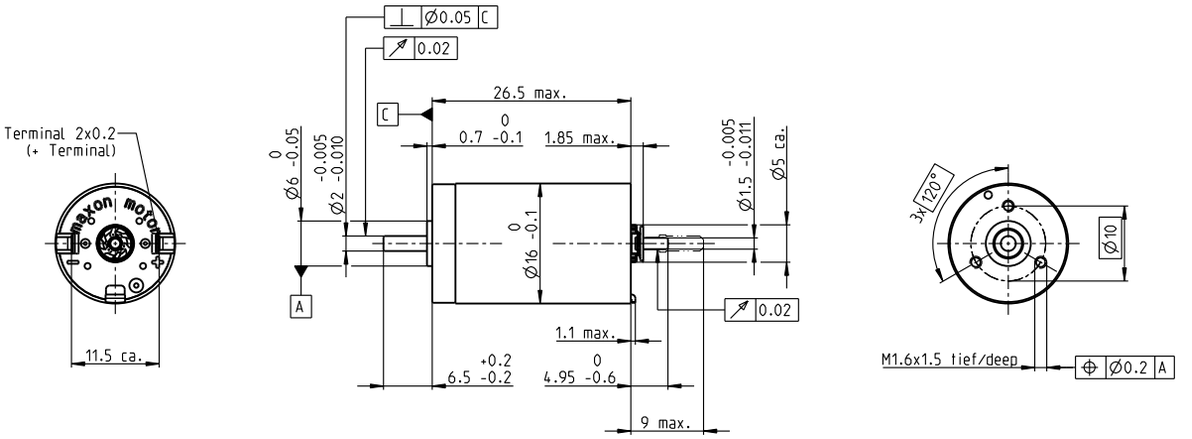
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DCX 16 S ∅16 mm, graphite brushes, DC motor

Key data: 5/10 W, 5.4 mNm, 17000 rpm



DCX



M 1:1

	Motor data							
1_	Nominal voltage	V	6	9	12	18	24	48
2_	No load speed	rpm	12700	12700	13200	12700	12700	12600
3_	No load current	mA	63.9	42.6	35.4	22.4	16.8	8.28
4_	Nominal speed	rpm	9400	9400	9850	9260	9430	9250
5_	Nominal torque	mNm	5.45	5.4	5.36	5.21	5.43	5.32
6_	Nominal current (max. continuous current)	A	1.28	0.847	0.662	0.411	0.321	0.156
7_	Stall torque	mNm	21.3	21	22.6	20.1	21.7	20.6
8_	Stall current	A	4.79	3.15	2.65	1.51	1.22	0.572
9_	Max. efficiency	%	78	78	76	76	78	77
10_	Terminal resistance	Ω	1.25	2.85	4.53	12	19.7	83.9
11_	Terminal inductance	mH	0.036	0.080	0.131	0.320	0.569	2.32
12_	Torque constant	mNm/A	4.45	6.67	8.53	13.3	17.8	36.0
13_	Speed constant	rpm/V	2150	1430	1120	715	536	265
14_	Speed/torque gradient	rpm/mNm	605	612	594	641	592	620
15_	Mechanical time constant	ms	6.35	6.21	6.74	6.43	6.32	6.23
16_	Rotor inertia	gcm²	1.00	0.970	1.08	0.959	1.02	0.960

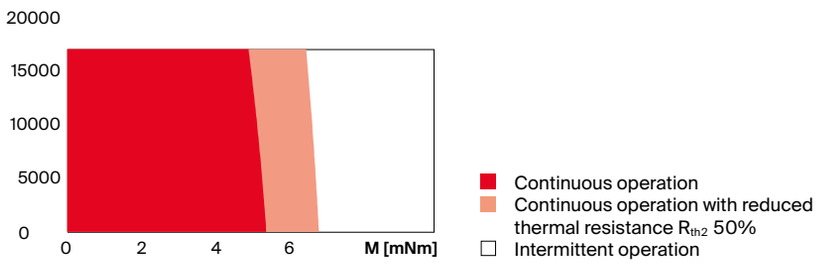
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	23.5
18_	Thermal resistance winding-housing	K/W	9.9
19_	Thermal time constant winding	s	9.63
20_	Thermal time constant motor	s	227
21_	Ambient temperature ball bearings	°C	-40...+100
	Ambient temperature sleeve bearings	°C	-30...+100
22_	Max. winding temperature	°C	125
	Mechanical data ball bearings		
23_	Max. speed	rpm	17000
24_	Axial play	mm	0...0.1
	Preload	N	0.8
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.8
27_	Max. force for press fits (static)	N	18
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	10 [5]

	Mechanical data sleeve bearings		
23_	Max. speed	rpm	17000
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	60
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	2 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	26
32_	Typical noise level	dBA	38

Operating range

n [rpm] Winding 12 V



Modular system Details on catalog page 40

Gear	Stages [opt.]
381_GPX 16 A/C	1–2 [3–4]
382_GPX 16 LN/LZ	1–2 [3–4]
383_GPX 16 HP	2–3 [4]
386_GPX 19 A/C	3–4
387_GPX 19 LN/LZ	3–4
388_GPX 19 HP	4

Sensor
507_ENX 10 EASY
507_ENX 10 QUAD
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
519_ENX 16 RIO

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

Configuration

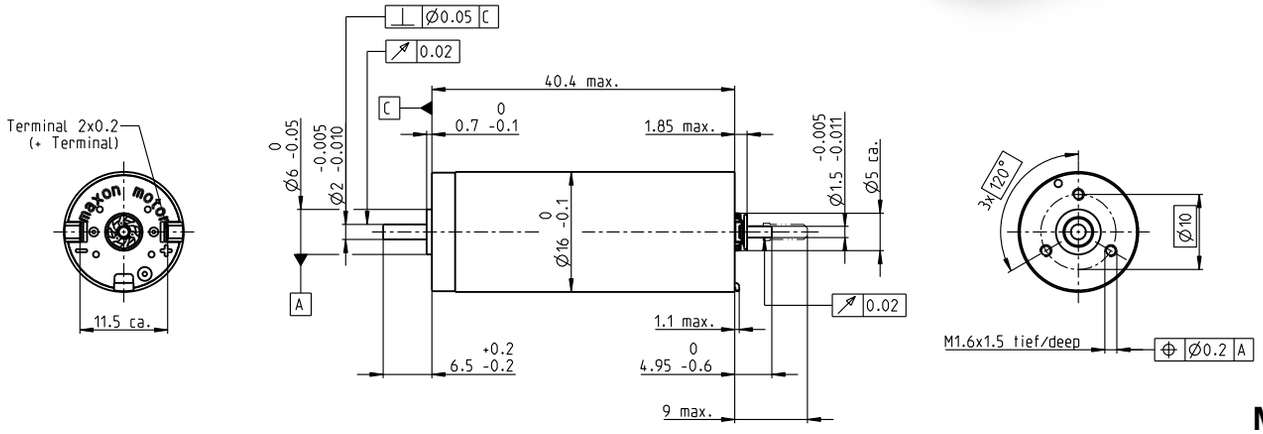
Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with CLL/ graphite brushes
Flange front/back: standard flange/configurable flange/ no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/ alignment of connection/cable length/connector type

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DCX 16 L ∅16 mm, precious metal brushes, DC motor

Key data: 5/10 W, 11.5 mNm, 8680 rpm



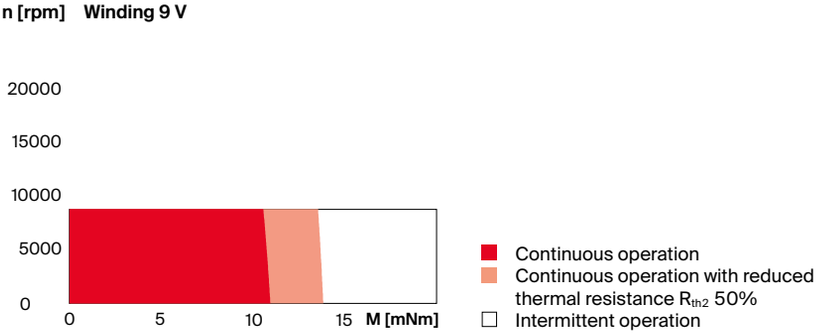


M 1:1

	Motor data							
1_	Nominal voltage	V	3	6	9	12	18	24
2_	No load speed	rpm	6400	6620	6410	6400	6400	6560
3_	No load current	mA	62.5	32.6	20.8	15.6	10.4	8.05
4_	Nominal speed	rpm	5450	4920	4620	4490	4510	4630
5_	Nominal torque	mNm	5.06	10.0	11.6	10.8	10.9	10.7
6_	Nominal current (max. continuous current)	A	1.20	1.20	0.89	0.625	0.42	0.316
7_	Stall torque	mNm	34.4	39.3	41.8	36.6	37.3	36.6
8_	Stall current	A	7.73	4.57	3.14	2.06	1.40	1.06
9_	Max. efficiency	%	83	84	84	83	84	83
10_	Terminal resistance	Ω	0.388	1.31	2.87	5.82	12.9	22.7
11_	Terminal inductance	mH	0.026	0.096	0.231	0.411	0.925	1.56
12_	Torque constant	mNm/A	4.44	8.59	13.3	17.8	26.7	34.7
13_	Speed constant	rpm/V	2150	1110	716	537	358	276
14_	Speed/torque gradient	rpm/mNm	188	170	154	176	173	181
15_	Mechanical time constant	ms	4.29	4.20	4.18	4.19	4.22	4.23
16_	Rotor inertia	gcm²	2.18	2.36	2.59	2.28	2.33	2.23

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	17.9
18_	Thermal resistance winding-housing	K/W	7.21
19_	Thermal time constant winding	s	21.5
20_	Thermal time constant motor	s	294
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	8680
24_	Axial play	mm	0...0.1
	Preload	N	0.8
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.8
27_	Max. force for press fits (static)	N	18
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	10 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	8680
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	60
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	2 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	42
32_	Typical noise level	dBA	44

Operating range



Modular system Details on catalog page 40

Gear	Stages [opt.]
381_GPX 16 A/C	1–2 [3–4]
382_GPX 16 LN/LZ	1–2 [3–4]
383_GPX 16 HP	2–3 [4]
386_GPX 19 A/C	3–4
387_GPX 19 LN/LZ	3–4
388_GPX 19 HP	4

Sensor
507_ENX 10 EASY
507_ENX 10 QUAD
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
519_ENX 16 RIO

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

Configuration

Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with CLL/graphite brushes
Flange front/back: standard flange/configurable flange/no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/alignment of connection/cable length/connector type

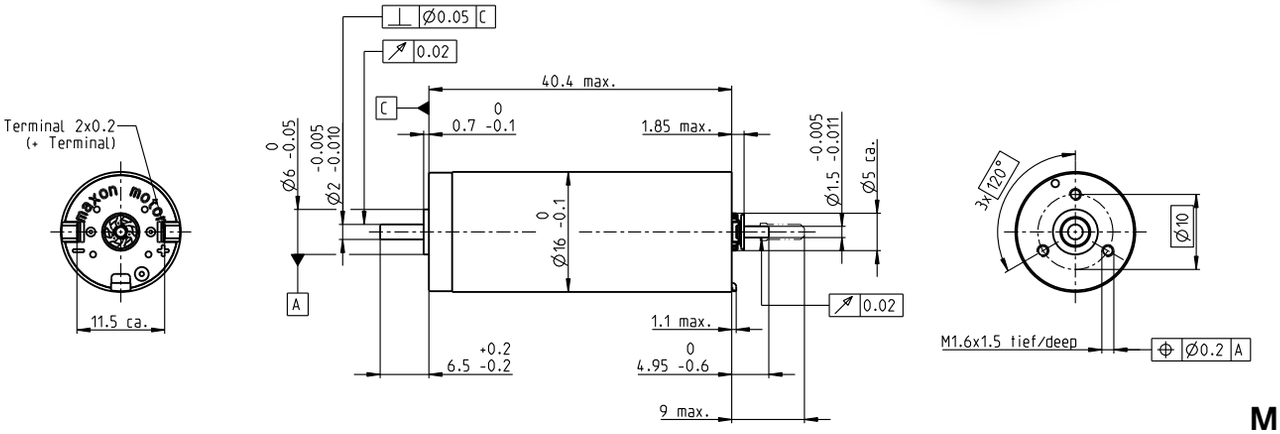
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DCX 16 L ∅16 mm, graphite brushes, DC motor

Key data: 10/19 W, 11.8 mNm, 17 000 rpm



DCX



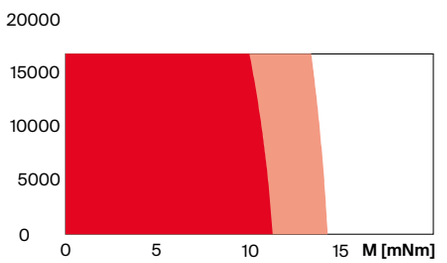
M 1:1

	Motor data							
1_	Nominal voltage	V	6	9	12	18	24	36
2_	No load speed	rpm	12800	13100	13200	12800	12800	12800
3_	No load current	mA	73.5	50.7	38.6	24.5	18.4	12.3
4_	Nominal speed	rpm	11000	11000	10700	10600	10600	10700
5_	Nominal torque	mNm	8.58	11.8	10.4	11.6	11.3	11.6
6_	Nominal current (max. continuous current)	A	2.00	1.85	1.24	0.896	0.651	0.447
7_	Stall torque	mNm	61.8	74.2	63.3	74.5	68.5	72
8_	Stall current	A	13.9	11.4	7.37	5.59	3.85	2.70
9_	Max. efficiency	%	85	87	83	86	86	87
10_	Terminal resistance	Ω	0.431	0.791	1.63	3.22	6.23	13.3
11_	Terminal inductance	mH	0.026	0.055	0.096	0.231	0.411	0.925
12_	Torque constant	mNm/A	4.44	6.52	8.59	13.3	17.8	26.7
13_	Speed constant	rpm/V	2150	1470	1110	716	537	358
14_	Speed/torque gradient	rpm/mNm	209	178	211	173	188	179
15_	Mechanical time constant	ms	4.77	4.47	5.21	4.70	4.48	4.37
16_	Rotor inertia	gcm²	2.18	2.40	2.36	2.59	2.28	2.33

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	17.9
18_	Thermal resistance winding-housing	K/W	7.21
19_	Thermal time constant winding	s	21.5
20_	Thermal time constant motor	s	294
21_	Ambient temperature ball bearings	°C	-40...+100
	Ambient temperature sleeve bearings	°C	-30...+100
22_	Max. winding temperature	°C	125
	Mechanical data ball bearings		
23_	Max. speed	rpm	17 000
24_	Axial play	mm	0...0.1
	Preload	N	0.8
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.8
27_	Max. force for press fits (static)	N	18
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	10 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	15 000
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.015
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	60
	(shaft supported)	N	300
28_	Max. radial load [mm from flange]	N	2 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	42
32_	Typical noise level	dBA	40

Operating range

n [rpm] Winding 12 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]
381_GPX 16 A/C	1–2 [3–4]
382_GPX 16 LN/LZ	1–2 [3–4]
383_GPX 16 HP	2–3 [4]
386_GPX 19 A/C	3–4
387_GPX 19 LN/LZ	3–4
388_GPX 19 HP	4

Sensor
507_ENX 10 EASY
507_ENX 10 QUAD
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
519_ENX 16 RIO

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

Configuration

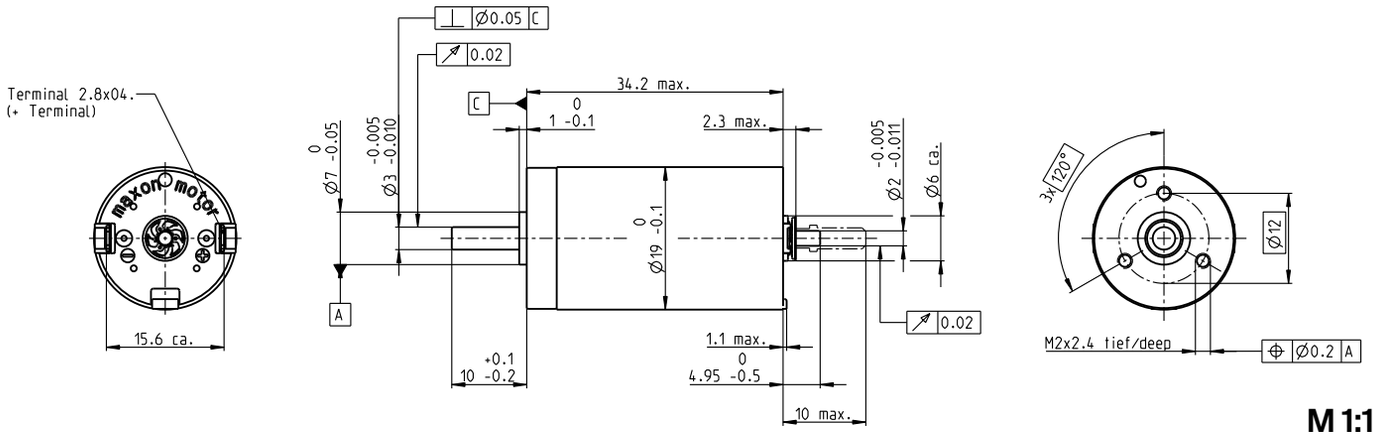
Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with CLL/graphite brushes
Flange front/back: standard flange/configurable flange/no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/alignment of connection/cable length/connector type

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DCX 19 S ∅19 mm, precious metal brushes, DC motor

Key data: 5/8 W, 11.0 mNm, 7500 rpm



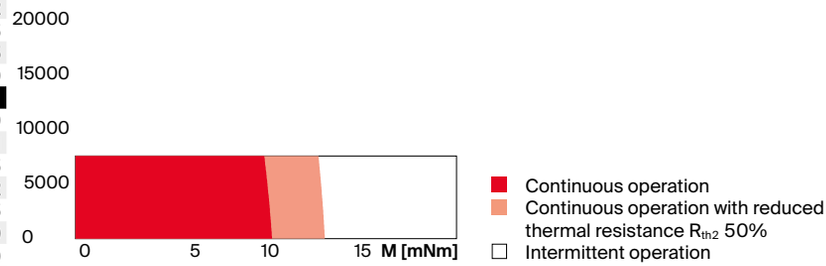


M 1:1

	Motor data							
1_	Nominal voltage	V	4.5	6	9	12	18	24
2_	No load speed	rpm	6440	6350	6260	6360	6360	6350
3_	No load current	mA	72	53	34.6	26.5	17.7	13.2
4_	Nominal speed	rpm	5080	4540	4350	4490	4490	4480
5_	Nominal torque	mNm	7.46	10.3	10.8	11.0	11.0	10.9
6_	Nominal current (max. continuous current)	A	1.20	1.20	0.829	0.643	0.428	0.319
7_	Stall torque	mNm	35.7	36.3	35.8	38.0	37.8	37.5
8_	Stall current	A	5.42	4.07	2.64	2.13	1.41	1.05
9_	Max. efficiency	%	78	79	79	79	79	79
10_	Terminal resistance	Ω	0.831	1.47	3.40	5.63	12.7	22.8
11_	Terminal inductance	mH	0.045	0.082	0.191	0.329	0.740	1.320
12_	Torque constant	mNm/A	6.58	8.90	13.5	17.8	26.7	35.6
13_	Speed constant	rpm/V	1450	1070	705	536	358	268
14_	Speed/torque gradient	rpm/mNm	183	177	177	170	170	172
15_	Mechanical time constant	ms	5.12	4.99	4.92	4.89	4.89	4.90
16_	Rotor inertia	gcm²	2.67	2.68	2.65	2.75	2.74	2.72

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	17.6
18_	Thermal resistance winding-housing	K/W	6.5
19_	Thermal time constant winding	s	11.6
20_	Thermal time constant motor	s	312
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	7500
24_	Axial play	mm	0...0.1
	Preload	N	2.5
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	2.5
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	16 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	7500
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	80
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	3 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		9
31_	Weight of motor	g	50
32_	Typical noise level	dBA	48

Operating range



Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
386_GPX 19 A/C	1–2 [3–4]	507_ENX 10 EASY	550_ESCON Module 24/2
387_GPX 19 LN/LZ	1–2 [3–4]	507_ENX 10 QUAD	550_ESCON 36/2 DC
388_GPX 19 HP	2–3 [4]	508_ENX 10 EASY XT	557_ESCON2 Nano 24/2
390_GPX 22 A/C	3–4	509_ENX 16 EASY	563_EPOS4 Micro 24/5
391_GPX 22 LN/LZ	3–4	510_ENX 16 EASY XT	564_EPOS4 Module 24/1.5
392_GPX 22 HP	4	511_ENX 16 EASY Abs.	565_EPOS4 Compact 24/5 3-axes
		512_ENX 16 EASY Abs. XT	566_EPOS4 Compact 24/1.5
		519_ENX 16 RIO	

Configuration

Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with CLL/graphite brushes
Flange front/back: standard flange/configurable flange/no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/alignment of connection/cable length/connector type

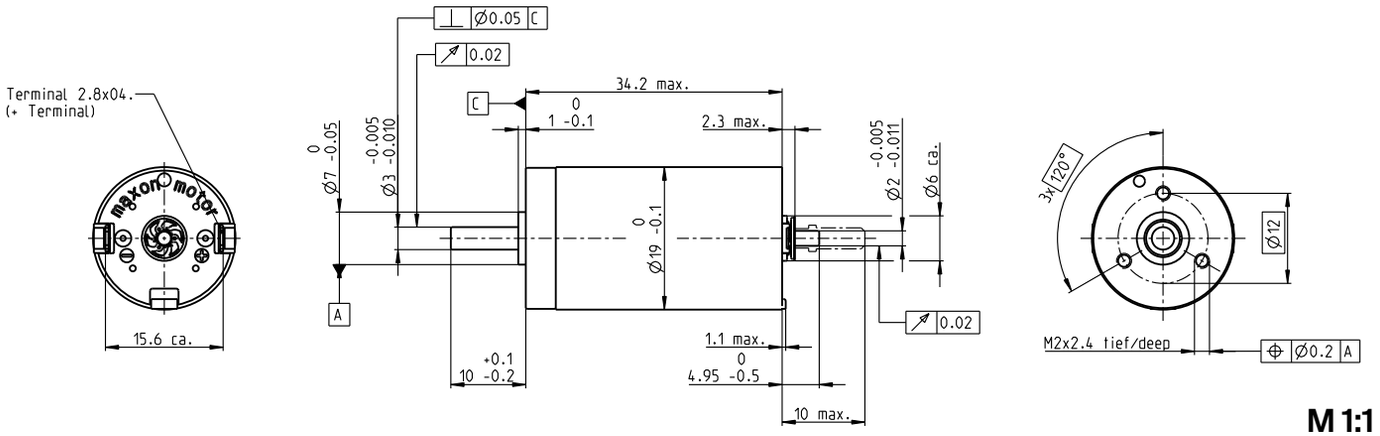
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DCX 19 S ∅19 mm, graphite brushes, DC motor

Key data: 11/17 W, 11.4 mNm, 16 000 rpm



DCX



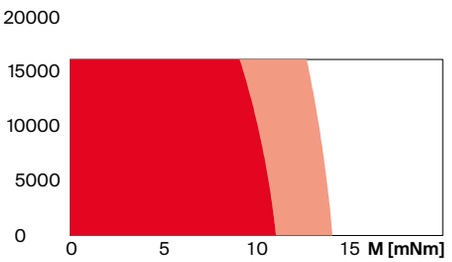
M 1:1

	Motor data							
1_	Nominal voltage	V	9	12	18	24	36	48
2_	No load speed	rpm	12900	12800	12600	12700	12700	12700
3_	No load current	mA	102	75	48.9	37.4	25	18.7
4_	Nominal speed	rpm	10900	10800	10600	10600	10700	10700
5_	Nominal torque	mNm	11.3	11.4	11.4	11.1	11.3	11.3
6_	Nominal current (max. continuous current)	A	1.81	1.35	0.884	0.657	0.445	0.335
7_	Stall torque	mNm	73.8	73.9	72.2	73.2	73.9	73.8
8_	Stall current	A	11.2	8.30	5.33	4.11	2.77	2.07
9_	Max. efficiency	%	82	82	82	81	82	82
10_	Terminal resistance	Ω	0.802	1.45	3.38	5.84	13.0	23.2
11_	Terminal inductance	mH	0.045	0.082	0.191	0.329	0.740	1.320
12_	Torque constant	mNm/A	6.58	8.90	13.5	17.8	26.7	35.6
13_	Speed constant	rpm/V	1450	1070	705	536	358	268
14_	Speed/torque gradient	rpm/mNm	177	174	176	176	174	174
15_	Mechanical time constant	ms	4.94	4.90	4.88	5.07	5.00	4.97
16_	Rotor inertia	gcm²	2.67	2.68	2.65	2.75	2.74	2.72

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	17.6
18_	Thermal resistance winding-housing	K/W	6.5
19_	Thermal time constant winding	s	11.6
20_	Thermal time constant motor	s	312
21_	Ambient temperature ball bearings	°C	-40...+100
	Ambient temperature sleeve bearings	°C	-30...+100
22_	Max. winding temperature	°C	125
	Mechanical data ball bearings		
23_	Max. speed	rpm	16 000
24_	Axial play	mm	0...0.1
	Preload	N	2.5
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	2.5
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	16 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	13 500
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	80
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	3 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		9
31_	Weight of motor	g	50
32_	Typical noise level	dBA	40

Operating range

n [rpm] Winding 18 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]
386_GPX 19 A/C	1–2 [3–4]
387_GPX 19 LN/LZ	1–2 [3–4]
388_GPX 19 HP	2–3 [4]
390_GPX 22 A/C	3–4
391_GPX 22 LN/LZ	3–4
392_GPX 22 HP	4

Sensor
- 507_ENX 10 EASY
- 507_ENX 10 QUAD
- 508_ENX 10 EASY XT
- 509_ENX 16 EASY
- 510_ENX 16 EASY XT
- 511_ENX 16 EASY Abs.
- 512_ENX 16 EASY Abs. XT
- 519_ENX 16 RIO

Motor Control
- 550_ESCON Module 24/2
- 550_ESCON 36/2 DC
- 551_ESCON Module 50/5
- 553_ESCON 50/5
- 557_ESCON2 Nano 24/2
- 557_ESCON2 Micro 60/5
- 563_EPOS4 Micro 24/5
- 564_EPOS4 Module 24/1.5
- 564_EPOS4 Module 50/5
- 565_EPOS4 Compact 24/5 3-axes
- 566_EPOS4 Compact 24/1.5
- 567_EPOS4 Compact 50/5
- 569_EPOS4 50/5

Configuration

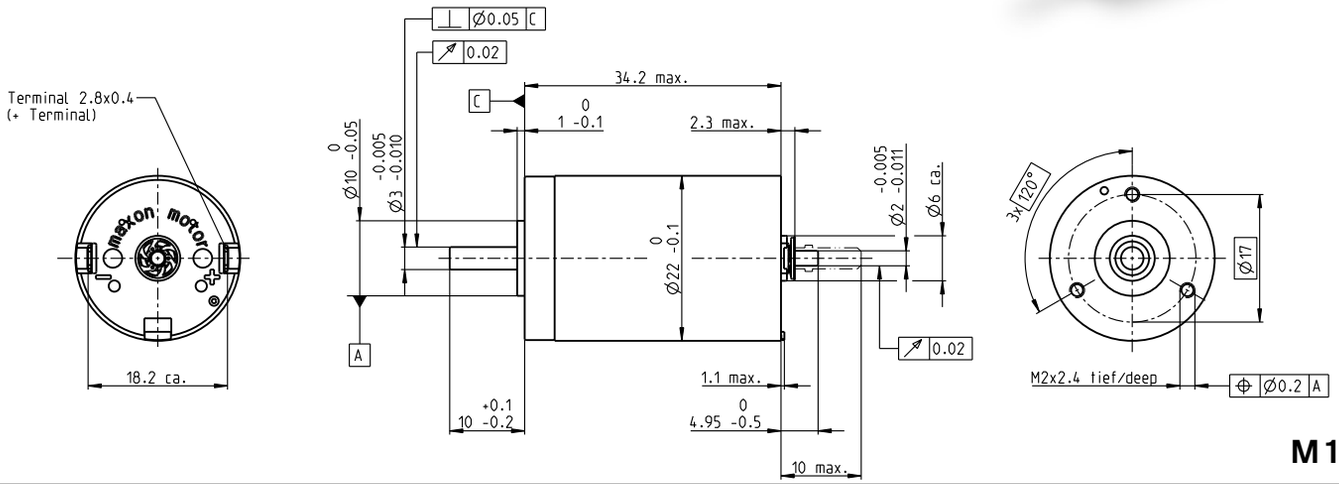
Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with CLL/ graphite brushes
Flange front/back: standard flange/configurable flange/ no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/alignment of connection/cable length/connector type

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DCX 22 S ∅22 mm, precious metal brushes, DC motor

Key data: 6/10 W, 14.7 mNm, 7160 rpm



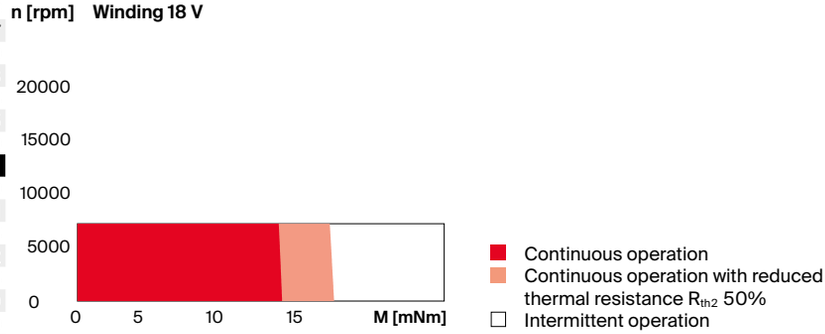


M 1:1

	Motor data							
1_	Nominal voltage	V	6	12	18	24	36	48
2_	No load speed	rpm	6200	6200	6110	6340	6550	5890
3_	No load current	mA	39.2	19.6	12.8	10.1	7.09	4.55
4_	Nominal speed	rpm	4960	4670	4560	4700	4940	4240
5_	Nominal torque	mNm	10.7	14.7	14.5	13.6	13.8	13.6
6_	Nominal current (max. continuous current)	A	1.20	0.817	0.531	0.388	0.272	0.180
7_	Stall torque	mNm	53.7	59.7	57.5	52.7	56.5	48.6
8_	Stall current	A	5.85	3.25	2.06	1.47	1.08	0.63
9_	Max. efficiency	%	84	85	85	84	85	84
10_	Terminal resistance	Ω	1.02	3.69	8.75	16.3	33.3	76.2
11_	Terminal inductance	mH	0.058	0.231	0.535	0.881	1.86	4.08
12_	Torque constant	mNm/A	9.18	18.4	28.0	35.9	52.2	77.2
13_	Speed constant	rpm/V	1040	520	342	266	183	124
14_	Speed/torque gradient	rpm/mNm	116	104	107	121	117	122
15_	Mechanical time constant	ms	6.14	6.07	6.09	5.93	6.15	6.19
16_	Rotor inertia	gcm²	5.05	5.55	5.44	4.67	5.03	4.84

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	16
18_	Thermal resistance winding-housing	K/W	7
19_	Thermal time constant winding	s	20
20_	Thermal time constant motor	s	528
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	7160
24_	Axial play	mm	0...0.1
	Preload	N	2.5
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	2.5
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	16 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	7160
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	80
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	3 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		9
31_	Weight of motor	g	66
32_	Typical noise level	dBA	48

Operating range



Modular system Details on catalog page 40

Gear	Stages [opt.]
390_GPX 22 A/C	1–2 [3–4]
391_GPX 22 LN/LZ	1–2 [3–4]
392_GPX 22 HP	2–3 [4]
394_GPX 22 UP	1–4
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
507_ENX 10 EASY/QUAD
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
518_ENX 22 EMT
519_ENX 16 RIO
535_ENC 30 HEDS 5540
538_ENC 30 HEDL 5540

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with or without CLL/ graphite brushes/EMI filter
Flange front/back: standard flange/configurable flange/ no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/ alignment of connection/cable length/connector type

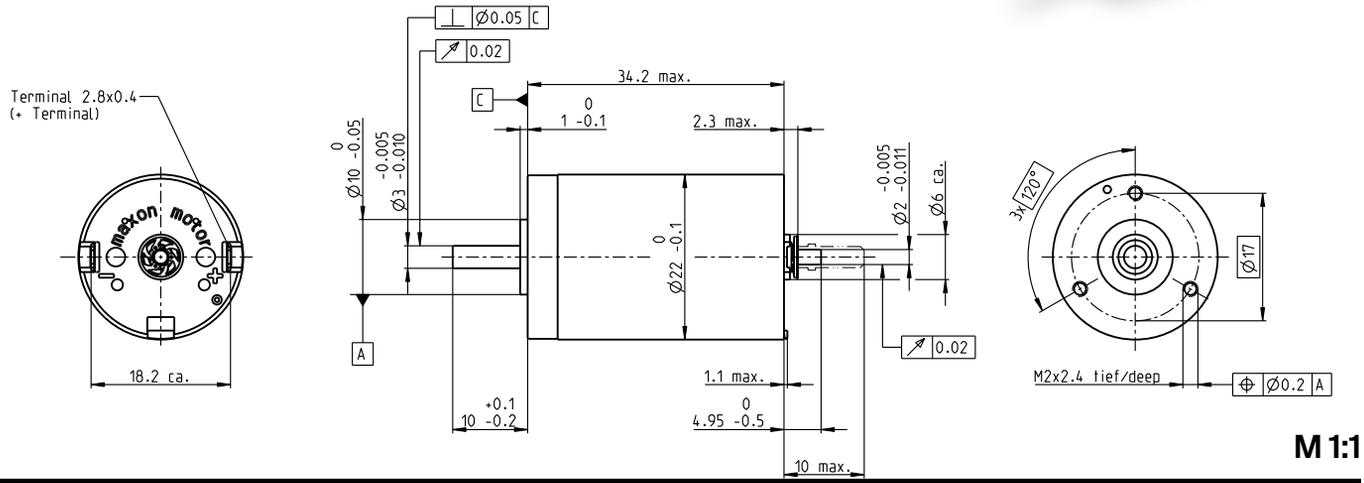
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DCX 22 S ∅22 mm, graphite brushes, DC motor

Key data: 14/24 W, 15.3 mNm, 18 000 rpm



DCX



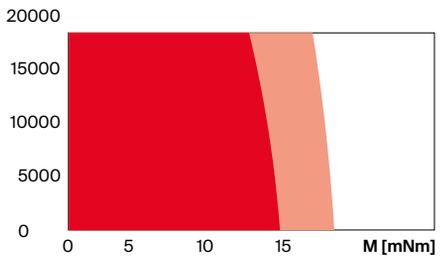
M 1:1

	Motor data							
1_	Nominal voltage	V	6	12	18	24	36	48
2_	No load speed	rpm	11400	12400	12400	12400	12200	12700
3_	No load current	mA	126	71.7	47.8	35.9	23.4	18.5
4_	Nominal speed	rpm	9700	10700	10800	10800	10500	10900
5_	Nominal torque	mNm	14.4	14.6	14.9	15.3	14.8	14.0
6_	Nominal current (max. continuous current)	A	3.00	1.65	1.12	0.869	0.552	0.406
7_	Stall torque	mNm	101	108	112	120	113	104
8_	Stall current	A	20.2	11.8	8.15	6.51	4.03	2.90
9_	Max. efficiency	%	85	85	85	86	85	84
10_	Terminal resistance	Ω	0.297	1.02	2.21	3.69	8.94	16.6
11_	Terminal inductance	mH	0.017	0.058	0.130	0.231	0.535	0.881
12_	Torque constant	mNm/A	5.01	9.18	13.8	18.4	28.0	35.9
13_	Speed constant	rpm/V	1910	1040	693	520	342	266
14_	Speed/torque gradient	rpm/mNm	113	116	111	104	109	123
15_	Mechanical time constant	ms	6.23	6.12	6.08	6.07	6.22	6.01
16_	Rotor inertia	gcm²	5.27	5.05	5.22	5.55	5.44	4.67

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	16
18_	Thermal resistance winding-housing	K/W	7
19_	Thermal time constant winding	s	20
20_	Thermal time constant motor	s	528
21_	Ambient temperature ball bearings	°C	-40...+100
	Ambient temperature sleeve bearings	°C	-30...+100
22_	Max. winding temperature	°C	125
	Mechanical data ball bearings		
23_	Max. speed	rpm	18 000
24_	Axial play	mm	0...0.1
	Preload	N	2.5
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	2.5
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	16 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	18 000
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	80
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	3 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		9
31_	Weight of motor	g	66
32_	Typical noise level	dBA	41

Operating range

n [rpm] Winding 18 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]
390_GPX 22 A/C	1–2 [3–4]
391_GPX 22 LN/LZ	1–2 [3–4]
392_GPX 22 HP	2–3 [4]
394_GPX 22 UP	1–4
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
507_ENX 10 EASY/QUAD
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
518_ENX 22 EMT
519_ENX 16 RIO
535_ENC 30 HEDS 5540
538_ENC 30 HEDL 5540

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

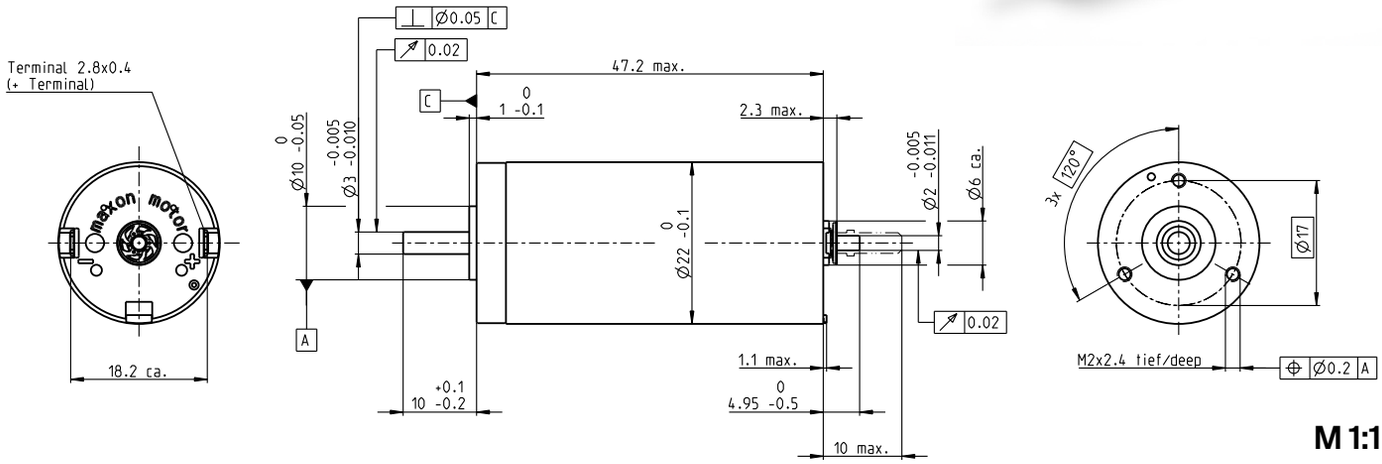
Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with or without CLL/ graphite brushes/EMI filter
Flange front/back: standard flange/configurable flange/ no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/ alignment of connection/cable length/connector type

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DCX 22 L ∅22 mm, precious metal brushes, DC motor

Key data: 11/20 W, 29.8 mNm, 7160 rpm





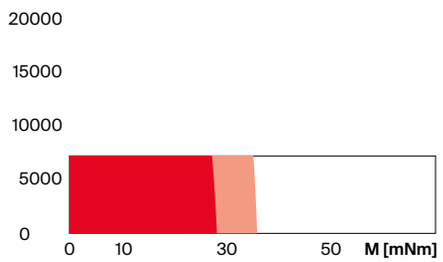
M 1:1

	Motor data								
1_	Nominal voltage	V	6	9	12	18	24	36	48
2_	No load speed	rpm	5870	5870	4980	5740	5060	6020	5220
3_	No load current	mA	51.0	34	20.0	16.4	10.2	8.82	5.36
4_	Nominal speed	rpm	5380	5210	4000	4780	4070	5040	4180
5_	Nominal torque	mNm	14.1	21.4	29.5	29.8	29.2	29.2	27.8
6_	Nominal current (max. continuous current)	A	1.50	1.50	1.30	1.01	0.655	0.520	0.322
7_	Stall torque	mNm	170	191	150	178	150	180	140
8_	Stall current	A	17.5	13.1	6.54	5.97	3.31	3.16	1.60
9_	Max. efficiency	%	89	90	89	90	89	90	89
10_	Terminal resistance	Ω	0.343	0.687	1.84	3.01	7.25	11.4	29.9
11_	Terminal inductance	mH	0.035	0.078	0.192	0.326	0.746	1.19	2.80
12_	Torque constant	mNm/A	9.73	14.6	22.9	29.9	45.2	57.0	87.6
13_	Speed constant	rpm/V	981	654	416	320	211	168	109
14_	Speed/torque gradient	rpm/mNm	34.6	30.8	33.3	32.2	33.9	33.5	37.3
15_	Mechanical time constant	ms	3.28	3.17	3.14	3.13	3.14	3.14	3.17
16_	Rotor inertia	gcm²	9.06	9.82	9.00	9.26	8.85	8.94	8.12

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	13.6
18_	Thermal resistance winding-housing	K/W	4.57
19_	Thermal time constant winding	s	22
20_	Thermal time constant motor	s	646
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	7160
24_	Axial play	mm	0...0.1
	Preload	N	2.5
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	2.5
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	16 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	7160
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	80
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	3 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		9
31_	Weight of motor	g	95
32_	Typical noise level	dBA	52

Operating range

n [rpm] Winding 18 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]
390_GPX 22 A/C	1–2 [3–4]
391_GPX 22 LN/LZ	1–2 [3–4]
392_GPX 22 HP	2–3 [4]
394_GPX 22 UP	1–4
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
507_ENX 10 EASY/QUAD
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
518_ENX 22 EMT
519_ENX 16 RIO
535_ENC 30 HEDS 5540
538_ENC 30 HEDL 5540

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with or without CLL/ graphite brushes/EMI filter
Flange front/back: standard flange/configurable flange/ no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/ alignment of connection/cable length/connector type

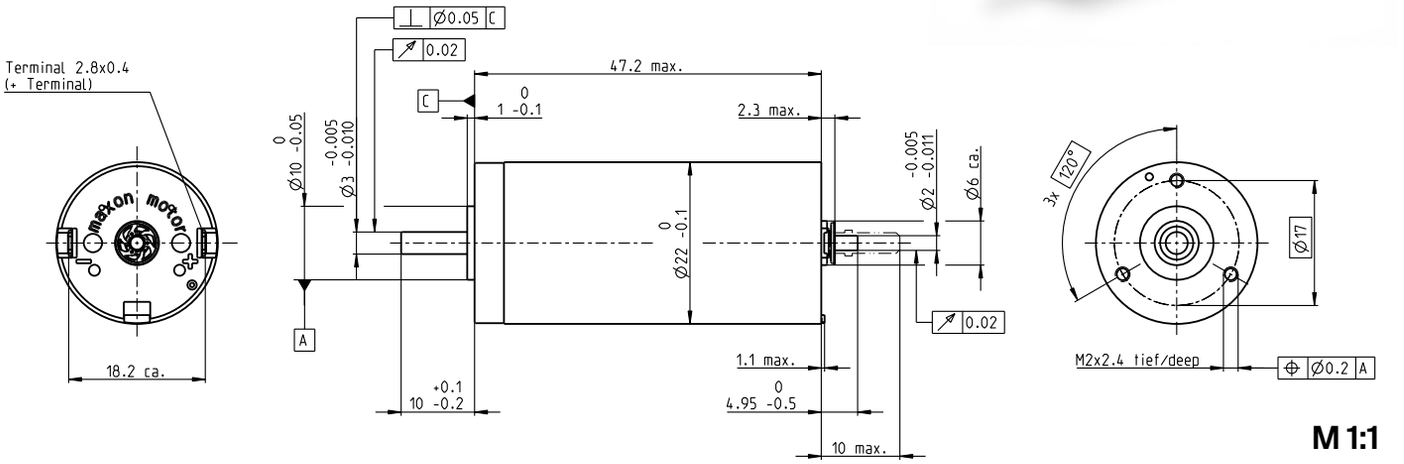
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DCX 22 L ∅22 mm, graphite brushes, DC motor

Key data: 20/49 W, 32.2 mNm, 18 000 rpm



DCX



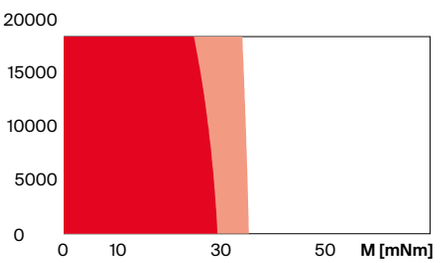
M 1:1

	Motor data						
1_	Nominal voltage	V	9	12	18	36	48
2_	No load speed	rpm	12300	11700	11800	11400	10100
3_	No load current	mA	118	81.8	54.6	26.3	16.2
4_	Nominal speed	rpm	11400	10700	10800	10400	9020
5_	Nominal torque	mNm	27.0	30.5	32.2	30.0	30.3
6_	Nominal current (max. continuous current)	A	4.00	3.21	2.26	1.03	0.687
7_	Stall torque	mNm	371	348	386	346	294
8_	Stall current	A	53.4	35.8	26.5	11.6	6.50
9_	Max. efficiency	%	90	91	91	90	90
10_	Terminal resistance	Ω	0.168	0.335	0.680	3.11	7.39
11_	Terminal inductance	mH	0.018	0.035	0.078	0.326	0.746
12_	Torque constant	mNm/A	6.95	9.73	14.6	29.9	45.2
13_	Speed constant	rpm/V	1370	981	654	320	211
14_	Speed/torque gradient	rpm/mNm	33.3	33.8	30.5	33.3	34.6
15_	Mechanical time constant	ms	3.27	3.21	3.13	3.23	3.20
16_	Rotor inertia	gcm²	9.37	9.06	9.82	9.26	8.85

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	13.6
18_	Thermal resistance winding-housing	K/W	4.57
19_	Thermal time constant winding	s	22
20_	Thermal time constant motor	s	646
21_	Ambient temperature ball bearings	°C	-40...+100
	Ambient temperature sleeve bearings	°C	-30...+100
22_	Max. winding temperature	°C	125
	Mechanical data ball bearings		
23_	Max. speed	rpm	18 000
24_	Axial play	mm	0...0.1
	Preload	N	2.5
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	2.5
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	16 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	18 000
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	80
	(shaft supported)	N	440
28_	Max. radial load [mm from flange]	N	3 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		9
31_	Weight of motor	g	95
32_	Typical noise level	dBA	44

Operating range

n [rpm] Winding 18 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]
390_GPX 22 A/C	1–2 [3–4]
391_GPX 22 LN/LZ	1–2 [3–4]
392_GPX 22 HP	2–3 [4]
394_GPX 22 UP	1–4
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
507_ENX 10 EASY/QUAD
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
518_ENX 22 EMT
519_ENX 16 RIO
535_ENC 30 HEDS 5540
539_ENC 30 HEDL 5540

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

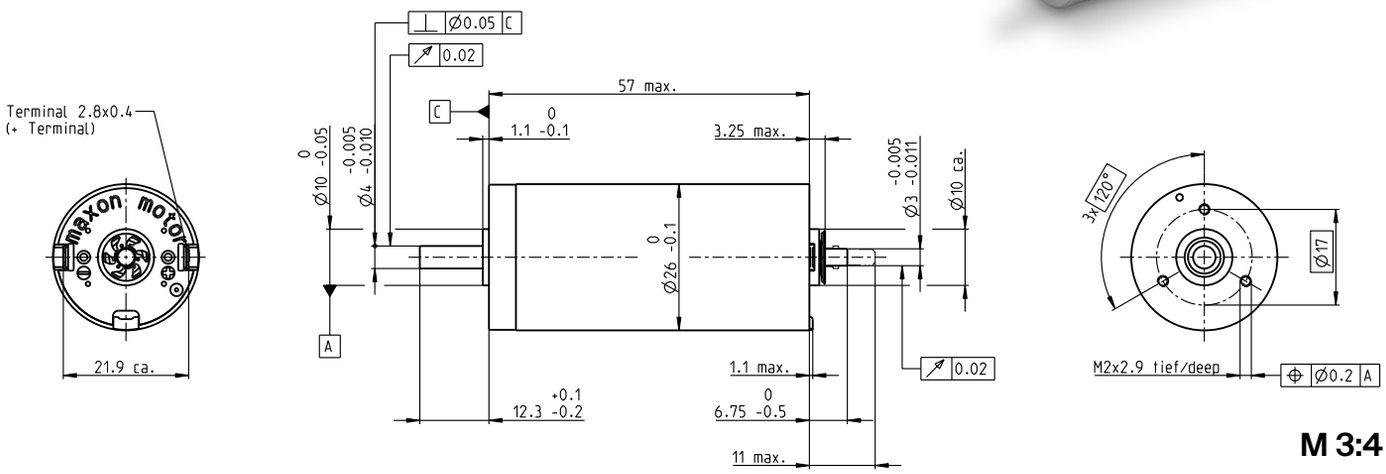
Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with or without CLL/ graphite brushes/EMI filter
Flange front/back: standard flange/configurable flange/ no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/ alignment of connection/cable length/connector type

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DCX 26 L ∅26 mm, precious metal brushes, DC motor

Key data: 18/29 W, 52.3 mNm, 5900 rpm





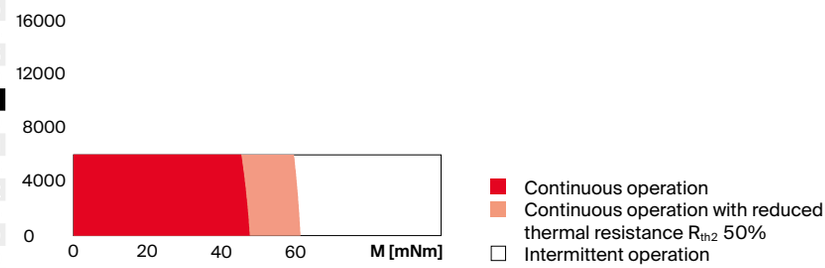
M 3:4

	Motor data							
1_	Nominal voltage	V	9	12	18	24	36	48
2_	No load speed	rpm	5530	5330	5530	5330	5430	5320
3_	No load current	mA	80.5	56.8	40.2	28.4	19.5	14.2
4_	Nominal speed	rpm	5060	4690	4770	4600	4680	4570
5_	Nominal torque	mNm	32.9	46.1	49.8	52.3	50.8	50.3
6_	Nominal current (max. continuous current)	A	2.2	2.2	1.64	1.25	0.822	0.599
7_	Stall torque	mNm	384	384	362	384	370	355
8_	Stall current	A	24.8	17.9	11.7	8.95	5.86	4.14
9_	Max. efficiency	%	89	89	89	89	89	89
10_	Terminal resistance	Ω	0.363	0.671	1.54	2.68	6.15	11.6
11_	Terminal inductance	mH	0.067	0.129	0.268	0.514	1.11	2.06
12_	Torque constant	mNm/A	15.5	21.4	31	42.9	63.2	85.8
13_	Speed constant	rpm/V	616	445	308	223	151	111
14_	Speed/torque gradient	rpm/mNm	14.4	13.9	15.3	13.9	14.7	15
15_	Mechanical time constant	ms	3.23	3.13	3.11	3.09	3.1	3.11
16_	Rotor inertia	gcm²	21.3	21.4	19.4	21.2	20.1	19.7

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	10.2
18_	Thermal resistance winding-housing	K/W	3.01
19_	Thermal time constant winding	s	24
20_	Thermal time constant motor	s	620
21_	Ambient temperature ball bearings	°C	-40...+85
	Ambient temperature sleeve bearings	°C	-30...+85
22_	Max. winding temperature	°C	100
	Mechanical data ball bearings		
23_	Max. speed	rpm	5900
24_	Axial play	mm	0...0.1
	Preload	N	5.5
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	5.5
27_	Max. force for press fits (static)	N	40
	(shaft supported)	N	500
28_	Max. radial load [mm from flange]	N	20.5 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	5900
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	80
	(shaft supported)	N	500
28_	Max. radial load [mm from flange]	N	5.5 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		11
31_	Weight of motor	g	170
32_	Typical noise level	dBA	48

Operating range

n [rpm] Winding 18 V



Modular system Details on catalog page 40

Gear	Stages [opt.]
396_GPX 26 A/C	1–2 [3]
397_GPX 26 LN/LZ	1–2 [3]
398_GPX 26 HP	2–3 [4]
399_GPX 32 A/C	3
400_GPX 32 LN/LZ	3
401_GPX 32 HP	4

Sensor
507_ENX 10 EASY/QUAD
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
518_ENX 22 EMT
519_ENX 16 RIO
535_ENC 30 HEDS 5540
539_ENC 30 HEDL 5540

Motor Control
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with CLL/ graphite brushes
Flange front/back: standard flange/configurable flange/ no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/ alignment of connection/cable length/connector type

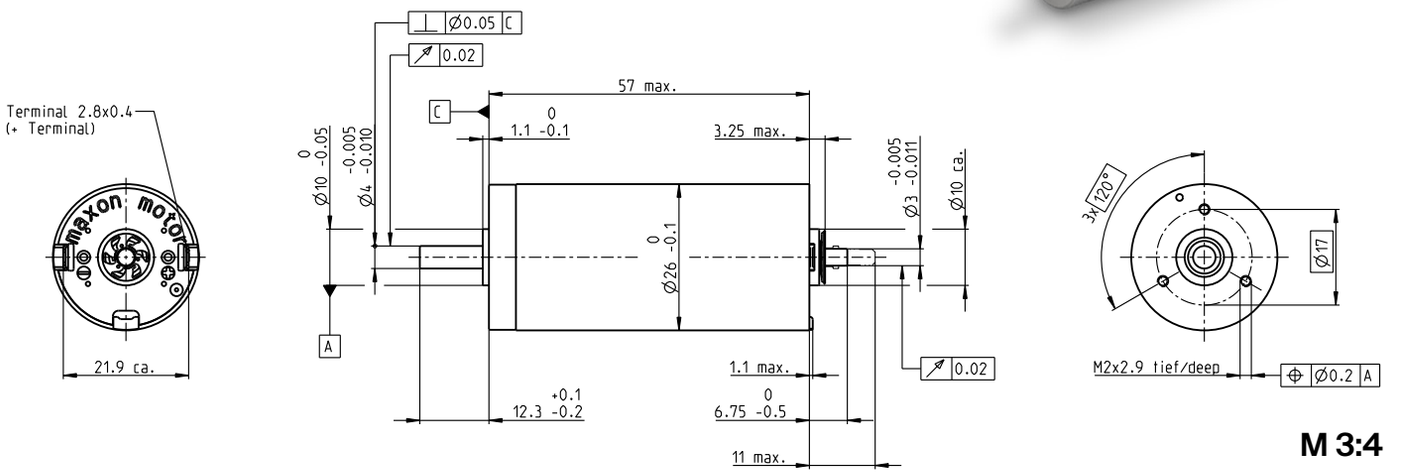
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DCX 26 L ∅26 mm, graphite brushes, DC motor

Key data: 40/74 W, 59.8 mNm, 14400 rpm



DCX



M 3:4

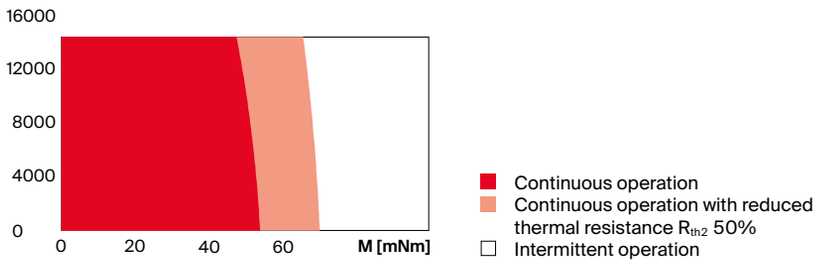
	Motor data							
1_	Nominal voltage	V	12	18	24	36	48	60
2_	No load speed	rpm	10600	11100	10700	11100	10700	10900
3_	No load current	mA	131	93	65.7	46.5	32.9	27.3
4_	Nominal speed	rpm	9460	10000	9690	10000	9730	10000
5_	Nominal torque	mNm	46.9	54.3	57.8	54	59.1	59.8
6_	Nominal current (max. continuous current)	A	4.5	3.59	2.76	1.79	1.41	1.17
7_	Stall torque	mNm	532	653	695	639	697	750
8_	Stall current	A	49.7	42.2	32.4	20.6	16.2	14.3
9_	Max. efficiency	%	88	90	91	90	91	91
10_	Terminal resistance	Ω	0.242	0.427	0.74	1.75	2.95	4.19
11_	Terminal inductance	mH	0.032	0.067	0.129	0.268	0.514	0.768
12_	Torque constant	mNm/A	10.7	15.5	21.4	31	42.9	52.4
13_	Speed constant	rpm/V	890	616	445	308	223	182
14_	Speed/torque gradient	rpm/mNm	20.1	17	15.4	17.4	15.3	14.6
15_	Mechanical time constant	ms	4.5	3.79	3.45	3.53	3.4	3.16
16_	Rotor inertia	gcm²	21.4	21.3	21.4	19.4	21.2	20.7

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	10.2
18_	Thermal resistance winding-housing	K/W	3.01
19_	Thermal time constant winding	s	24
20_	Thermal time constant motor	s	620
21_	Ambient temperature ball bearings	°C	-40...+100
	Ambient temperature sleeve bearings	°C	-30...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	14400
24_	Axial play	mm	0...0.1
	Preload	N	5.5
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	5.5
27_	Max. force for press fits (static)	N	40
	(shaft supported)	N	500
28_	Max. radial load [mm from flange]	N	20.5 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	8600
24_	Axial play	mm	0...0.2
	Preload	N	0
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	80
	(shaft supported)	N	500
28_	Max. radial load [mm from flange]	N	5.5 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		11
31_	Weight of motor	g	170
32_	Typical noise level	dBA	44

Motor specifications may vary for version with sintered bearing (max. winding temperature 125°C).

Operating range

n [rpm] Winding 18 V



Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
396_GPX 26 A/C	1–2 [3]	507_ENX 10 EASY/QUAD	550_ESCON 36/2 DC
397_GPX 26 LN/LZ	1–2 [3]	508_ENX 10 EASY XT	551_ESCON Module 50/5
398_GPX 26 HP	2–3 [4]	509_ENX 16 EASY	553_ESCON 50/5
399_GPX 32 A/C	3	510_ENX 16 EASY XT	557_ESCON2 Micro 60/5
400_GPX 32 LN/LZ	3	511_ENX 16 EASY Abs.	563_EPOS4 Micro 24/5
401_GPX 32 HP	4	512_ENX 16 EASY Abs. XT	565_EPOS4 Compact 24/5 3-axes
		518_ENX 22 EMT	564_EPOS4 Module 50/5
		519_ENX 16 RIO	567_EPOS4 Compact 50/5
		535_ENC 30 HEDS 5540	569_EPOS4 50/5
		539_ENC 30 HEDL 5540	570_EPOS4 Disk 60/8

Configuration

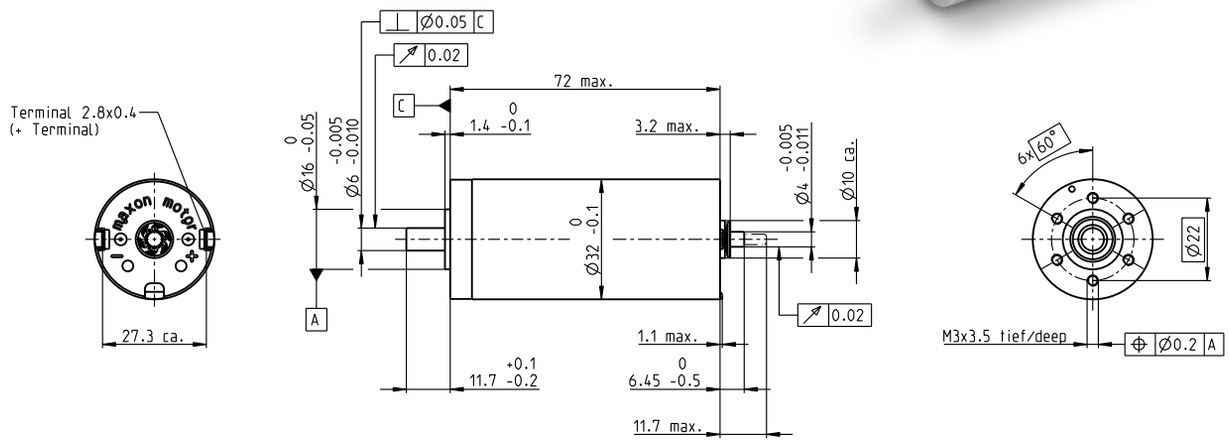
Bearing: ball bearings preloaded/sleeve bearings
Commutation: precious metal brushes with CLL/graphite brushes
Flange front/back: standard flange/configurable flange/no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/alignment of connection/cable length/connector type

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DCX 32 L ∅32 mm, graphite brushes, DC motor

Key data: 70/110 W, 128 mNm, 11300 rpm



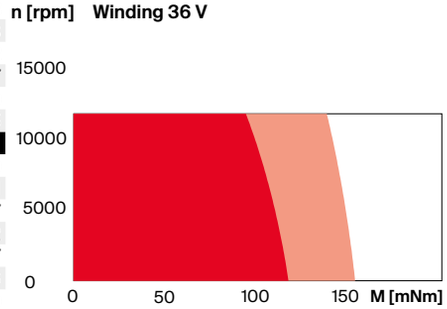


M 1:2

	Motor data							
1_	Nominal voltage	V	12	18	24	36	48	60
2_	No load speed	rpm	7120	8630	8270	7940	7780	5840
3_	No load current	mA	274	234	164	103	75.2	41.6
4_	Nominal speed	rpm	6560	8070	7710	7410	7260	5290
5_	Nominal torque	mNm	89.4	101	108	119	123	128
6_	Nominal current (max. continuous current)	A	6.00	5.42	4.12	2.87	2.17	1.35
7_	Stall torque	mNm	1730	2120	1980	2020	2000	1420
8_	Stall current	A	111	109	72.5	47.1	34.2	14.5
9_	Max. efficiency	%	85	88	88	90	90	89
10_	Terminal resistance	Ω	0.108	0.165	0.331	0.764	1.40	4.12
11_	Terminal inductance	mH	0.034	0.053	0.103	0.254	0.473	1.31
12_	Torque constant	mNm/A	15.6	19.5	27.3	42.9	58.5	97.5
13_	Speed constant	rpm/V	612	490	350	223	163	97.9
14_	Speed/torque gradient	rpm/mNm	4.24	4.15	4.24	3.96	3.92	4.14
15_	Mechanical time constant	ms	3.44	3.30	3.24	3.19	3.11	3.11
16_	Rotor inertia	gcm²	77.6	75.9	72.8	76.8	75.9	71.7

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	7.28
18_	Thermal resistance winding-housing	K/W	2.3
19_	Thermal time constant winding	s	42.2
20_	Thermal time constant motor	s	837
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	11300
24_	Axial play	mm	0...0.1
	Preload	N	7
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	7
27_	Max. force for press fits (static)	N	22.6
	(shaft supported)	N	2510
28_	Max. radial load [mm from flange]	N	65.3 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		11
31_	Weight of motor	g	325
32_	Typical noise level	dBA	47

Operating range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]
399_GPX 32 A/C	1–2 [3]
400_GPX 32 LN/LZ	1–2 [3]
401_GPX 32 HP	2–3 [4]
402_GPX 32 UP	1–4
403_GPX 37 A	3
404_GPX 37 LN/LZ	3

Sensor
507_ENX 10 EASY/QUAD
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
518_ENX 22 EMT
519_ENX 16 RIO
535_ENC 30 HEDS 5540
539_ENC 30 HEDL 5540

Motor Control
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Configuration

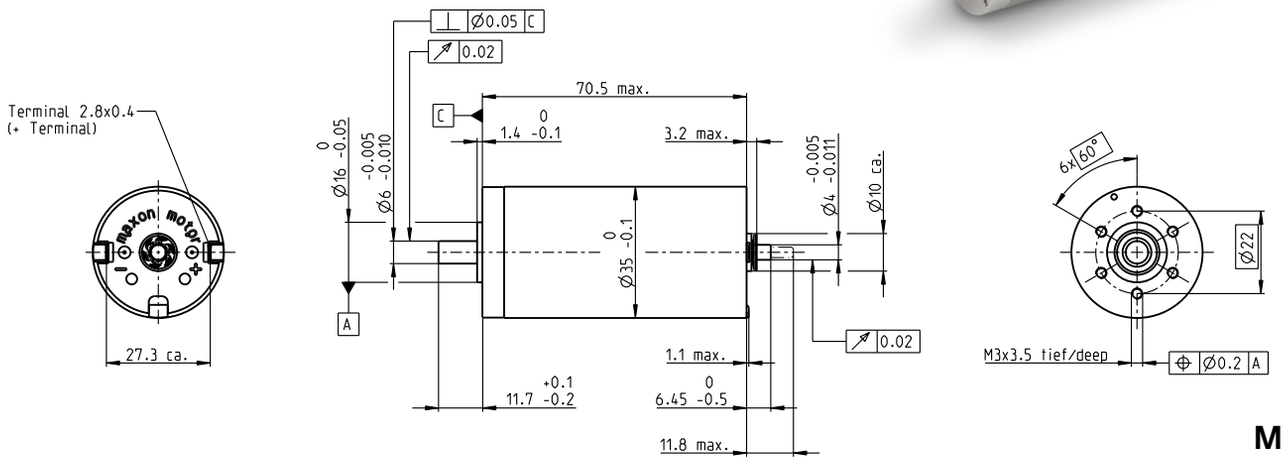
Bearing: ball bearings preloaded
Commutation: graphite brushes
Flange front/back: standard flange/configurable flange/ no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/ alignment of connection/cable length/connector type

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DCX 35 L ∅35 mm, graphite brushes, DC motor

Key data: 80/120 W, 138 mNm, 12300 rpm





M 1:2

	Motor data							
1_	Nominal voltage	V	12	18	24	36	48	60
2_	No load speed	rpm	8130	7200	7720	7940	6670	7690
3_	No load current	mA	320	177	146	101	58.6	57.5
4_	Nominal speed	rpm	7610	6640	7160	7410	6140	7160
5_	Nominal torque	mNm	77.7	120	121	128	138	132
6_	Nominal current (max. continuous current)	A	6.00	5.32	4.26	3.07	2.08	1.84
7_	Stall torque	mNm	2080	1980	2030	2160	1860	2050
8_	Stall current	A	152	84.8	69.3	50.3	27.3	27.7
9_	Max. efficiency	%	85	88	89	90	90	90
10_	Terminal resistance	Ω	0.079	0.212	0.346	0.716	1.76	2.16
11_	Terminal inductance	mH	0.026	0.077	0.121	0.260	0.658	0.776
12_	Torque constant	mNm/A	13.7	23.4	29.3	42.9	68.3	74.1
13_	Speed constant	rpm/V	699	408	326	223	140	129
14_	Speed/torque gradient	rpm/mNm	4.04	3.70	3.86	3.72	3.61	3.76
15_	Mechanical time constant	ms	4.21	3.97	3.91	3.84	3.76	3.75
16_	Rotor inertia	gcm²	99.5	102	96.6	98.7	99.5	95.2

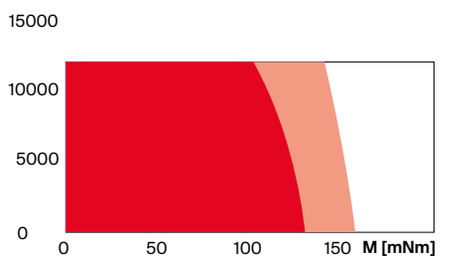
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	6.98
18_	Thermal resistance winding-housing	K/W	2.1
19_	Thermal time constant winding	s	43.9
20_	Thermal time constant motor	s	1030
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	12300
24_	Axial play	mm	0...0.1
	Preload	N	7
25_	Radial play	mm	0.02
26_	Max. axial load (dynamic)	N	7
27_	Max. force for press fits (static)	N	22.6
	(shaft supported)	N	2510
28_	Max. radial load [mm from flange]	N	65.3 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		11
31_	Weight of motor	g	385
32_	Typical noise level	dBA	48

Operating range

n [rpm] Winding 36 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]
403_GPX 37 A	1–2
404_GPX 37 LN/LZ	1–2
405_GPX 42 C	1–4
405_GPX 42 UP	1–4

Sensor
507_ENX 10 EASY/QUAD
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
518_ENX 22 EMT
519_ENX 16 RIO
535_ENC 30 HEDS 5540
539_ENC 30 HEDL 5540

Motor Control
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Configuration

Bearing: ball bearings preloaded
Commutation: graphite brushes
Flange front/back: standard flange/configurable flange/ no flange
Shaft front/back: length/diameter/flat face
Electric connection: terminals or cable/ alignment of connection/cable length/connector type

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maxon DC-max

can be configured online

Standard specification no. 100	90
Terminology explanations	94

DC-max 16 S ∅16 mm, Precious metal brushes, 2 Watt	121
DC-max 16 S ∅16 mm, Graphite brushes, 3 Watt	122
DC-max 22 S ∅22 mm, Precious metal brushes, 5 Watt	123
DC-max 22 S ∅22 mm, Graphite brushes, 8 Watt	124
DC-max 26 S ∅26 mm, Precious metal brushes, 9 Watt	125
DC-max 26 S ∅26 mm, Graphite brushes, 22 Watt	126



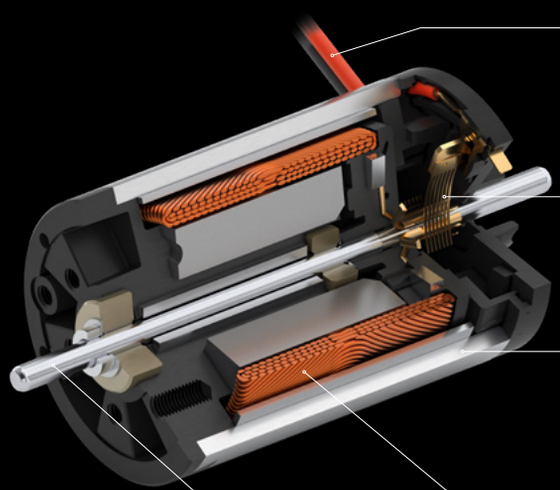
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maxon DC-max program

Strong neodymium magnet, state-of-the-art winding technology, cost-optimized design, economical manufacturing: The brushed maxon DC-max motors feature maximum performance at minimum volume and an unrivaled price-performance ratio. Choose between graphite and precious metal brushes, sintered and ball bearings, and many other components.

Key data

Motor ∅	16...26 mm
Motor length	25.4...44.7 mm
Power	2...22 W
Nominal torque	up to 32.7 mNm
Max. permissible speed	up to 11000 rpm



Electrical connection with terminals, cables and connectors, depending on the size.

Commutation with precious metal brushes for fine rotary motion or graphite brushes for heavy-duty use.

In a hybrid process, a stator is formed by assembling the motor housing and magnet in one step using injection molding of PPA plastic. Sintered bearings or ball bearings.

Highly efficient ironless winding, system maxon – different nominal voltages available.

Stainless steel shaft with high stiffness; various modification options available.

- → The cost-effective alternative to the DCX program
- → High performance at a low cost
- → Combines the rational manufacturing and design of A-max motors with the higher power density offered by NdFeB magnets
- → Automated manufacturing process
- → Easily configured online

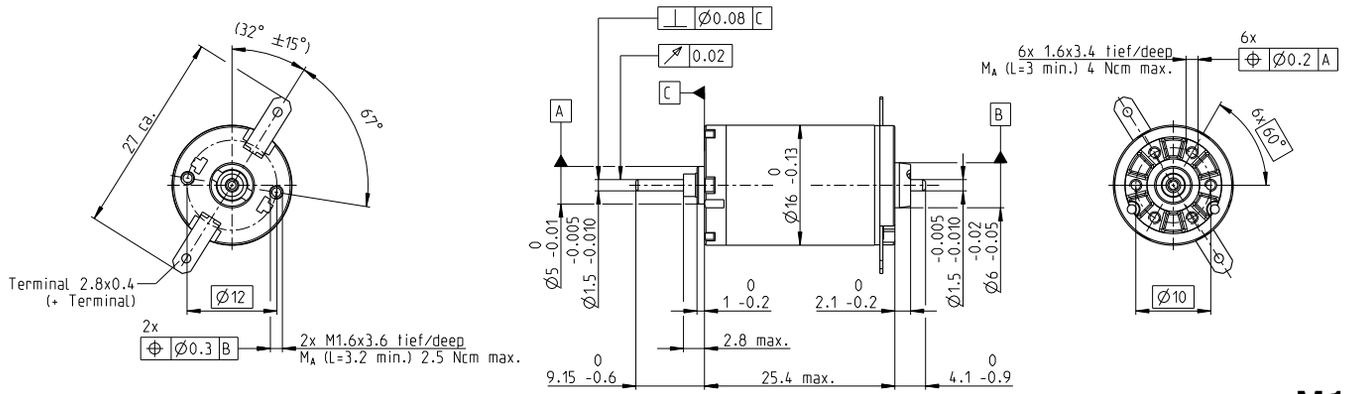
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DC-max 16 S ∅16 mm, precious metal brushes, DC motor



Key data: 2/4.3 W, 4.1 mNm, 11000 rpm



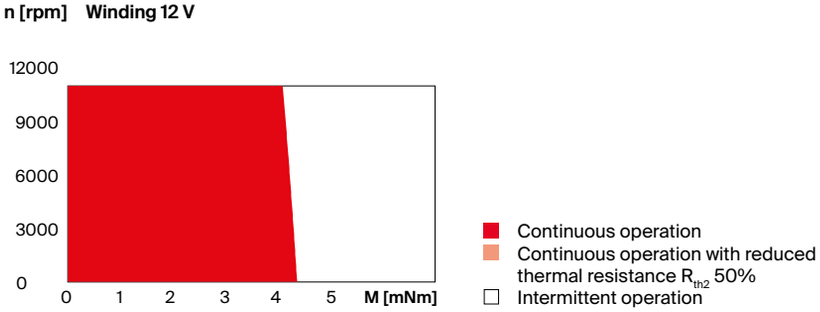
M 1:1

	Motor data				
1_	Nominal voltage	V	6	12	24
2_	No load speed	rpm	7890	7560	7470
3_	No load current	mA	14.7	6.90	3.40
4_	Nominal speed	rpm	4830	4390	4210
5_	Nominal torque	mNm	4.06	3.92	3.80
6_	Nominal current (max. continuous current)	A	0.577	0.267	0.128
7_	Stall torque	mNm	10.5	9.44	8.75
8_	Stall current	A	1.46	0.629	0.289
9_	Max. efficiency	%	81	80	80
10_	Terminal resistance	Ω	4.10	19.1	83.2
11_	Terminal inductance	mH	0.140	0.610	2.49
12_	Torque constant	mNm/A	7.19	15.0	30.3
13_	Speed constant	rpm/V	1330	637	315
14_	Speed/torque gradient	rpm/mNm	758	809	864
15_	Mechanical time constant	ms	8.87	8.92	9.00
16_	Rotor inertia	gcm²	1.12	1.05	0.994

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	29.8
18_	Thermal resistance winding-housing	K/W	5.5
19_	Thermal time constant winding	s	5.35
20_	Thermal time constant motor	s	288
21_	Ambient temperature	°C	-30...+65
22_	Max. winding temperature	°C	85
	Mechanical data ball bearings		
23_	Max. speed	rpm	11000
24_	Axial play	mm	0.05...0.15
	Preload	N	0
25_	Radial play	mm	0.025
26_	Max. axial load (dynamic)	N	2.2
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	200
28_	Max. radial load [mm from flange]	N	7.8 [5]

	Mechanical data sleeve bearings		
23_	Max. speed	rpm	11000
24_	Axial play	mm	0.05...0.15
	Preload	N	0
25_	Radial play	mm	0.012
26_	Max. axial load (dynamic)	N	0.8
27_	Max. force for press fits (static)	N	35
	(shaft supported)	N	200
28_	Max. radial load [mm from flange]	N	1.4 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	23.3

Operating range



Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
381_GPX 16 A/C	1–2 [3–4]	498_ENX 13 GAMA	550_ESCON Module 24/2
382_GPX 16 LN/LZ	1–2 [3–4]	502_ENX 16 IMR	550_ESCON 36/2 DC
386_GPX 19 A/C	3–4	507_ENX 10 QUAD	557_ESCON2 Nano 24/2
387_GPX 19 LN/LZ	3–4	507_ENX 10 EASY	563_EPOS4 Micro 24/5
			564_EPOS4 Module 24/1.5
			565_EPOS4 Compact 24/5 3-axes
			566_EPOS4 Compact 24/1.5

Configuration

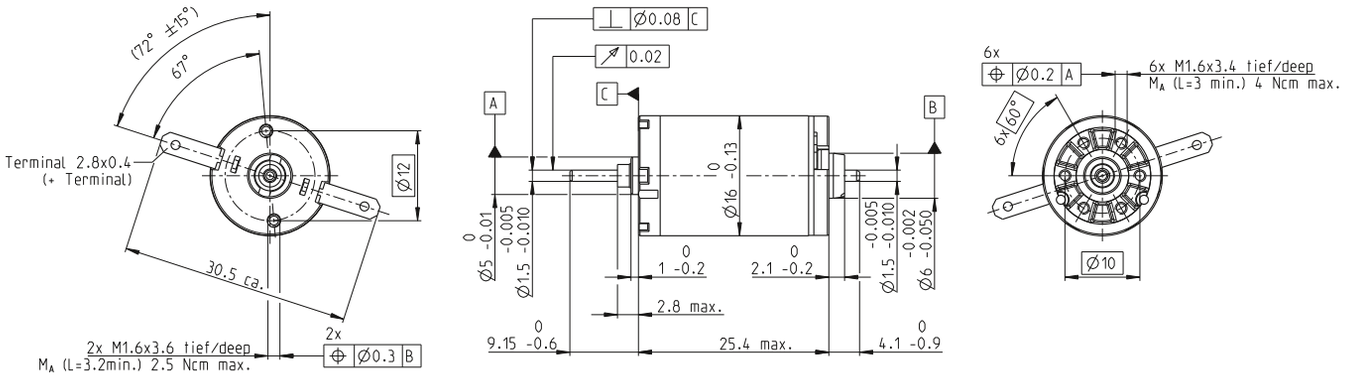
Bearing: sleeve bearings/ball bearings
Commutation: precious metal brushes with CLL/graphite brushes
Shaft front/back: length
Electric connection: terminals/cable

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DC-max 16 S ∅16 mm, graphite brushes, DC motor



Key data: 3/4.7 W, 4.8 mNm, 11000 rpm



M 1:1

	Motor data				
1_	Nominal voltage	V	6	12	24
2_	No load speed	rpm	9870	9860	9920
3_	No load current	mA	67.3	33.6	16.8
4_	Nominal speed	rpm	6770	6200	6580
5_	Nominal torque	mNm	3.71	4.31	4.76
6_	Nominal current (max. continuous current)	A	0.720	0.413	0.227
7_	Stall torque	mNm	12.1	11.9	14.4
8_	Stall current	A	2.15	1.05	0.64
9_	Max. efficiency	%	68	68	71
10_	Terminal resistance	Ω	2.79	11.4	37.5
11_	Terminal inductance	mH	0.086	0.343	1.37
12_	Torque constant	mNm/A	5.62	11.2	22.5
13_	Speed constant	rpm/V	1700	849	424
14_	Speed/torque gradient	rpm/mNm	843	858	707
15_	Mechanical time constant	ms	8.85	8.92	8.57
16_	Rotor inertia	gcm²	1.00	0.993	1.16

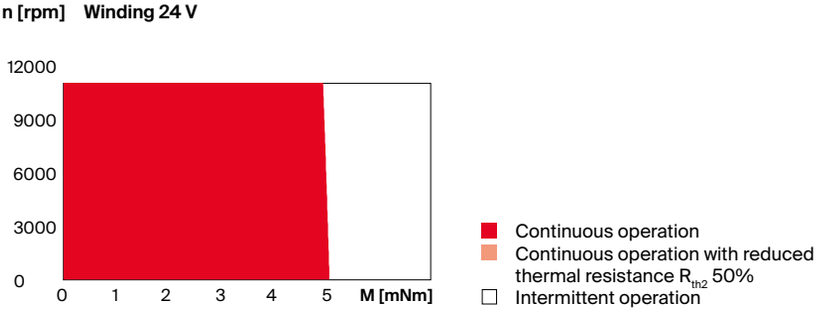
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	29.8
18_	Thermal resistance winding-housing	K/W	5.5
19_	Thermal time constant winding	s	5.35
20_	Thermal time constant motor	s	288
21_	Ambient temperature	°C	-30...+85
22_	Max. winding temperature	°C	125

	Mechanical data ball bearings		
23_	Max. speed	rpm	11000
24_	Axial play	mm	0.05...0.15
	Preload	N	0
25_	Radial play	mm	0.025
26_	Max. axial load (dynamic)	N	2.2
27_	Max. force for press fits (static)	N	30
	(shaft supported)	N	200
28_	Max. radial load [mm from flange]	N	7.8 [5]

	Mechanical data sleeve bearings		
23_	Max. speed	rpm	11000
24_	Axial play	mm	0.05...0.15
	Preload	N	0
25_	Radial play	mm	0.012
26_	Max. axial load (dynamic)	N	0.8
27_	Max. force for press fits (static)	N	35
	(shaft supported)	N	200
28_	Max. radial load [mm from flange]	N	1.4 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		7
31_	Weight of motor	g	23.1

Operating range



Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
381_GPX 16 A/C	1–2 [3–4]	498_ENX 13 GAMA	550_ESCON Module 24/2
382_GPX 16 LN/LZ	1–2 [3–4]	502_ENX 16 IMR	550_ESCON 36/2 DC
386_GPX 19 A/C	3–4	507_ENX 10 QUAD	557_ESCON2 Nano 24/2
387_GPX 19 LN/LZ	3–4	507_ENX 10 EASY	563_EPOS4 Micro 24/5
			564_EPOS4 Module 24/1.5
			565_EPOS4 Compact 24/5 3-axes
			566_EPOS4 Compact 24/1.5

Configuration

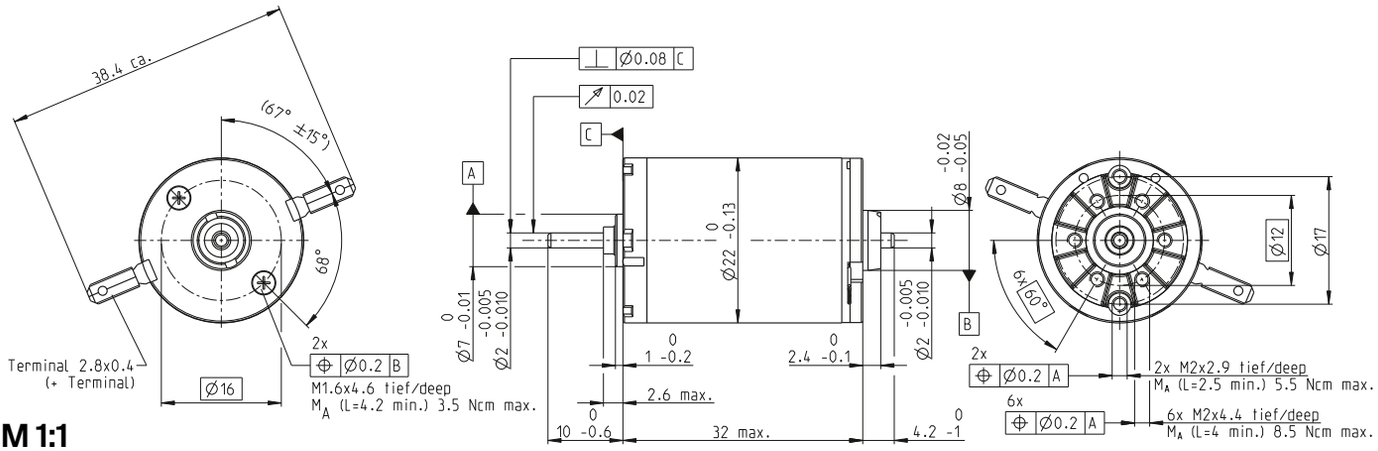
Bearing: sleeve bearings/ball bearings
Commutation: precious metal brushes with CLL/graphite brushes
Shaft front/back: length
Electric connection: terminals/cable

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DC-max 22 S ∅22 mm, precious metal brushes, DC motor



Key data: 5/9.6 W, 10.4 mNm, 9000 rpm

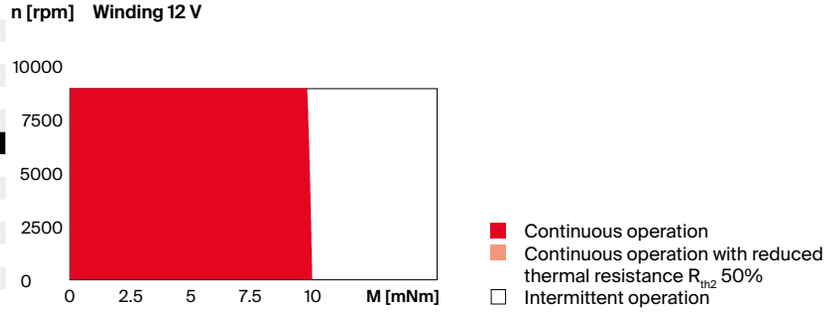


M 1:1

	Motor data				
1_	Nominal voltage	V	6	12	24
2_	No load speed	rpm	5480	5890	5090
3_	No load current	mA	20.8	11.7	4.62
4_	Nominal speed	rpm	4280	4240	3440
5_	Nominal torque	mNm	8.54	10.3	10.4
6_	Nominal current (max. continuous current)	A	0.840	0.543	0.236
7_	Stall torque	mNm	39.0	36.9	33.3
8_	Stall current	A	3.75	1.91	0.721
9_	Max. efficiency	%	85.7	85.2	84.9
10_	Terminal resistance	Ω	1.60	6.28	33.3
11_	Terminal inductance	mH	0.119	0.413	2.21
12_	Torque constant	mNm/A	10.4	19.3	44.8
13_	Speed constant	rpm/V	919	494	213
14_	Speed/torque gradient	rpm/mNm	141	160	159
15_	Mechanical time constant	ms	8.44	8.36	8.39
16_	Rotor inertia	gcm²	5.70	4.98	5.05

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	20
18_	Thermal resistance winding-housing	K/W	6
19_	Thermal time constant winding	s	16.8
20_	Thermal time constant motor	s	538
21_	Ambient temperature	°C	-30...+65
22_	Max. winding temperature	°C	85
	Mechanical data ball bearings		
23_	Max. speed	rpm	9000
24_	Axial play	mm	0.05...0.15
	Preload	N	0
25_	Radial play	mm	0.025
26_	Max. axial load (dynamic)	N	3.3
27_	Max. force for press fits (static)	N	45
	(shaft supported)	N	420
28_	Max. radial load [mm from flange]	N	12.3 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	9000
24_	Axial play	mm	0.05...0.15
	Preload	N	0
25_	Radial play	mm	0.012
26_	Max. axial load (dynamic)	N	1
27_	Max. force for press fits (static)	N	80
	(shaft supported)	N	420
28_	Max. radial load [mm from flange]	N	2.8 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		9
31_	Weight of motor	g	53.8

Operating range



Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
390_GPX 22 A/C	1–2 [3–4]	498_ENX 13 GAMA	550_ESCON Module 24/2
391_GPX 22 LN/LZ	1–2 [3–4]	504_ENX 22 IMR	550_ESCON 36/2 DC
396_GPX 26 A/C	3	507_ENX 10 QUAD	557_ESCON2 Nano 24/2
397_GPX 26 LN/LZ	3	507_ENX 10 EASY	563_EPOS4 Micro 24/5
			564_EPOS4 Module 24/1.5
			565_EPOS4 Compact 24/5 3-axes
			566_EPOS4 Compact 24/1.5

Configuration

Bearing: sleeve bearings/ball bearings
Commutation: precious metal brushes with CLL/graphite brushes
Shaft front/back: length
Electric connection: terminals/cable

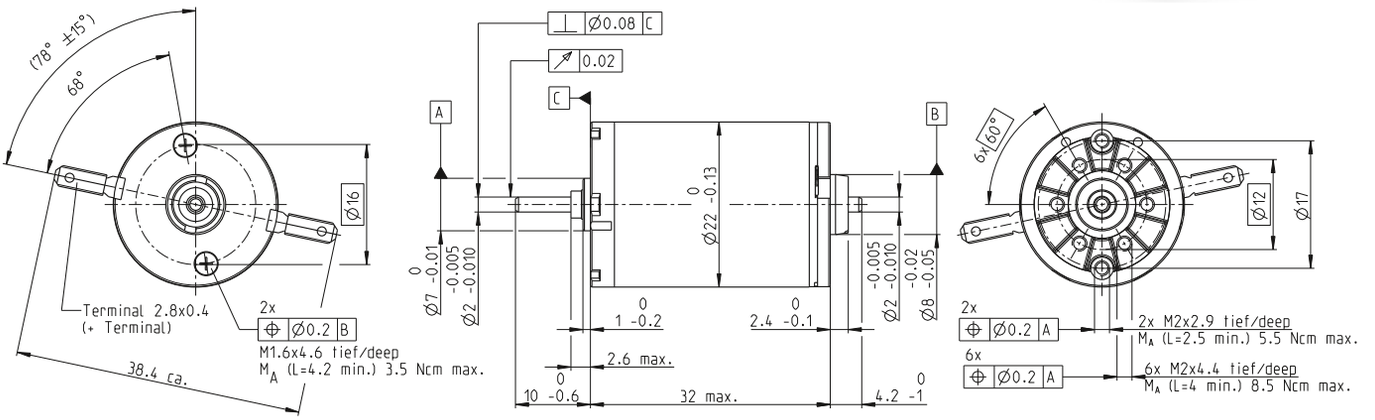
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DC-max 22 S ∅22 mm, graphite brushes, DC motor



Key data: 8/10 W, 12.6 mNm, 9000 rpm

DC-max



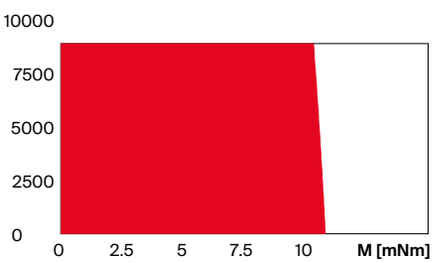
M 1:1

	Motor data				
1_	Nominal voltage	V	6	12	24
2_	No load speed	rpm	7030	7140	7330
3_	No load current	mA	58.8	29.5	15.1
4_	Nominal speed	rpm	4950	5240	5350
5_	Nominal torque	mNm	11.5	12.6	11.8
6_	Nominal current (max. continuous current)	A	1.52	0.825	0.398
7_	Stall torque	mNm	42.4	49.4	44.6
8_	Stall current	A	5.39	3.14	1.45
9_	Max. efficiency	%	76	80	80
10_	Terminal resistance	Ω	1.11	3.83	16.6
11_	Terminal inductance	mH	0.069	0.274	1.05
12_	Torque constant	mNm/A	7.88	15.8	30.8
13_	Speed constant	rpm/V	1210	606	310
14_	Speed/torque gradient	rpm/mNm	171	147	167
15_	Mechanical time constant	ms	9.09	8.57	8.20
16_	Rotor inertia	gcm²	5.07	5.57	4.69

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	20
18_	Thermal resistance winding-housing	K/W	6
19_	Thermal time constant winding	s	16.8
20_	Thermal time constant motor	s	538
21_	Ambient temperature	°C	-30...+85
22_	Max. winding temperature	°C	125
	Mechanical data ball bearings		
23_	Max. speed	rpm	9000
24_	Axial play	mm	0.05...0.15
	Preload	N	0
25_	Radial play	mm	0.025
26_	Max. axial load (dynamic)	N	3.3
27_	Max. force for press fits (static)	N	45
	(shaft supported)	N	420
28_	Max. radial load [mm from flange]	N	12.3 [5]
	Mechanical data sleeve bearings		
23_	Max. speed	rpm	9000
24_	Axial play	mm	0.05...0.15
	Preload	N	0
25_	Radial play	mm	0.012
26_	Max. axial load (dynamic)	N	1
27_	Max. force for press fits (static)	N	80
	(shaft supported)	N	420
28_	Max. radial load [mm from flange]	N	2.8 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of commutator segments		9
31_	Weight of motor	g	53.8

Operating range

n [rpm] Winding 12 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
390_GPX 22 A/C	1–2 [3–4]	498_ENX 13 GAMA	550_ESCON Module 24/2
391_GPX 22 LN/LZ	1–2 [3–4]	504_ENX 22 IMR	550_ESCON 36/2 DC
396_GPX 26 A/C	3	507_ENX 10 QUAD	557_ESCON2 Nano 24/2
397_GPX 26 LN/LZ	3	507_ENX 10 EASY	563_EPOS4 Micro 24/5
			564_EPOS4 Module 24/1.5
			565_EPOS4 Compact 24/5 3-axes
			566_EPOS4 Compact 24/1.5

Configuration

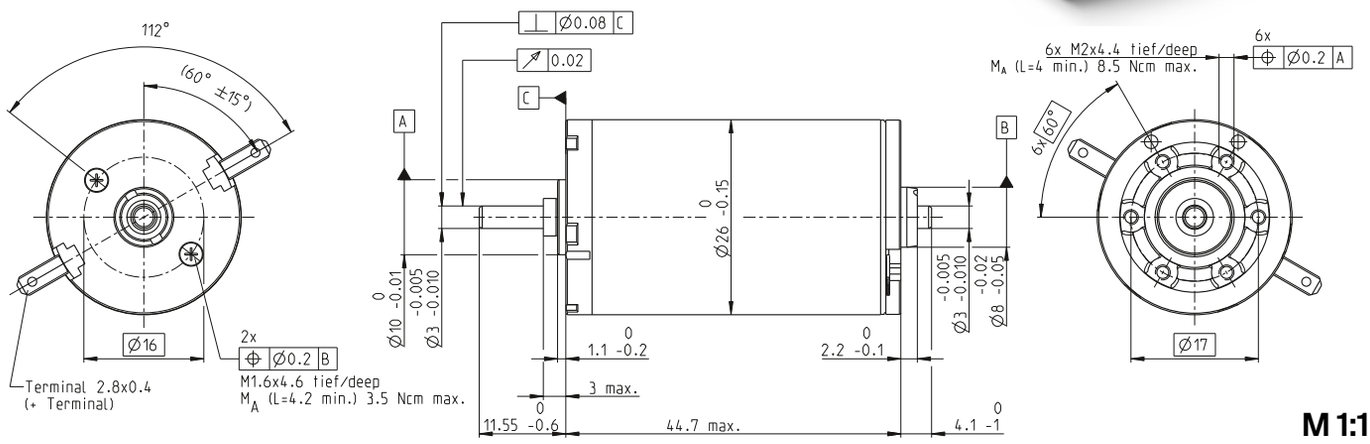
Bearing: sleeve bearings/ball bearings
Commutation: precious metal brushes with CLL/graphite brushes
Shaft front/back: length
Electric connection: terminals/cable

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DC-max 26 S ∅26 mm, precious metal brushes, DC motor



Key data: 9/12 W, 28.8 mNm, 6700 rpm

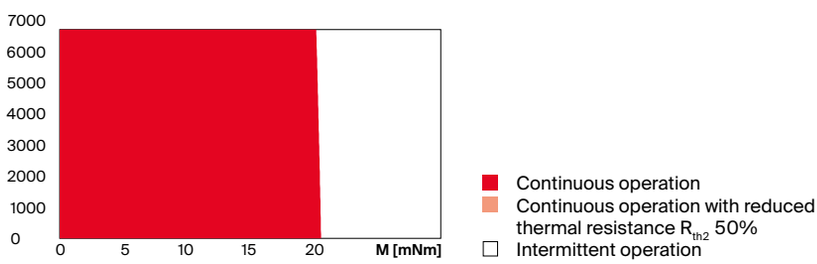


M 1:1

	Motor data			
1_	Nominal voltage	V	12	24
2_	No load speed	rpm	4460	4370
3_	No load current	mA	27.1	13.2
4_	Nominal speed	rpm	3790	3450
5_	Nominal torque	mNm	20.8	28.8
6_	Nominal current (max. continuous current)	A	0.84	0.564
7_	Stall torque	mNm	140	138
8_	Stall current	A	5.49	2.64
9_	Max. efficiency	%	87	87
10_	Terminal resistance	Ω	2.19	9.08
11_	Terminal inductance	mH	0.278	1.16
12_	Torque constant	mNm/A	25.6	52.2
13_	Speed constant	rpm/V	373	183
14_	Speed/torque gradient	rpm/mNm	31.9	31.8
15_	Mechanical time constant	ms	4.99	5.06
16_	Rotor inertia	gcm²	14.9	15.2
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	13.2	
18_	Thermal resistance winding-housing	K/W	3.2	
19_	Thermal time constant winding	s	17.8	
20_	Thermal time constant motor	s	350	
21_	Ambient temperature	°C	-30...+65	
22_	Max. winding temperature	°C	85	
	Mechanical data ball bearings			
23_	Max. speed	rpm	6700	
24_	Axial play	mm	0.1...0.2	
	Preload	N	0	
25_	Radial play	mm	0.025	
26_	Max. axial load (dynamic)	N	5	
27_	Max. force for press fits (static)	N	75	
	(shaft supported)	N	1200	
28_	Max. radial load [mm from flange]	N	20 [5]	
	Mechanical data sleeve bearings			
23_	Max. speed	rpm	6700	
24_	Axial play	mm	0.1...0.2	
	Preload	N	0	
25_	Radial play	mm	0.012	
26_	Max. axial load (dynamic)	N	1.7	
27_	Max. force for press fits (static)	N	80	
	(shaft supported)	N	1200	
28_	Max. radial load [mm from flange]	N	5.5 [5]	
	Other specifications			
29_	Number of pole pairs		1	
30_	Number of commutator segments		13	
31_	Weight of motor	g	120	

Operating range

n [rpm] Winding 12 V



Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
396_GPX 26 A/C	1–2 [3]	498_ENX 13 GAMA	550_ESCON Module 24/2
397_GPX 26 LN/LZ	1–2 [3]	507_ENX 10 QUAD	550_ESCON 36/2 DC
399_GPX 32 A/C	3	509_ENX 16 EASY	551_ESCON Module 50/5
400_GPX 32 LN/LZ	3	511_ENX 16 EASY Abs.	553_ESCON 50/5
			557_ESCON2 Nano 24/2
			557_ESCON2 Micro 60/5
			563_EPOS4 Micro 24/5
			564_EPOS4 Module 24/1.5
			564_EPOS4 Module 50/5
			565_EPOS4 Compact 24/5 3-axes
			566_EPOS4 Compact 24/1.5
			567_EPOS4 Compact 50/5
			569_EPOS4 50/5

Configuration

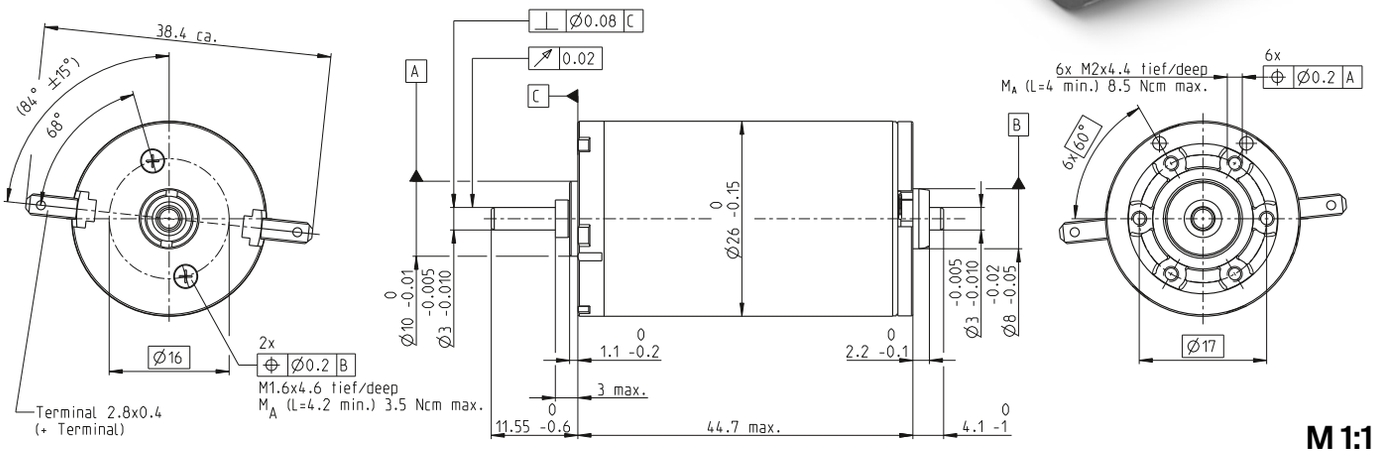
Bearing: sleeve bearings/ball bearings
Commutation: precious metal brushes with CLL/ graphite brushes
Shaft front/back: length
Electric connection: terminals/cable

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DC-max 26 S ∅26 mm, graphite brushes, DC motor



Key Data: 22/29 W, 28.3 mNm, 11000 rpm

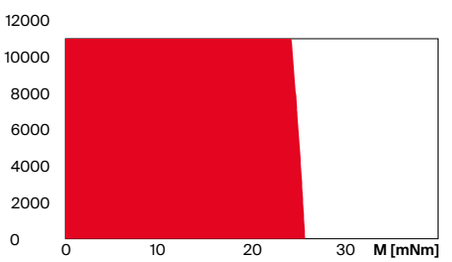


M 1:1

	Motor data			
1_	Nominal voltage	V	24	48
2_	No load speed	rpm	8920	8730
3_	No load current	mA	53	25.7
4_	Nominal speed	rpm	8100	7840
5_	Nominal torque	mNm	26.3	28.3
6_	Nominal current (max. continuous current)	A	1.08	0.567
7_	Stall torque	mNm	287	277
8_	Stall current	A	11.2	5.31
9_	Max. efficiency	%	87	87
10_	Terminal resistance	Ω	2.14	9.04
11_	Terminal inductance	mH	0.278	1.16
12_	Torque constant	mNm/A	25.6	52.2
13_	Speed constant	rpm/V	373	183
14_	Speed/torque gradient	rpm/mNm	31.2	31.6
15_	Mechanical time constant	ms	4.89	5.04
16_	Rotor inertia	gcm²	14.9	15.2
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	13.2	
18_	Thermal resistance winding-housing	K/W	3.2	
19_	Thermal time constant winding	s	17.8	
20_	Thermal time constant motor	s	350	
21_	Ambient temperature	°C	-30...+85	
22_	Max. winding temperature	°C	100	
	Mechanical data ball bearings			
23_	Max. speed	rpm	11000	
24_	Axial play	mm	0.1...0.2	
	Preload	N	0	
25_	Radial play	mm	0.025	
26_	Max. axial load (dynamic)	N	5	
27_	Max. force for press fits (static)	N	75	
	(shaft supported)	N	1200	
28_	Max. radial load [mm from flange]	N	20 [5]	
	Mechanical data sleeve bearings			
23_	Max. speed	rpm	11000	
24_	Axial play	mm	0.1...0.2	
	Preload	N	0	
25_	Radial play	mm	0.012	
26_	Max. axial load (dynamic)	N	1.7	
27_	Max. force for press fits (static)	N	80	
	(shaft supported)	N	1200	
28_	Max. radial load [mm from flange]	N	5.5 [5]	
	Other specifications			
29_	Number of pole pairs		1	
30_	Number of commutator segments		13	
31_	Weight of motor	g	120	

Operating range

n [rpm] Winding 24 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Modular system Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
396_GPX 26 A/C	1–2 [3]	498_ENX 13 GAMA	550_ESCON Module 24/2
397_GPX 26 LN/LZ	1–2 [3]	507_ENX 10 QUAD	550_ESCON 36/2 DC
399_GPX 32 A/C	3	509_ENX 16 EASY	551_ESCON Module 50/5
400_GPX 32 LN/LZ	3	511_ENX 16 EASY Abs.	553_ESCON 50/5
			557_ESCON2 Nano 24/2
			557_ESCON2 Micro 60/5
			563_EPOS4 Micro 24/5
			564_EPOS4 Module 24/1.5
			564_EPOS4 Module 50/5
			565_EPOS4 Compact 24/5 3-axes
			566_EPOS4 Compact 24/1.5
			567_EPOS4 Compact 50/5
			569_EPOS4 50/5

Configuration

Bearing: sleeve bearings/ball bearings
Commutation: precious metal brushes with CLL/ graphite brushes
Shaft front/back: length
Electric connection: terminals/cable

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maxon RE

Standard specification no. 100	90
Terminology explanations	94

RE 6 ∅6 mm, Precious metal brushes, 0.3 Watt	129
RE 8 ∅8 mm, Precious metal brushes, 0.5 Watt	130
RE 10 ∅10 mm, Precious metal brushes, 0.75 Watt	131–132
RE 10 ∅10 mm, Precious metal brushes, 1.5 Watt	133–134
RE 13 ∅13 mm, Precious metal brushes, 1.2 Watt	135–136
RE 13 ∅13 mm, Precious metal brushes, 0.75 Watt	137–138
RE 13 ∅13 mm, Precious metal brushes, 2.5 Watt	139–140
RE 13 ∅13 mm, Precious metal brushes, 2 Watt	141–142
RE 13 ∅13 mm, Graphite brushes, 1.5 Watt	143–146
RE 13 ∅13 mm, Graphite brushes, 3 Watt	147–150
RE 16 ∅16 mm, Precious metal brushes CLL, 2 Watt	151
RE 16 ∅16 mm, Precious metal brushes CLL, 3.2 Watt	152–153
RE 16 ∅16 mm, Graphite brushes, 4.5 Watt	154–155
RE 25 ∅25 mm, Precious metal brushes CLL, 10 Watt	156
RE 25 ∅25 mm, Graphite brushes, 20 Watt	157–158
RE 30 ∅30 mm, Precious metal brushes, 15 Watt	159
RE 30 ∅30 mm, Graphite brushes, 60 Watt	160
RE 35 ∅35 mm, Graphite brushes, 90 Watt	161
RE 40 ∅40 mm, Precious metal brushes, 25 Watt	162
RE 40 ∅40 mm, Graphite brushes, 150 Watt	163
RE 50 ∅50 mm, Graphite brushes, 200 Watt	164
RE 65 ∅65 mm, Graphite brushes, 250 Watt	165



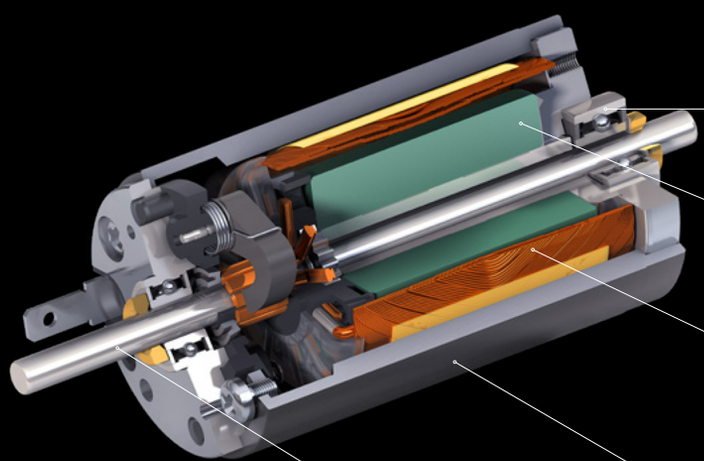
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maxon RE program

maxon brushed RE-motors are high-quality DC motors, equipped with powerful permanent magnets. The centerpiece of the motor is the ironless rotor. This means cutting-edge technology for compact, powerful drives with low inertia. As a result of the low mass moment of inertia, the DC motors feature high acceleration.

Key data

Motor ∅	6...65 mm
Motor length	15.6...131.4 mm
Power	0.3...250 W
Nominal torque	up to 888 mNm
Max. permissible speed	up to 23 000 rpm



Sintered bearings or ball bearings.

Equipped with powerful NdFeB permanent magnet.

Highly efficient ironless winding. Different nominal voltages available.

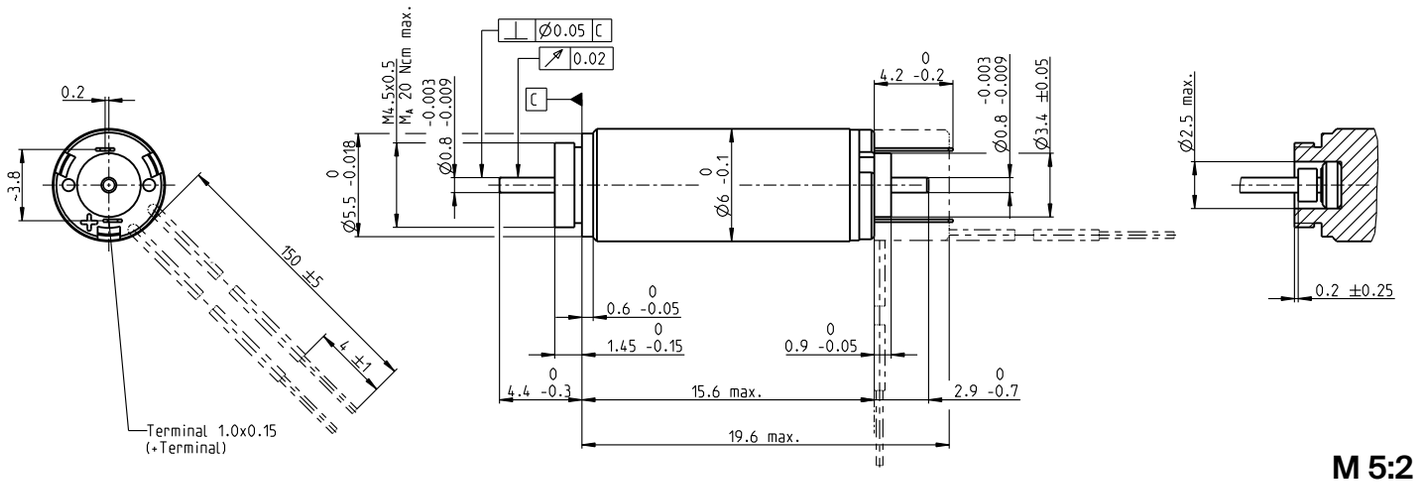
Magnetic return painted black for optimum heat dissipation. Commutation with precious metal brushes for fine rotary motion or graphite brushesfor heavy-duty use.

Stainless steel shaft with high stiffness. No recesses; the stress concentration is eliminated.

- → High power density
- → High-quality DC motor with NdFeB magnet
- → High speeds and torques
- → Robust design (metal flange)

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RE 6 ∅6 mm, precious metal brushes, 0.3 watt



M 5:2

Stock program
Standard program
Special program (on request)

	Part numbers			
B with cables	386780	386781	386782	386783
A with terminals	349189	349190	349191	349192
Motor data				
Values at nominal voltage				
1 Nominal voltage V	1.5	3	4.5	6
2 No load speed rpm	18500	18600	18600	18600
3 No load current mA	42.6	21.3	14.2	10.7
4 Nominal speed rpm	4680	5670	5400	5340
5 Nominal torque mNm	0.302	0.324	0.318	0.316
6 Nominal current (max. continuous current) A	0.453	0.242	0.158	0.118
7 Stall torque mNm	0.419	0.485	0.469	0.465
8 Stall current A	0.581	0.336	0.217	0.161
9 Max. efficiency %	54	56	56	56
Characteristics				
10 Terminal resistance Ω	2.58	8.92	20.8	37.2
11 Terminal inductance mH	0.023	0.091	0.204	0.363
12 Torque constant mNm/A	0.72	1.44	2.16	2.88
13 Speed constant rpm/V	13300	6630	4420	3310
14 Speed/torque gradient rpm/mNm	47500	41000	42400	42700
15 Mechanical time constant ms	7.45	7.18	7.24	7.24
16 Rotor inertia gcm²	0.015	0.0167	0.0163	0.0162

Specifications

Thermal data

17	Thermal resistance housing-ambient	77 K/W
18	Thermal resistance winding-housing	16.2 K/W
19	Thermal time constant winding	1.39 s
20	Thermal time constant motor	16.3 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

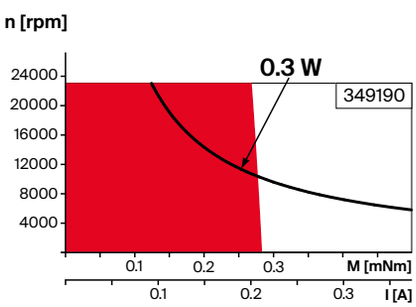
23	Max. speed	23000 rpm
24	Axial play	0.02 - 0.1 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.15 N
27	Max. force for press fits (static)	10 N
28	Max. radial load, 4 mm from flange	0.6 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	5
31	Weight of motor	2.3 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

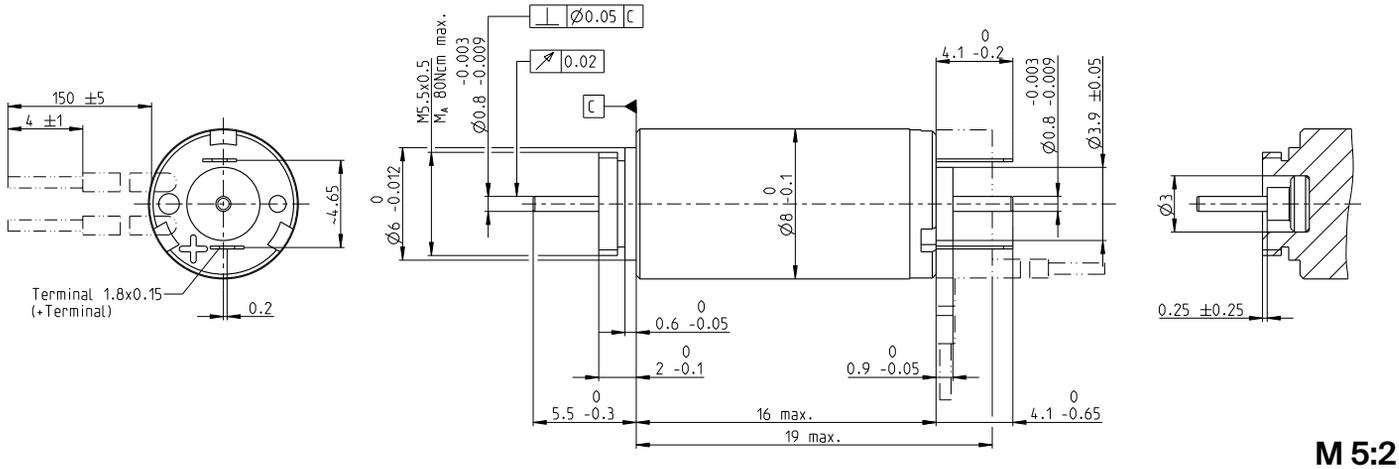
Details on catalog page 48

Gear
412_GP 6 A
465_GP 6 S
466_GP 6 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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RE 8 ∅8 mm, precious metal brushes, 0.5 watt



M 5:2

Stock program
Standard program
Special program (on request)

		Part numbers					
B with cables		462207	463219	463220	463221	463222	463223
A with terminals		347723	347724	347725	347728	347726	347727
Motor data							
Values at nominal voltage							
1 Nominal voltage	V	2.4	4.2	6	7.2	9	12
2 No load speed	rpm	13900	14200	13300	14300	14400	15600
3 No load current	mA	19.2	11.2	7.3	6.66	5.35	4.44
4 Nominal speed	rpm	4320	4480	3500	4220	4760	5410
5 Nominal torque	mNm	0.63	0.624	0.616	0.596	0.626	0.589
6 Nominal current (max. continuous current)	A	0.412	0.237	0.155	0.134	0.113	0.0865
7 Stall torque	mNm	0.925	0.932	0.857	0.866	0.957	0.925
8 Stall current	A	0.581	0.34	0.207	0.187	0.166	0.13
9 Max. efficiency	%	67	67	66	66	68	67
Characteristics							
10 Terminal resistance	Ω	4.13	12.3	29	38.5	54.3	92.2
11 Terminal inductance	mH	0.03	0.09	0.206	0.257	0.4	0.606
12 Torque constant	mNm/A	1.59	2.74	4.15	4.63	5.77	7.11
13 Speed constant	rpm/V	6000	3490	2300	2060	1650	1340
14 Speed / torque gradient	rpm/mNm	15600	15700	16100	17200	15500	17400
15 Mechanical time constant	ms	6.31	6.3	6.34	6.44	6.29	6.49
16 Rotor inertia	gcm²	0.0388	0.0383	0.0375	0.0358	0.0387	0.0355

Specifications

Thermal data

17	Thermal resistance housing-ambient	48 K/W
18	Thermal resistance winding-housing	22 K/W
19	Thermal time constant winding	2.96 s
20	Thermal time constant motor	21.3 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

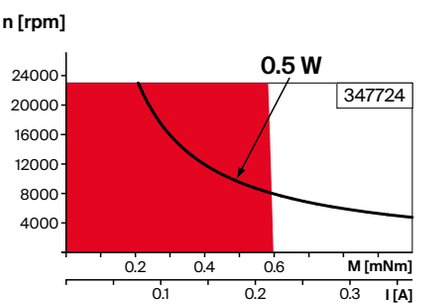
23	Max. speed	23 000 rpm
24	Axial play	0.02 - 0.1 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.15 N
27	Max. force for press fits (static)	10 N
28	Max. radial load, 4 mm from flange	0.6 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	5
31	Weight of motor	4.0 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

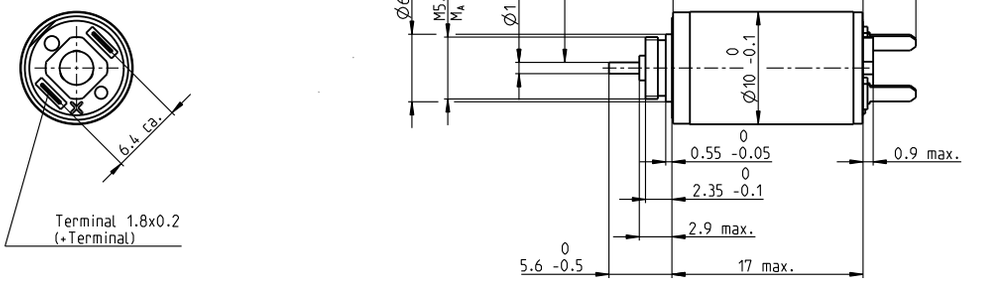
Gear
413_GP 8 A
467_GP 8 S
468_GP 8 S

Sensor
499_ENX 8 IMR
534_Encoder 8 OPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
564_EPOS4 Module 24/1.5
566_EPOS4 Compact 24/1.5

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RE 10 ∅10 mm, precious metal brushes, 0.75 watt



M 3:2

Stock program
Standard program
Special program (on request)

			Part numbers									
			118382	118383	118384	118385	118386	118387	118388	118389	118390	118391
Motor data												
	Values at nominal voltage											
1	Nominal voltage	V	2.4	3	3.6	4.5	6	6	7.2	7.2	9	12
2	No load speed	rpm	10300	10400	9930	11300	13000	11400	11700	10600	10700	11600
3	No load current	mA	16	12.8	10.1	9.52	8.51	7.18	6.22	5.46	4.44	3.68
4	Nominal speed	rpm	1610	1970	1500	2950	4670	3150	3340	1860	2000	2790
5	Nominal torque	mNm	0.757	0.789	0.784	0.787	0.784	0.8	0.784	0.757	0.757	0.746
6	Nominal current (max. continuous current)	A	0.367	0.306	0.243	0.222	0.19	0.17	0.143	0.125	0.101	0.081
7	Stall torque	mNm	0.924	1	0.949	1.09	1.25	1.13	1.12	0.944	0.957	1.01
8	Stall current	A	0.432	0.375	0.284	0.297	0.292	0.232	0.198	0.15	0.123	0.106
9	Max. efficiency	%	66	67	66	68	69	68	68	66	66	67
	Characteristics											
10	Terminal resistance	Ω	5.55	8	12.7	15.2	20.6	25.8	36.4	47.9	72.9	114
11	Terminal inductance	mH	0.046	0.072	0.112	0.136	0.184	0.24	0.325	0.398	0.605	0.92
12	Torque constant	mNm/A	2.14	2.67	3.34	3.67	4.27	4.88	5.68	6.28	7.75	9.55
13	Speed constant	rpm/V	4470	3570	2860	2600	2230	1960	1680	1520	1230	1000
14	Speed / torque gradient	rpm/mNm	11600	10700	10800	10700	10700	10400	10800	11600	11600	11900
15	Mechanical time constant	ms	8.15	8.11	8.14	8.09	8.09	8.03	8.13	8.26	8.25	8.34
16	Rotor inertia	gcm²	0.0671	0.0723	0.0717	0.0719	0.0719	0.0739	0.0719	0.068	0.068	0.0669

Specifications

Thermal data

17	Thermal resistance housing-ambient	45.5 K/W
18	Thermal resistance winding-housing	19.5 K/W
19	Thermal time constant winding	3.66 s
20	Thermal time constant motor	119 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

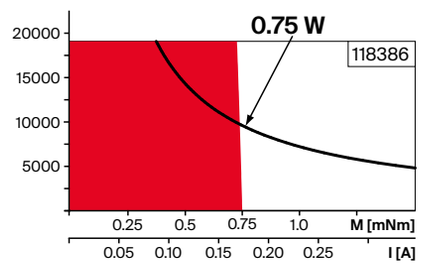
23	Max. speed	19 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.15 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 4 mm from flange	0.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	7 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

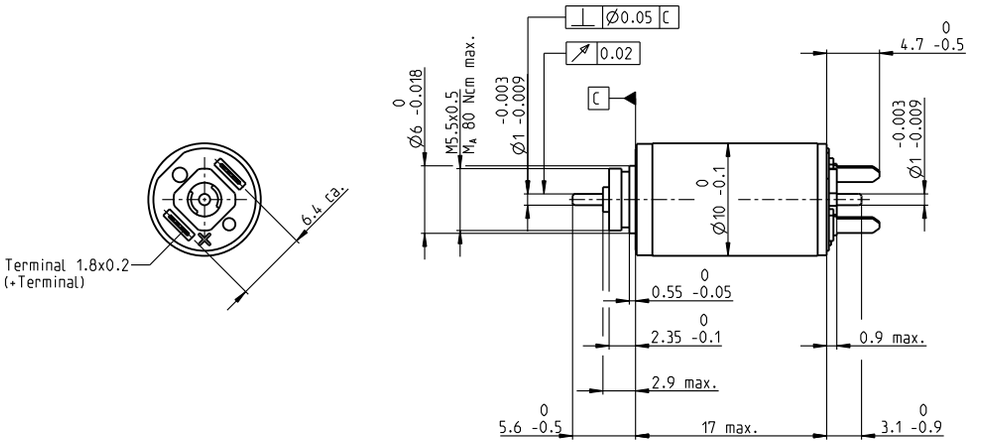
Details on catalog page 48

Gear
414_GP 10 A

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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RE 10 ∅10 mm, precious metal brushes, 0.75 watt



M 3:2

Stock program
Standard program
Special program (on request)

		Part numbers									
		256085	256086	256087	256088	256089	256090	256091	256092	256093	256094
Motor data											
Values at nominal voltage											
1 Nominal voltage	V	2.4	3	3.6	4.5	6	6	7.2	7.2	9	12
2 No load speed	rpm	10200	10300	9840	11200	12900	11300	11600	10500	10600	11500
3 No load current	mA	23.4	18.8	14.9	13.9	11.8	10.5	8.86	8.01	6.51	5.37
4 Nominal speed	rpm	1630	1990	1500	2950	4680	3160	3350	1860	2000	2790
5 Nominal torque	mNm	0.742	0.775	0.769	0.771	0.768	0.785	0.768	0.743	0.742	0.731
6 Nominal current (max. continuous current)	A	0.367	0.306	0.243	0.222	0.19	0.17	0.143	0.125	0.101	0.081
7 Stall torque	mNm	0.924	1	0.949	1.09	1.25	1.13	1.12	0.944	0.957	1.01
8 Stall current	A	0.432	0.375	0.284	0.297	0.292	0.232	0.198	0.15	0.123	0.106
9 Max. efficiency	%	59	61	60	62	64	62	62	60	60	60
Characteristics											
10 Terminal resistance	Ω	5.55	8	12.7	15.2	20.6	25.8	36.4	47.9	72.9	114
11 Terminal inductance	mH	0.046	0.072	0.112	0.136	0.184	0.24	0.325	0.398	0.605	0.92
12 Torque constant	mNm/A	2.14	2.67	3.34	3.67	4.27	4.87	5.68	6.28	7.75	9.55
13 Speed constant	rpm/V	4470	3570	2860	2600	2230	1960	1680	1520	1230	1000
14 Speed / torque gradient	rpm/mNm	11600	10700	10800	10700	10700	10400	10800	11600	11600	11900
15 Mechanical time constant	ms	7.97	7.92	7.95	7.9	7.9	7.85	7.93	8.04	8.04	8.11
16 Rotor inertia	gcm²	0.066	0.0711	0.0704	0.0706	0.0706	0.0726	0.0706	0.0666	0.0666	0.0654

Specifications

Thermal data

17	Thermal resistance housing-ambient	45.5 K/W
18	Thermal resistance winding-housing	19.5 K/W
19	Thermal time constant winding	3.16 s
20	Thermal time constant motor	108 s
21	Ambient temperature	-20...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

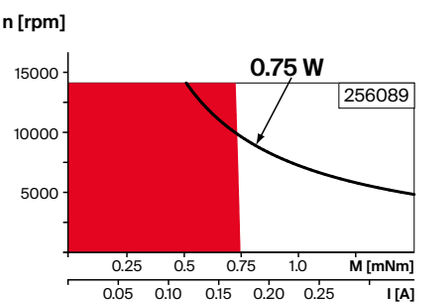
23	Max. speed	14 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.15 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 4 mm from flange	0.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	7 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

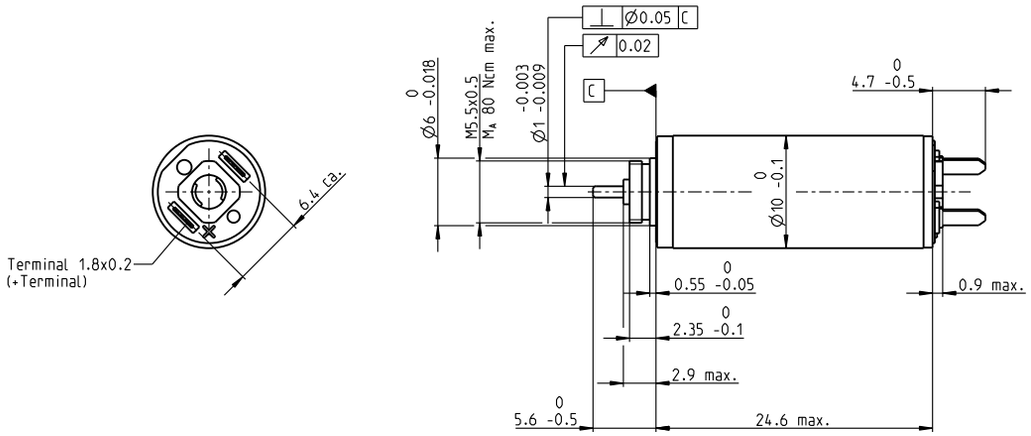
Gear
414_GP 10 A

Sensor
497_ENX 10 GAMA
500_ENX 10 IMR
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
564_EPOS4 Module 24/1.5
566_EPOS4 Compact 24/1.5

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RE 10 ∅10 mm, precious metal brushes, 1.5 watt



M 3:2

Stock program
Standard program
Special program (on request)

Motor data		Part numbers								
		118392	118393	118394	118395	118396	118397	118398	118399	118400
Values at nominal voltage										
1 Nominal voltage	V	3	3	4.5	4.5	6	6	9	9	12
2 No load speed	rpm	13000	10700	12800	10600	12400	9880	12200	11100	12500
3 No load current	mA	23.9	18.5	15.5	12.1	11.1	8.33	7.27	6.42	5.67
4 Nominal speed	rpm	6840	4430	6530	4210	6160	3880	6080	4990	6510
5 Nominal torque	mNm	1.5	1.49	1.48	1.47	1.5	1.57	1.53	1.54	1.54
6 Nominal current (max. continuous current)	A	0.713	0.582	0.462	0.379	0.338	0.282	0.226	0.207	0.176
7 Stall torque	mNm	3.12	2.52	3.04	2.47	3.01	2.61	3.08	2.83	3.24
8 Stall current	A	1.44	0.963	0.919	0.619	0.66	0.458	0.444	0.371	0.36
9 Max. efficiency	%	76	74	76	74	76	75	76	76	77
Characteristics										
10 Terminal resistance	Ω	2.08	3.11	4.9	7.27	9.09	13.1	20.3	24.3	33.3
11 Terminal inductance	mH	0.017	0.025	0.04	0.059	0.077	0.12	0.178	0.215	0.299
12 Torque constant	mNm/A	2.16	2.62	3.3	3.99	4.56	5.7	6.95	7.63	9
13 Speed constant	rpm/V	4410	3640	2890	2400	2100	1680	1370	1250	1060
14 Speed / torque gradient	rpm/mNm	4240	4330	4280	4370	4180	3860	4010	3980	3930
15 Mechanical time constant	ms	4.62	4.61	4.6	4.59	4.58	4.56	4.59	4.56	4.56
16 Rotor inertia	gcm²	0.104	0.102	0.102	0.1	0.105	0.113	0.109	0.11	0.111

Specifications

Thermal data

17	Thermal resistance housing-ambient	37.5 K/W
18	Thermal resistance winding-housing	9.0 K/W
19	Thermal time constant winding	2.22 s
20	Thermal time constant motor	135 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

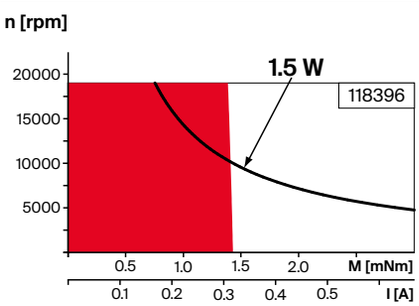
23	Max. speed	19 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.15 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 4 mm from flange	0.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	10 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

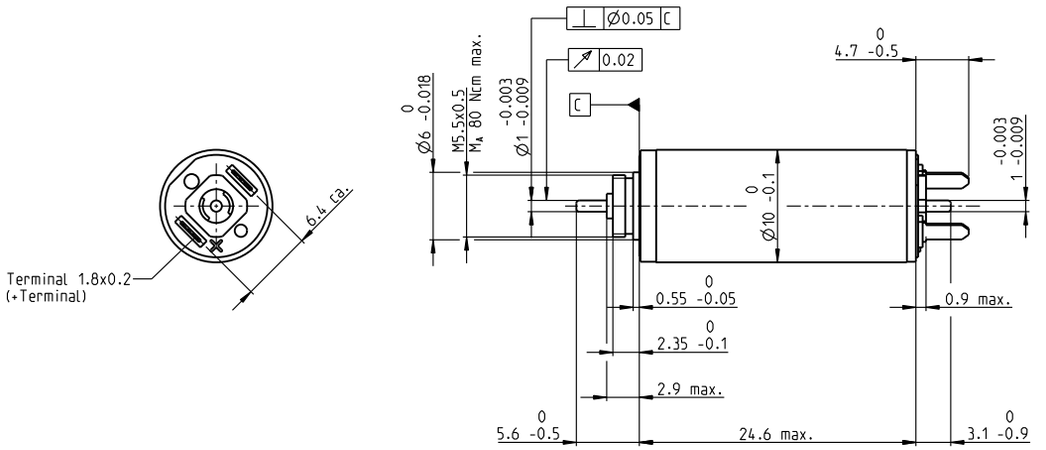
Details on catalog page 48

Gear
414_GP 10 A

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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RE 10 ∅10 mm, precious metal brushes, 1.5 watt



M 3:2

Stock program
Standard program
Special program (on request)

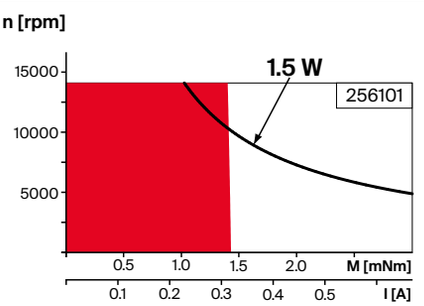
			Part numbers								
			256096	256097	256099	256100	256101	256102	256103	256104	256105
Motor data											
	Values at nominal voltage										
1	Nominal voltage	V	2.4	2.4	4.5	4.5	6	7.2	9	10	12
2	No load speed	rpm	10400	8560	12800	10600	12400	11900	12200	12300	12500
3	No load current	mA	21.7	17	15.1	11.8	10.8	8.55	7.06	6.45	5.5
4	Nominal speed	rpm	4170	2230	6530	4210	6160	5900	6080	6250	6510
5	Nominal torque	mNm	1.51	1.49	1.48	1.47	1.5	1.56	1.53	1.54	1.55
6	Nominal current (max. continuous current)	A	0.715	0.583	0.462	0.379	0.339	0.282	0.226	0.207	0.176
7	Stall torque	mNm	2.49	2.02	3.04	2.47	3.01	3.13	3.08	3.14	3.24
8	Stall current	A	1.15	0.771	0.919	0.619	0.66	0.549	0.444	0.412	0.36
9	Max. efficiency	%	75	73	76	75	76	77	77	77	77
	Characteristics										
10	Terminal resistance	Ω	2.08	3.11	4.9	7.27	9.09	13.1	20.3	24.3	33.3
11	Terminal inductance	mH	0.017	0.025	0.04	0.059	0.077	0.12	0.178	0.215	0.299
12	Torque constant	mNm/A	2.16	2.62	3.3	3.99	4.56	5.7	6.95	7.63	9
13	Speed constant	rpm/V	4410	3640	2890	2400	2100	1680	1370	1250	1060
14	Speed / torque gradient	rpm/mNm	4240	4330	4280	4370	4180	3860	4010	3980	3930
15	Mechanical time constant	ms	4.62	4.61	4.6	4.59	4.58	4.56	4.59	4.56	4.56
16	Rotor inertia	gcm²	0.104	0.102	0.102	0.1	0.105	0.113	0.109	0.11	0.111

Specifications

	Thermal data	
17	Thermal resistance housing-ambient	37.5 K/W
18	Thermal resistance winding-housing	9.0 K/W
19	Thermal time constant winding	2.22 s
20	Thermal time constant motor	135 s
21	Ambient temperature	-20...+65°C
22	Max. winding temperature	+85°C
	Mechanical data (sleeve bearings)	
23	Max. speed	14 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.15 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 4 mm from flange	0.4 N
	Other specifications	
29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	10 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

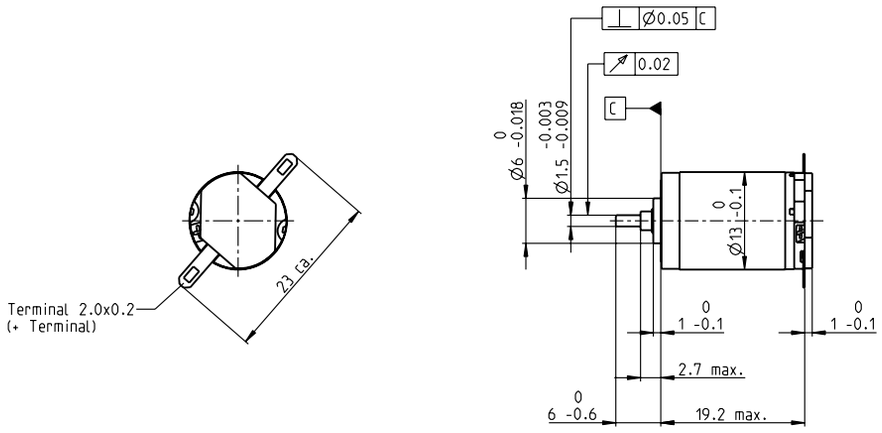
Gear
414_GP 10 A

Sensor
497_ENX 10 GAMA
500_ENX 10 IMR
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
564_EPOS4 Module 24/1.5
566_EPOS4 Compact 24/1.5

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RE 13 ∅13 mm, precious metal brushes, 1.2 watt



M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers														
		118401	118402	118403	118404	118405	118406	118407	118408	118409	118410	118411	118412	118413	118414	118415
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	1	1.2	1.5	1.8	2.4	3	3.6	4.2	5	6	8	9	10	12	15
2 No load speed	rpm	11600	11300	11100	11000	11300	11600	12100	11500	11300	10900	11700	10600	11000	11200	10700
3 No load current	mA	104	84.1	65.7	53.8	42	34.5	30.6	24.5	20.1	16	13.2	10.3	9.75	8.31	6.21
4 Nominal speed	rpm	9930	8600	7670	6520	5860	6250	6960	6310	6010	5650	6400	5210	5590	5820	5300
5 Nominal torque	mNm	0.499	0.63	0.825	1.02	1.24	1.27	1.31	1.3	1.28	1.28	1.27	1.26	1.24	1.25	1.27
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.666	0.557	0.499	0.405	0.329	0.266	0.211	0.169	0.156	0.133	0.103
7 Stall torque	mNm	2.86	2.4	2.52	2.45	2.54	2.76	3.08	2.9	2.76	2.69	2.84	2.52	2.57	2.65	2.57
8 Stall current	A	3.56	2.45	2.02	1.62	1.3	1.15	1.11	0.857	0.674	0.53	0.449	0.321	0.307	0.268	0.198
9 Max. efficiency	%	69	67	68	67	68	69	70	70	69	69	69	68	68	68	68
Characteristics																
10 Terminal resistance	Ω	0.281	0.491	0.742	1.11	1.85	2.61	3.23	4.9	7.42	11.3	17.8	28	32.6	44.9	78.8
11 Terminal inductance	mH	0.006	0.009	0.015	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.6
12 Torque constant	mNm/A	0.802	0.98	1.25	1.51	1.96	2.41	2.76	3.39	4.1	5.08	6.32	7.84	8.37	9.89	13
13 Speed constant	rpm/V	11900	9740	7660	6310	4870	3970	3460	2820	2330	1880	1510	1220	1140	966	734
14 Speed / torque gradient	rpm/mNm	4170	4880	4560	4640	4600	4310	4040	4090	4220	4190	4250	4350	4440	4380	4280
15 Mechanical time constant	ms	15.6	14.9	14.3	14.1	13.9	13.7	13.5	13.5	13.5	13.5	13.6	13.7	13.6	13.6	13.2
16 Rotor inertia	gcm²	0.358	0.291	0.299	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.294

Specifications

Thermal data

17	Thermal resistance housing-ambient	46 K/W
18	Thermal resistance winding-housing	14 K/W
19	Thermal time constant winding	5.18 s
20	Thermal time constant motor	76.1 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

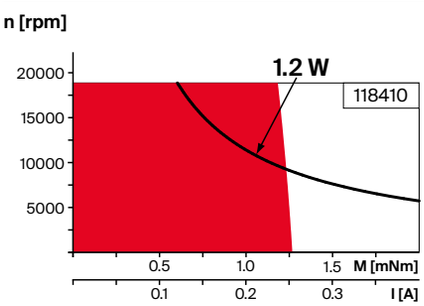
23	Max. speed	19 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	12 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

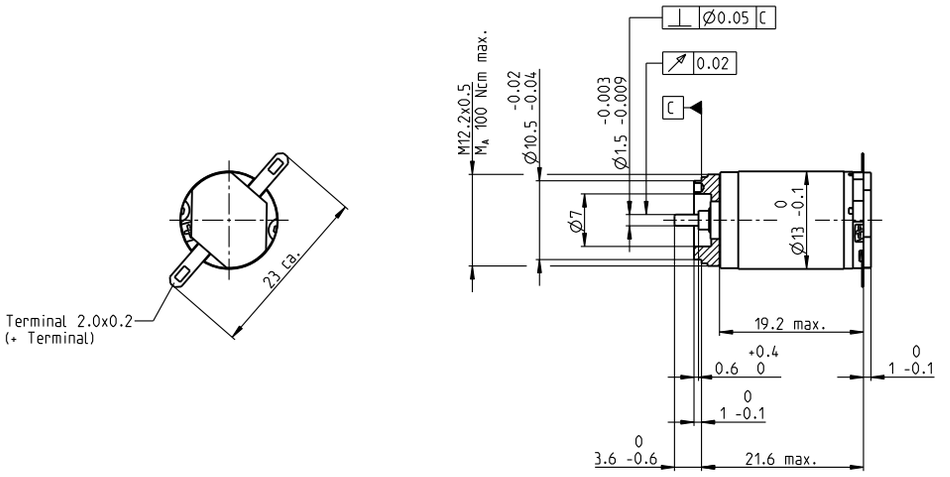
Modular system

Details on catalog page 48

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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RE 13 ∅13 mm, precious metal brushes, 1.2 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

		118416	118417	118418	118419	118420	118421	118422	118423	118424	118425	118426	118427	118428	118429	118430
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	1	1.2	1.5	1.8	2.4	3	3.6	4.2	5	6	8	9	10	12	15
2 No load speed	rpm	11600	11300	11100	11000	11300	11600	12100	11500	11300	10900	11700	10600	11000	11200	10700
3 No load current	mA	104	84.1	65.7	53.8	42	34.5	30.6	24.5	20.1	16	13.2	10.3	9.75	8.31	6.2
4 Nominal speed	rpm	9930	8600	7670	6520	5860	6250	6960	6310	6010	5650	6400	5210	5590	5820	5190
5 Nominal torque	mNm	0.499	0.63	0.825	1.02	1.24	1.27	1.31	1.3	1.28	1.28	1.27	1.26	1.24	1.25	1.24
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.666	0.557	0.499	0.405	0.329	0.266	0.211	0.169	0.156	0.133	0.101
7 Stall torque	mNm	2.86	2.4	2.52	2.45	2.54	2.76	3.08	2.9	2.76	2.69	2.84	2.52	2.57	2.65	2.48
8 Stall current	A	3.56	2.45	2.02	1.62	1.3	1.15	1.11	0.857	0.674	0.53	0.449	0.321	0.307	0.268	0.19
9 Max. efficiency	%	69	67	68	67	68	69	70	70	69	69	69	68	68	68	68
Characteristics																
10 Terminal resistance	Ω	0.281	0.491	0.742	1.11	1.85	2.61	3.23	4.9	7.42	11.3	17.8	28	32.6	44.9	78.8
11 Terminal inductance	mH	0.006	0.009	0.015	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.59
12 Torque constant	mNm/A	0.802	0.98	1.25	1.51	1.96	2.41	2.76	3.39	4.1	5.08	6.32	7.84	8.37	9.89	13
13 Speed constant	rpm/V	11900	9740	7660	6310	4870	3970	3460	2820	2330	1880	1510	1220	1140	966	734
14 Speed/torque gradient	rpm/mNm	4170	4880	4560	4640	4600	4310	4040	4090	4220	4190	4250	4350	4440	4380	4450
15 Mechanical time constant	ms	15.6	14.9	14.3	14.1	13.9	13.7	13.5	13.5	13.5	13.5	13.6	13.7	13.6	13.6	13.7
16 Rotor inertia	gcm²	0.358	0.291	0.299	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.294

Specifications

Thermal data

17	Thermal resistance housing-ambient	46 K/W
18	Thermal resistance winding-housing	14 K/W
19	Thermal time constant winding	5.18 s
20	Thermal time constant motor	76.1 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

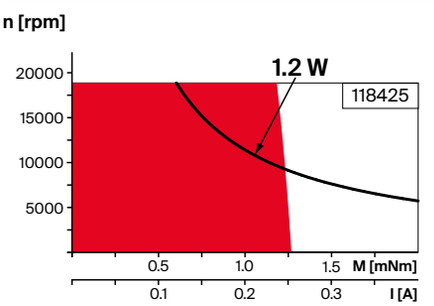
23	Max. speed	19 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	15 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

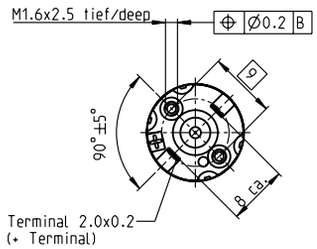
Details on catalog page 48

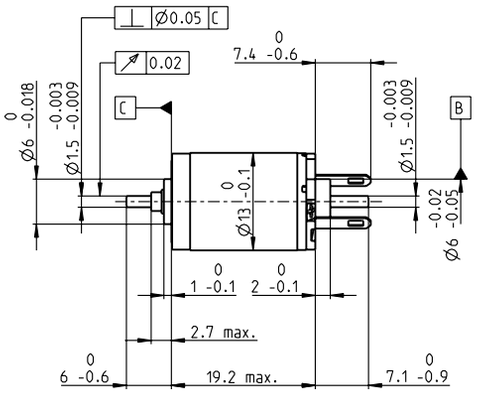
Gear
415_GP 13 A

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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RE 13 ∅13 mm, precious metal brushes, 0.75 watt





M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

		118431	118432	118433	118434	118435	118436	118437	118438	118439	118440	118441	118442	118443	118444	118445
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	0.6	0.72	0.9	1.2	1.5	1.8	1.8	2.4	3	3.6	4.8	6	6	7.2	10
2 No load speed	rpm	6900	6710	6590	7250	6990	6850	5950	6490	6700	6480	6950	7000	6530	6650	7030
3 No load current	mA	88.2	71.7	56.1	47.3	36.2	29.4	24.7	20.6	17.1	13.7	11.2	9.06	8.33	7.09	5.46
4 Nominal speed	rpm	5170	3920	3070	2740	1430	1430	682	1350	1300	1090	1520	1510	990	1140	1480
5 Nominal torque	mNm	0.511	0.643	0.837	1.03	1.26	1.3	1.34	1.28	1.3	1.3	1.29	1.28	1.26	1.27	1.26
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.671	0.562	0.504	0.396	0.331	0.268	0.213	0.17	0.158	0.134	0.101
7 Stall torque	mNm	1.71	1.44	1.51	1.63	1.59	1.66	1.54	1.66	1.66	1.61	1.7	1.68	1.54	1.59	1.65
8 Stall current	A	2.14	1.47	1.21	1.08	0.812	0.69	0.557	0.489	0.404	0.318	0.269	0.214	0.184	0.161	0.127
9 Max. efficiency	%	64	61	62	63	63	63	63	64	64	63	64	64	62	63	63
Characteristics																
10 Terminal resistance	Ω	0.281	0.491	0.742	1.11	1.85	2.61	3.23	4.9	7.42	11.3	17.8	28	32.6	44.9	78.8
11 Terminal inductance	mH	0.006	0.009	0.015	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.59
12 Torque constant	mNm/A	0.802	0.98	1.25	1.51	1.96	2.41	2.76	3.39	4.1	5.08	6.32	7.84	8.37	9.89	13
13 Speed constant	rpm/V	11900	9740	7660	6310	4870	3970	3460	2820	2330	1880	1510	1220	1140	966	734
14 Speed / torque gradient	rpm/mNm	4170	4880	4560	4640	4600	4310	4040	4090	4220	4190	4250	4350	4440	4380	4450
15 Mechanical time constant	ms	15.6	14.9	14.3	14.1	13.9	13.7	13.5	13.5	13.5	13.5	13.6	13.7	13.6	13.6	13.7
16 Rotor inertia	gcm²	0.358	0.291	0.299	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.294

Specifications

Thermal data

17	Thermal resistance housing-ambient	46 K/W
18	Thermal resistance winding-housing	14 K/W
19	Thermal time constant winding	5.18 s
20	Thermal time constant motor	76.1 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

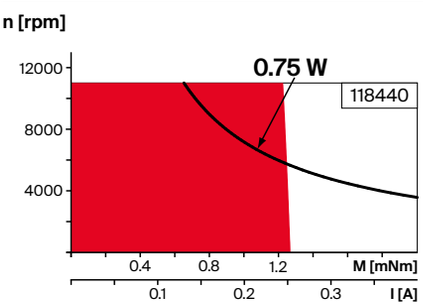
23	Max. speed	11000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	170 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	12 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

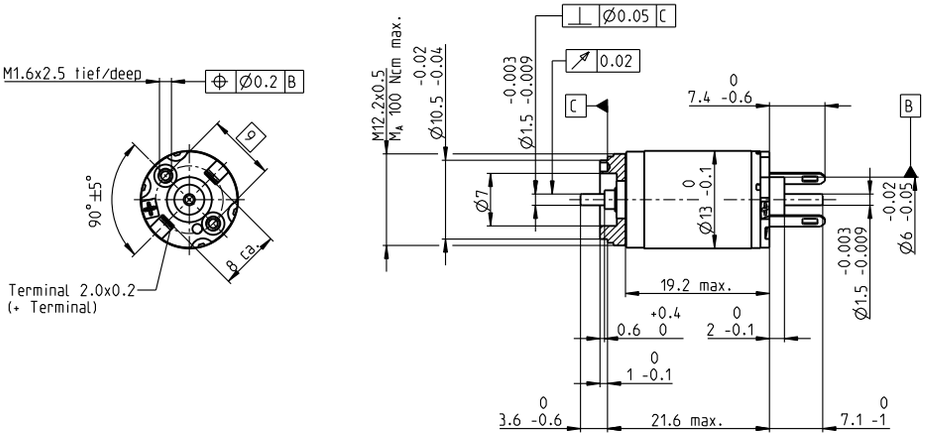
Details on catalog page 48

Sensor
498_ENX 13 GAMA
501_ENX 13 IMR
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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RE 13 ∅13 mm, precious metal brushes, 0.75 watt



M 1:1

Stock program
Standard program
Special program (on request)

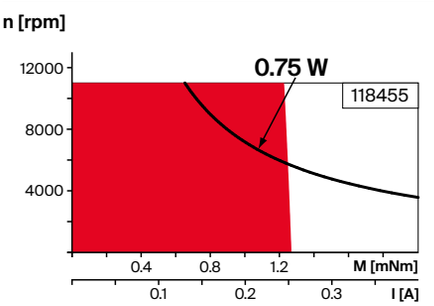
		Part numbers														
		118446	118447	118448	118449	118450	118451	118452	118453	118454	118455	118456	118457	118458	118459	118460
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	0.6	0.7	0.9	1.2	1.5	1.8	1.8	2.4	3	3.6	4.8	6	6	7.2	10
2 No load speed	rpm	6900	6520	6590	7250	6990	6850	5950	6490	6700	6480	6950	7000	6530	6650	7030
3 No load current	mA	88.2	71.2	56.1	47.3	36.2	29.4	24.7	20.6	17.1	13.7	11.2	9.06	8.33	7.09	5.46
4 Nominal speed	rpm	5170	3730	3070	2740	1430	1430	682	1350	1300	1090	1520	1510	990	1140	1480
5 Nominal torque	mNm	0.511	0.643	0.837	1.03	1.26	1.3	1.34	1.28	1.3	1.3	1.29	1.28	1.26	1.27	1.26
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.671	0.562	0.504	0.396	0.331	0.268	0.213	0.17	0.158	0.134	0.101
7 Stall torque	mNm	1.71	1.4	1.51	1.63	1.59	1.66	1.54	1.66	1.66	1.61	1.7	1.68	1.54	1.59	1.65
8 Stall current	A	2.14	1.43	1.21	1.08	0.812	0.69	0.557	0.489	0.404	0.318	0.269	0.214	0.184	0.161	0.127
9 Max. efficiency	%	64	61	62	63	63	63	63	64	64	63	64	64	62	63	63
Characteristics																
10 Terminal resistance	Ω	0.281	0.491	0.742	1.11	1.85	2.61	3.23	4.9	7.42	11.3	17.8	28	32.6	44.9	78.8
11 Terminal inductance	mH	0.006	0.009	0.015	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.59
12 Torque constant	mNm/A	0.802	0.98	1.25	1.51	1.96	2.41	2.76	3.39	4.1	5.08	6.32	7.84	8.37	9.89	13
13 Speed constant	rpm/V	11900	9740	7660	6310	4870	3970	3460	2820	2330	1880	1510	1220	1140	966	734
14 Speed / torque gradient	rpm/mNm	4170	4880	4560	4640	4600	4310	4040	4090	4220	4190	4250	4350	4440	4380	4450
15 Mechanical time constant	ms	15.6	14.9	14.3	14.1	13.9	13.7	13.5	13.5	13.5	13.5	13.6	13.7	13.6	13.6	13.7
16 Rotor inertia	gcm²	0.358	0.291	0.299	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.294

Specifications

Thermal data		
17	Thermal resistance housing-ambient	46 K/W
18	Thermal resistance winding-housing	14 K/W
19	Thermal time constant winding	5.18 s
20	Thermal time constant motor	76.1 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C
Mechanical data (sleeve bearings)		
23	Max. speed	11 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	170 N
28	Max. radial load, 5 mm from flange	1.4 N
Other specifications		
29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	15 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

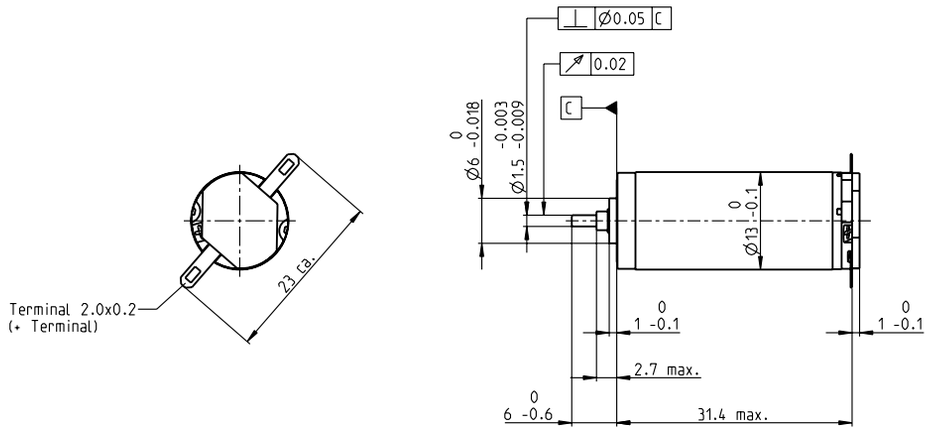
Gear
415_GP 13 A

Sensor
498_ENX 13 GAMA
501_ENX 13 IMR
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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RE 13 ∅13 mm, precious metal brushes, 2.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

Motor data		118461	118462	118463	118464	118465	118466	118467	118468	118469	118470	118471	118472	118473	118474	118475
Values at nominal voltage																
1 Nominal voltage	V	2.4	3	3	3.6	4.8	4.8	6	7.2	8	10	12	15	15	18	24
2 No load speed	rpm	10600	12200	10700	10800	11400	10100	11400	11400	10900	11400	11000	11100	10300	10600	11500
3 No load current	mA	51.5	50.8	42	35.5	28.8	24.4	23	19.2	16.1	13.8	11	8.87	7.98	6.9	5.82
4 Nominal speed	rpm	9160	10500	8490	8050	7890	6430	7660	7730	7320	7790	7390	7470	6620	6920	7800
5 Nominal torque	mNm	1.44	1.56	1.8	2.16	2.76	2.87	2.81	2.86	2.98	2.9	2.89	2.9	2.88	2.9	2.84
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.664	0.586	0.497	0.443	0.363	0.291	0.235	0.217	0.187	0.149
7 Stall torque	mNm	9.95	10.2	8.34	8.25	8.81	7.78	8.51	8.84	9.1	9.15	8.77	8.9	8.13	8.44	8.87
8 Stall current	A	4.63	4.42	3.15	2.63	2.22	1.74	1.72	1.48	1.31	1.11	0.856	0.699	0.592	0.526	0.451
9 Max. efficiency	%	80	80	79	78	79	78	79	79	79	79	79	79	78	79	79
Characteristics																
10 Terminal resistance	Ω	0.519	0.679	0.951	1.37	2.16	2.75	3.5	4.85	6.11	9.03	14	21.5	25.3	34.2	53.2
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.485	0.749	0.87	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed / torque gradient	rpm/mNm	1070	1210	1300	1330	1310	1320	1360	1310	1210	1260	1270	1260	1280	1270	1310
15 Mechanical time constant	ms	7.65	7.55	7.45	7.37	7.28	7.27	7.28	7.23	7.16	7.2	7.21	7.21	7.21	7.22	7.27
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17	Thermal resistance housing-ambient	33 K/W
18	Thermal resistance winding-housing	7.0 K/W
19	Thermal time constant winding	4.88 s
20	Thermal time constant motor	229 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

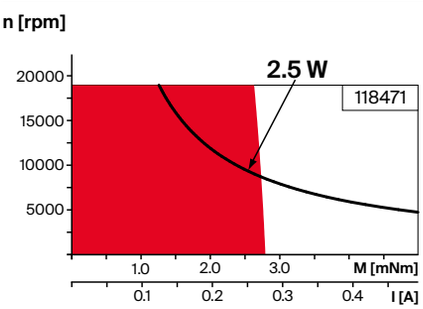
23	Max. speed	19 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	21 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

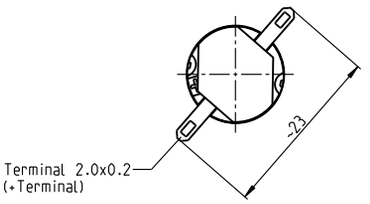
Modular system

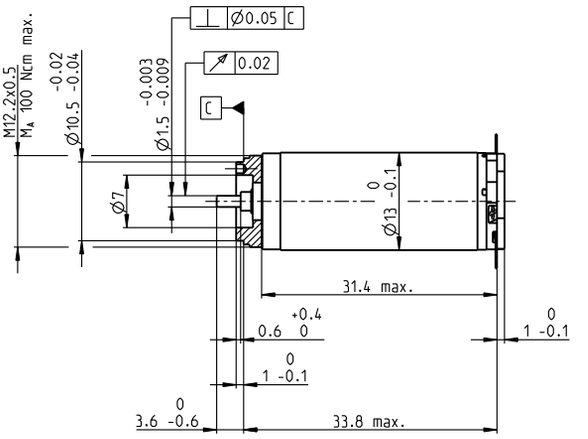
Details on catalog page 48

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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RE 13 ∅13 mm, precious metal brushes, 2.5 watt





M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers														
		118476	118477	118478	118479	118480	118481	118482	118483	118484	118485	118486	118487	118488	118489	118490
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	2.4	3	3	3.6	4.8	4.8	6	7.2	8	10	12	15	15	18	24
2 No load speed	rpm	10600	12200	10700	10800	11400	10100	11400	11400	10900	11400	11000	11100	10300	10600	11500
3 No load current	mA	51.5	50.8	42	35.5	28.8	24.4	23	19.2	16.1	13.8	11	8.87	7.98	6.9	5.82
4 Nominal speed	rpm	9160	10500	8490	8050	7890	6430	7660	7730	7320	7790	7390	7470	6620	6920	7800
5 Nominal torque	mNm	1.44	1.56	1.8	2.16	2.76	2.87	2.81	2.86	2.98	2.9	2.89	2.9	2.88	2.9	2.84
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.664	0.586	0.497	0.443	0.363	0.291	0.235	0.217	0.187	0.149
7 Stall torque	mNm	9.95	10.2	8.34	8.25	8.81	7.78	8.51	8.84	9.1	9.15	8.77	8.9	8.13	8.44	8.87
8 Stall current	A	4.63	4.42	3.15	2.63	2.22	1.74	1.72	1.48	1.31	1.11	0.856	0.699	0.592	0.526	0.451
9 Max. efficiency	%	80	80	79	78	79	78	79	79	79	79	79	79	78	79	79
Characteristics																
10 Terminal resistance	Ω	0.519	0.679	0.951	1.37	2.16	2.75	3.5	4.85	6.11	9.03	14	21.5	25.3	34.2	53.2
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed / torque gradient	rpm/mNm	1070	1210	1300	1330	1310	1320	1360	1310	1210	1260	1270	1260	1280	1270	1310
15 Mechanical time constant	ms	7.65	7.55	7.45	7.37	7.28	7.27	7.28	7.23	7.16	7.2	7.21	7.21	7.21	7.22	7.27
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17	Thermal resistance housing-ambient	33 K/W
18	Thermal resistance winding-housing	7.0 K/W
19	Thermal time constant winding	4.88 s
20	Thermal time constant motor	229 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

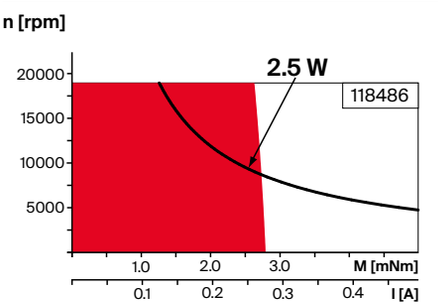
23	Max. speed	19 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	24 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

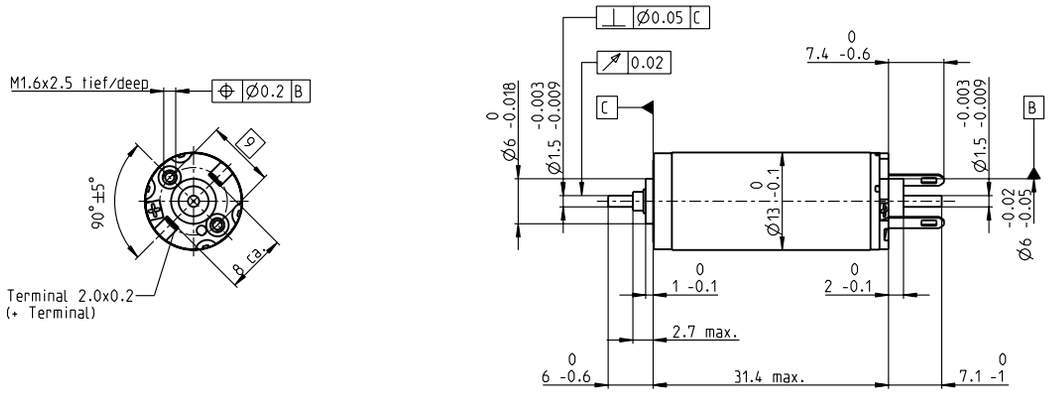
Details on catalog page 48

Gear
415_GP 13 A

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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RE 13 ∅13 mm, precious metal brushes, 2 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers	118491	118492	118493	118494	118495	118496	118497	118498	118499	118500	118501	118502	118503	118504	118505
Motor data															
Values at nominal voltage															
1 Nominal voltage V	1.5	1.5	1.8	2.4	3	3	3.6	4.2	4.8	6	7.2	9	10	12	15
2 No load speed rpm	6570	6090	6380	7170	7100	6300	6800	6620	6490	6810	6590	6630	6840	7020	7150
3 No load current mA	43.8	39.8	35.3	30.8	24.3	20.8	19.2	15.8	13.5	11.5	9.19	7.41	6.94	5.99	4.91
4 Nominal speed rpm	5170	4320	4160	4400	3560	2550	3000	2880	2880	3130	2880	2940	3120	3330	3400
5 Nominal torque mNm	1.46	1.58	1.82	2.18	2.78	2.91	2.85	2.91	3.02	2.95	2.93	2.94	2.92	2.93	2.88
6 Nominal current (max. continuous current) A	0.72	0.72	0.72	0.72	0.72	0.669	0.592	0.502	0.446	0.367	0.294	0.237	0.218	0.188	0.151
7 Stall torque mNm	6.22	5.12	5.01	5.5	5.51	4.86	5.1	5.16	5.46	5.49	5.26	5.34	5.42	5.63	5.54
8 Stall current A	2.89	2.21	1.89	1.75	1.39	1.09	1.03	0.866	0.786	0.665	0.514	0.419	0.395	0.351	0.282
9 Max. efficiency %	77	75	75	76	76	75	75	75	76	76	75	76	76	76	76
Characteristics															
10 Terminal resistance Ω	0.519	0.679	0.951	1.37	2.16	2.75	3.5	4.85	6.11	9.03	14	21.5	25.3	34.2	53.2
11 Terminal inductance mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.485	0.749	0.87	1.19	1.79
12 Torque constant mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed / torque gradient rpm/mNm	1070	1210	1300	1330	1310	1320	1360	1310	1210	1260	1270	1260	1280	1270	1310
15 Mechanical time constant ms	7.65	7.55	7.45	7.37	7.28	7.27	7.28	7.23	7.16	7.2	7.21	7.21	7.21	7.22	7.27
16 Rotor inertia gcm^2	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17 Thermal resistance housing-ambient	33 K/W
18 Thermal resistance winding-housing	7.0 K/W
19 Thermal time constant winding	4.88 s
20 Thermal time constant motor	229 s
21 Ambient temperature	-20...+65 °C
22 Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

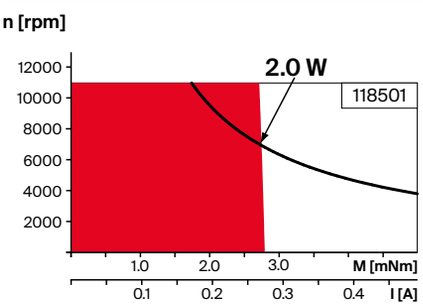
23 Max. speed	11000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	15 N
(static, shaft supported)	95 N
28 Max. radial load, 5 mm from flange	1.4 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	12 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

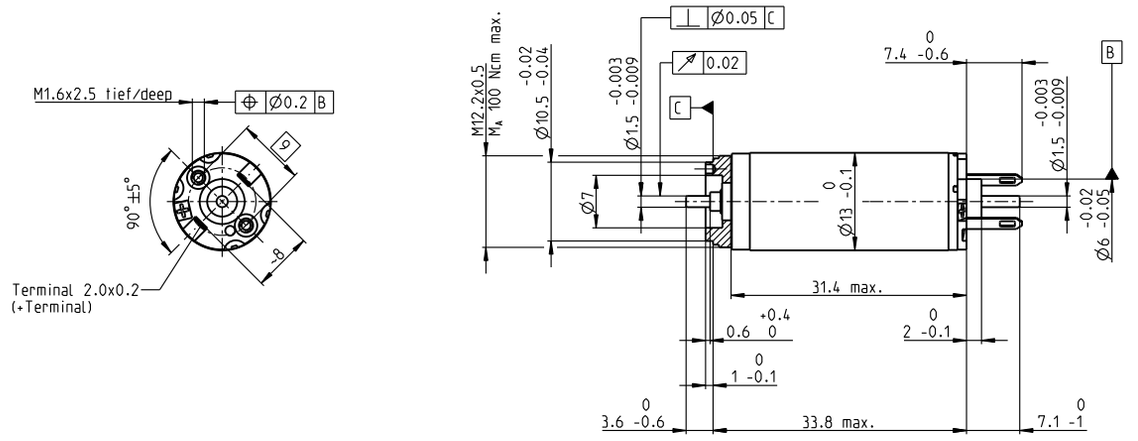
Details on catalog page 48

Sensor
498_ENX 13 GAMA
501_ENX 13 IMR
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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RE 13 ∅13 mm, precious metal brushes, 2 watt



M 1:1

Stock program
Standard program
Special program (on request)

Motor data		Part numbers														
		118506	118507	118508	118509	118510	118511	118512	118513	118514	118515	118516	118517	118518	118519	118520
Values at nominal voltage																
1 Nominal voltage	V	1.5	1.5	1.8	2.4	3	3	3.6	4.2	4.8	6	7.2	9	10	12	15
2 No load speed	rpm	6570	6090	6380	7170	7100	6300	6800	6620	6490	6810	6590	6630	6840	7020	7150
3 No load current	mA	43.8	39.8	35.3	30.8	24.3	20.8	19.2	15.8	13.5	11.5	9.19	7.41	6.94	5.99	4.91
4 Nominal speed	rpm	5170	4320	4160	4400	3560	2550	3000	2880	2880	3130	2880	2940	3120	3330	3400
5 Nominal torque	mNm	1.46	1.58	1.82	2.18	2.78	2.91	2.85	2.91	3.02	2.95	2.93	2.94	2.92	2.93	2.88
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.669	0.592	0.502	0.446	0.367	0.294	0.237	0.218	0.188	0.151
7 Stall torque	mNm	6.22	5.12	5.01	5.5	5.51	4.86	5.1	5.16	5.46	5.49	5.26	5.34	5.42	5.63	5.54
8 Stall current	A	2.89	2.21	1.89	1.75	1.39	1.09	1.03	0.866	0.786	0.665	0.514	0.419	0.395	0.351	0.282
9 Max. efficiency	%	77	75	75	76	76	75	75	75	76	76	75	76	76	76	76
Characteristics																
10 Terminal resistance	Ω	0.519	0.679	0.951	1.37	2.16	2.75	3.5	4.85	6.11	9.03	14	21.5	25.3	34.2	53.2
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1070	1210	1300	1330	1310	1320	1360	1310	1210	1260	1270	1260	1280	1270	1310
15 Mechanical time constant	ms	7.65	7.55	7.45	7.37	7.28	7.27	7.28	7.23	7.16	7.2	7.21	7.21	7.21	7.22	7.27
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17	Thermal resistance housing-ambient	33 K/W
18	Thermal resistance winding-housing	7.0 K/W
19	Thermal time constant winding	4.88 s
20	Thermal time constant motor	229 s
21	Ambient temperature	-20...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

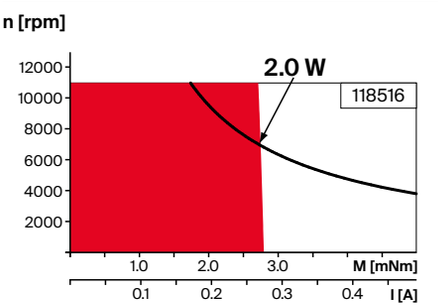
23	Max. speed	11000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	95 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	24 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

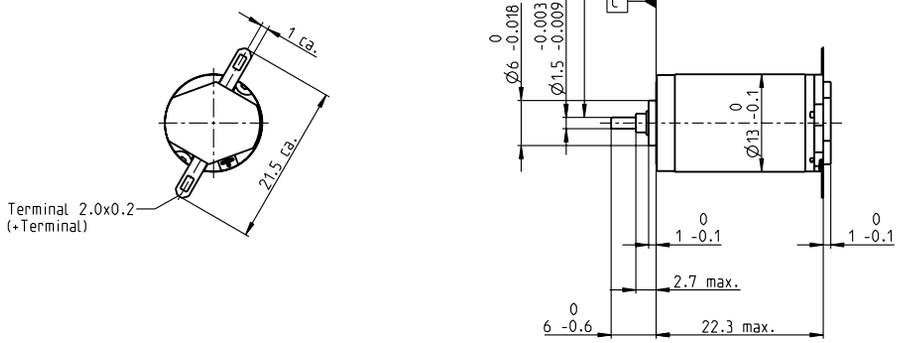
Gear
415_GP 13 A

Sensor
498_ENX 13 GAMA
501_ENX 13 IMR
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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RE 13 ∅13 mm, graphite brushes, 1.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers														
		118521	118522	118523	118524	118525	118526	118527	118528	118529	118530	118531	118532	118533	118534	118535
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	1.2	1.5	2.4	3	3.6	4.2	4.8	6	7.2	9	12	12	15	18	20
2 No load speed	rpm	13300	13300	13700	13200	13000	13300	12300	12700	12300	12300	13300	12300	13100	14000	13300
3 No load current	mA	482	394	259	197	159	140	111	92.5	73.7	59.2	49.2	44.7	38.9	35.1	29.7
4 Nominal speed	rpm	12600	11800	10600	8520	7790	8260	7130	7480	7010	7000	8040	6940	7870	8890	8020
5 Nominal torque	mNm	0.194	0.329	0.719	1.06	1.23	1.27	1.28	1.25	1.26	1.25	1.21	1.22	1.21	1.2	1.19
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.659	0.588	0.481	0.39	0.316	0.252	0.199	0.186	0.157	0.139	0.119
7 Stall torque	mNm	4.07	3.25	3.33	3.19	3.3	3.56	3.26	3.25	3.16	3.12	3.28	3.01	3.23	3.51	3.22
8 Stall current	A	5.2	3.4	2.26	1.67	1.41	1.32	0.989	0.814	0.639	0.506	0.429	0.368	0.335	0.321	0.254
9 Max. efficiency	%	49	44	45	44	45	46	45	45	44	44	45	43	44	46	44
Characteristics																
10 Terminal resistance	Ω	0.231	0.441	1.06	1.8	2.56	3.18	4.85	7.37	11.3	17.8	28	32.6	44.8	56.1	78.8
11 Terminal inductance	mH	0.006	0.009	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.19	1.59
12 Torque constant	mNm/A	0.782	0.956	1.48	1.91	2.35	2.69	3.3	4	4.95	6.17	7.64	8.17	9.64	10.9	12.7
13 Speed constant	rpm/V	12200	9990	6470	5000	4070	3550	2890	2390	1930	1550	1250	1170	990	872	753
14 Speed / torque gradient	rpm/mNm	3600	4610	4660	4700	4440	4190	4250	4410	4390	4460	4570	4660	4600	4470	4680
15 Mechanical time constant	ms	13.5	14	14.1	14.2	14.1	14	14	14.1	14.2	14.2	14.3	14.3	14.3	14.2	14.4
16 Rotor inertia	gcm²	0.358	0.291	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.303	0.294

Specifications

Thermal data

17	Thermal resistance housing-ambient	46 K/W
18	Thermal resistance winding-housing	14 K/W
19	Thermal time constant winding	5.18 s
20	Thermal time constant motor	231 s
21	Ambient temperature	-20...+85 °C
22	Max. winding temperature	+125 °C

Mechanical data (sleeve bearings)

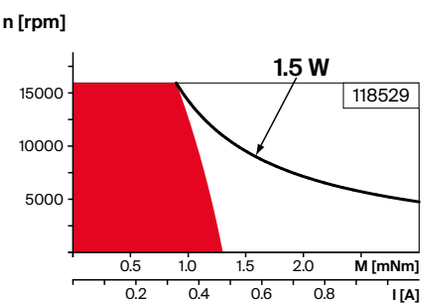
23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	15 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

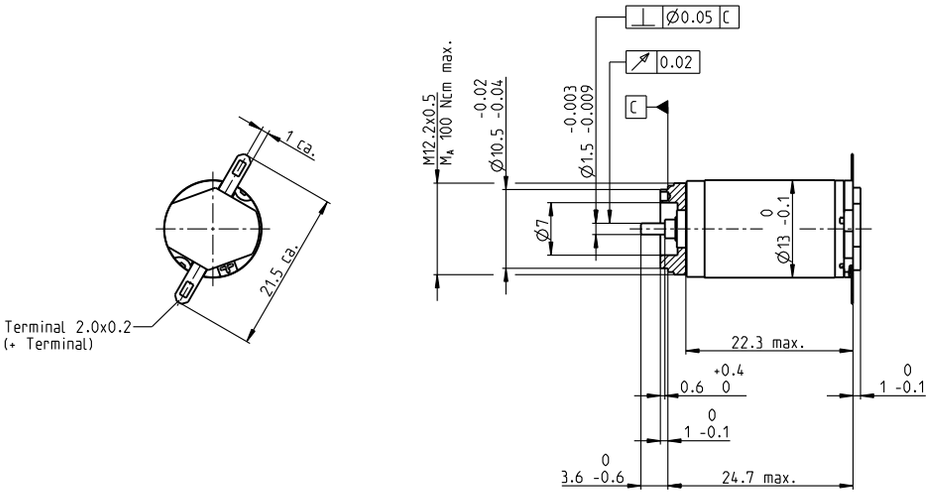
Modular system

Details on catalog page 48

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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RE 13 ∅13 mm, graphite brushes, 1.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers														
		118536	118537	118538	118539	118540	118541	118542	118543	118544	118545	118546	118547	118548	118549	118550
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	1.2	1.5	2.4	3	3.6	4.2	4.8	6	7.2	9	12	12	15	18	20
2 No load speed	rpm	13300	13300	13700	13200	13000	13300	12300	12700	12300	12300	13300	12300	13100	14000	13300
3 No load current	mA	482	394	259	197	159	140	111	92.5	73.7	59.2	49.2	44.7	38.9	35.1	29.7
4 Nominal speed	rpm	12600	11800	10600	8520	7790	8260	7130	7480	7010	7000	8040	6940	7870	8890	8020
5 Nominal torque	mNm	0.194	0.329	0.719	1.06	1.23	1.27	1.28	1.25	1.26	1.25	1.21	1.22	1.21	1.2	1.19
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.659	0.588	0.481	0.39	0.316	0.252	0.199	0.186	0.157	0.139	0.119
7 Stall torque	mNm	4.07	3.25	3.33	3.19	3.3	3.56	3.26	3.25	3.16	3.12	3.28	3.01	3.23	3.51	3.22
8 Stall current	A	5.2	3.4	2.26	1.67	1.41	1.32	0.989	0.814	0.639	0.506	0.429	0.368	0.335	0.321	0.254
9 Max. efficiency	%	49	44	45	44	45	46	45	45	44	44	45	43	44	46	44
Characteristics																
10 Terminal resistance	Ω	0.231	0.441	1.06	1.8	2.56	3.18	4.85	7.37	11.3	17.8	28	32.6	44.8	56.1	78.8
11 Terminal inductance	mH	0.006	0.009	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.19	1.59
12 Torque constant	mNm/A	0.782	0.956	1.48	1.91	2.35	2.69	3.3	4	4.95	6.17	7.64	8.17	9.64	10.9	12.7
13 Speed constant	rpm/V	12200	9990	6470	5000	4070	3550	2890	2390	1930	1550	1250	1170	990	872	753
14 Speed / torque gradient	rpm/mNm	3600	4610	4660	4700	4440	4190	4250	4410	4390	4460	4570	4660	4600	4470	4680
15 Mechanical time constant	ms	13.5	14	14.1	14.2	14.1	14	14	14.1	14.2	14.2	14.3	14.3	14.3	14.2	14.4
16 Rotor inertia	gcm²	0.358	0.291	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.303	0.294

Specifications

Thermal data

17	Thermal resistance housing-ambient	46 K/W
18	Thermal resistance winding-housing	14 K/W
19	Thermal time constant winding	5.38 s
20	Thermal time constant motor	231 s
21	Ambient temperature	-20...+85 °C
22	Max. winding temperature	+125 °C

Mechanical data (sleeve bearings)

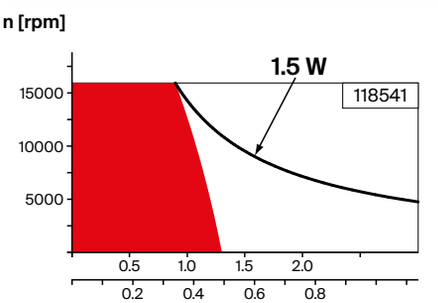
23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	17 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

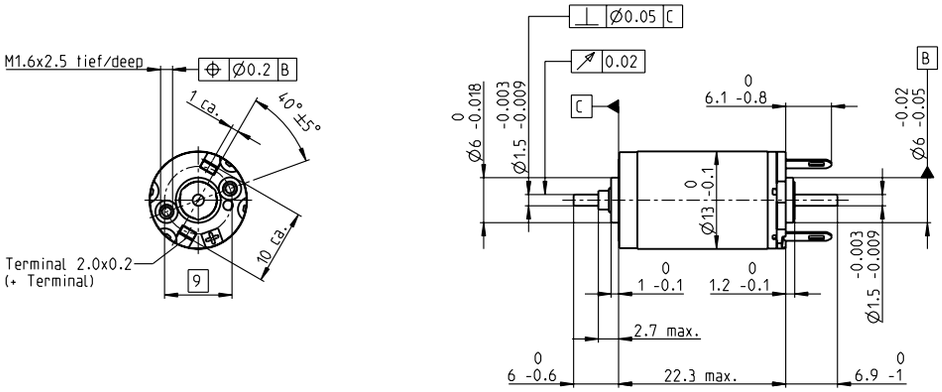
Details on catalog page 48

Gear
415_GP 13 A

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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RE 13 ∅13 mm, graphite brushes, 1.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

Motor data		118555	118556	118557	118558	118559	118560	118561	118562	118563	118564	118565	118566
Values at nominal voltage													
1 Nominal voltage	V	3	3.6	4.2	4.8	6	7.2	9	12	12	15	18	20
2 No load speed	rpm	13200	13000	13300	12300	12700	12300	12300	13300	12300	13100	14000	13300
3 No load current	mA	197	159	140	111	92.5	73.7	59.2	49.2	44.7	38.9	35.1	29.7
4 Nominal speed	rpm	8520	7790	8260	7130	7480	7010	7000	8040	6940	7870	8890	8020
5 Nominal torque	mNm	1.06	1.23	1.27	1.28	1.25	1.26	1.25	1.21	1.22	1.21	1.2	1.19
6 Nominal current (max. continuous current)	A	0.72	0.659	0.588	0.481	0.39	0.316	0.252	0.199	0.186	0.157	0.139	0.119
7 Stall torque	mNm	3.19	3.3	3.56	3.26	3.25	3.16	3.12	3.28	3.01	3.23	3.51	3.22
8 Stall current	A	1.67	1.41	1.32	0.989	0.814	0.639	0.506	0.429	0.368	0.335	0.321	0.254
9 Max. efficiency	%	44	45	46	45	45	44	44	45	43	44	46	44
Characteristics													
10 Terminal resistance	Ω	1.8	2.56	3.18	4.85	7.37	11.3	17.8	28	32.6	44.8	56.1	78.8
11 Terminal inductance	mH	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.19	1.59
12 Torque constant	mNm/A	1.91	2.35	2.69	3.3	4	4.95	6.17	7.64	8.17	9.64	10.9	12.7
13 Speed constant	rpm/V	5000	4070	3550	2890	2390	1930	1550	1250	1170	990	872	753
14 Speed / torque gradient	rpm/mNm	4700	4440	4190	4250	4410	4390	4460	4570	4660	4600	4470	4680
15 Mechanical time constant	ms	14.2	14.1	14	14	14.1	14.2	14.2	14.3	14.3	14.3	14.2	14.4
16 Rotor inertia	gcm²	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.303	0.294

Specifications

Thermal data

17	Thermal resistance housing-ambient	46 K/W
18	Thermal resistance winding-housing	14 K/W
19	Thermal time constant winding	5.38 s
20	Thermal time constant motor	231 s
21	Ambient temperature	-20...+85 °C
22	Max. winding temperature	+125 °C

Mechanical data (sleeve bearings)

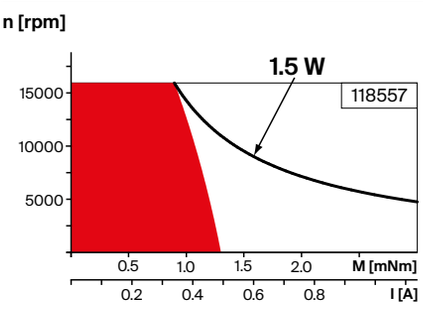
23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	140 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	15 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

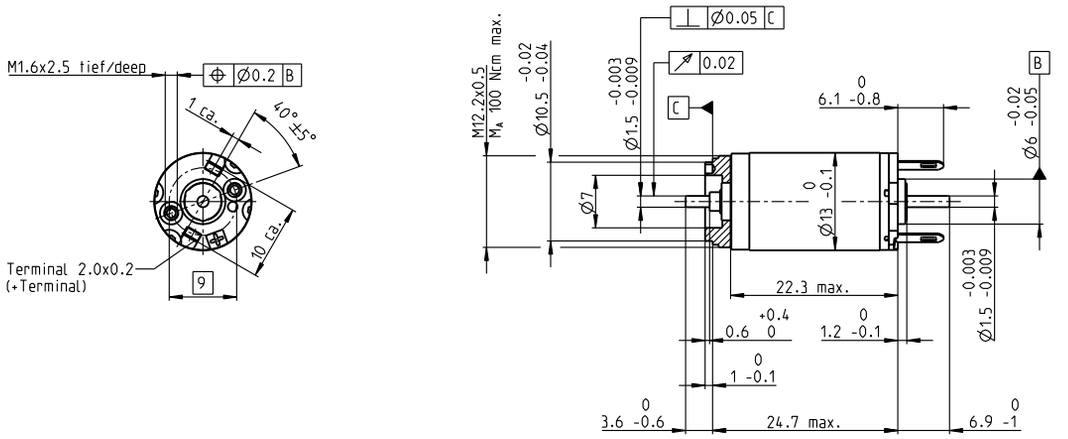
Details on catalog page 48

Sensor
498_ENX 13 GAMA
501_ENX 13 IMR
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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RE 13 ∅13 mm, graphite brushes, 1.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

		118570	118571	118572	118573	118574	118575	118576	118577	118578	118579	118580	118581
Motor data													
Values at nominal voltage													
1 Nominal voltage	V	3	3.6	4.2	4.8	6	7.2	9	12	12	15	18	20
2 No load speed	rpm	13200	13000	13300	12300	12700	12300	12300	13300	12300	13100	14000	13300
3 No load current	mA	197	159	140	111	92.5	73.7	59.2	49.2	44.7	38.9	35.1	29.7
4 Nominal speed	rpm	8520	7790	8260	7130	7480	7010	7000	8040	6940	7870	8890	8020
5 Nominal torque	mNm	1.06	1.23	1.27	1.28	1.25	1.26	1.25	1.21	1.22	1.21	1.2	1.19
6 Nominal current (max. continuous current)	A	0.72	0.659	0.588	0.481	0.39	0.316	0.252	0.199	0.186	0.157	0.139	0.119
7 Stall torque	mNm	3.19	3.3	3.56	3.26	3.25	3.16	3.12	3.28	3.01	3.23	3.51	3.22
8 Stall current	A	1.67	1.41	1.32	0.989	0.814	0.639	0.506	0.429	0.368	0.335	0.321	0.254
9 Max. efficiency	%	44	45	46	45	45	44	44	45	43	44	46	44
Characteristics													
10 Terminal resistance	Ω	1.8	2.56	3.18	4.85	7.37	11.3	17.8	28	32.6	44.8	56.1	78.8
11 Terminal inductance	mH	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.19	1.59
12 Torque constant	mNm/A	1.91	2.35	2.69	3.3	4	4.95	6.17	7.64	8.17	9.64	10.9	12.7
13 Speed constant	rpm/V	5000	4070	3550	2890	2390	1930	1550	1250	1170	990	872	753
14 Speed / torque gradient	rpm/mNm	4700	4440	4190	4250	4410	4390	4460	4570	4660	4600	4470	4680
15 Mechanical time constant	ms	14.2	14.1	14	14	14.1	14.2	14.2	14.3	14.3	14.3	14.2	14.4
16 Rotor inertia	gcm²	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.303	0.294

Specifications

Thermal data

17	Thermal resistance housing-ambient	46 K/W
18	Thermal resistance winding-housing	14 K/W
19	Thermal time constant winding	5.38 s
20	Thermal time constant motor	231 s
21	Ambient temperature	-20...+85°C
22	Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

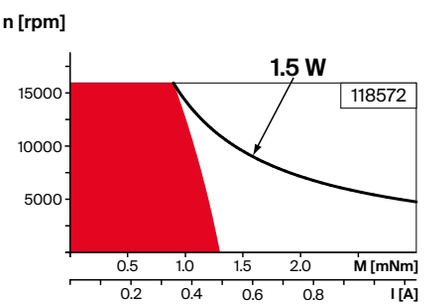
23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	140 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	18 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

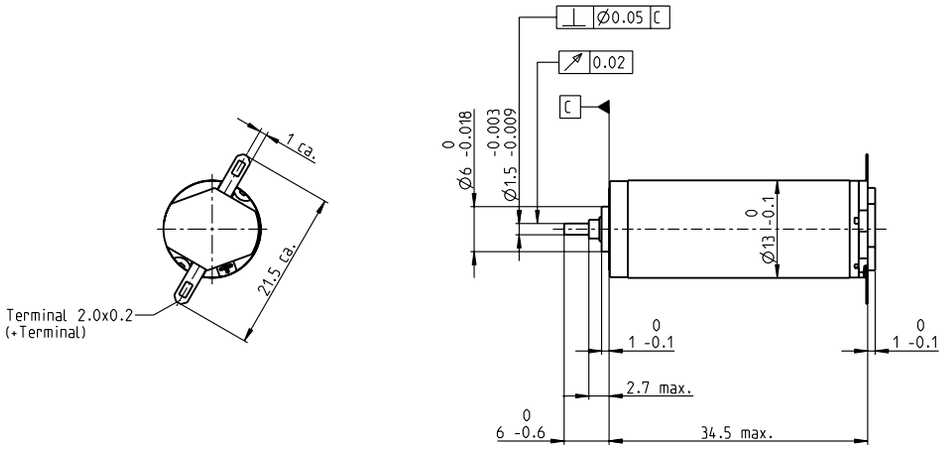
Gear
415_GP 13 A

Sensor
498_ENX 13 GAMA
501_ENX 13 IMR
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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RE 13 ∅13 mm, graphite brushes, 3 watt



M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers														
		118582	118583	118584	118585	118586	118587	118588	118589	118590	118591	118592	118593	118594	118595	118596
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	3	3.6	3.6	4.8	6	6	7.2	9	10	12	15	18	21	24	30
2 No load speed	rpm	12000	13600	11900	13600	13600	12100	13100	13800	13200	13300	13400	13000	14100	13800	14000
3 No load current	mA	168	164	136	121	95.5	81	75.3	64	53.9	45.4	36.8	29.2	28	23.8	19.5
4 Nominal speed	rpm	9520	10800	8780	10100	10300	8660	9790	10600	10100	10200	10400	9910	11100	10800	11000
5 Nominal torque	mNm	1.22	1.32	1.58	1.92	2.05	2.17	2.12	2.17	2.32	2.3	2.31	2.36	2.29	2.33	2.28
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.602	0.558	0.495	0.422	0.383	0.319	0.259	0.212	0.192	0.167	0.134
7 Stall torque	mNm	7.44	8.13	7.11	8.58	9.25	8.35	9.03	10.1	10.5	10.4	10.5	10.4	11.1	11	10.9
8 Stall current	A	3.46	3.51	2.69	2.73	2.33	1.87	1.82	1.69	1.52	1.25	1.03	0.814	0.809	0.688	0.556
9 Max. efficiency	%	50	53	53	57	60	60	61	63	64	65	65	66	66	66	66
Characteristics																
10 Terminal resistance	Ω	0.867	1.02	1.34	1.76	2.57	3.21	3.96	5.32	6.6	9.56	14.6	22.1	26	34.9	54
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed / torque gradient	rpm/mNm	1790	1830	1830	1700	1560	1540	1540	1430	1310	1340	1330	1300	1320	1300	1330
15 Mechanical time constant	ms	12.8	11.4	10.5	9.44	8.68	8.46	8.23	7.93	7.74	7.62	7.51	7.42	7.39	7.37	7.38
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17	Thermal resistance housing-ambient	33 K/W
18	Thermal resistance winding-housing	7.0 K/W
19	Thermal time constant winding	4.88 s
20	Thermal time constant motor	259 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

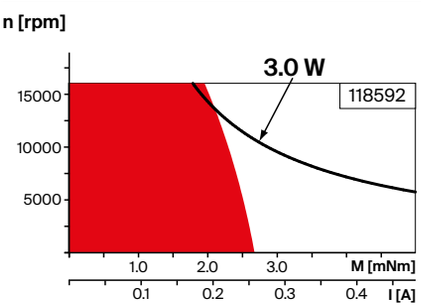
23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	24 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

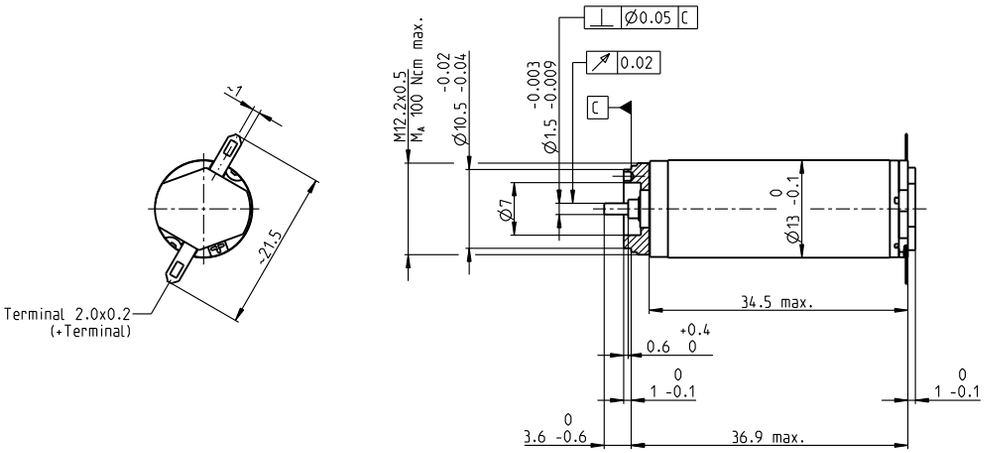
Modular system

Details on catalog page 48

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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RE 13 ∅13 mm, graphite brushes, 3 watt



M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers														
		118597	118598	118599	118600	118601	118602	118603	118604	118605	118606	118607	118608	118609	118610	118611
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	3	3.6	3.6	4.8	6	6	7.2	9	10	12	15	18	21	24	30
2 No load speed	rpm	12000	13600	11900	13600	13600	12100	13100	13800	13200	13300	13400	13000	14100	13800	14000
3 No load current	mA	168	164	136	121	95.5	81	75.3	64	53.9	45.4	36.8	29.2	28	23.8	19.5
4 Nominal speed	rpm	9520	10800	8780	10100	10300	8660	9790	10600	10100	10200	10400	9910	11100	10800	11000
5 Nominal torque	mNm	1.22	1.32	1.58	1.92	2.05	2.17	2.12	2.17	2.32	2.3	2.31	2.36	2.29	2.33	2.28
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.602	0.558	0.495	0.422	0.383	0.319	0.259	0.212	0.192	0.167	0.134
7 Stall torque	mNm	7.44	8.13	7.11	8.58	9.25	8.35	9.03	10.1	10.5	10.4	10.5	10.4	11.1	11	10.9
8 Stall current	A	3.46	3.51	2.69	2.73	2.33	1.87	1.82	1.69	1.52	1.25	1.03	0.814	0.809	0.688	0.556
9 Max. efficiency	%	50	53	53	57	60	60	61	63	64	65	65	66	66	66	66
Characteristics																
10 Terminal resistance	Ω	0.867	1.02	1.34	1.76	2.57	3.21	3.96	5.32	6.6	9.56	14.6	22.1	26	34.9	54
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed / torque gradient	rpm/mNm	1790	1830	1830	1700	1560	1540	1540	1430	1310	1340	1330	1300	1320	1300	1330
15 Mechanical time constant	ms	12.8	11.4	10.5	9.44	8.68	8.46	8.23	7.93	7.74	7.62	7.51	7.42	7.39	7.37	7.38
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17	Thermal resistance housing-ambient	33 K/W
18	Thermal resistance winding-housing	7.0 K/W
19	Thermal time constant winding	4.88 s
20	Thermal time constant motor	259 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

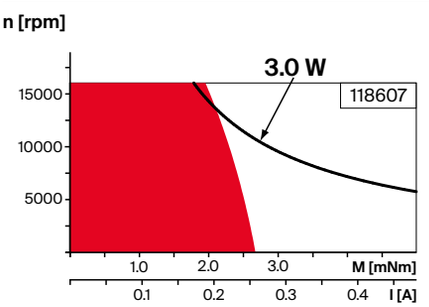
23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	27 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

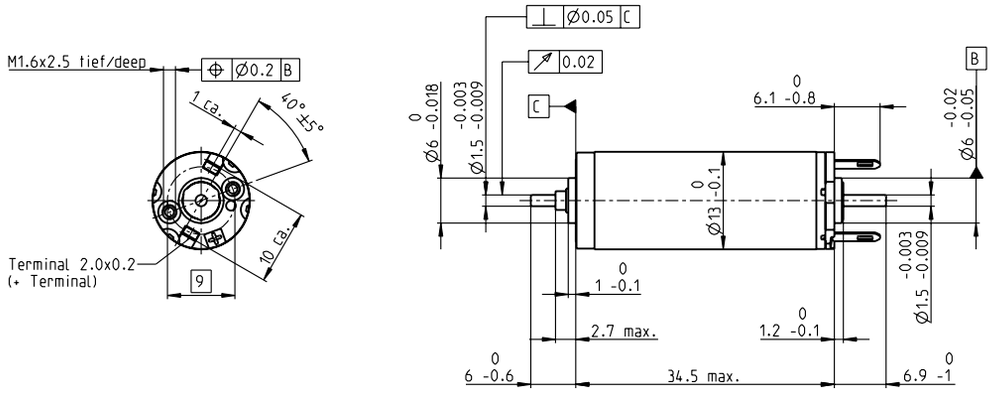
Details on catalog page 48

Gear
415_GP 13 A

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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RE 13 ∅13 mm, graphite brushes, 3 watt



M 1:1

DC Motor

Stock program
Standard program
Special program (on request)

		Part numbers														
		118613	118614	118615	118616	118617	118618	118619	118620	118621	118622	118623	118624	118625	118626	118627
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	3	3.6	3.6	4.8	6	6	7.2	9	10	12	15	18	21	24	30
2 No load speed	rpm	12000	13600	11900	13600	13600	12100	13100	13800	13200	13300	13400	13000	14100	13800	14000
3 No load current	mA	168	164	136	121	95.5	81	75.3	64	53.9	45.4	36.8	29.2	28	23.8	19.5
4 Nominal speed	rpm	9520	10800	8780	10100	10300	8660	9790	10600	10100	10200	10400	9910	11100	10800	11000
5 Nominal torque	mNm	1.22	1.32	1.58	1.92	2.05	2.17	2.12	2.17	2.32	2.3	2.31	2.36	2.29	2.33	2.28
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.602	0.558	0.495	0.422	0.383	0.319	0.259	0.212	0.192	0.167	0.134
7 Stall torque	mNm	7.44	8.13	7.11	8.58	9.25	8.35	9.03	10.1	10.5	10.4	10.5	10.4	11.1	11	10.9
8 Stall current	A	3.46	3.51	2.69	2.73	2.33	1.87	1.82	1.69	1.52	1.25	1.03	0.814	0.809	0.688	0.556
9 Max. efficiency	%	50	53	53	57	60	60	61	63	64	65	65	66	66	66	66
Characteristics																
10 Terminal resistance	Ω	0.867	1.02	1.34	1.76	2.57	3.21	3.96	5.32	6.6	9.56	14.6	22.1	26	34.9	54
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1790	1830	1830	1700	1560	1540	1540	1430	1310	1340	1330	1300	1320	1300	1330
15 Mechanical time constant	ms	12.8	11.4	10.5	9.44	8.68	8.46	8.23	7.93	7.74	7.62	7.51	7.42	7.39	7.37	7.38
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17	Thermal resistance housing-ambient	33 K/W
18	Thermal resistance winding-housing	7.0 K/W
19	Thermal time constant winding	4.88 s
20	Thermal time constant motor	259 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

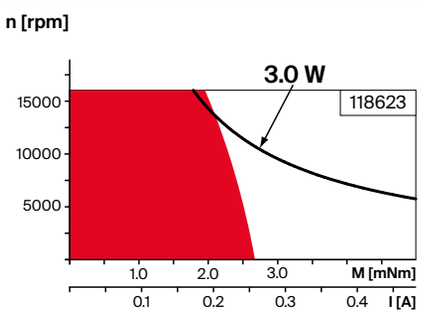
23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	95 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	24 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

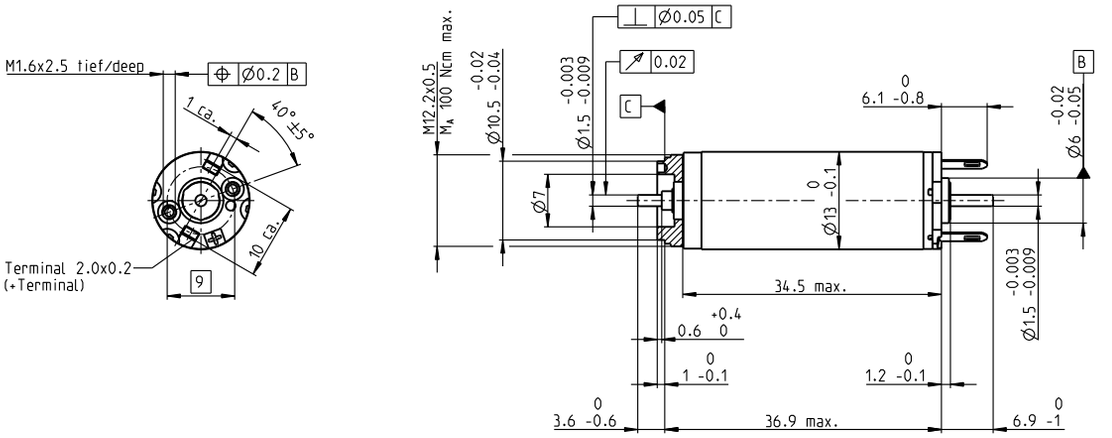
Details on catalog page 48

Sensor
498_ENX 13 GAMA
501_ENX 13 IMR
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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RE 13 ∅13 mm, graphite brushes, 3 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

		118628	118629	118630	118631	118632	118633	118634	118635	118636	118637	118638	118639	118640	118641	118642
Motor data																
Values at nominal voltage																
1 Nominal voltage	V	3	3.6	3.6	4.8	6	6	7.2	9	10	12	15	18	21	24	30
2 No load speed	rpm	12000	13600	11900	13600	13600	12100	13100	13800	13200	13300	13400	13000	14100	13800	14000
3 No load current	mA	168	164	136	121	95.5	81	75.3	64	53.9	45.4	36.8	29.2	28	23.8	19.5
4 Nominal speed	rpm	9520	10800	8780	10100	10300	8660	9790	10600	10100	10200	10400	9910	11100	10800	11000
5 Nominal torque	mNm	1.22	1.32	1.58	1.92	2.05	2.17	2.12	2.17	2.32	2.3	2.31	2.36	2.29	2.33	2.28
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.602	0.558	0.495	0.422	0.383	0.319	0.259	0.212	0.192	0.167	0.134
7 Stall torque	mNm	7.44	8.13	7.11	8.58	9.25	8.35	9.03	10.1	10.5	10.4	10.5	10.4	11.1	11	10.9
8 Stall current	A	3.46	3.51	2.69	2.73	2.33	1.87	1.82	1.69	1.52	1.25	1.03	0.814	0.809	0.688	0.556
9 Max. efficiency	%	50	53	53	57	60	60	61	63	64	65	65	66	66	66	66
Characteristics																
10 Terminal resistance	Ω	0.867	1.02	1.34	1.76	2.57	3.21	3.96	5.32	6.6	9.56	14.6	22.1	26	34.9	54
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1790	1830	1830	1700	1560	1540	1540	1430	1310	1340	1330	1300	1320	1300	1330
15 Mechanical time constant	ms	12.8	11.4	10.5	9.44	8.68	8.46	8.23	7.93	7.74	7.62	7.51	7.42	7.39	7.37	7.38
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17	Thermal resistance housing-ambient	33 K/W
18	Thermal resistance winding-housing	7.0 K/W
19	Thermal time constant winding	4.88 s
20	Thermal time constant motor	259 s
21	Ambient temperature	-20...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

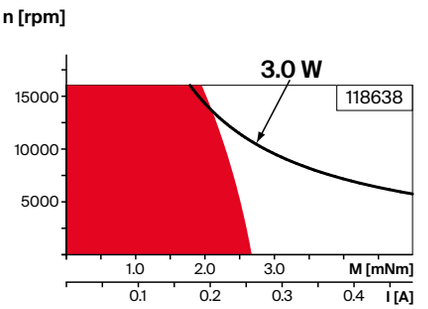
23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	95 N
28	Max. radial load, 5 mm from flange	1.4 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	27 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

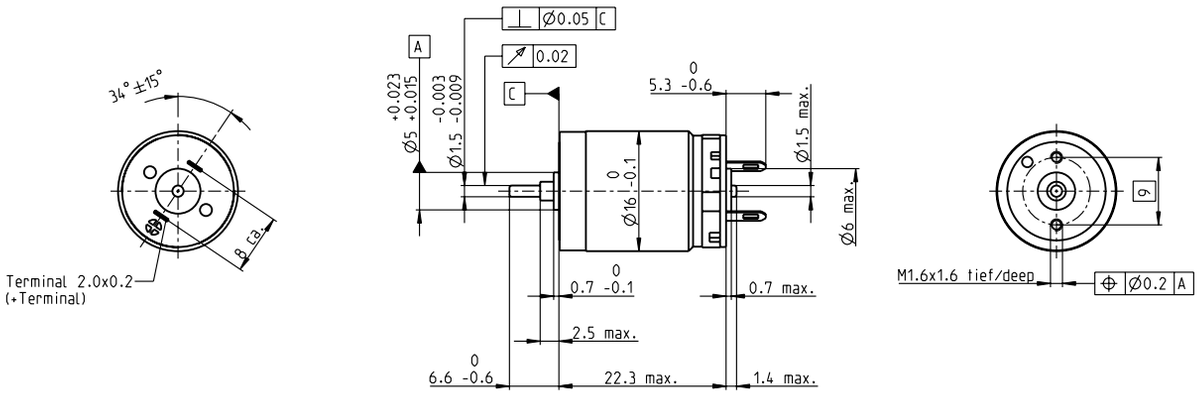
Gear
415_GP 13 A

Sensor
498_ENX 13 GAMA
501_ENX 13 IMR
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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RE 16 ∅16 mm, precious metal brushes CLL, 2 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

			320173	320174	320175	409575	320176	320177	320178	320179
Motor data										
	Values at nominal voltage									
1	Nominal voltage	V	1.8	3	6	6	9	12	18	24
2	No load speed	rpm	7730	7820	7960	7920	7730	7590	7450	7240
3	No load current	mA	32.2	19.6	10.1	13.8	6.44	5.35	3.08	2.94
4	Nominal speed	rpm	5700	4430	4520	4530	4290	4070	3880	3610
5	Nominal torque	mNm	1.52	2.55	2.54	2.5	2.54	2.45	2.44	2.36
6	Nominal current (max. continuous current)	A	0.72	0.72	0.365	0.364	0.237	0.169	0.11	0.0784
7	Stall torque	mNm	5.83	5.92	5.92	5.92	5.76	5.34	5.13	4.75
8	Stall current	A	2.65	1.64	0.833	0.833	0.524	0.359	0.226	0.153
9	Max. efficiency	%	80	80	80	76	79	77	78	75
	Characteristics									
10	Terminal resistance	Ω	0.679	1.83	7.2	7.2	17.2	33.4	79.8	157
11	Terminal inductance	mH	0.0169	0.0457	0.176	0.176	0.421	0.771	1.81	3.36
12	Torque constant	mNm/A	2.2	3.62	7.11	7.11	11	14.9	22.8	31
13	Speed constant	rpm/V	4350	2640	1340	1340	869	642	420	308
14	Speed/torque gradient	rpm/mNm	1340	1340	1360	1360	1360	1440	1470	1550
15	Mechanical time constant	ms	9.26	8.87	8.82	8.82	8.83	8.88	8.87	9.08
16	Rotor inertia	gcm²	0.659	0.633	0.619	0.619	0.621	0.587	0.575	0.558

Specifications

Thermal data

17	Thermal resistance housing-ambient	40.6 K/W
18	Thermal resistance winding-housing	9.52 K/W
19	Thermal time constant winding	5.33 s
20	Thermal time constant motor	295 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

23	Max. speed	11000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.5 N

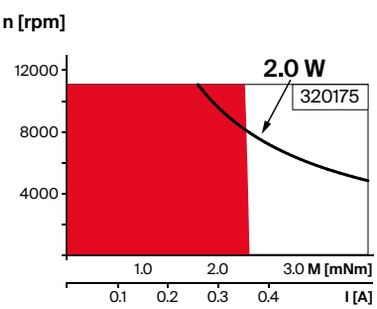
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	21 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

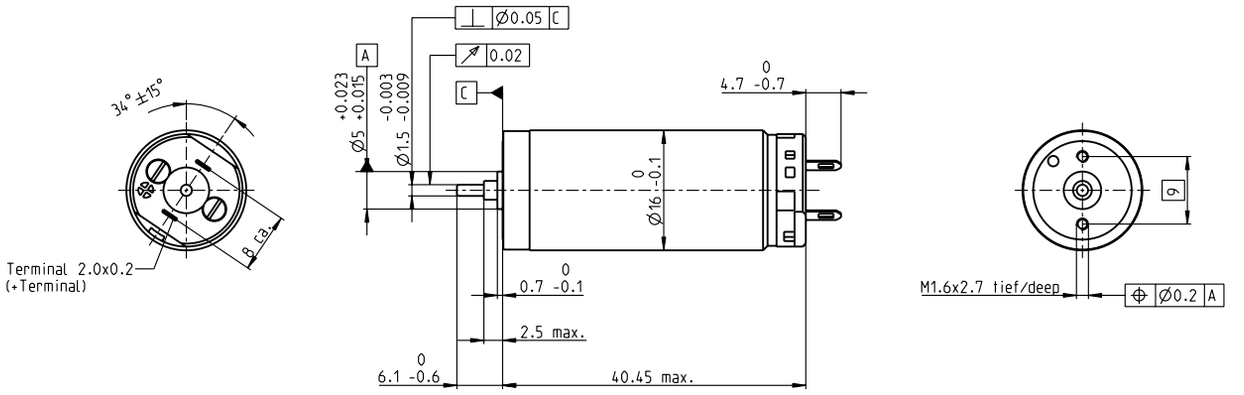
Gear
416_GP 16 A
417_GP 16 C
469–471_GP 16 S

Sensor
502_ENX 16 IMR
533_Encoder MR 32 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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RE 16 ∅16 mm, precious metal brushes CLL, 3.2 watt



M 1:1

Stock program
Standard program
Special program (on request)

			Part numbers													
			118678	118679	118680	118681	118682	118683	118684	118685	118686	118687	118688	118689	118690	118691	118692
Motor data																	
	Values at nominal voltage																
1	Nominal voltage	V	1.8	2.4	3	3.2	4.5	4.8	7.2	9	12	12	15	18	24	30	48
2	No load speed	rpm	4990	6360	6890	6270	6740	5700	6890	6740	7130	5990	6010	5900	7250	6460	5500
3	No load current	mA	23.5	25.4	23	18.6	14.8	10.8	9.57	7.4	6.05	4.63	3.72	3.02	3.11	2.08	1.02
4	Nominal speed	rpm	4320	5510	5820	4930	5050	3630	4810	4630	5030	3830	3840	3730	5070	4220	3180
5	Nominal torque	mNm	2.39	2.5	2.89	3.41	4.48	5.61	5.54	5.48	5.48	5.38	5.36	5.33	5.29	5.18	5.01
6	Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.711	0.566	0.438	0.348	0.287	0.229	0.187	0.171	0.119	0.0614
7	Stall torque	mNm	15.5	16.9	17.3	15.2	17.4	15.2	18.1	17.4	18.6	14.9	14.9	14.5	17.6	15	11.9
8	Stall current	A	4.53	4.71	4.19	3.13	2.74	1.9	1.82	1.37	1.16	0.784	0.628	0.5	0.561	0.341	0.144
9	Max. efficiency	%	86	86	86	85	86	86	86	86	86	86	85	85	86	85	84
	Characteristics																
10	Terminal resistance	Ω	0.397	0.51	0.715	1.02	1.64	2.53	3.95	6.56	10.3	15.3	23.9	36	42.8	88	333
11	Terminal inductance	mH	0.021	0.023	0.03	0.042	0.071	0.113	0.174	0.284	0.452	0.639	0.993	1.48	1.75	3.44	12.1
12	Torque constant	mNm/A	3.43	3.58	4.13	4.84	6.34	7.99	9.92	12.7	16	19	23.7	28.9	31.4	44.1	82.7
13	Speed constant	rpm/V	2790	2660	2310	1970	1510	1190	962	753	597	502	403	330	304	217	115
14	Speed / torque gradient	rpm/mNm	323	379	400	415	391	378	383	389	386	404	406	410	414	432	465
15	Mechanical time constant	ms	5.84	5.71	5.56	5.46	5.36	5.31	5.29	5.29	5.27	5.29	5.3	5.31	5.31	5.36	5.42
16	Rotor inertia	gcm²	1.73	1.44	1.33	1.26	1.31	1.34	1.32	1.3	1.3	1.25	1.25	1.24	1.23	1.18	1.11

Specifications

Thermal data

17	Thermal resistance housing-ambient	30 K/W
18	Thermal resistance winding-housing	8.5 K/W
19	Thermal time constant winding	10.6 s
20	Thermal time constant motor	436 s
21	Ambient temperature	-20...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23	Max. speed	11000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.5 N

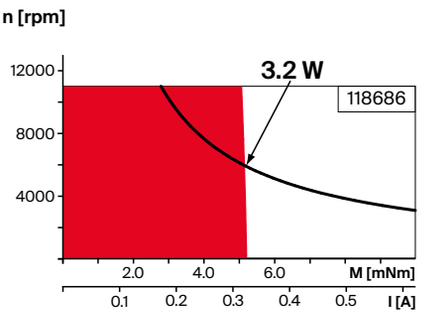
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	38 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

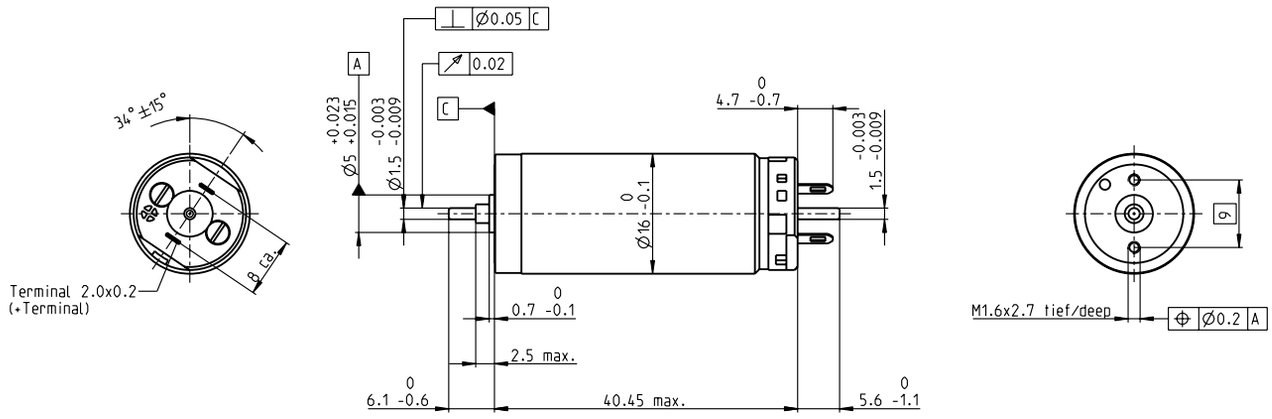
Details on catalog page 48

Gear
416_GP 16 A
417_GP 16 C
469-471_GP 16 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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RE 16 ∅16 mm, precious metal brushes CLL, 3.2 watt



M 1:1

RE

DC Motor

Stock program
Standard program
Special program (on request)

			Part numbers													
			118693	118694	118695	118696	118697	118698	118699	118700	118701	118702	118703	118704	118705	118706	118707
Motor data																	
	Values at nominal voltage																
1	Nominal voltage	V	1.8	2.4	3	3.2	4.5	4.8	7.2	9	12	12	15	18	24	30	48
2	No load speed	rpm	4990	6360	6890	6270	6740	5700	6890	6740	7130	5990	6010	5900	7250	6460	5500
3	No load current	mA	23.5	25.4	23	18.6	14.8	10.8	9.57	7.4	6.05	4.63	3.72	3.02	3.11	2.08	1.02
4	Nominal speed	rpm	4320	5510	5820	4930	5050	3630	4810	4630	5030	3830	3840	3730	5070	4220	3180
5	Nominal torque	mNm	2.39	2.5	2.89	3.41	4.48	5.61	5.54	5.48	5.48	5.38	5.36	5.33	5.29	5.18	5.01
6	Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.711	0.566	0.438	0.348	0.287	0.229	0.187	0.171	0.119	0.0614
7	Stall torque	mNm	15.5	16.9	17.3	15.2	17.4	15.2	18.1	17.4	18.6	14.9	14.9	14.5	17.6	15	11.9
8	Stall current	A	4.53	4.71	4.19	3.13	2.74	1.9	1.82	1.37	1.16	0.784	0.628	0.5	0.561	0.341	0.144
9	Max. efficiency	%	86	86	86	85	86	86	86	86	86	86	85	85	86	85	84
	Characteristics																
10	Terminal resistance	Ω	0.397	0.51	0.715	1.02	1.64	2.53	3.95	6.56	10.3	15.3	23.9	36	42.8	88	333
11	Terminal inductance	mH	0.021	0.023	0.03	0.042	0.071	0.113	0.174	0.284	0.452	0.639	0.993	1.48	1.75	3.44	12.1
12	Torque constant	mNm/A	3.43	3.58	4.13	4.84	6.34	7.99	9.92	12.7	16	19	23.7	28.9	31.4	44.1	82.7
13	Speed constant	rpm/V	2790	2660	2310	1970	1510	1190	962	753	597	502	403	330	304	217	115
14	Speed/torque gradient	rpm/mNm	323	379	400	415	391	378	383	389	386	404	406	410	414	432	465
15	Mechanical time constant	ms	5.84	5.71	5.56	5.46	5.36	5.31	5.29	5.29	5.27	5.29	5.3	5.31	5.31	5.36	5.42
16	Rotor inertia	gcm²	1.73	1.44	1.33	1.26	1.31	1.34	1.32	1.3	1.3	1.25	1.25	1.24	1.23	1.18	1.11

Specifications

Thermal data

17	Thermal resistance housing-ambient	30 K/W
18	Thermal resistance winding-housing	8.5 K/W
19	Thermal time constant winding	10.6 s
20	Thermal time constant motor	436 s
21	Ambient temperature	-20...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23	Max. speed	11000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	70 N
28	Max. radial load, 5 mm from flange	1.5 N

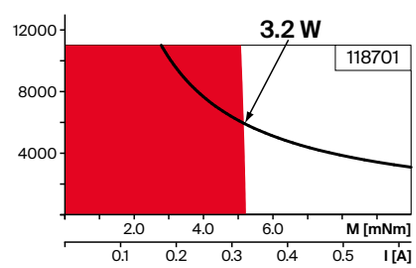
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	38 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

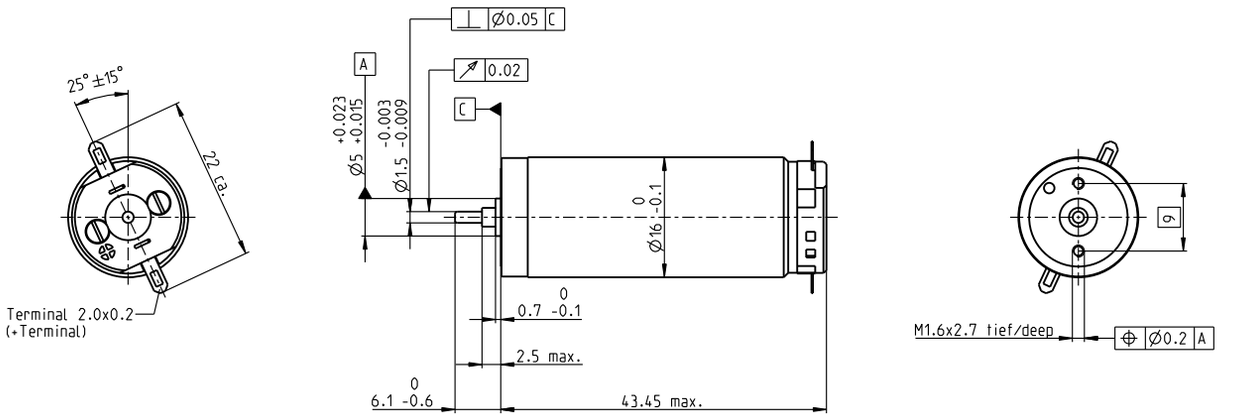
Gear
416_GP 16 A
417_GP 16 C
469–471_GP 16 S

Sensor
498_ENX 13 GAMA
502_ENX 16 IMR
533_Encoder MR 32 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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RE 16 ∅16 mm, graphite brushes, 4.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

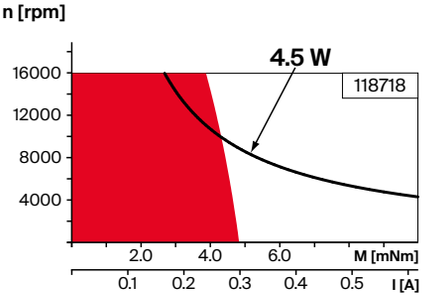
			Part numbers													
			118710	118711	118712	118713	118714	118715	118716	118717	118718	118719	118720	118721	118722	118723	118724
Motor data																	
	Values at nominal voltage																
1	Nominal voltage	V	4.8	4.8	6	7.2	9	12	15	18	24	30	36	45	48	48	48
2	No load speed	rpm	12700	12100	13200	13600	13100	13900	14000	13200	14000	14700	14100	14500	14200	10100	5320
3	No load current	mA	105	98.7	87.6	75.4	56.9	45.9	37.1	28.5	23	19.6	15.6	12.8	11.8	7.66	3.63
4	Nominal speed	rpm	11200	10500	11500	11700	11000	11900	12100	11300	12100	12900	12300	12700	12400	8120	3170
5	Nominal torque	mNm	2.15	2.27	2.67	3.18	4.23	4.36	4.42	4.53	4.53	4.4	4.46	4.42	4.43	4.65	4.77
6	Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.712	0.582	0.475	0.379	0.302	0.247	0.2	0.163	0.15	0.111	0.0603
7	Stall torque	mNm	26.3	22.8	25.8	27.4	29.9	34.3	35.3	33.4	36.3	36.8	35.6	36.2	35.4	24.2	12.1
8	Stall current	A	7.56	6.26	6.16	5.58	4.65	4.23	3.51	2.6	2.24	1.91	1.48	1.23	1.11	0.541	0.144
9	Max. efficiency	%	73	72	74	76	77	79	80	80	80	81	81	81	81	78	71
	Characteristics																
10	Terminal resistance	Ω	0.635	0.767	0.975	1.29	1.94	2.83	4.28	6.93	10.7	15.7	24.4	36.5	43.3	88.7	334
11	Terminal inductance	mH	0.021	0.023	0.03	0.042	0.071	0.113	0.174	0.284	0.452	0.639	0.993	1.48	1.74	3.44	12.1
12	Torque constant	mNm/A	3.48	3.64	4.2	4.91	6.43	8.11	10.1	12.9	16.2	19.3	24.1	29.4	31.9	44.8	83.9
13	Speed constant	rpm/V	2750	2630	2280	1940	1480	1180	948	742	589	495	397	325	299	213	114
14	Speed / torque gradient	rpm/mNm	502	554	529	510	447	411	403	399	389	403	402	404	407	423	453
15	Mechanical time constant	ms	9.07	8.35	7.36	6.71	6.13	5.78	5.56	5.43	5.31	5.28	5.25	5.23	5.22	5.24	5.28
16	Rotor inertia	gcm²	1.73	1.44	1.33	1.26	1.31	1.34	1.32	1.3	1.3	1.25	1.25	1.24	1.23	1.18	1.11

Specifications

	Thermal data	
17	Thermal resistance housing-ambient	30 K/W
18	Thermal resistance winding-housing	8.5 K/W
19	Thermal time constant winding	10.6 s
20	Thermal time constant motor	504 s
21	Ambient temperature	-20...+65°C
22	Max. winding temperature	+85°C
	Mechanical data (sleeve bearings)	
23	Max. speed	16000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 5 mm from flange	1.5 N
	Other specifications	
29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	40 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

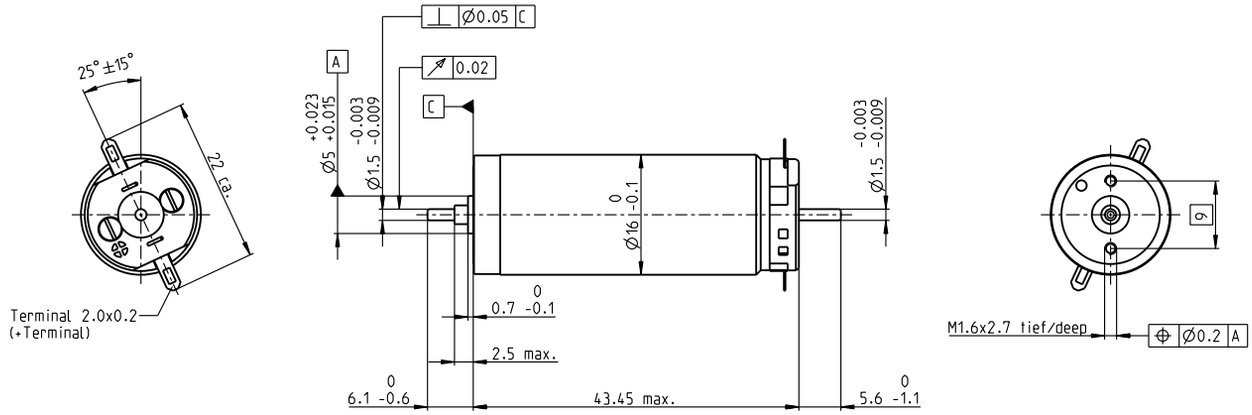
Details on catalog page 48

Gear
416_GP 16 A
417_GP 16 C
469-471_GP 16 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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RE 16 ∅16 mm, graphite brushes, 4.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers	118725	118726	118727	118728	118729	118730	118731	118732	118733	118734	118735	118736	118737	118738	118739
Motor data															
Values at nominal voltage															
1 Nominal voltage V	4.8	4.8	6	7.2	9	12	15	18	24	30	36	45	48	48	48
2 No load speed rpm	12700	12100	13200	13600	13100	13900	14000	13200	14000	14700	14100	14500	14200	10100	5320
3 No load current mA	105	98.7	87.6	75.4	56.9	45.9	37.1	28.5	23	19.6	15.6	12.8	11.8	7.66	3.63
4 Nominal speed rpm	11200	10500	11500	11700	11000	11900	12200	11300	12200	12900	12300	12700	12400	8130	3170
5 Nominal torque mNm	2.15	2.27	2.67	3.18	4.09	4.36	4.34	4.48	4.5	4.37	4.44	4.41	4.43	4.65	4.77
6 Nominal current (max. continuous current) A	0.72	0.72	0.72	0.72	0.69	0.582	0.467	0.375	0.299	0.245	0.199	0.162	0.15	0.111	0.0603
7 Stall torque mNm	26.3	22.7	25.8	27.4	29.9	34.3	35.3	33.4	36.3	36.8	35.6	36.2	35.4	24.2	12.1
8 Stall current A	7.56	6.26	6.16	5.58	4.65	4.23	3.51	2.6	2.24	1.91	1.48	1.23	1.11	0.541	0.144
9 Max. efficiency %	69	69	72	73	76	79	79	79	80	80	80	81	81	78	71
Characteristics															
10 Terminal resistance Ω	0.635	0.767	0.975	1.29	1.94	2.83	4.28	6.93	10.7	15.7	24.4	36.5	43.3	88.7	334
11 Terminal inductance mH	0.021	0.023	0.03	0.042	0.071	0.113	0.174	0.285	0.452	0.64	0.994	1.48	1.74	3.44	12.1
12 Torque constant mNm/A	3.48	3.64	4.2	4.91	6.43	8.11	10.1	12.9	16.2	19.3	24.1	29.4	31.9	44.8	83.9
13 Speed constant rpm/V	2750	2630	2280	1940	1480	1180	948	742	589	495	397	325	299	213	114
14 Speed/torque gradient rpm/mNm	502	554	529	511	447	411	403	399	389	403	402	404	407	423	453
15 Mechanical time constant ms	9.07	8.35	7.36	6.71	6.13	5.78	5.56	5.43	5.31	5.28	5.25	5.23	5.22	5.24	5.28
16 Rotor inertia gcm²	1.73	1.44	1.33	1.26	1.31	1.34	1.32	1.3	1.3	1.25	1.25	1.24	1.23	1.18	1.11

Specifications

Thermal data

17	Thermal resistance housing-ambient	30 K/W
18	Thermal resistance winding-housing	8.5 K/W
19	Thermal time constant winding	10.6 s
20	Thermal time constant motor	459 s
21	Ambient temperature	-20...+65 °C
22	Max. winding temperature	+85 °C

Mechanical data (sleeve bearings)

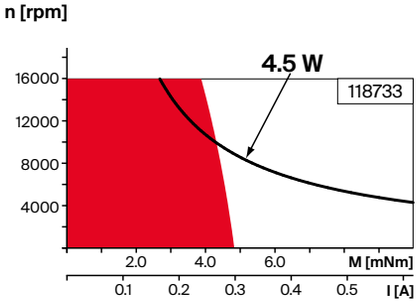
23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.014 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	60 N
28	Max. radial load, 5 mm from flange	1.5 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	40 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25 °C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

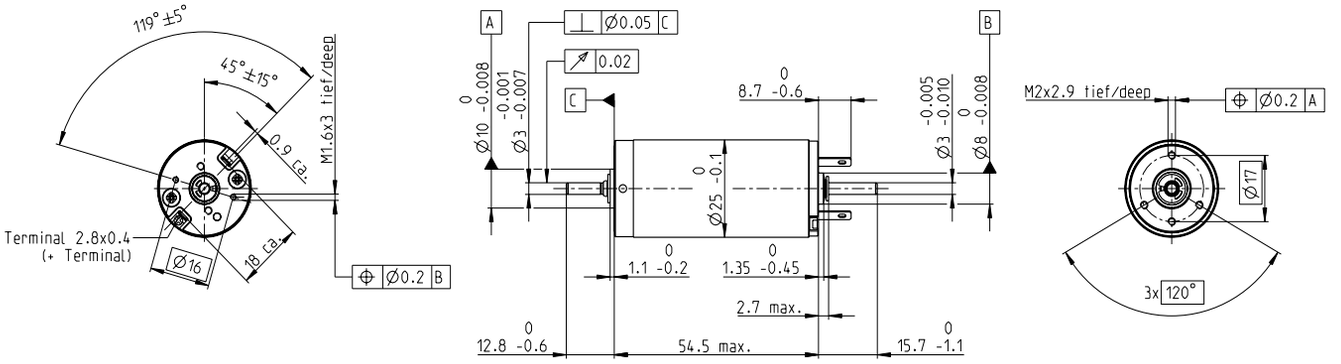
Gear
416_GP 16 A
417_GP 16 C
469–471_GP 16 S

Sensor
498_ENX 13 GAMA
502_ENX 16 IMR
533_Encoder MR 32 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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RE 25 ∅25 mm, precious metal brushes CLL, 10 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

		118740	118741	118742	118743	118744	118745	118746	118747	118748
Motor data										
Values at nominal voltage										
1 Nominal voltage	V	4.5	8	9	12	15	18	24	32	48
2 No load speed	rpm	5360	5320	5230	4850	4980	4790	5190	5510	5070
3 No load current	mA	79.7	44.4	38.7	26.3	21.8	9.88	14.4	11.7	6.96
4 Nominal speed	rpm	4980	4520	4220	3800	3920	3710	4130	4450	4000
5 Nominal torque	mNm	11.4	20.9	23.9	28.6	28.2	28.7	28	27.9	27.9
6 Nominal current (max. continuous current)	A	1.5	1.5	1.5	1.24	1.01	0.811	0.652	0.516	0.317
7 Stall torque	mNm	131	132	119	129	131	126	136	144	132
8 Stall current	A	16.5	9.23	7.31	5.5	4.57	3.52	3.1	2.61	1.47
9 Max. efficiency	%	87	87	86	87	87	90	87	87	87
Characteristics										
10 Terminal resistance	Ω	0.273	0.867	1.23	2.18	3.28	5.11	7.73	12.3	32.6
11 Terminal inductance	mH	0.0275	0.0882	0.115	0.238	0.353	0.551	0.832	1.31	3.48
12 Torque constant	mNm/A	7.99	14.3	16.3	23.5	28.6	35.8	43.9	55.2	89.9
13 Speed constant	rpm/V	1200	668	584	406	334	267	217	173	106
14 Speed / torque gradient	rpm/mNm	40.9	40.5	44	37.7	38.3	38.2	38.3	38.5	38.6
15 Mechanical time constant	ms	4.99	4.4	4.37	4.25	4.23	4.22	4.22	4.22	4.23
16 Rotor inertia	gcm²	11.7	10.4	9.49	10.8	10.6	10.6	10.5	10.5	10.5

Specifications

Thermal data

17	Thermal resistance housing-ambient	14 K/W
18	Thermal resistance winding-housing	3.1 K/W
19	Thermal time constant winding	12.5 s
20	Thermal time constant motor	612 s
21	Ambient temperature	-20...+85°C
22	Max. winding temperature	+100°C

Mechanical data (ball bearings)

23	Max. speed	5500 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	3.2 N
27	Max. force for press fits (static)	64 N
	(static, shaft supported)	800 N
28	Max. radial load, 5 mm from flange	16 N

Other specifications

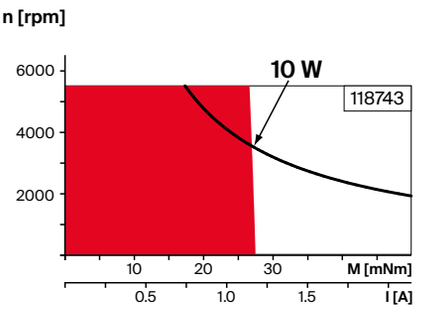
29	Number of pole pairs	1
30	Number of commutator segments	11
31	Weight of motor	130 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Preloaded ball bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

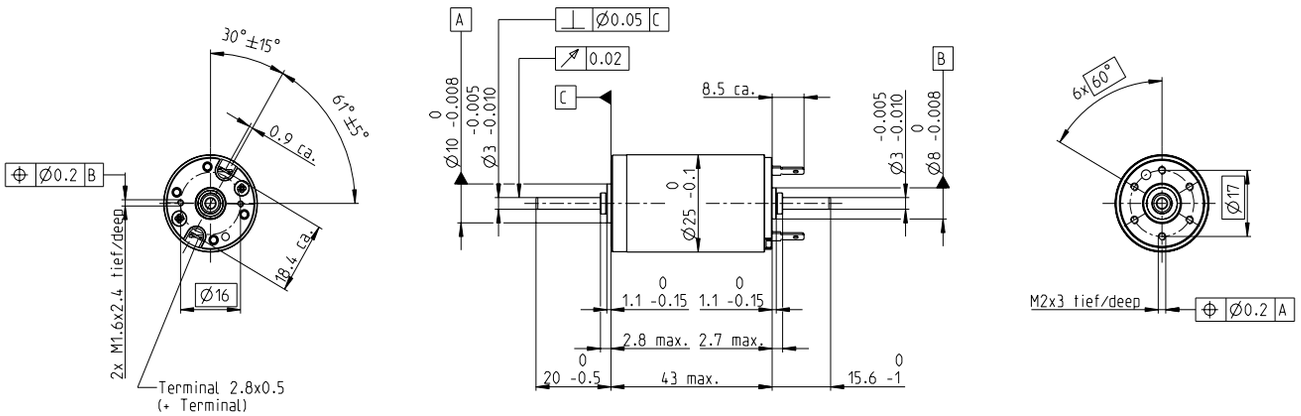
Gear
425_GP 26 A
426_GP 32 BZ
427_GP 32 A
429_GP 32 C
435_KD 32
474–482_GP 32 S

Sensor
505_ENX 25 IMR
535_Encoder HEDS 5540
537_Encoder HEDL 5540
542_DC-Tacho DCT 22

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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RE 25 ∅25 mm, graphite brushes, 20 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

			302534	339149	339150	339151	339152	339153	339154	339155	339156	339157	339158
Motor data													
	Values at nominal voltage												
1	Nominal voltage	V	7.2	9	12	18	24	30	36	48	48	48	48
2	No load speed	rpm	10500	9710	9620	10400	10900	9210	10100	9540	8450	6720	4650
3	No load current	mA	133	93.2	68.1	50.6	40.2	25	23.7	16.4	13.7	9.89	6
4	Nominal speed	rpm	8970	8260	8310	9190	9690	8010	8860	8360	7270	5530	3430
5	Nominal torque	mNm	21.9	24.4	27.5	29.1	30.4	31.4	30.7	31.7	32.3	32.9	32.8
6	Nominal current (max. continuous current)	A	3.68	2.97	2.45	1.85	1.5	1.04	0.931	0.68	0.614	0.495	0.341
7	Stall torque	mNm	259	238	268	297	325	265	279	270	243	192	127
8	Stall current	A	42.1	28.1	23.2	18.4	15.6	8.61	8.24	5.67	4.51	2.84	1.3
9	Max. efficiency	%	79	81	84	86	88	88	88	89	88	88	86
	Characteristics												
10	Terminal resistance	Ω	0.171	0.32	0.517	0.98	1.53	3.49	4.37	8.47	10.6	16.9	36.8
11	Terminal inductance	mH	0.016	0.031	0.057	0.112	0.186	0.407	0.493	0.979	1.25	1.97	4.11
12	Torque constant	mNm/A	6.15	8.46	11.5	16.1	20.8	30.8	33.8	47.7	53.8	67.7	97.6
13	Speed constant	rpm/V	1550	1130	828	591	460	311	282	200	177	141	97.8
14	Speed/torque gradient	rpm/mNm	43.2	42.8	37.1	35.9	34	35.2	36.5	35.6	35.1	35.2	36.9
15	Mechanical time constant	ms	6.52	6.06	5.62	5.36	5.24	5.17	5.16	5.13	5.12	5.12	5.14
16	Rotor inertia	gcm²	14.4	13.5	14.5	14.3	14.7	14	13.5	13.8	13.9	13.9	13.3

Specifications

Thermal data

17	Thermal resistance housing-ambient	14.4 K/W
18	Thermal resistance winding-housing	5.1 K/W
19	Thermal time constant winding	27.7 s
20	Thermal time constant motor	543 s
21	Ambient temperature	-30...+100°C
22	Max. winding temperature	+155°C

Mechanical data (ball bearings)

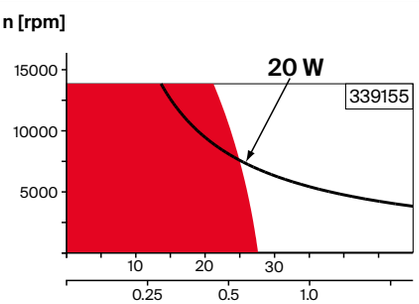
23	Max. speed	14 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	20 N
27	Max. force for press fits (static)	60 N
	(static, shaft supported)	1000 N
28	Max. radial load, 5 mm from flange	35 N

Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	11
31	Weight of motor	115 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

Gear
425_GP 26 A
426_GP 32 BZ
427_GP 32 A
429_GP 32 C
435_KD 32
474–482_GP 32 S

Sensor
505_ENX 25 IMR
536_Encoder HEDS 5540
537_Encoder HEDL 5540
542_DC-Tacho DCT 22

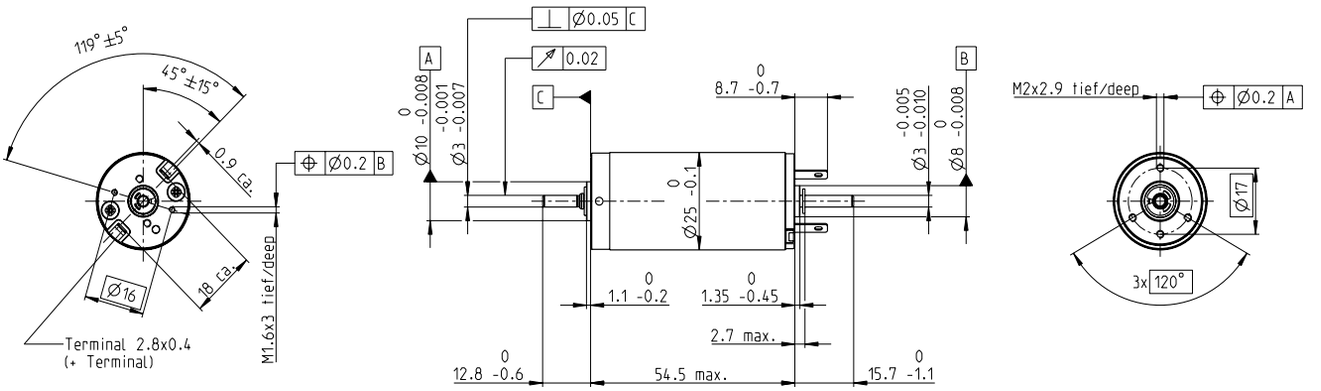
Accessories
587_Brake AB 28

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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RE 25 ∅25 mm, graphite brushes, 20 watt

RE



M 1:2

Stock program
Standard program
Special program (on request)

		Part numbers								
according to dimensional drawing		118749	118750	118751	118752	118753	118754	118755	118756	118757
shaft length 15.7 shortened to 4 mm		302002	302003	302004	302005	302006	302007	302001	302008	302009
Motor data										
Values at nominal voltage										
1 Nominal voltage	V	9	15	18	24	30	42	48	48	48
2 No load speed	rpm	10000	9660	10200	9560	9860	11100	10300	8240	5050
3 No load current	mA	110	60.8	53.9	36.9	30.5	25.2	20.1	15.2	8.52
4 Nominal speed	rpm	8970	8430	8850	8330	8640	9920	9160	7040	3830
5 Nominal torque	mNm	11.1	20.5	22.9	26.3	26.7	27.1	27.7	28.7	30
6 Nominal current (max. continuous current)	A	1.5	1.5	1.46	1.16	0.968	0.784	0.653	0.536	0.343
7 Stall torque	mNm	232	225	220	243	249	283	264	209	129
8 Stall current	A	29.1	15.8	13.5	10.4	8.72	7.94	6.03	3.81	1.44
9 Max. efficiency	%	76	82	83	85	86	87	87	86	84
Characteristics										
10 Terminal resistance	Ω	0.309	0.952	1.33	2.32	3.44	5.29	7.96	12.6	33.4
11 Terminal inductance	mH	0.028	0.088	0.115	0.238	0.353	0.551	0.832	1.31	3.48
12 Torque constant	mNm/A	7.96	14.3	16.3	23.4	28.5	35.6	43.8	55	89.6
13 Speed constant	rpm/V	1200	670	586	408	335	268	218	174	107
14 Speed / torque gradient	rpm/mNm	46.5	44.7	48	40.3	40.4	39.8	39.6	39.8	39.7
15 Mechanical time constant	ms	5.68	4.87	4.77	4.55	4.47	4.4	4.37	4.37	4.35
16 Rotor inertia	gcm²	11.7	10.4	9.49	10.8	10.6	10.6	10.5	10.5	10.5

Specifications

Thermal data

17	Thermal resistance housing-ambient	14 K/W
18	Thermal resistance winding-housing	3.1 K/W
19	Thermal time constant winding	12.5 s
20	Thermal time constant motor	612 s
21	Ambient temperature	-30...+100°C
22	Max. winding temperature	+125°C

Mechanical data (ball bearings)

23	Max. speed	14 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	3.2 N
27	Max. force for press fits (static)	64 N
	(static, shaft supported)	800 N
28	Max. radial load, 5 mm from flange	16 N

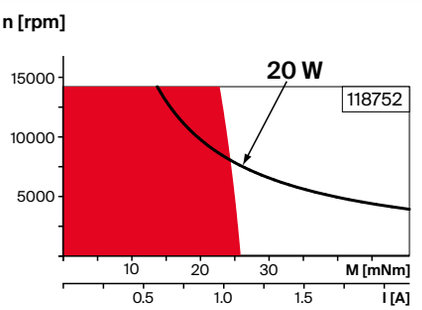
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	11
31	Weight of motor	130 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Preloaded ball bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

Gear
425_GP 26 A
426_GP 32 BZ
427_GP 32 A
429_GP 32 C
435_KD 32
474–482_GP 32 S

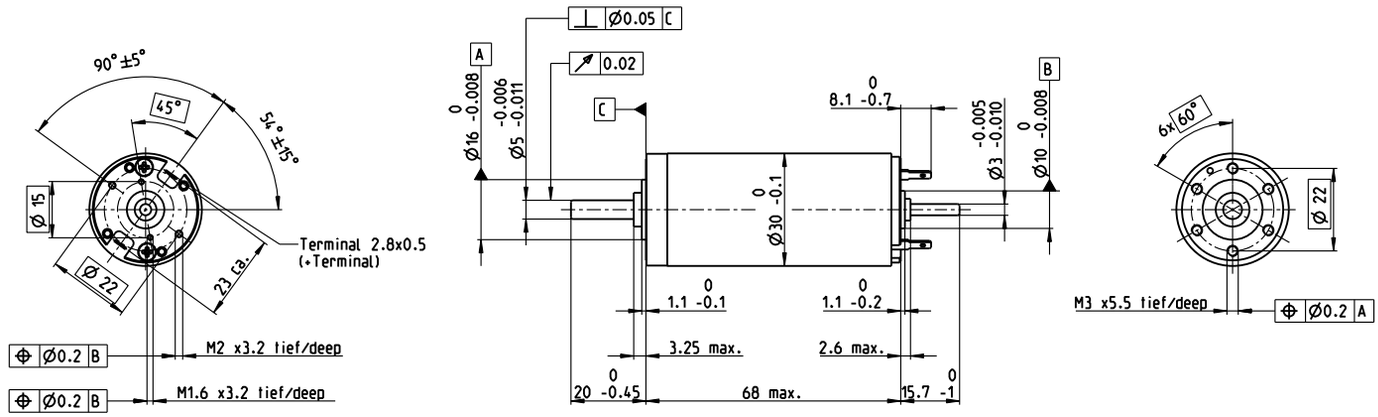
Sensor
505_ENX 25 IMR
535_Encoder HEDS 5540
537_Encoder HEDL 5540
542_DC-Tacho DCT 22

Accessories
587_Brake AB 28

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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RE 30 ∅30 mm, precious metal brushes, 15 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

	448593	448594	448595	448596
Motor data (provisional)				
Values at nominal voltage				
1 Nominal voltage V	6	9	12	18
2 No load speed rpm	2870	3310	2870	3190
3 No load current mA	41.6	33.4	20.8	15.9
4 Nominal speed rpm	2450	2870	2420	2770
5 Nominal torque mNm	53	53	53	53
6 Nominal current (max. continuous current) A	2.7	2.08	1.35	1
7 Stall torque mNm	364	402	342	401
8 Stall current A	18.3	15.5	8.58	7.45
9 Max. efficiency %	90	91	90	91
Characteristics				
10 Terminal resistance Ω	0.378	0.63	1.45	2.47
11 Terminal inductance mH	0.07	0.119	0.281	0.513
12 Torque constant mNm/A	19.9	25.9	39.8	53.8
13 Speed constant rpm/V	479	369	240	178
14 Speed/torque gradient rpm/mNm	9.1	8.97	8.71	8.14
15 Mechanical time constant ms	3.42	3.14	3.02	2.96
16 Rotor inertia gcm²	35.9	33.5	33.1	34.7

Specifications

Thermal data

17 Thermal resistance housing-ambient	6 K/W
18 Thermal resistance winding-housing	1.7 K/W
19 Thermal time constant winding	16.9 s
20 Thermal time constant motor	593 s
21 Ambient temperature	-20...+85°C
22 Max. winding temperature	+100°C

Mechanical data (ball bearings)

23 Max. speed	3300 rpm
24 Axial play at axial load	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	5.6 N
27 Max. force for press fits (static)	110 N
(static, shaft supported)	1200 N
28 Max. radial load, 5 mm from flange	28 N

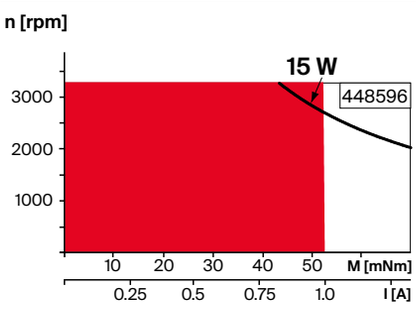
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	13
31 Weight of motor	260 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Preloaded ball bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

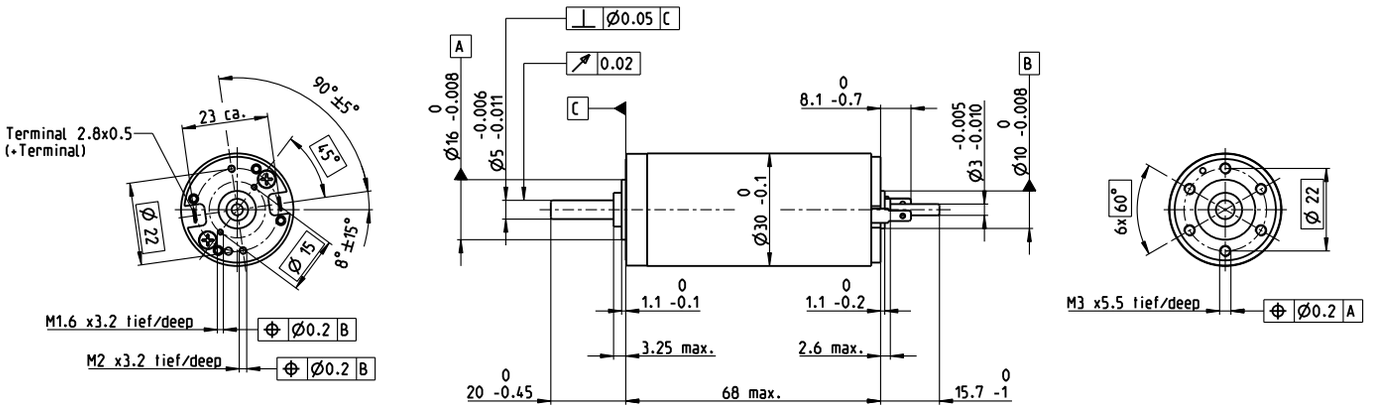
Gear
428_GP 32 A

Sensor
506_ENX 32 IMR
535_Encoder HEDS 5540
537_Encoder HEDL 5540

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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RE 30 ∅30 mm, graphite brushes, 60 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

according to dimensional drawing	310005	310006	310007	310008	310009
shaft length 15.7 shortened to 8.7 mm	268193	268213	268214	268215	268216
Motor data					
Values at nominal voltage					
1 Nominal voltage V	12	18	24	36	48
2 No load speed rpm	8170	8590	8810	8590	8490
3 No load current mA	301	213	165	106	78.6
4 Nominal speed rpm	7630	7910	8050	7840	7760
5 Nominal torque mNm	51.6	75.5	85.6	86.6	89.7
6 Nominal current (max. continuous current) A	4	4	3.47	2.28	1.74
7 Stall torque mNm	853	1000	1020	1000	1050
8 Stall current A	61.1	50.3	39.3	25.2	19.6
9 Max. efficiency %	85	87	87	87	88
Characteristics					
10 Terminal resistance Ω	0.196	0.358	0.611	1.43	2.45
11 Terminal inductance mH	0.034	0.07	0.119	0.281	0.513
12 Torque constant mNm/A	13.9	19.9	25.9	39.8	53.8
13 Speed constant rpm/V	685	479	369	240	178
14 Speed / torque gradient rpm/mNm	9.64	8.61	8.7	8.61	8.09
15 Mechanical time constant ms	3.4	3.24	3.05	2.98	2.94
16 Rotor inertia gcm^2	33.7	35.9	33.5	33.1	34.7

Specifications

Thermal data

17	Thermal resistance housing-ambient	6.0 K/W
18	Thermal resistance winding-housing	1.7 K/W
19	Thermal time constant winding	16.3 s
20	Thermal time constant motor	593 s
21	Ambient temperature	-30...+100°C
22	Max. winding temperature	+125°C

Mechanical data (ball bearings)

23	Max. speed	12 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	5.6 N
27	Max. force for press fits (static)	110 N
	(static, shaft supported)	1200 N
28	Max. radial load, 5 mm from flange	28 N

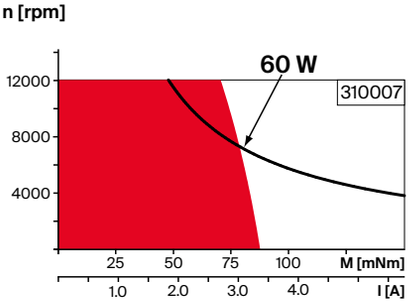
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	13
31	Weight of motor	260 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Preloaded ball bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

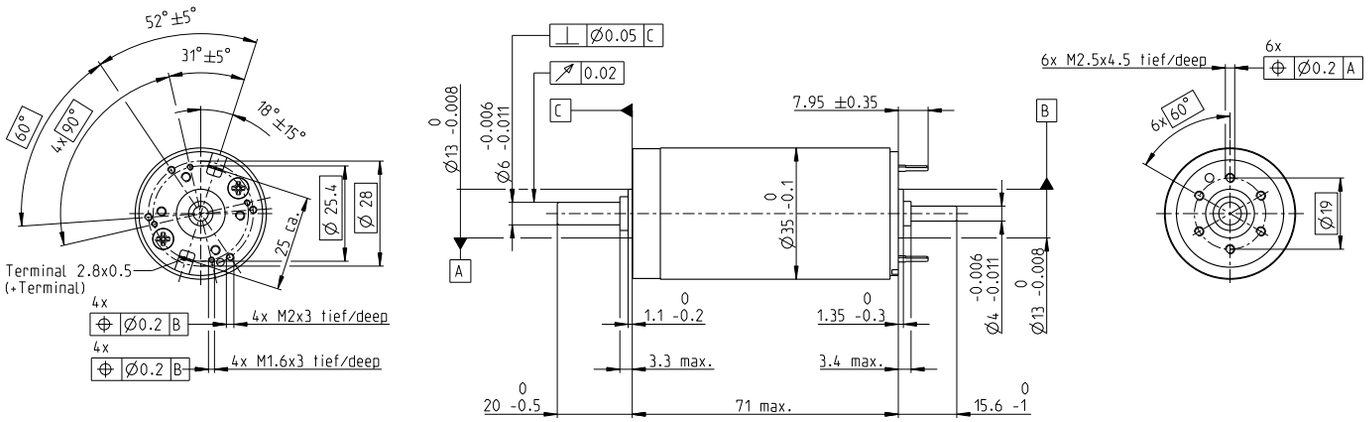
Gear
426_GP 32 BZ
427_GP 32 A
429_GP 32 C
435_KD 32
474-482_GP 32 S

Sensor
506_ENX 32 IMR
535_Encoder HEDS 5540
537_Encoder HEDL 5540

Motor Control
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
569_EPOS4 50/5

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RE 35 ∅35 mm, graphite brushes, 90 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers										
according to dimensional drawing		273752	323890	273753	273754	273755	273756	273757	273758	273759
shaft length 15.6 shortened to 4 mm		285785	323891	285786	285787	285788	285789	285790	285791	285792
Motor data										
Values at nominal voltage										
1 Nominal voltage	V	15	24	30	42	48	48	48	48	48
2 No load speed	rpm	7200	7750	7280	7580	7310	6680	5990	4770	3830
3 No load current	mA	188	128	94.1	70.5	58.9	52.6	46	34.9	27
4 Nominal speed	rpm	6500	6970	6470	6800	6510	5870	5170	3930	2990
5 Nominal torque	mNm	74.2	108	101	105	103	104	104	106	108
6 Nominal current (max. continuous current)	A	4	3.81	2.68	2.07	1.71	1.58	1.41	1.15	0.934
7 Stall torque	mNm	931	1210	976	1090	983	892	778	621	499
8 Stall current	A	47.9	41.6	25.1	20.7	15.8	13.1	10.3	6.52	4.21
9 Max. efficiency	%	85	88	87	88	88	87	86	85	84
Characteristics										
10 Terminal resistance	Ω	0.313	0.577	1.2	2.03	3.04	3.66	4.68	7.36	11.4
11 Terminal inductance	mH	0.085	0.191	0.34	0.62	0.87	1.04	1.29	2.04	3.16
12 Torque constant	mNm/A	19.4	29.2	38.9	52.5	62.2	68	75.8	95.2	119
13 Speed constant	rpm/V	491	328	246	182	154	140	126	100	80.5
14 Speed/torque gradient	rpm/mNm	7.91	6.48	7.55	7.03	7.5	7.55	7.77	7.75	7.74
15 Mechanical time constant	ms	5.62	5.41	5.37	5.32	5.32	5.32	5.33	5.33	5.33
16 Rotor inertia	gcm²	67.9	79	67.9	72.3	67.7	67.2	65.4	65.7	65.7

Specifications

Thermal data

17	Thermal resistance housing-ambient	6.2 K/W
18	Thermal resistance winding-housing	2 K/W
19	Thermal time constant winding	30.1 s
20	Thermal time constant motor	707 s
21	Ambient temperature	-30...+100°C
22	Max. winding temperature	+155°C

Mechanical data (ball bearings)

23	Max. speed	12000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	5.6 N
27	Max. force for press fits (static)	110 N
	(static, shaft supported)	1200 N
28	Max. radial load, 5 mm from flange	28 N

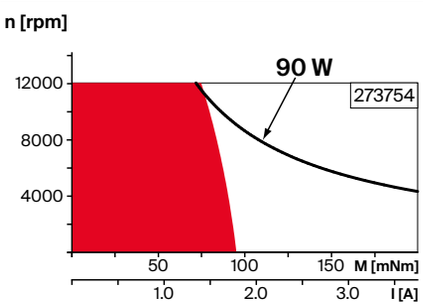
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	13
31	Weight of motor	340 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Hollow shaft as special design
Preloaded ball bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

Gear
426_GP 32 BZ
427_GP 32 A
429_GP 32 C
432_GP 32 HP
436_GP 42 A
439_GP 42 C
474–482_GP 32 S

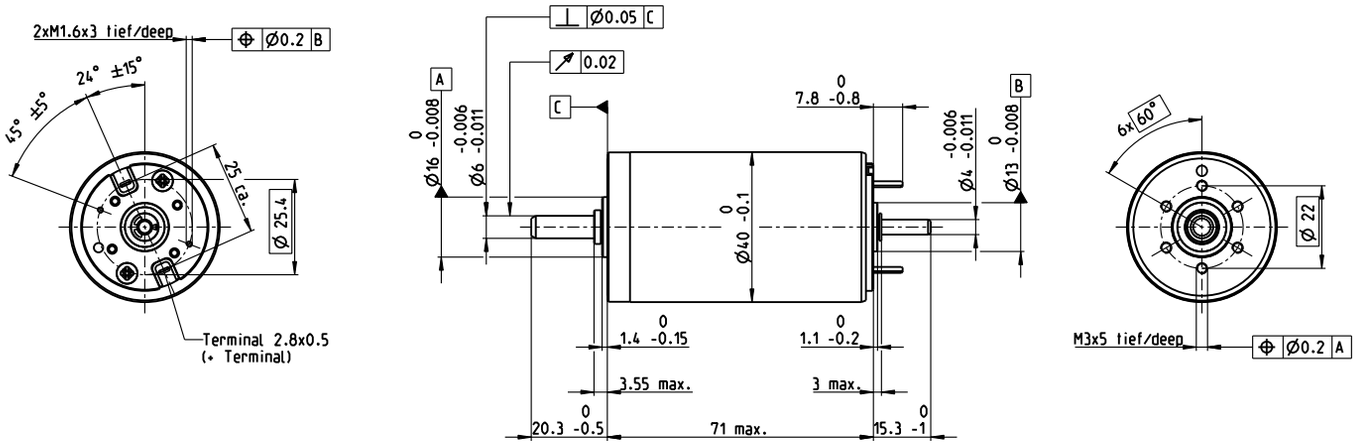
Sensor
506_ENX 32 IMR
535_Encoder HEDS 5540
537_Encoder HEDL 5540
542_DC-Tacho DCT 22

Accessories
587_Brake AB 28
594_End cap

Motor Control
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
569_EPOS4 50/5

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RE 40 ∅40 mm, precious metal brushes, 25 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

		448588	448589	448590	448591	448592
Motor data (provisional)						
Values at nominal voltage						
1 Nominal voltage	V	9	18	24	42	48
2 No load speed	rpm	2850	2850	2780	2920	2690
3 No load current	mA	49.7	24.8	18.1	11	8.62
4 Nominal speed	rpm	2560	2580	2470	2640	2400
5 Nominal torque	mNm	87.8	87.8	88.2	87.6	87.6
6 Nominal current (max. continuous current)	A	2.96	1.48	1.09	0.65	0.524
7 Stall torque	mNm	873	956	794	895	818
8 Stall current	A	29	15.9	9.66	6.53	4.81
9 Max. efficiency	%	92	92	92	92	92
Characteristics						
10 Terminal resistance	Ω	0.311	1.14	2.49	6.43	9.97
11 Terminal inductance	mH	0.082	0.33	0.613	1.7	2.62
12 Torque constant	mNm/A	30.2	60.3	82.2	137	170
13 Speed constant	rpm/V	317	158	116	69.7	56.2
14 Speed/torque gradient	rpm/mNm	3.27	2.98	3.51	3.27	3.3
15 Mechanical time constant	ms	4.85	4.29	4.36	4.14	4.13
16 Rotor inertia	gcm²	142	137	119	121	120

Specifications

Thermal data

17	Thermal resistance housing-ambient	4.65 K/W
18	Thermal resistance winding-housing	1.93 K/W
19	Thermal time constant winding	41.5 s
20	Thermal time constant motor	809 s
21	Ambient temperature	-20...+85°C
22	Max. winding temperature	+100°C

Mechanical data (ball bearings)

23	Max. speed	3330 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	5.6 N
27	Max. force for press fits (static)	110 N
	(static, shaft supported)	1200 N
28	Max. radial load, 5 mm from flange	28 N

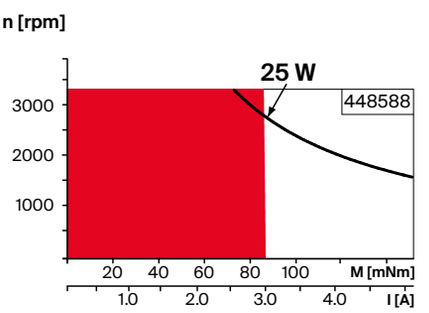
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	13
31	Weight of motor	480 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Preloaded ball bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

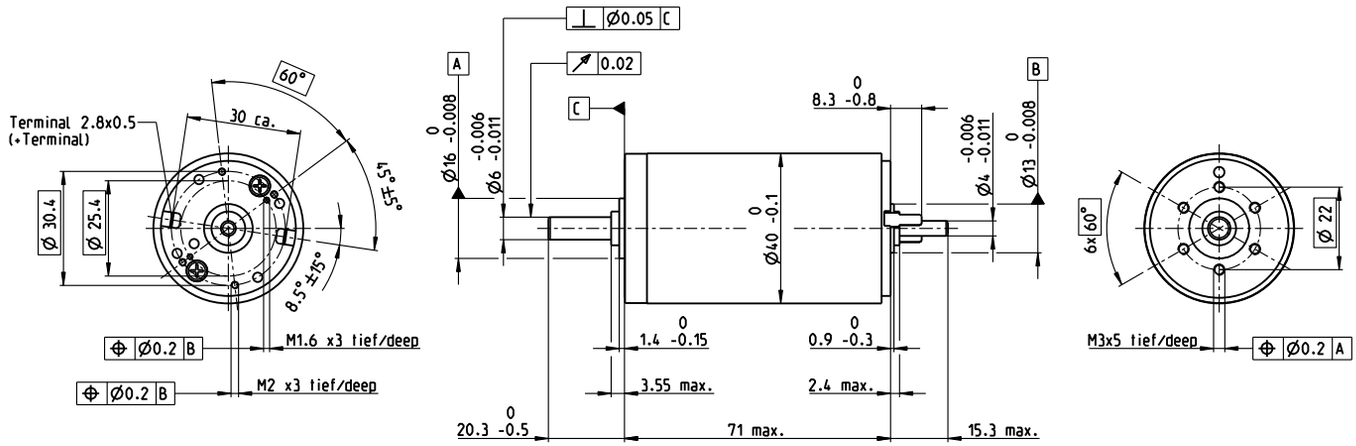
Details on catalog page 48

Sensor
506_ENX 32 IMR
535_Encoder HEDS 5540
538_Encoder HEDL 5540

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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RE 40 ∅40 mm, graphite brushes, 150 watt



M 1:2

RE

DC Motor

Stock program
Standard program
Special program (on request)

Part numbers

	148866	148867	148877	218008	218009	218010	218011	218012	218013
Motor data									
Values at nominal voltage									
1 Nominal voltage V	12	24	48	48	48	48	48	48	48
2 No load speed rpm	6920	7580	7590	6420	5560	3330	2690	2130	1720
3 No load current mA	241	137	68.6	53.7	43.7	21.9	16.6	12.5	9.66
4 Nominal speed rpm	6380	6940	7000	5810	4930	2710	2060	1510	1080
5 Nominal torque mNm	94.9	177	187	186	180	189	190	192	192
6 Nominal current (max. continuous current) A	6	6	3.17	2.66	2.23	1.4	1.13	0.909	0.73
7 Stall torque mNm	1720	2420	2560	2040	1620	1020	814	655	523
8 Stall current A	105	80.2	42.4	28.6	19.7	7.43	4.79	3.06	1.97
9 Max. efficiency %	88	91	92	91	91	89	89	88	86
Characteristics									
10 Terminal resistance Ω	0.115	0.299	1.13	1.68	2.44	6.46	10	15.7	24.4
11 Terminal inductance mH	0.024	0.082	0.33	0.46	0.613	1.7	2.62	4.14	6.41
12 Torque constant mNm/A	16.4	30.2	60.3	71.3	82.2	137	170	214	266
13 Speed constant rpm/V	581	317	158	134	116	69.7	56.2	44.7	35.9
14 Speed/torque gradient rpm/mNm	4.05	3.14	2.97	3.16	3.45	3.29	3.31	3.27	3.29
15 Mechanical time constant ms	5.89	4.67	4.28	4.2	4.19	4.16	4.15	4.15	4.15
16 Rotor inertia gcm^2	139	142	137	127	116	121	120	121	120

Specifications

Thermal data

17 Thermal resistance housing-ambient	4.7 K/W
18 Thermal resistance winding-housing	1.9 K/W
19 Thermal time constant winding	41.5 s
20 Thermal time constant motor	809 s
21 Ambient temperature	-30...+100°C
22 Max. winding temperature	+155°C

Mechanical data (ball bearings)

23 Max. speed	12 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	5.6 N
27 Max. force for press fits (static)	110 N
(static, shaft supported)	1200 N
28 Max. radial load, 5 mm from flange	28 N

Other specifications

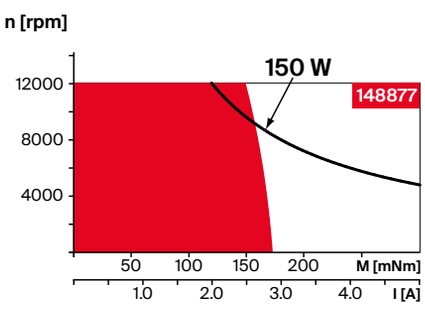
29 Number of pole pairs	1
30 Number of commutator segments	13
31 Weight of motor	480 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Preloaded ball bearings

* Industrial version with radial shaft seal ring (resulting in increased no load current). IP54 protection only if mounted on brush side, in compliance with maxon modular system.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

Gear
436_GP 42 A
439_GP 42 C
443_GP 52 C

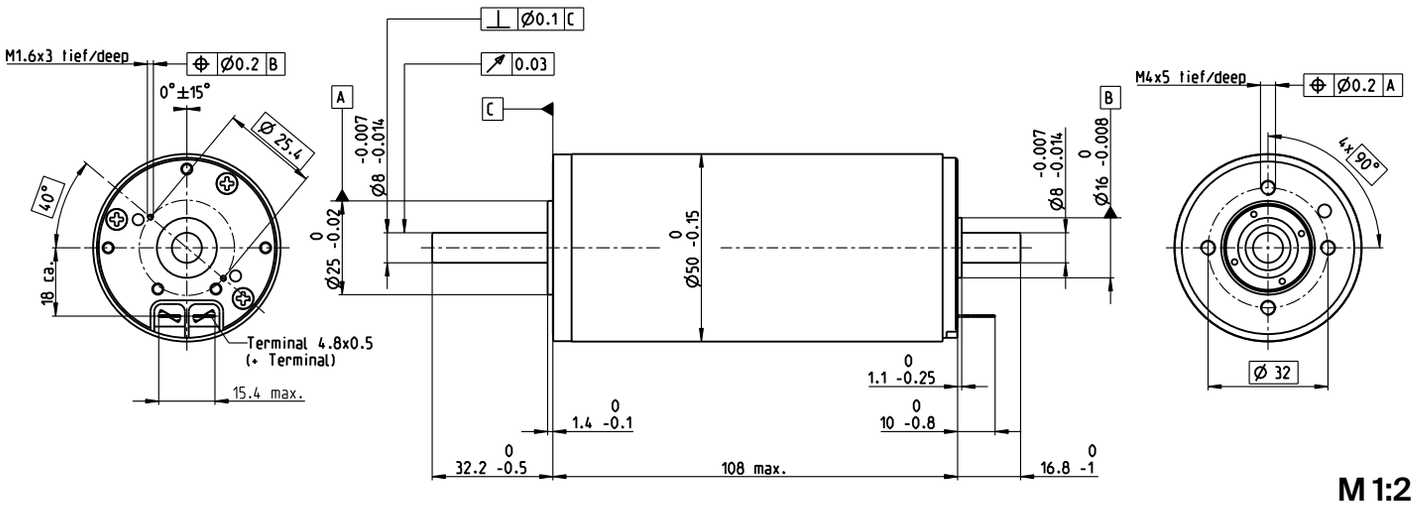
Sensor
506_ENX 32 IMR
535_Encoder HEDS 5540
538_Encoder HEDL 5540
587_Brake AB 28

Industrial version IP54*
540_Encoder HEDL 9140
588_Brake AB 28
594_End cap

Motor Control
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8 CAN
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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RE 50 ∅50 mm, graphite brushes, 200 watt



M 1:2

Stock program
Standard program
Special program (on request)

	Part numbers			
	578296	578297	578298	578299
Industrial Version IP54*	618570	618571	618572	618573
Motor data				
Values at nominal voltage				
1 Nominal voltage V	24	36	48	70
2 No load speed rpm	5950	5680	4900	2760
3 No load current mA	236	147	88.4	27.4
4 Nominal speed rpm	5680	5420	4620	2470
5 Nominal torque mNm	405	418	420	452
6 Nominal current (max. continuous current) A	10.8	7.07	4.58	1.89
7 Stall torque mNm	8920	8920	7370	4340
8 Stall current A	232	148	78.9	17.9
9 Max. efficiency %	94	94	94	92
Characteristics				
10 Terminal resistance Ω	0.103	0.244	0.608	3.9
11 Terminal inductance mH	0.072	0.177	0.423	2.83
12 Torque constant mNm/A	38.5	60.4	93.4	242
13 Speed constant rpm/V	248	158	102	39.5
14 Speed/torque gradient rpm/mNm	0.668	0.638	0.666	0.638
15 Mechanical time constant ms	3.75	3.74	3.78	3.74
16 Rotor inertia gcm^2	536	560	542	560

Specifications

Thermal data

17	Thermal resistance housing-ambient	3.8 K/W
18	Thermal resistance winding-housing	1.2 K/W
19	Thermal time constant winding	71.7 s
20	Thermal time constant motor	1370 s
21	Ambient temperature	-30...+100°C
22	Max. winding temperature	+125°C

Mechanical data
(preloaded ball bearings)

23	Max. speed		9500 rpm
24	Axial play at axial load	< 11.5 N	0 mm
		> 11.5 N	0.1 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		30 N
27	Max. force for press fits (static)		150 N
	(static, shaft supported)		6000 N
28	Max. radial load, 15 mm from flange		110 N

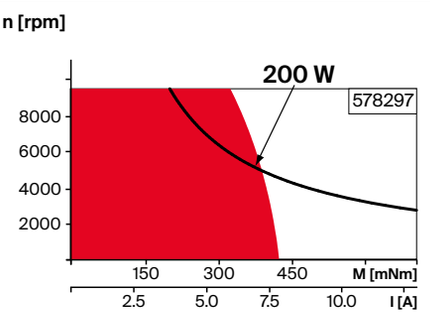
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	15
31	Weight of motor	1100 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

* Industrial version with radial shaft seal ring (resulting in increased no load current). IP54 protection only if mounted on brush side, in compliance with maxon modular system.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

Gear
443_GP 52 C
445_GP 62 A

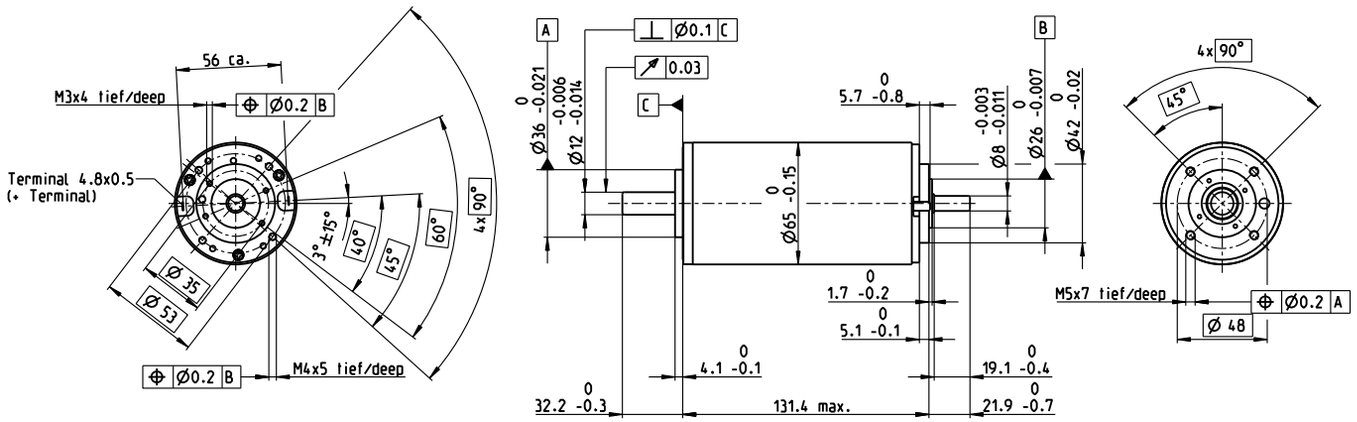
Sensor
536_Encoder HEDS 5540
538_Encoder HEDL 5540

Industrial version IP54*
541_Encoder HEDL 9140
591_Brake AB 44
594_End cap

Motor Control
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8 CAN
568_EPOS4 Compact 50/15
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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RE 65 ∅65 mm, graphite brushes, 250 watt



M 1:4

Stock program
Standard program
Special program (on request)

Part numbers

	353294	**353295**	353296	**353297**	353298	353299	353300	353301
Industrial Version IP54*	388984	388985	388986	388987	388988	388989	388990	388991
Motor data								
Values at nominal voltage								
1 Nominal voltage	V	18	24	36	48	60	70	70	70
2 No load speed	rpm	3520	4090	3970	3670	3680	3440	3190	2690
3 No load current	mA	755	697	437	289	231	179	160	125
4 Nominal speed	rpm	3250	3810	3700	3420	3450	3220	2960	2470
5 Nominal torque	mNm	427	501	751	800	813	832	839	888
6 Nominal current (max. continuous current)	A	10	10	9.32	6.8	5.53	4.51	4.21	3.74
7 Stall torque	mNm	13600	15700	17400	16100	16200	15100	13700	12200
8 Stall current	A	295	292	207	131	106	78.6	66.1	49.7
9 Max. efficiency	%	81	83	87	88	89	89	89	89
Characteristics								
10 Terminal resistance	Ω	0.0609	0.0821	0.174	0.365	0.568	0.891	1.06	1.41
11 Terminal inductance	mH	0.023	0.031	0.076	0.161	0.251	0.393	0.458	0.644
12 Torque constant	mNm/A	46	53.7	84.4	123	153	192	207	245
13 Speed constant	rpm/V	208	178	113	77.8	62.3	49.8	46.1	38.9
14 Speed/torque gradient	rpm/mNm	0.275	0.272	0.234	0.231	0.231	0.231	0.236	0.223
15 Mechanical time constant	ms	3.98	3.68	3.38	3.25	3.19	3.16	3.16	3.13
16 Rotor inertia	gcm²	1380	1290	1380	1340	1320	1310	1280	1340

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.3 K/W
18	Thermal resistance winding-housing	1.85 K/W
19	Thermal time constant winding	123 s
20	Thermal time constant motor	1060 s
21	Ambient temperature	-30...+100°C
22	Max. winding temperature	+125°C

Mechanical data
(preloaded ball bearings)

23	Max. speed	5500 rpm
24	Axial play at axial load	< 25 N 0 mm > 25 N 0.1 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	70 N
27	Max. force for press fits (static) (static, shaft supported)	420 N 12000 N
28	Max. radial load, 15 mm from flange	350 N

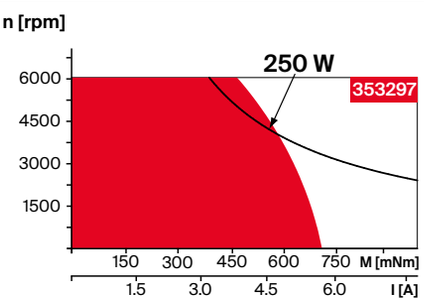
Other specifications

29	Number of pole pairs	2
30	Number of commutator segments	26
31	Weight of motor	2100 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

* Industrial version with radial shaft seal ring (resulting in increased no load current). IP54 protection only if mounted on brush side, in compliance with maxon modular system.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

Gear
446_GP 81 A

Sensor
536_Encoder HEDS 5540
538_Encoder HEDL 5540

Industrial version IP54*
541_Encoder HEDL 9140
591_Brake AB 44
594_End cap

Motor Control
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/8 CAN
568_EPOS4 Compact 50/15
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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For your personal notes

maxon A-max

Standard specification no. 100	90
Terminology explanations	94
A-max 12 ∅12 mm, precious metal brushes, CLL, 0.75 W	169
A-max 12 ∅12 mm, precious metal brushes, CLL, 0.5 W	170
A-max 16 ∅16 mm, precious metal brushes, CLL, 2 W	171
A-max 16 ∅16 mm, precious metal brushes, CLL, 1.2 W	172
A-max 16 ∅16 mm, graphite brushes, 2 W	173–174
A-max 19 ∅19 mm, precious metal brushes, CLL, 2.5 W	175
A-max 19 ∅19 mm, precious metal brushes, CLL, 1.5 W	176
A-max 19 ∅19 mm, graphite brushes, 2.5 W	177–178
A-max 22 ∅22 mm, precious metal brushes, CLL, 5 W	179
A-max 22 ∅22 mm, precious metal brushes, CLL, 3.5 W	180
A-max 22 ∅22 mm, graphite brushes, 6 W	181–182
A-max 26 ∅26 mm, precious metal brushes, CLL, 7 W	183
A-max 26 ∅26 mm, precious metal brushes, CLL, 4.5 W	184
A-max 26 ∅26 mm, graphite brushes, 11 W	185–186
A-max 32 ∅32 mm, graphite brushes, 20 W	187–188



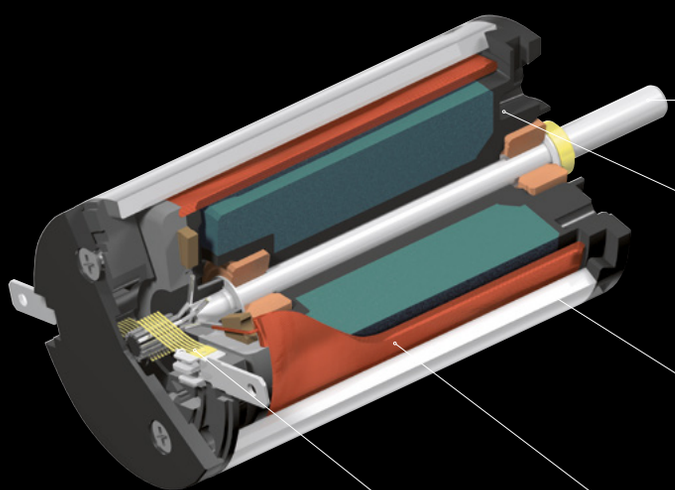
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maxon A-max program

The drives use an ironless rotor and AlNiCo magnets. Automated manufacturing means that maxon's brushed A-max motors offer top performance at an attractive price. In maxon's modular system you can combine the A-max motors with gears, sensors and controllers for a complete drive system.

Key data

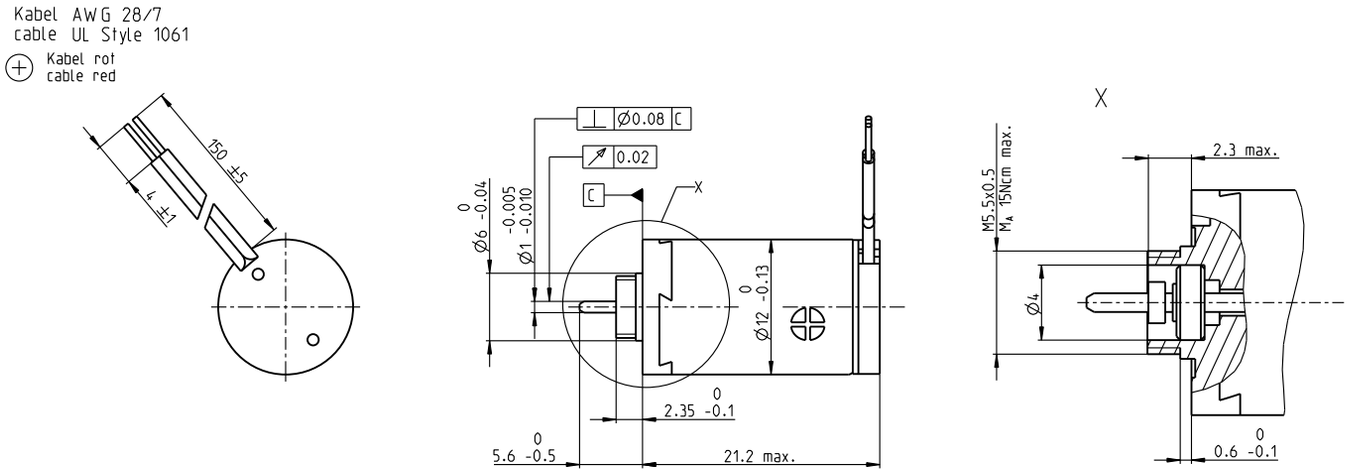
Motor ∅	12...32 mm
Motor length	21.2...62.9 mm
Power	0.5...20 W
Nominal torque	up to 45.5 mNm
Max. permissible speed	up to 19 000 rpm



- → Good price-performance ratio
- → DC motor with AlNiCo magnet
- → Torque-resistant shaft
- → Automated manufacturing process

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A-max 12 ∅12 mm, precious metal brushes CLL, 0.75 watt



M 3:2

Stock program
Standard program
Special program (on request)

Motor data		Part numbers					
		200937	265374	265375	265376	265377	265378
Values at nominal voltage							
1 Nominal voltage	V	3	4.5	6	9	12	15
2 No load speed	rpm	13900	11900	12800	12100	12300	13800
3 No load current	mA	21.1	11.5	9.47	5.87	4.5	4.2
4 Nominal speed	rpm	5980	4380	5260	4470	4610	5030
5 Nominal torque	mNm	0.897	0.961	0.948	0.941	0.931	0.804
6 Nominal current (max. continuous current)	A	0.465	0.282	0.225	0.141	0.107	0.0836
7 Stall torque	mNm	1.58	1.55	1.63	1.52	1.52	1.29
8 Stall current	A	0.789	0.438	0.374	0.22	0.168	0.129
9 Max. efficiency	%	70	71	71	70	70	68
Characteristics							
10 Terminal resistance	Ω	3.8	10.3	16	40.9	71.6	116
11 Terminal inductance	mH	0.085	0.264	0.403	1.01	1.74	2.13
12 Torque constant	mNm/A	2.01	3.53	4.36	6.92	9.06	10
13 Speed constant	rpm/V	4760	2710	2190	1380	1050	952
14 Speed/torque gradient	rpm/mNm	9030	7880	8060	8170	8330	11000
15 Mechanical time constant	ms	20.6	20.3	20.4	20.4	20.5	21.1
16 Rotor inertia	gcm²	0.218	0.246	0.241	0.238	0.235	0.183

Specifications

Thermal data

17	Thermal resistance housing-ambient	44.5 K/W
18	Thermal resistance winding-housing	15 K/W
19	Thermal time constant winding	5.03 s
20	Thermal time constant motor	245 s
21	Ambient temperature	-30...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23	Max. speed	19000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.15 N
27	Max. force for press fits (static)	15 N
28	Max. radial load, 4 mm from flange	0.4 N

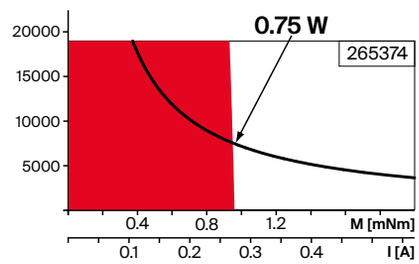
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	11 g

CLL = Capacitor Long Life
Alignment of the electronic connections not specified.

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

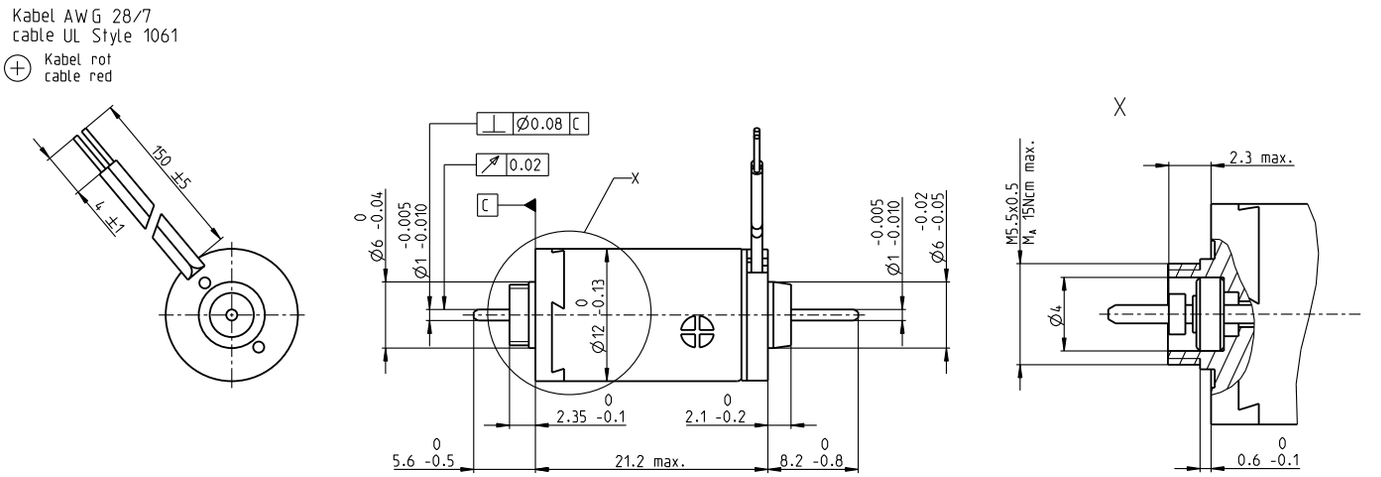
Details on catalog page 48

Gear
414_GP 10 A
415_GP 13 A
448_GS 12 A

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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A-max 12 ∅12 mm, precious metal brushes CLL, 0.5 watt



M 3:2

Stock program
Standard program
Special program (on request)

			Part numbers					
			200938	265389	265390	265391	265392	265393
Motor data								
	Values at nominal voltage							
1	Nominal voltage	V	3	4.5	6	9	12	15
2	No load speed	rpm	13700	11700	12600	11900	12100	13500
3	No load current	mA	34.5	18.8	15.5	9.63	7.38	6.88
4	Nominal speed	rpm	6000	4390	5280	4480	4620	5050
5	Nominal torque	mNm	0.872	0.937	0.923	0.918	0.908	0.78
6	Nominal current (max. continuous current)	A	0.464	0.282	0.225	0.141	0.106	0.0835
7	Stall torque	mNm	1.58	1.55	1.63	1.52	1.52	1.29
8	Stall current	A	0.789	0.438	0.374	0.22	0.168	0.129
9	Max. efficiency	%	63	63	64	63	63	60
	Characteristics							
10	Terminal resistance	Ω	3.8	10.3	16	40.9	71.6	116
11	Terminal inductance	mH	0.0851	0.263	0.402	1.01	1.74	2.13
12	Torque constant	mNm/A	2.01	3.53	4.36	6.92	9.06	10
13	Speed constant	rpm/V	4760	2710	2190	1380	1050	952
14	Speed/torque gradient	rpm/mNm	9030	7880	8060	8170	8330	11000
15	Mechanical time constant	ms	20.6	20.3	20.4	20.4	20.5	21.1
16	Rotor inertia	gcm²	0.218	0.246	0.241	0.238	0.235	0.183

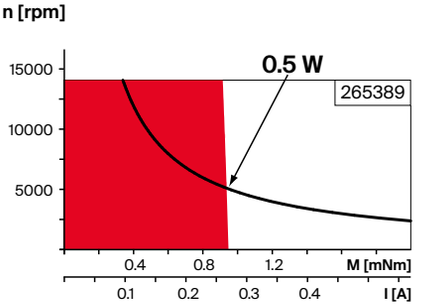
Specifications

	Thermal data	
17	Thermal resistance housing-ambient	44.5 K/W
18	Thermal resistance winding-housing	15 K/W
19	Thermal time constant winding	5.03 s
20	Thermal time constant motor	267 s
21	Ambient temperature	-30...+65°C
22	Max. winding temperature	+85°C
	Mechanical data (sleeve bearings)	
23	Max. speed	14 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.15 N
27	Max. force for press fits (static)	15 N
	(static, shaft supported)	70 N
28	Max. radial load, 4 mm from flange	0.4 N
	Other specifications	
29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	12 g

CLL = Capacitor Long Life
Alignment of the electronic connections not specified.

Values listed in the table are nominal.
Explanation of the figures on page 94.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

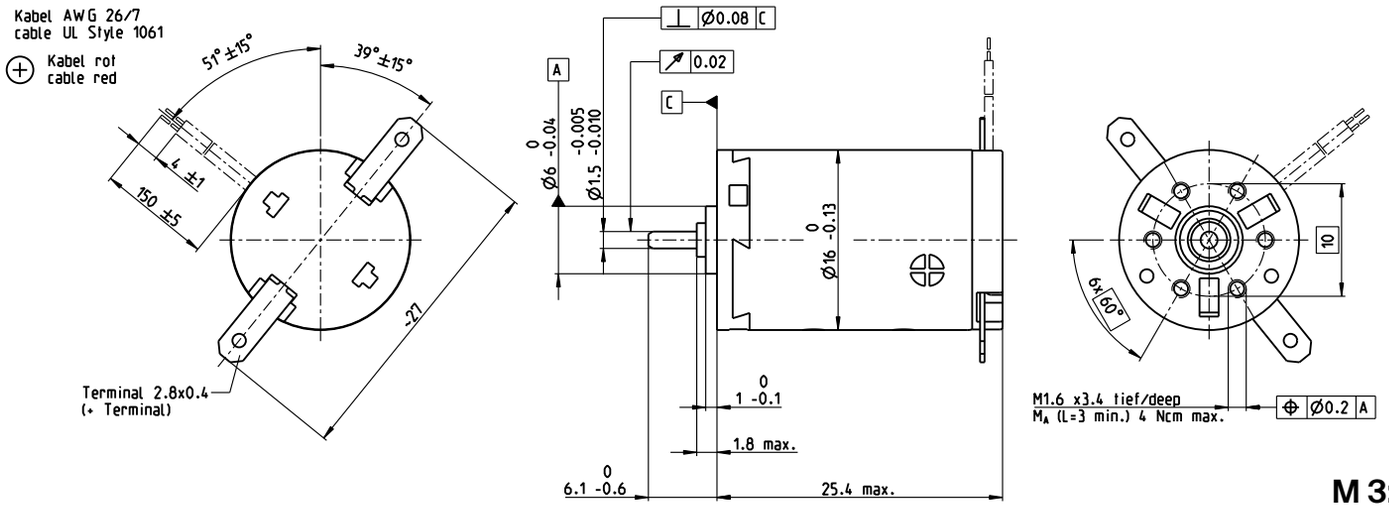
Gear
414_GP 10 A
415_GP 13 A
448_GS 12 A

Sensor
532_Encoder MR 16 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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A-max 16 ∅16 mm, precious metal brushes CLL, 2 watt



M 3:2

Stock program
Standard program
Special program (on request)

		Part numbers									
with terminals		110041	110042	110043	110044	**110045**	110046	110047	110048	**110049**	110050
with cables		139820	352815	134844	231379	220514	304672	352823	352816	260678	352817
Motor data											
Values at nominal voltage											
1 Nominal voltage	V	1.5	3	6	9	12	15	18	21	24	30
2 No load speed	rpm	10800	11000	10100	12300	12300	13200	14100	13700	13800	11400
3 No load current	mA	61.4	38.1	13.9	12.7	9.54	8.57	7.99	6.53	5.83	3.37
4 Nominal speed	rpm	9360	8810	4530	6700	6660	7590	8480	8040	8120	5480
5 Nominal torque	mNm	0.712	1.3	2.22	2.19	2.17	2.17	2.15	2.14	2.11	2.08
6 Nominal current (max. continuous current)	A	0.6	0.6	0.408	0.327	0.243	0.209	0.185	0.153	0.134	0.0864
7 Stall torque	mNm	4.79	4.51	4.03	4.82	4.77	5.16	5.44	5.22	5.12	4.04
8 Stall current	A	3.66	1.97	0.723	0.702	0.52	0.482	0.453	0.362	0.315	0.164
9 Max. efficiency	%	76	75	75	76	76	76	76	76	76	74
Characteristics											
10 Terminal resistance	Ω	0.41	1.52	8.3	12.8	23.1	31.1	39.7	57.9	76.2	183
11 Terminal inductance	mH	0.017	0.052	0.306	0.467	0.83	1.13	1.42	2.05	2.61	6.01
12 Torque constant	mNm/A	1.31	2.29	5.57	6.88	9.17	10.7	12	14.4	16.3	24.7
13 Speed constant	rpm/V	7290	4170	1720	1390	1040	893	795	663	587	387
14 Speed/torque gradient	rpm/mNm	2280	2770	2560	2590	2620	2600	2630	2670	2750	2880
15 Mechanical time constant	ms	25.3	23.8	23.2	23.3	23.3	23.4	23.5	23.4	23.5	23.9
16 Rotor inertia	gcm²	1.06	0.82	0.868	0.859	0.849	0.859	0.852	0.838	0.816	0.793

Specifications

Thermal data

17	Thermal resistance housing-ambient	29.8 K/W
18	Thermal resistance winding-housing	5.5 K/W
19	Thermal time constant winding	3.55 s
20	Thermal time constant motor	165 s
21	Ambient temperature	-30...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23	Max. speed	19 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	35 N
28	Max. radial load, 5 mm from flange	1.4 N

Mechanical data (ball bearings)

23	Max. speed	19 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	2.2 N
27	Max. force for press fits (static)	30 N
28	Max. radial load, 5 mm from flange	7.8 N

Other specifications

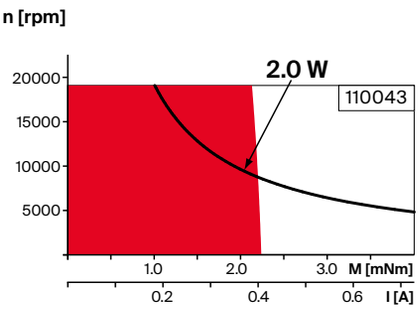
29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	21 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings
Without CLL

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

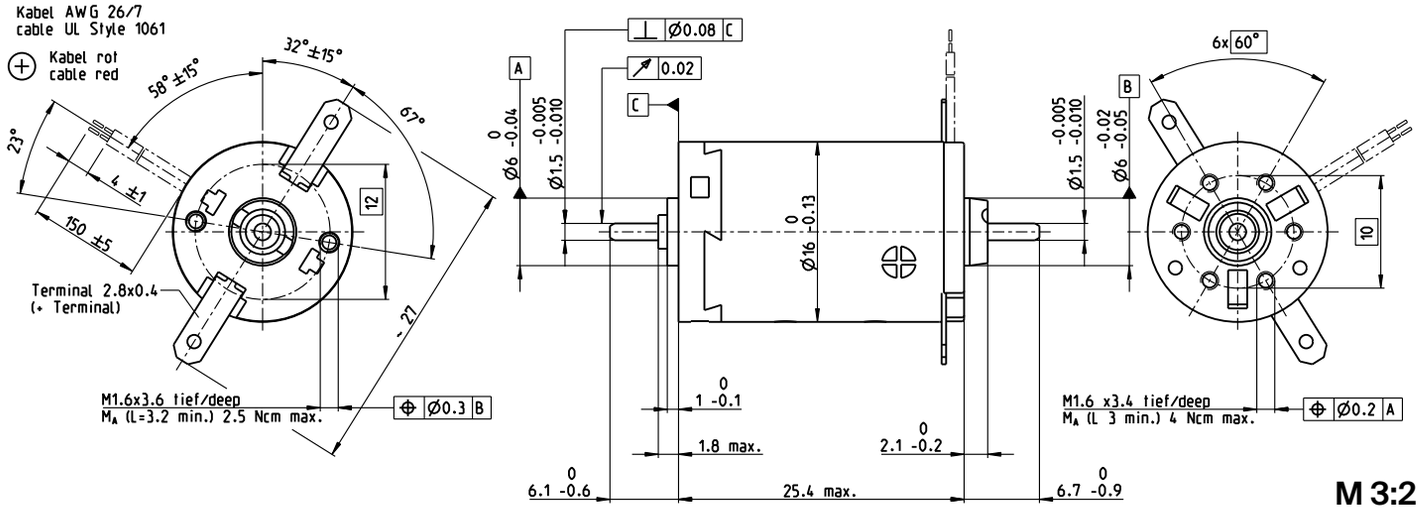
Details on catalog page 48

Gear
416_GP 16 A
417_GP 16 C
449_GS 16 A
450_GS 16 V
451_GS 16 VZ
469–471_GP 16 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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A-max 16 ∅16 mm, precious metal brushes CLL, 1.2 watt



M 3:2

Stock program
Standard program
Special program (on request)

		Part numbers									
	with terminals	110051	110052	110053	110054	110055	110056	110057	110058	110059	110060
	with cables	139823	352825	352826	352827	352828	352829	352830	352831	352832	352833
Motor data											
	Values at nominal voltage										
1	Nominal voltage	V	1.2	2.4	6	7.2	9	12	15	18	18	30
2	No load speed	rpm	8560	9730	10000	9740	9120	10400	11600	11600	10300	11300
3	No load current	mA	73.9	44.1	18.3	14.7	10.8	9.69	8.99	7.49	6.34	4.33
4	Nominal speed	rpm	7170	6310	4540	4200	3530	4900	6090	6050	4580	5500
5	Nominal torque	mNm	0.694	1.29	2.18	2.17	2.16	2.16	2.13	2.12	2.09	2.04
6	Nominal current (max. continuous current)	A	0.6	0.6	0.407	0.327	0.244	0.21	0.185	0.153	0.134	0.0862
7	Stall torque	mNm	3.83	3.61	4.03	3.86	3.57	4.13	4.54	4.48	3.84	4.04
8	Stall current	A	2.93	1.58	0.723	0.561	0.39	0.386	0.378	0.311	0.236	0.164
9	Max. efficiency	%	71	70	71	71	70	71	72	72	71	71
	Characteristics										
10	Terminal resistance	Ω	0.41	1.52	8.3	12.8	23.1	31.1	39.7	57.9	76.2	183
11	Terminal inductance	mH	0.017	0.0519	0.306	0.467	0.831	1.13	1.42	2.05	2.61	6.01
12	Torque constant	mNm/A	1.31	2.29	5.57	6.88	9.17	10.7	12	14.4	16.3	24.7
13	Speed constant	rpm/V	7290	4170	1720	1390	1040	893	795	663	587	387
14	Speed/torque gradient	rpm/mNm	2280	2770	2560	2590	2620	2600	2630	2670	2750	2880
15	Mechanical time constant	ms	25.3	23.7	23.2	23.3	23.3	23.3	23.4	23.3	23.4	23.8
16	Rotor inertia	gcm²	1.06	0.818	0.866	0.857	0.847	0.857	0.85	0.836	0.814	0.791

Specifications

Thermal data

17	Thermal resistance housing-ambient	29.8 K/W
18	Thermal resistance winding-housing	5.5 K/W
19	Thermal time constant winding	3.55 s
20	Thermal time constant motor	165 s
21	Ambient temperature	-30...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23	Max. speed	11000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	35 N
	(static, shaft supported)	280 N
28	Max. radial load, 5 mm from flange	1.4 N

Mechanical data (ball bearings)

23	Max. speed	11000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	2.2 N
27	Max. force for press fits (static)	30 N
	(static, shaft supported)	280 N
28	Max. radial load, 5 mm from flange	7.8 N

Other specifications

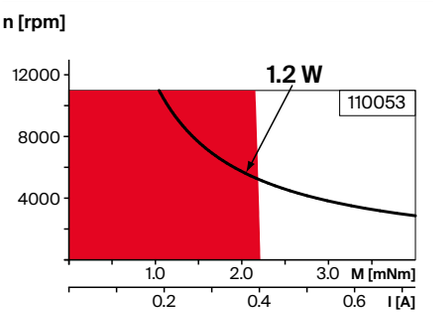
29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	22 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings
Without CLL

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

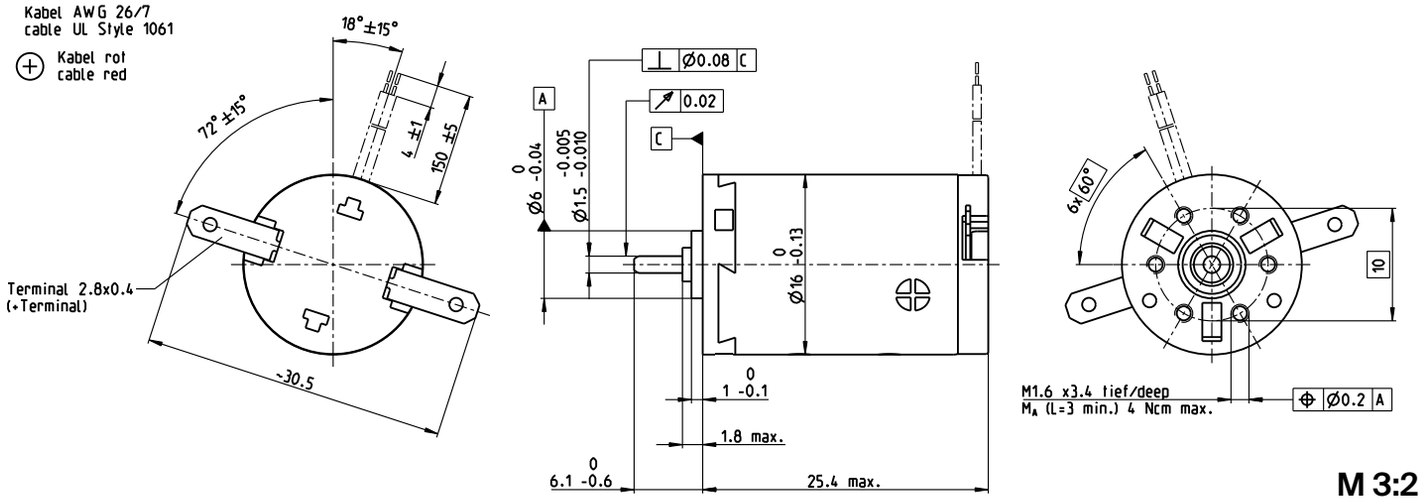
Gear
416_GP 16 A
417_GP 16 C
449_GS 16 A
450_GS 16 V
451_GS 16 VZ
469–471_GP 16 S

Sensor
502_ENX 16 IMR
498_ENX 13 GAMA
533_Encoder MR 32 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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A-max 16 ∅16 mm, graphite brushes, 2 watt



M 3:2

Stock program
Standard program
Special program (on request)

		Part numbers									
with terminals		110061	110062	110063	110064	110065	110066	110067	110068	110069	110070
with cables		139821	352853	352854	352855	325083	352856	205903	352857	266076	352858
Motor data											
Values at nominal voltage											
1 Nominal voltage	V	1.5	3	6	9	12	14	15	18	21	30
2 No load speed	rpm	10200	11500	9360	11500	11500	11500	11000	10900	11300	10500
3 No load current	mA	282	164	65.6	54.6	41	35.1	31.1	25.9	23	15
4 Nominal speed	rpm	9010	8060	3280	5510	5460	5500	4860	4810	5100	4180
5 Nominal torque	mNm	0.579	1.29	2.42	2.36	2.34	2.35	2.35	2.33	2.28	2.24
6 Nominal current (max. continuous current)	A	0.72	0.72	0.495	0.394	0.293	0.253	0.224	0.186	0.162	0.105
7 Stall torque	mNm	5.36	4.65	4.05	4.84	4.78	4.82	4.54	4.48	4.49	4.04
8 Stall current	A	4.1	2.03	0.727	0.704	0.521	0.451	0.378	0.311	0.276	0.164
9 Max. efficiency	%	54	51	49	52	52	52	51	51	50	48
Characteristics											
10 Terminal resistance	Ω	0.366	1.48	8.25	12.8	23	31.1	39.7	57.9	76.1	183
11 Terminal inductance	mH	0.017	0.052	0.306	0.467	0.83	1.13	1.42	2.05	2.61	6.01
12 Torque constant	mNm/A	1.31	2.29	5.57	6.88	9.17	10.7	12	14.4	16.3	24.7
13 Speed constant	rpm/V	7290	4170	1720	1390	1040	893	795	663	587	387
14 Speed/torque gradient	rpm/mNm	2040	2690	2540	2580	2620	2590	2630	2660	2750	2880
15 Mechanical time constant	ms	22.6	23.1	23.1	23.2	23.3	23.3	23.5	23.4	23.5	23.9
16 Rotor inertia	gcm²	1.06	0.82	0.868	0.859	0.849	0.859	0.852	0.838	0.816	0.793

Specifications

Thermal data

17	Thermal resistance housing-ambient	29.8 K/W
18	Thermal resistance winding-housing	5.5 K/W
19	Thermal time constant winding	3.55 s
20	Thermal time constant motor	165 s
21	Ambient temperature	-30...+85°C
22	Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

23	Max. speed	11900 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	35 N
28	Max. radial load, 5 mm from flange	1.4 N

Mechanical data (ball bearings)

23	Max. speed	11900 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	2.2 N
27	Max. force for press fits (static)	30 N
28	Max. radial load, 5 mm from flange	7.8 N

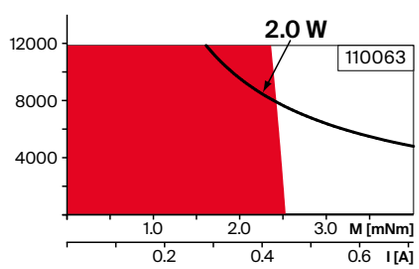
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	21 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

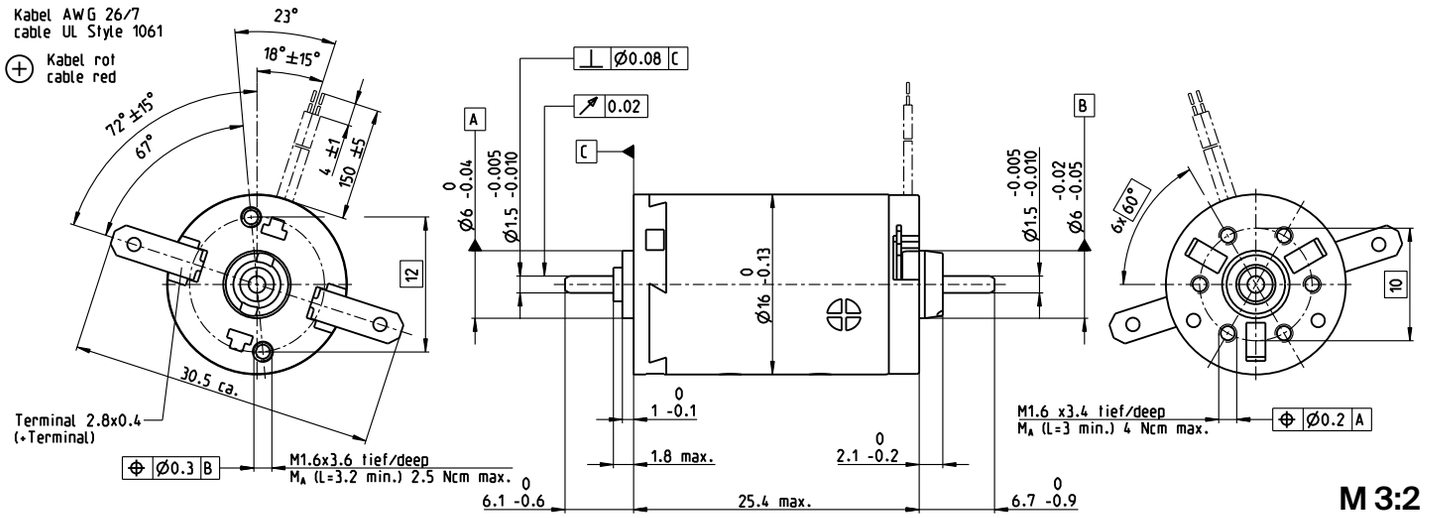
Details on catalog page 48

Gear
416_GP 16 A
417_GP 16 C
449_GS 16 A
450_GS 16 V
451_GS 16 VZ
469–471_GP 16 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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A-max 16 ∅16 mm, graphite brushes, 2 watt



Stock program
Standard program
Special program (on request)

		Part numbers									
	with terminals	110071	110072	110073	110074	110075	110076	110077	110078	110079	110080
	with cables	139825	352870	352871	352872	352873	352874	352875	352876	352877	352878
Motor data											
	Values at nominal voltage										
1	Nominal voltage	V	1.5	3	6	9	12	14	15	18	21	30
2	No load speed	rpm	10200	11500	9360	11500	11500	11500	11000	10900	11300	10500
3	No load current	mA	282	164	65.6	54.6	41	35.1	31.1	25.9	23	15
4	Nominal speed	rpm	9010	8060	3280	5510	5460	5500	4860	4810	5100	4180
5	Nominal torque	mNm	0.579	1.29	2.42	2.36	2.34	2.35	2.35	2.33	2.28	2.24
6	Nominal current (max. continuous current)	A	0.72	0.72	0.495	0.394	0.293	0.253	0.224	0.186	0.162	0.105
7	Stall torque	mNm	5.36	4.65	4.05	4.84	4.78	4.82	4.54	4.48	4.49	4.04
8	Stall current	A	4.1	2.03	0.727	0.704	0.521	0.451	0.378	0.311	0.276	0.164
9	Max. efficiency	%	54	51	49	52	52	52	51	51	50	48
	Characteristics										
10	Terminal resistance	Ω	0.366	1.48	8.25	12.8	23	31.1	39.7	57.9	76.1	183
11	Terminal inductance	mH	0.017	0.052	0.306	0.467	0.83	1.13	1.42	2.05	2.61	6.01
12	Torque constant	mNm/A	1.31	2.29	5.57	6.88	9.17	10.7	12	14.4	16.3	24.7
13	Speed constant	rpm/V	7290	4170	1720	1390	1040	893	795	663	587	387
14	Speed / torque gradient	rpm/mNm	2040	2690	2540	2580	2620	2590	2630	2660	2750	2880
15	Mechanical time constant	ms	22.6	23.1	23.1	23.2	23.3	23.3	23.5	23.4	23.5	23.9
16	Rotor inertia	gcm²	1.06	0.82	0.868	0.859	0.849	0.859	0.852	0.838	0.816	0.793

Specifications

Thermal data

17	Thermal resistance housing-ambient	29.8 K/W
18	Thermal resistance winding-housing	5.5 K/W
19	Thermal time constant winding	3.55 s
20	Thermal time constant motor	165 s
21	Ambient temperature	-30...+85°C
22	Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

23	Max. speed	11900 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	0.8 N
27	Max. force for press fits (static)	35 N
	(static, shaft supported)	280 N
28	Max. radial load, 5 mm from flange	1.4 N

Mechanical data (ball bearings)

23	Max. speed	11900 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	2.2 N
27	Max. force for press fits (static)	30 N
	(static, shaft supported)	280 N
28	Max. radial load, 5 mm from flange	7.8 N

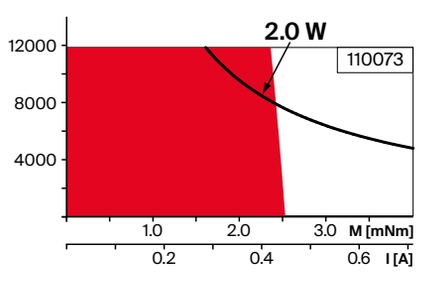
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	7
31	Weight of motor	22 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

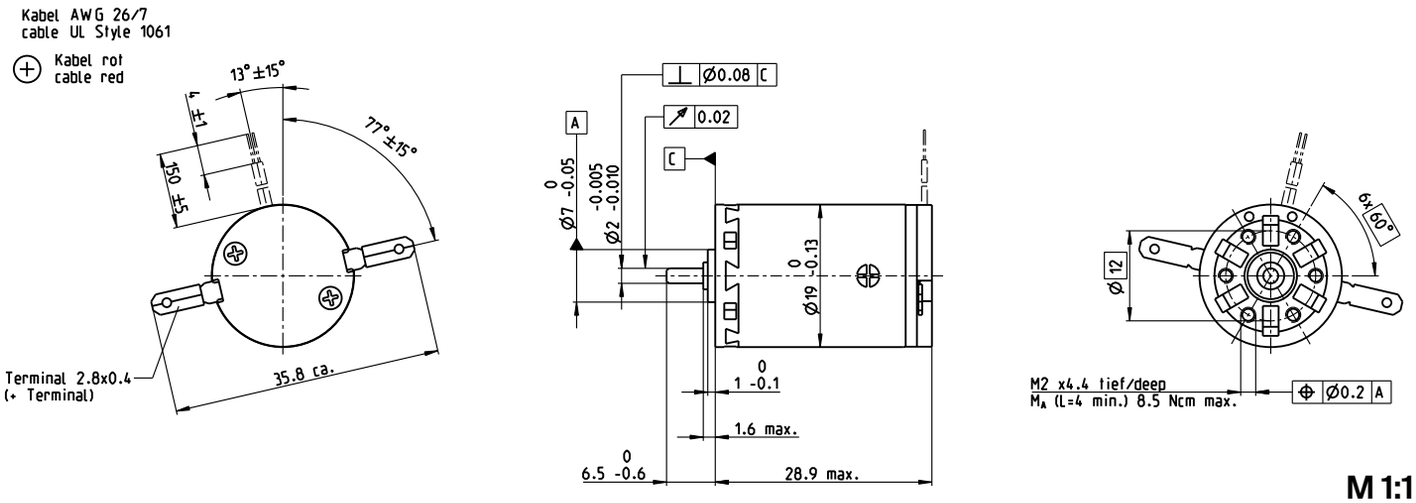
Gear
416_GP 16 A
417_GP 16 C
449_GS 16 A
450_GS 16 V
451_GS 16 VZ
469-471_GP 16 S

Sensor
498_ENX 13 GAMA
502_ENX 16 IMR
533_Encoder MR 32 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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A-max 19 ∅19 mm, precious metal brushes CLL, 2.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers								
	with terminals	110081	110082	110083	110084	110085	110086	110087	110088	110089
	with cables	139828	202411	352922	202412	352923	233453	238388	267427	235373
Motor data										
	Values at nominal voltage									
1	Nominal voltage	V	1.5	3.6	4.5	6	9	12	15	18	24
2	No load speed	rpm	8040	10800	9420	7790	9220	10300	10300	9300	8870
3	No load current	mA	78	52.9	33.6	18.6	16.2	14.6	11.7	8.25	5.73
4	Nominal speed	rpm	6840	8080	5710	4000	5470	6510	6500	5380	4900
5	Nominal torque	mNm	1.35	2.48	3.61	3.59	3.59	3.49	3.48	3.42	3.39
6	Nominal current (max. continuous current)	A	0.84	0.84	0.83	0.51	0.403	0.33	0.264	0.195	0.138
7	Stall torque	mNm	7.79	9.43	9	7.36	8.83	9.47	9.45	8.16	7.63
8	Stall current	A	4.44	3.02	2.01	1.02	0.963	0.867	0.692	0.45	0.301
9	Max. efficiency	%	76	76	76	76	76	76	76	76	75
	Characteristics									
10	Terminal resistance	Ω	0.338	1.19	2.24	5.88	9.34	13.8	21.7	40	79.7
11	Terminal inductance	mH	0.019	0.059	0.121	0.314	0.506	0.719	1.12	1.98	3.87
12	Torque constant	mNm/A	1.76	3.12	4.49	7.22	9.17	10.9	13.7	18.1	25.4
13	Speed constant	rpm/V	5440	3060	2130	1320	1040	874	699	526	377
14	Speed/torque gradient	rpm/mNm	1050	1170	1060	1080	1060	1110	1110	1160	1180
15	Mechanical time constant	ms	27.9	25.4	24.3	24.2	24.1	24.2	24.3	25	24.6
16	Rotor inertia	gcm²	2.54	2.07	2.18	2.14	2.16	2.09	2.09	2.06	1.99

Specifications

Thermal data

17	Thermal resistance housing-ambient	21.3 K/W
18	Thermal resistance winding-housing	10.5 K/W
19	Thermal time constant winding	11 s
20	Thermal time constant motor	201 s
21	Ambient temperature	-30...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1 N
27	Max. force for press fits (static)	80 N
28	Max. radial load, 5 mm from flange	2.7 N

Mechanical data (ball bearings)

23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	3.3 N
27	Max. force for press fits (static)	45 N
28	Max. radial load, 5 mm from flange	11.9 N

Other specifications

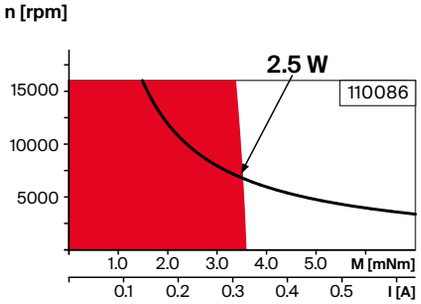
29	Number of pole pairs	1
30	Number of commutator segments	9
31	Weight of motor	33 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings
Without CLL

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

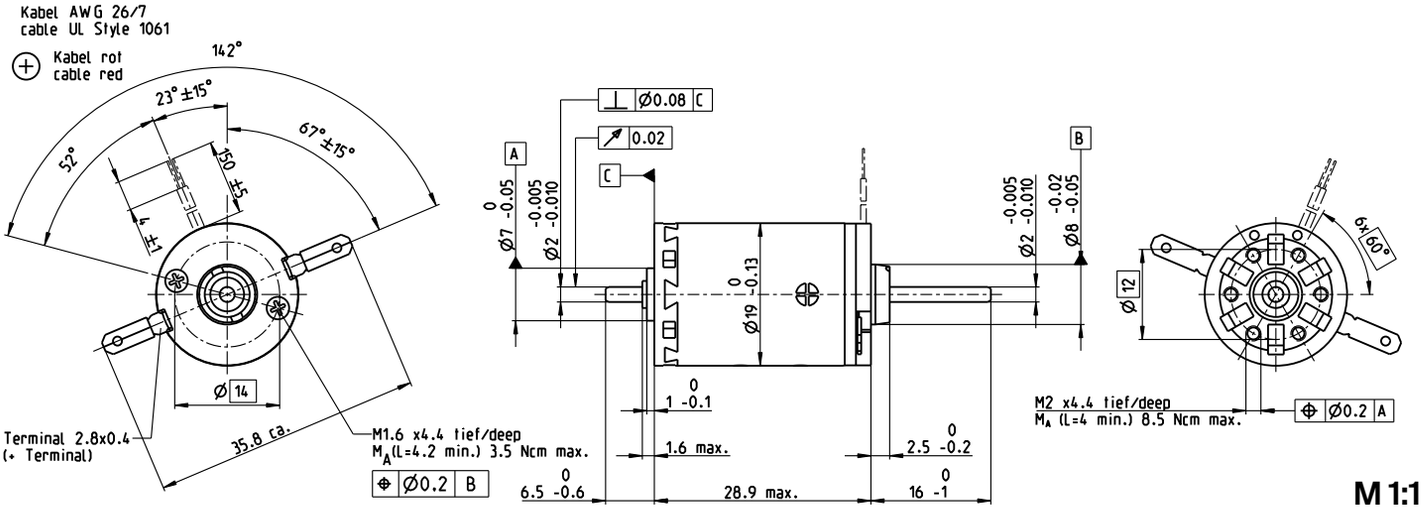
Details on catalog page 48

Gear
418_GP 19 B
420_GP 22 A
421_GP 22 C
452_GS 24 A
472_GP 22 S
473_GP 22 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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A-max 19 ∅19 mm, precious metal brushes CLL, 1.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

	with terminals	110090	110091	110092	110093	110094	110095	110096	110097	110098
	with cables	139832	352925	352926	352927	352928	352929	352930	315468	352931
Motor data										
	Values at nominal voltage									
1	Nominal voltage	V	1.2	2.4	3	4.8	6	7.2	9	12	18
2	No load speed	rpm	6390	7160	6230	6190	6090	6130	6130	6140	6590
3	No load current	mA	88.3	52	34.2	21.2	16.6	14	11.2	8.41	6.19
4	Nominal speed	rpm	5210	4410	2500	2410	2330	2290	2280	2210	2630
5	Nominal torque	mNm	1.33	2.49	3.62	3.57	3.59	3.51	3.51	3.43	3.38
6	Nominal current (max. continuous current)	A	0.84	0.84	0.833	0.511	0.405	0.332	0.265	0.195	0.138
7	Stall torque	mNm	6.23	6.28	6	5.89	5.89	5.68	5.67	5.44	5.73
8	Stall current	A	3.55	2.01	1.34	0.816	0.642	0.52	0.415	0.3	0.226
9	Max. efficiency	%	72	71	71	71	71	70	70	70	70
	Characteristics										
10	Terminal resistance	Ω	0.338	1.19	2.24	5.88	9.34	13.8	21.7	40	79.7
11	Terminal inductance	mH	0.019	0.059	0.121	0.314	0.506	0.719	1.12	1.98	3.87
12	Torque constant	mNm/A	1.76	3.12	4.49	7.22	9.17	10.9	13.7	18.1	25.4
13	Speed constant	rpm/V	5440	3060	2130	1320	1040	874	699	526	377
14	Speed / torque gradient	rpm/mNm	1050	1170	1060	1080	1060	1110	1110	1160	1180
15	Mechanical time constant	ms	27.9	25.4	24.3	24.2	24.1	24.3	24.3	25	24.7
16	Rotor inertia	gcm²	2.54	2.08	2.18	2.15	2.17	2.09	2.09	2.06	1.99

Specifications

Thermal data

17	Thermal resistance housing-ambient	21.3 K/W
18	Thermal resistance winding-housing	10.5 K/W
19	Thermal time constant winding	11 s
20	Thermal time constant motor	201 s
21	Ambient temperature	-30...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23	Max. speed	10 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1 N
27	Max. force for press fits (static)	80 N
	(static, shaft supported)	440 N
28	Max. radial load, 5 mm from flange	2.7 N

Mechanical data (ball bearings)

23	Max. speed	10 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	3.3 N
27	Max. force for press fits (static)	45 N
	(static, shaft supported)	440 N
28	Max. radial load, 5 mm from flange	11.9 N

Other specifications

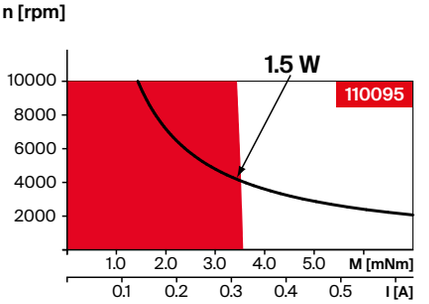
29	Number of pole pairs	1
30	Number of commutator segments	9
31	Weight of motor	34 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings
Without CLL

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

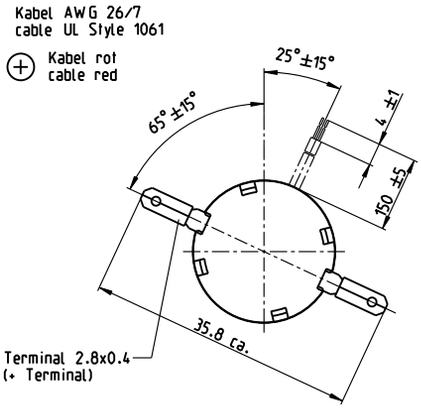
Gear
418_GP 19 B
420_GP 22 A
421_GP 22 C
452_GS 24 A
472_GP 22 S
473_GP 22 S

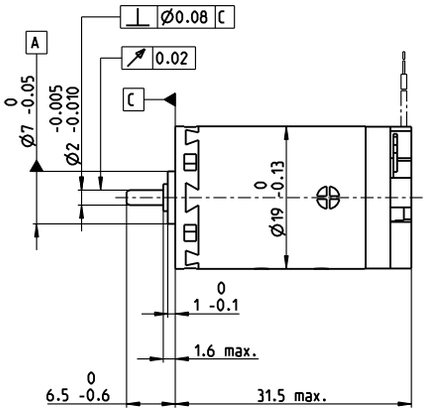
Sensor
498_ENX 13 GAMA
503_ENX 19 IMR
533_Encoder MR 32 CPT

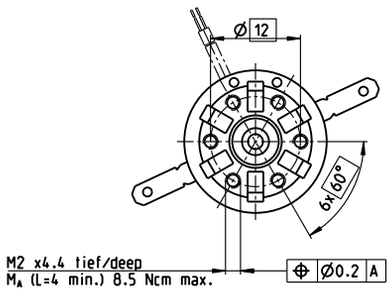
Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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A-max 19 ∅19 mm, graphite brushes, 2.5 watt







M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers								
	with terminals	249982	249983	249984	249985	249986	249987	249988	249989	249990
	with cables	240133	352942	310977	352943	352944	352945	352946	352947	310980
Motor data										
	Values at nominal voltage									
1	Nominal voltage	V	2.4	3.6	6	7.2	9	12	15	18	24
2	No load speed	rpm	12400	10400	12200	8980	8850	9930	9930	8910	8470
3	No load current	mA	292	158	114	66.1	51.9	44.6	35.7	26.3	18.6
4	Nominal speed	rpm	11700	8350	9310	4750	4630	5670	5670	4520	4020
5	Nominal torque	mNm	0.759	1.78	2.75	3.98	4.02	3.89	3.89	3.83	3.8
6	Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.612	0.485	0.397	0.317	0.235	0.167
7	Stall torque	mNm	14.1	9.66	12.1	8.84	8.83	9.47	9.44	8.16	7.63
8	Stall current	A	8.04	3.09	2.71	1.23	0.963	0.867	0.691	0.45	0.301
9	Max. efficiency	%	64	59	63	59	59	60	60	58	57
	Characteristics									
10	Terminal resistance	Ω	0.299	1.16	2.22	5.88	9.35	13.8	21.7	40	79.8
11	Terminal inductance	mH	0.019	0.059	0.121	0.314	0.506	0.719	1.12	1.98	3.87
12	Torque constant	mNm/A	1.76	3.12	4.49	7.22	9.17	10.9	13.7	18.1	25.4
13	Speed constant	rpm/V	5440	3060	2130	1320	1040	874	699	526	377
14	Speed/torque gradient	rpm/mNm	925	1140	1050	1080	1060	1110	1110	1160	1180
15	Mechanical time constant	ms	24.9	25.1	24.4	24.5	24.4	24.6	24.7	25.4	25
16	Rotor inertia	gcm²	2.57	2.1	2.21	2.17	2.2	2.12	2.12	2.09	2.02

Specifications

Thermal data

17	Thermal resistance housing-ambient	21.3 K/W
18	Thermal resistance winding-housing	10.5 K/W
19	Thermal time constant winding	11.0 s
20	Thermal time constant motor	201 s
21	Ambient temperature	-30...+85°C
22	Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

23	Max. speed	12 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1 N
27	Max. force for press fits (static)	80 N
28	Max. radial load, 5 mm from flange	2.7 N

Mechanical data (ball bearings)

23	Max. speed	12 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	3.3 N
27	Max. force for press fits (static)	45 N
28	Max. radial load, 5 mm from flange	11.9 N

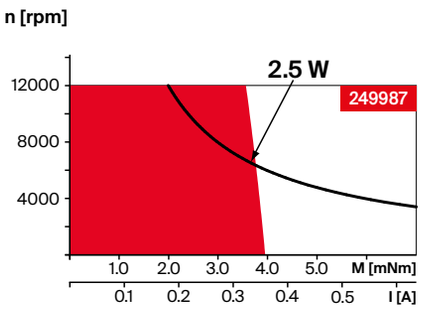
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	9
31	Weight of motor	33 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

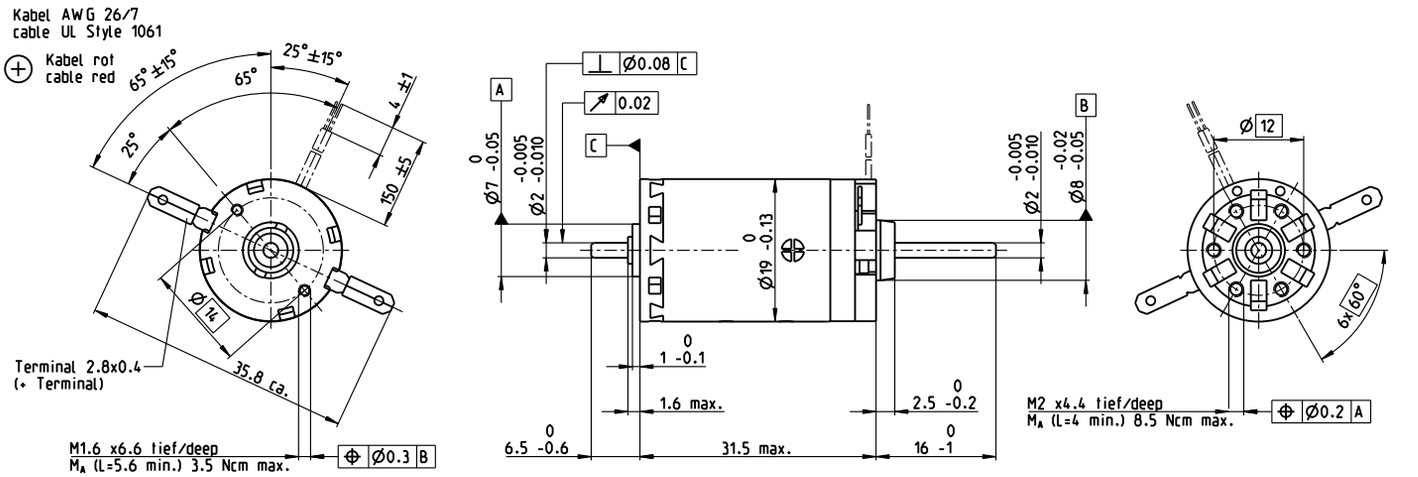
Details on catalog page 48

Gear
418_GP 19 B
420_GP 22 A
421_GP 22 C
452_GS 24 A
472_GP 22 S
473_GP 22 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2

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A-max 19 ∅19 mm, graphite brushes, 2.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

	with terminals	249991	249992	249993	249994	249995	249996	249997	249998	249999
	with cables	240035	352971	353590	352972	352973	344596	352974	352975	352976
Motor data										
	Values at nominal voltage									
1	Nominal voltage	V	2.4	3.6	6	7.2	9	12	15	18	24
2	No load speed	rpm	12400	10400	12200	8980	8850	9930	9930	8910	8470
3	No load current	mA	292	158	114	66.1	51.9	44.6	35.7	26.3	18.6
4	Nominal speed	rpm	11700	8350	9310	4750	4630	5670	5670	4520	4020
5	Nominal torque	mNm	0.759	1.78	2.75	3.98	4.02	3.89	3.89	3.83	3.8
6	Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.612	0.485	0.397	0.317	0.235	0.167
7	Stall torque	mNm	14.1	9.66	12.1	8.84	8.83	9.47	9.44	8.16	7.63
8	Stall current	A	8.04	3.09	2.71	1.23	0.963	0.867	0.691	0.45	0.301
9	Max. efficiency	%	64	59	63	59	59	60	60	58	57
	Characteristics										
10	Terminal resistance	Ω	0.299	1.16	2.22	5.88	9.35	13.8	21.7	40	79.8
11	Terminal inductance	mH	0.019	0.059	0.121	0.314	0.506	0.719	1.12	1.98	3.87
12	Torque constant	mNm/A	1.76	3.12	4.49	7.22	9.17	10.9	13.7	18.1	25.4
13	Speed constant	rpm/V	5440	3060	2130	1320	1040	874	699	526	377
14	Speed / torque gradient	rpm/mNm	925	1140	1050	1080	1060	1110	1110	1160	1180
15	Mechanical time constant	ms	24.6	24.8	24	24.2	24.1	24.2	24.3	25	24.6
16	Rotor inertia	gcm²	2.54	2.07	2.18	2.14	2.16	2.09	2.09	2.06	1.99

Specifications

Thermal data

17	Thermal resistance housing-ambient	21.3 K/W
18	Thermal resistance winding-housing	10.5 K/W
19	Thermal time constant winding	11.0 s
20	Thermal time constant motor	201 s
21	Ambient temperature	-30...+85°C
22	Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

23	Max. speed	12 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1 N
27	Max. force for press fits (static)	80 N
	(static, shaft supported)	480 N
28	Max. radial load, 5 mm from flange	2.7 N

Mechanical data (ball bearings)

23	Max. speed	12 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	3.3 N
27	Max. force for press fits (static)	45 N
	(static, shaft supported)	240 N
28	Max. radial load, 5 mm from flange	11.9 N

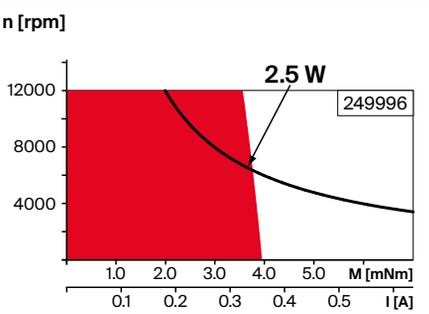
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	9
31	Weight of motor	34 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

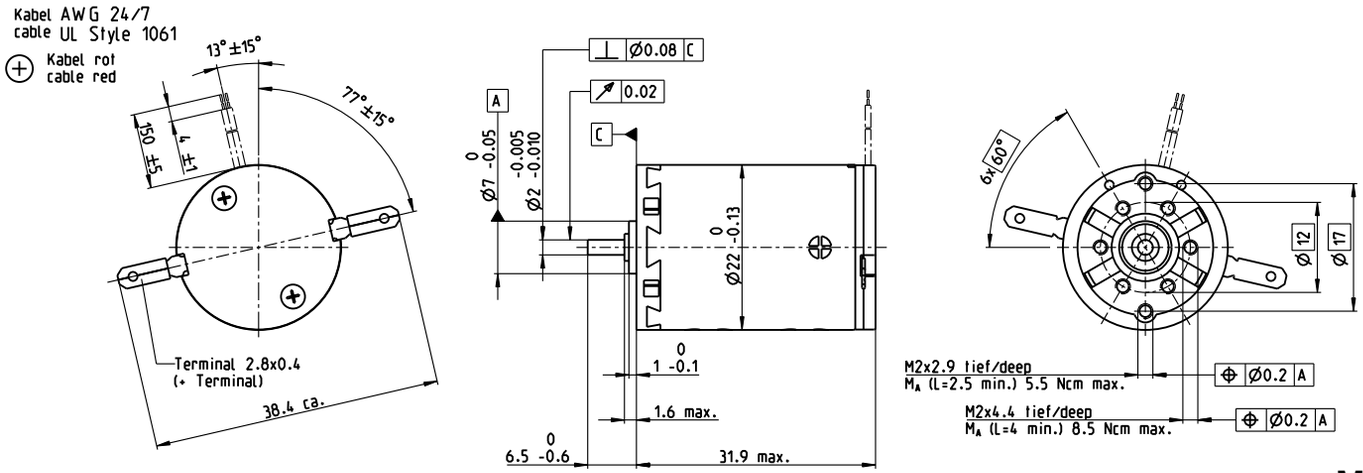
Gear
418_GP 19 B
420_GP 22 A
421_GP 22 C
452_GS 24 A
472_GP 22 S
473_GP 22 S

Sensor
498_ENX 13 GAMA
503_ENX 19 IMR
533_Encoder MR 32 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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A-max 22 ∅22 mm, precious metal brushes CLL, 5 watt



M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers												
	with terminals	110117	110119	110120	**110121**	110122	110123	110124	**110125**	110126	110127	**110128**	110129	
	with cables	139838	218799	238798	202413	258367	137255	134267	134666	267423	137476	310003	342390	
Motor data														
	Values at nominal voltage													
1	Nominal voltage	V	6	9	9	12	12	15	18	24	30	36	48	48
2	No load speed	rpm	9630	9970	8760	10400	9400	10300	9970	10700	10800	9800	9280	8370
3	No load current	mA	29.5	20.8	16.8	16.8	14.2	13.1	10.4	8.81	7.18	5.06	3.47	2.93
4	Nominal speed	rpm	7390	7300	6100	7770	6700	7530	7220	7970	8070	7000	6420	5520
5	Nominal torque	mNm	4.81	6.22	6.3	6.24	6.18	6.1	6.05	6.02	5.98	5.94	5.83	5.9
6	Nominal current (max. continuous current)	A	0.84	0.745	0.661	0.586	0.523	0.451	0.362	0.291	0.234	0.175	0.122	0.111
7	Stall torque	mNm	20.1	22.9	20.5	24.3	21.4	22.9	22	23.5	23.5	20.8	19	17.4
8	Stall current	A	3.42	2.68	2.11	2.23	1.77	1.65	1.28	1.11	0.894	0.599	0.387	0.32
9	Max. efficiency	%	83	84	83	84	83	83	83	83	83	83	82	82
	Characteristics													
10	Terminal resistance	Ω	1.76	3.36	4.27	5.39	6.78	9.07	14	21.6	33.5	60.1	124	150
11	Terminal inductance	mH	0.106	0.222	0.288	0.362	0.445	0.584	0.89	1.37	2.1	3.68	7.29	8.95
12	Torque constant	mNm/A	5.9	8.55	9.73	10.9	12.1	13.9	17.1	21.2	26.2	34.8	48.9	54.3
13	Speed constant	rpm/V	1620	1120	981	875	790	689	558	450	364	274	195	176
14	Speed/torque gradient	rpm/mNm	482	438	430	432	443	451	458	459	465	474	494	486
15	Mechanical time constant	ms	20.5	19.8	19.7	19.7	19.8	20.2	20.1	20.2	20.3	20.3	20.5	20.4
16	Rotor inertia	gcm²	4.07	4.32	4.37	4.36	4.26	4.27	4.2	4.2	4.16	4.09	3.97	4.01

Specifications

Thermal data

17	Thermal resistance housing-ambient	20 K/W
18	Thermal resistance winding-housing	6.0 K/W
19	Thermal time constant winding	10.2 s
20	Thermal time constant motor	313 s
21	Ambient temperatureC	-30...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1 N
27	Max. force for press fits (static)	80 N
28	Max. radial load, 5 mm from flange	2.8 N

Mechanical data (ball bearings)

23	Max. speed	16 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	3.3 N
27	Max. force for press fits (static)	45 N
28	Max. radial load, 5 mm from flange	12.3 N

Other specifications

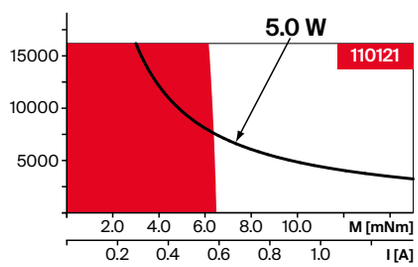
29	Number of pole pairs	1
30	Number of commutator segments	9
31	Weight of motor	54 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings
Without CLL

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

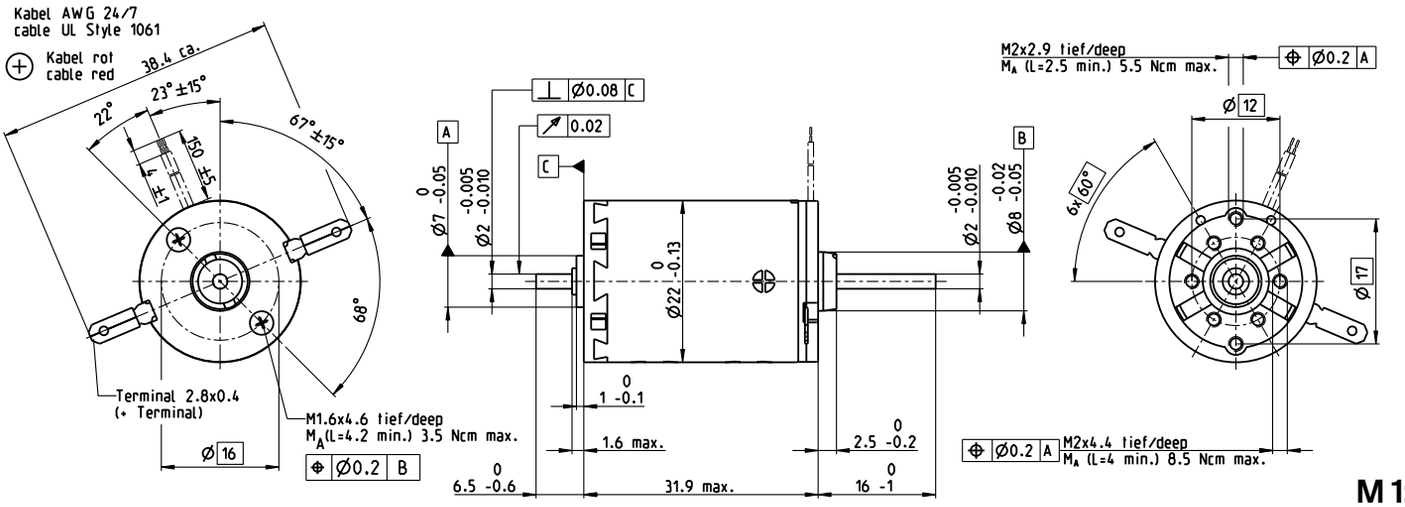
Details on catalog page 48

Gear
419_GP 22 B
420_GP 22 A
421_GP 22 C
452_GS 24 A
472_GP 22 S
473_GP 22 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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A-max 22 ∅22 mm, precious metal brushes CLL, 3.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers												
	with terminals	110130	110132	110133	110134	110135	110136	110137	110138	110139	110140	110141	110142
	with cables	139846	352986	352987	352988	352989	352990	352991	352992	352993	352994	352995	352996
Motor data														
	Values at nominal voltage													
1	Nominal voltage	V	4.5	6	7.2	7.2	7.2	9	12	15	18	24	36	42
2	No load speed	rpm	7210	6630	7000	6240	5620	6140	6630	6680	6480	6520	6950	7320
3	No load current	mA	26.7	17.8	16	13.6	11.8	10.6	8.88	7.17	5.73	4.33	3.16	2.92
4	Nominal speed	rpm	5010	3940	4330	3550	2890	3400	3890	3930	3710	3720	4100	4490
5	Nominal torque	mNm	4.82	6.27	6.31	6.31	6.24	6.21	6.16	6.15	6.11	6.05	5.91	5.95
6	Nominal current (max. continuous current)	A	0.84	0.749	0.662	0.589	0.525	0.457	0.368	0.296	0.237	0.177	0.123	0.112
7	Stall torque	mNm	15.4	15.3	16.4	14.6	12.8	14	14.9	15	14.4	14.2	14.5	15.5
8	Stall current	A	2.61	1.79	1.69	1.34	1.06	1.01	0.872	0.706	0.547	0.407	0.296	0.286
9	Max. efficiency	%	81	81	82	81	80	81	81	81	81	81	81	81
	Characteristics													
10	Terminal resistance	Ω	1.72	3.36	4.27	5.39	6.78	8.9	13.8	21.2	32.9	59	122	147
11	Terminal inductance	mH	0.106	0.222	0.288	0.362	0.445	0.585	0.89	1.37	2.1	3.69	7.29	8.95
12	Torque constant	mNm/A	5.9	8.55	9.73	10.9	12.1	13.9	17.1	21.2	26.2	34.8	48.9	54.3
13	Speed constant	rpm/V	1620	1120	981	875	790	689	558	450	364	274	195	176
14	Speed/torque gradient	rpm/mNm	474	438	430	432	443	443	449	450	456	465	485	477
15	Mechanical time constant	ms	20.2	19.8	19.7	19.7	19.8	19.8	19.8	19.8	19.9	19.9	20.2	20
16	Rotor inertia	gcm²	4.07	4.32	4.38	4.36	4.26	4.27	4.2	4.21	4.16	4.1	3.97	4.01

Specifications

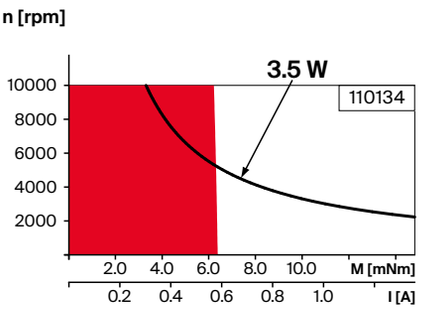
	Thermal data	
17	Thermal resistance housing-ambient	20 K/W
18	Thermal resistance winding-housing	6.0 K/W
19	Thermal time constant winding	10.2 s
20	Thermal time constant motor	313 s
21	Ambient temperature	-30...+65°C
22	Max. winding temperature	+85°C
	Mechanical data (sleeve bearings)	
23	Max. speed	10 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1 N
27	Max. force for press fits (static)	80 N
	(static, shaft supported)	440 N
28	Max. radial load, 5 mm from flange	2.8 N
	Mechanical data (ball bearings)	
23	Max. speed	10 000 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	3.3 N
27	Max. force for press fits (static)	45 N
	(static, shaft supported)	440 N
28	Max. radial load, 5 mm from flange	12.3 N
	Other specifications	
29	Number of pole pairs	1
30	Number of commutator segments	9
31	Weight of motor	54 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings
Without CLL

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

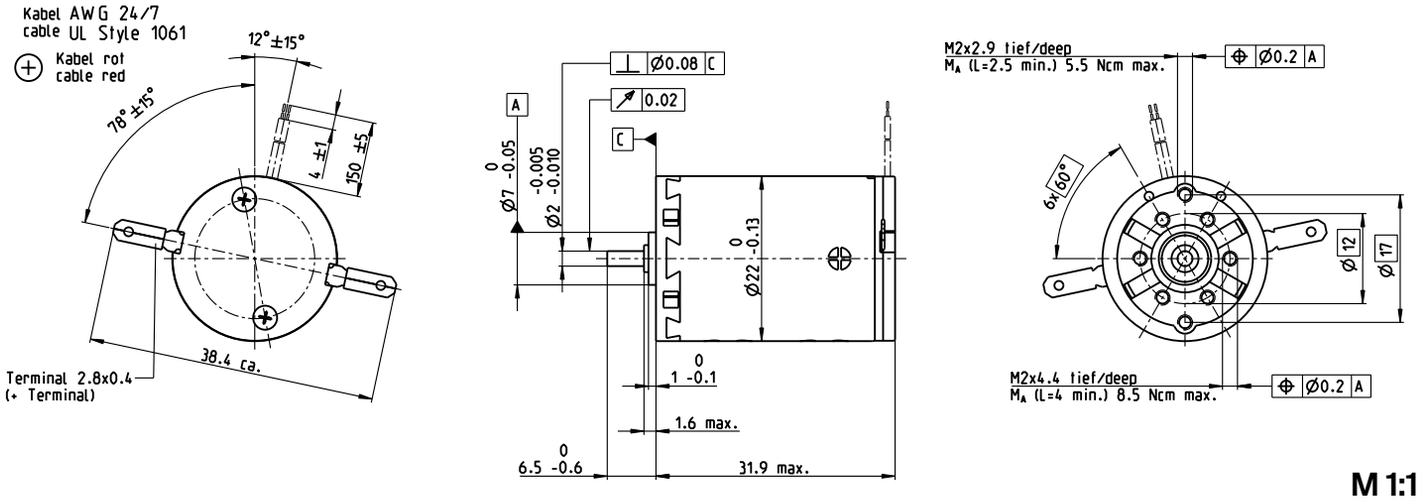
Gear
419_GP 22 B
420_GP 22 A
421_GP 22 C
452_GS 24 A
472_GP 22 S
473_GP 22 S

Sensor
498_ENX 13 GAMA
504_ENX 22 IMR
533_Encoder MR 32 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5

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A-max 22 ∅22 mm, graphite brushes, 6 watt



M 1:1

Stock program
Standard program
Special program (on request)

		Part numbers												
	with terminals	110143	110145	110146	**110147**	110148	110149	110150	**110151**	110152	110153	110154	110155
	with cables	139840	353017	199807	320206	323856	108828	199424	202921	267433	325492	313302	353019
Motor data														
	Values at nominal voltage													
1	Nominal voltage	V	6	9	9	12	12	15	18	24	24	36	48	48
2	No load speed	rpm	9240	9690	8500	10200	9170	10000	9770	10500	8480	9630	9110	8210
3	No load current	mA	83.1	57.9	49.6	45.8	40.5	36	29	23.7	18.4	14.2	9.99	8.84
4	Nominal speed	rpm	6240	6530	5350	7060	6000	6890	6600	7380	5270	6420	5840	4940
5	Nominal torque	mNm	5.91	6.88	7.04	6.96	6.95	6.93	6.92	6.9	6.97	6.86	6.75	6.86
6	Nominal current (max. continuous current)	A	1.08	0.859	0.77	0.681	0.613	0.534	0.432	0.347	0.283	0.21	0.147	0.135
7	Stall torque	mNm	19.4	22.1	19.8	23.7	20.9	22.9	22	23.7	18.9	21.1	19.2	17.6
8	Stall current	A	3.29	2.59	2.04	2.17	1.72	1.65	1.29	1.12	0.721	0.606	0.393	0.325
9	Max. efficiency	%	67	70	69	72	70	72	72	73	70	72	71	70
	Characteristics													
10	Terminal resistance	Ω	1.82	3.48	4.42	5.53	6.96	9.09	14	21.5	33.3	59.4	122	148
11	Terminal inductance	mH	0.106	0.223	0.288	0.363	0.445	0.585	0.891	1.37	2.1	3.69	7.3	8.97
12	Torque constant	mNm/A	5.9	8.55	9.73	10.9	12.1	13.9	17.1	21.2	26.2	34.8	48.9	54.3
13	Speed constant	rpm/V	1620	1120	981	875	790	689	558	450	364	274	195	176
14	Speed/torque gradient	rpm/mNm	500	454	446	444	455	452	457	456	461	468	487	479
15	Mechanical time constant	ms	20.9	20.2	20.1	19.9	19.9	19.9	19.7	19.7	19.8	19.7	19.9	19.8
16	Rotor inertia	gcm²	4	4.25	4.3	4.29	4.19	4.2	4.13	4.13	4.09	4.02	3.9	3.94

Specifications

Thermal data

17	Thermal resistance housing-ambient	20 K/W
18	Thermal resistance winding-housing	6.0 K/W
19	Thermal time constant winding	10.2 s
20	Thermal time constant motor	314 s
21	Ambient temperature	-30...+85°C
22	Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

23	Max. speed	9800 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1 N
27	Max. force for press fits (static)	80 N
28	Max. radial load, 5 mm from flange	2.8 N

Mechanical data (ball bearings)

23	Max. speed	9800 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	3.3 N
27	Max. force for press fits (static)	45 N
28	Max. radial load, 5 mm from flange	12.3 N

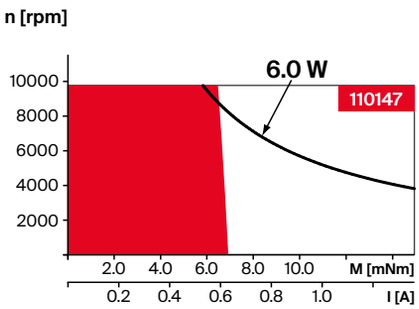
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	9
31	Weight of motor	54 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

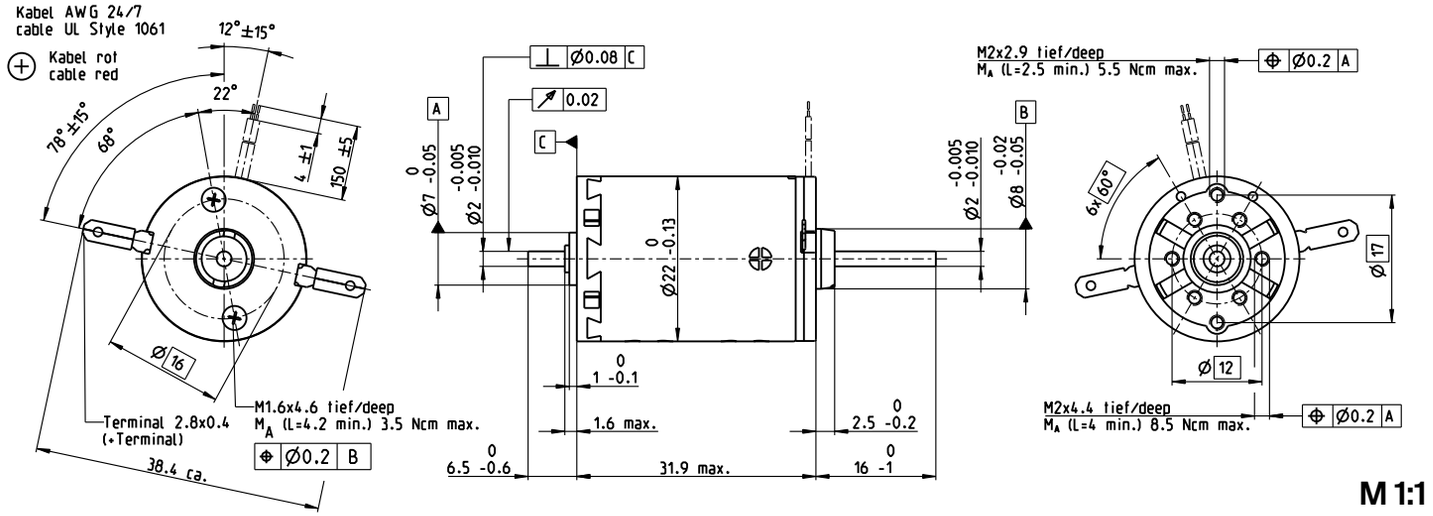
Details on catalog page 48

Gear
419_GP 22 B
420_GP 22 A
421_GP 22 C
452_GS 24 A
472_GP 22 S
473_GP 22 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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A-max 22 ∅22 mm, graphite brushes, 6 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

	with terminals	110156	110158	110159	110160	110161	110162	110163	110164	110165	110166	110167	110168
	with cables	139848	353023	353024	231171	353025	353026	231174	353027	353028	353029	316659	353603
Motor data													
	Values at nominal voltage												
1	Nominal voltage	V	6	9	9	12	12	15	18	24	24	36	48	48
2	No load speed	rpm	9240	9690	8500	10200	9170	10000	9770	10500	8480	9630	9110	8210
3	No load current	mA	83.1	57.9	49.6	45.8	40.5	36	29	23.7	18.4	14.2	9.99	8.84
4	Nominal speed	rpm	6240	6530	5350	7060	6000	6890	6600	7380	5270	6420	5840	4940
5	Nominal torque	mNm	5.91	6.88	7.04	6.96	6.95	6.93	6.92	6.9	6.97	6.86	6.75	6.86
6	Nominal current (max. continuous current)	A	1.08	0.859	0.77	0.681	0.613	0.534	0.432	0.347	0.283	0.21	0.147	0.135
7	Stall torque	mNm	19.4	22.1	19.8	23.7	20.9	22.9	22	23.7	18.9	21.1	19.2	17.6
8	Stall current	A	3.29	2.59	2.04	2.17	1.72	1.65	1.29	1.12	0.721	0.606	0.393	0.325
9	Max. efficiency	%	67	70	69	72	70	72	72	73	70	72	71	70
	Characteristics													
10	Terminal resistance	Ω	1.82	3.48	4.42	5.53	6.96	9.09	14	21.5	33.3	59.4	122	148
11	Terminal inductance	mH	0.106	0.223	0.288	0.363	0.445	0.585	0.891	1.37	2.1	3.69	7.3	8.97
12	Torque constant	mNm/A	5.9	8.55	9.73	10.9	12.1	13.9	17.1	21.2	26.2	34.8	48.9	54.3
13	Speed constant	rpm/V	1620	1120	981	875	790	689	558	450	364	274	195	176
14	Speed/torque gradient	rpm/mNm	500	454	446	444	455	452	457	456	461	468	487	479
15	Mechanical time constant	ms	21.3	20.5	20.4	20.2	20.3	20.2	20.1	20.1	20.1	20.1	20.2	20.1
16	Rotor inertia	gcm²	4.07	4.32	4.37	4.36	4.26	4.27	4.2	4.2	4.16	4.09	3.97	4.01

Specifications

Thermal data

17	Thermal resistance housing-ambient	20 K/W
18	Thermal resistance winding-housing	6.0 K/W
19	Thermal time constant winding	10.2 s
20	Thermal time constant motor	313 s
21	Ambient temperature	-30...+85°C
22	Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

23	Max. speed	9800 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1 N
27	Max. force for press fits (static)	80 N
	(static, shaft supported)	440 N
28	Max. radial load, 5 mm from flange	2.8 N

Mechanical data (ball bearings)

23	Max. speed	9800 rpm
24	Axial play	0.05 - 0.15 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	3.3 N
27	Max. force for press fits (static)	45 N
	(static, shaft supported)	240 N
28	Max. radial load, 5 mm from flange	12.3 N

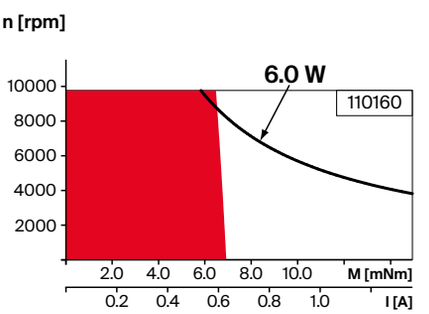
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	9
31	Weight of motor	54 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

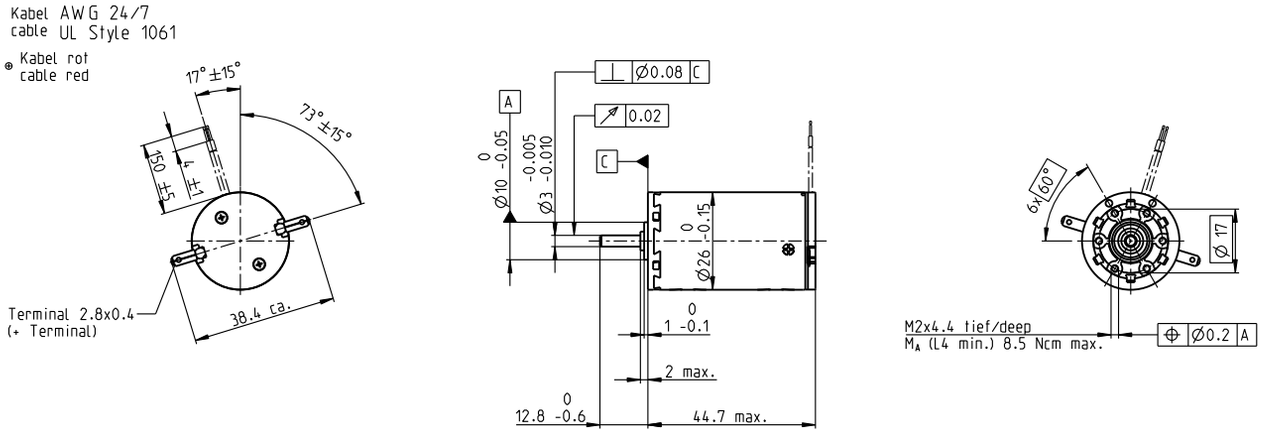
Gear
419_GP 22 B
420_GP 22 A
421_GP 22 C
452_GS 24 A
472_GP 22 S
473_GP 22 S

Sensor
498_ENX 13 GAMA
504_ENX 22 IMR
533_Encoder MR 32 CPT

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5

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A-max 26 ∅26 mm, precious metal brushes CLL, 7 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

	with terminals	110181	110182	110183	110184	110185	110186	110187	110188	110189	110190	110191
	with cables	353078	353079	353080	353081	329757	353082	332818	353083	353084	353085	353086
Motor data												
	Values at nominal voltage											
1	Nominal voltage	V	4.5	6	9	12	15	18	24	30	36	42	48
2	No load speed	rpm	7320	8670	6160	6780	6720	6690	5670	6090	6780	6570	6050
3	No load current	mA	78.9	77.7	30.2	26.3	20.7	17.1	9.97	8.9	8.76	7.15	5.5
4	Nominal speed	rpm	6900	8130	5000	5340	5060	5010	3940	4370	5060	4820	4280
5	Nominal torque	mNm	4.46	5.02	11.3	13.7	15.8	15.6	15.3	15.3	15.2	15	15
6	Nominal current (max. continuous current)	A	0.84	0.84	0.84	0.84	0.766	0.627	0.391	0.336	0.31	0.254	0.204
7	Stall torque	mNm	67.3	73.5	58.8	63.5	63.6	62.1	50.3	54.2	60.2	56.4	51.4
8	Stall current	A	11.5	11.2	4.25	3.78	3.01	2.43	1.25	1.16	1.2	0.93	0.683
9	Max. efficiency	%	84	84	84	84	84	84	83	84	84	84	83
	Characteristics												
10	Terminal resistance	Ω	0.39	0.536	2.12	3.17	4.99	7.41	19.2	25.8	30.1	45.1	70.2
11	Terminal inductance	mH	0.04	0.051	0.227	0.333	0.529	0.77	1.9	2.58	2.99	4.34	6.68
12	Torque constant	mNm/A	5.84	6.57	13.9	16.8	21.2	25.5	40.1	46.7	50.3	60.6	75.2
13	Speed constant	rpm/V	1640	1450	689	569	451	374	238	205	190	158	127
14	Speed/torque gradient	rpm/mNm	109	119	105	108	106	108	114	113	114	117	119
15	Mechanical time constant	ms	16.5	16	15	14.9	14.8	14.8	14.9	14.9	14.9	15	15
16	Rotor inertia	gcm²	14.4	12.9	13.6	13.2	13.3	13.1	12.5	12.6	12.5	12.2	12.1

Specifications

Thermal data

17	Thermal resistance housing-ambient	13.2 K/W
18	Thermal resistance winding-housing	3.2 K/W
19	Thermal time constant winding	13.8 s
20	Thermal time constant motor	473 s
21	Ambient temperature	-30...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23	Max. speed	11000 rpm
24	Axial play	0.1 - 0.2 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1.7 N
27	Max. force for press fits (static)	80 N
28	Max. radial load, 5 mm from flange	5.5 N

Mechanical data (ball bearings)

23	Max. speed	11000 rpm
24	Axial play	0.1 - 0.2 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	5 N
27	Max. force for press fits (static)	75 N
28	Max. radial load, 5 mm from flange	20.5 N

Other specifications

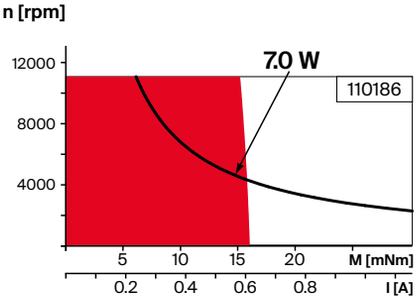
29	Number of pole pairs	1
30	Number of commutator segments	13
31	Weight of motor	117 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings
Without CLL

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

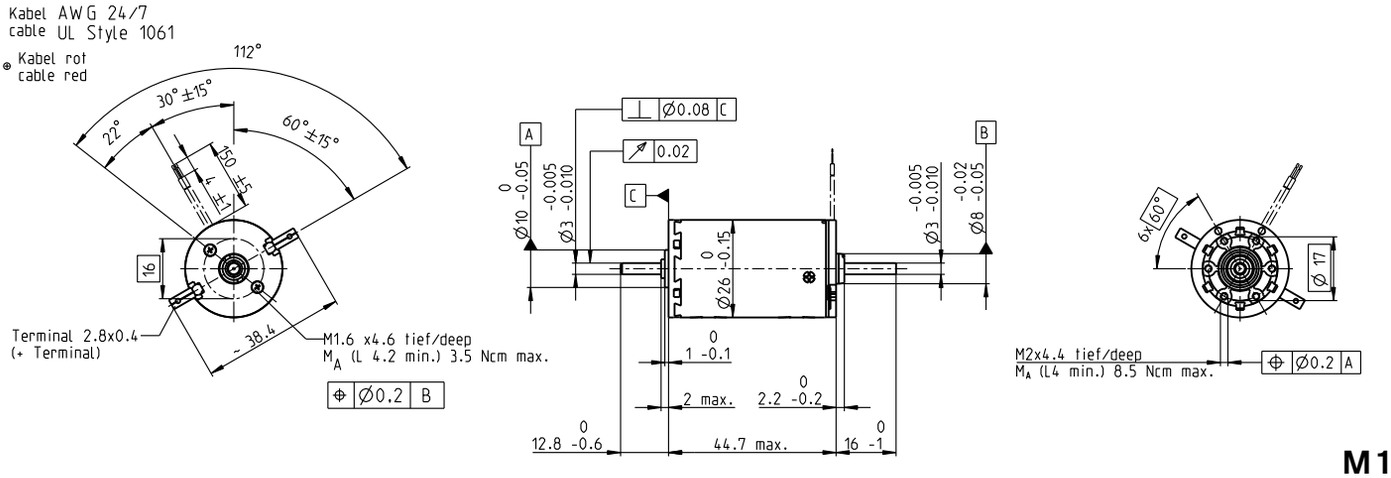
Details on catalog page 48

Gear
425_GP 26 A
426_GP 32 BZ
427_GP 32 A
429_GP 32 C
474–482_GP 32 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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A-max 26 ∅26 mm, precious metal brushes CLL, 4.5 watt



M 1:2

Stock program
Standard program
Special program (on request)

		Part numbers										
	with terminals	110204	110205	110206	110207	110208	110209	110210	110211	110212	110213	110214
	with cables	353109	353110	353111	353112	353113	353114	353115	353116	353117	353118	353119
Motor data												
	Values at nominal voltage											
1	Nominal voltage	V	2.4	3.6	6	7.2	9	12	15	18	24	30	36
2	No load speed	rpm	3890	5190	4090	4060	4020	4440	3530	3640	4510	4680	4520
3	No load current	mA	67.7	69.9	29.2	24	19	16.5	9.41	8.2	8.45	7.16	5.67
4	Nominal speed	rpm	3460	4640	2940	2650	2620	3030	2070	2180	3060	3210	3050
5	Nominal torque	mNm	4.53	5.08	11.3	13.3	13.4	13.2	12.9	12.9	12.8	12.6	12.5
6	Nominal current (max. continuous current)	A	0.84	0.84	0.84	0.814	0.647	0.529	0.33	0.284	0.262	0.214	0.171
7	Stall torque	mNm	35.9	44.1	39.2	38.1	38.2	41.4	31.4	32.5	40.1	40.3	38.5
8	Stall current	A	6.15	6.71	2.83	2.27	1.8	1.62	0.783	0.697	0.797	0.665	0.513
9	Max. efficiency	%	81	81	81	81	81	81	80	80	81	81	81
	Characteristics												
10	Terminal resistance	Ω	0.39	0.536	2.12	3.17	4.99	7.41	19.2	25.8	30.1	45.1	70.2
11	Terminal inductance	mH	0.0402	0.0509	0.227	0.332	0.528	0.77	1.9	2.57	2.99	4.34	6.68
12	Torque constant	mNm/A	5.84	6.57	13.9	16.8	21.2	25.5	40.1	46.7	50.3	60.6	75.2
13	Speed constant	rpm/V	1640	1450	689	569	451	374	238	205	190	158	127
14	Speed/torque gradient	rpm/mNm	109	119	105	108	106	108	114	113	114	117	119
15	Mechanical time constant	ms	16.6	16.1	15	14.9	14.9	14.9	14.9	14.9	14.9	15	15
16	Rotor inertia	gcm²	14.4	12.9	13.6	13.2	13.3	13.1	12.6	12.6	12.5	12.2	12.1

Specifications

Thermal data

17	Thermal resistance housing-ambient	13.2 K/W
18	Thermal resistance winding-housing	3.2 K/W
19	Thermal time constant winding	12.5 s
20	Thermal time constant motor	473 s
21	Ambient temperature	-30...+65°C
22	Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23	Max. speed	6700 rpm
24	Axial play	0.1 - 0.2 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1.7 N
27	Max. force for press fits (static)	80 N
	(static, shaft supported)	1200 N
28	Max. radial load, 5 mm from flange	5.5 N

Mechanical data (ball bearings)

23	Max. speed	6700 rpm
24	Axial play	0.1 - 0.2 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	5.0 N
27	Max. force for press fits (static)	75 N
	(static, shaft supported)	1200 N
28	Max. radial load, 5 mm from flange	20.5 N

Other specifications

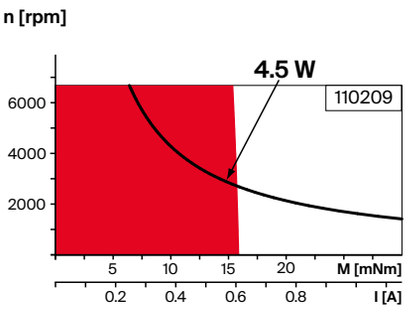
29	Number of pole pairs	1
30	Number of commutator segments	13
31	Weight of motor	119 g

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Ball bearings in place of sleeve bearings
Without CLL

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

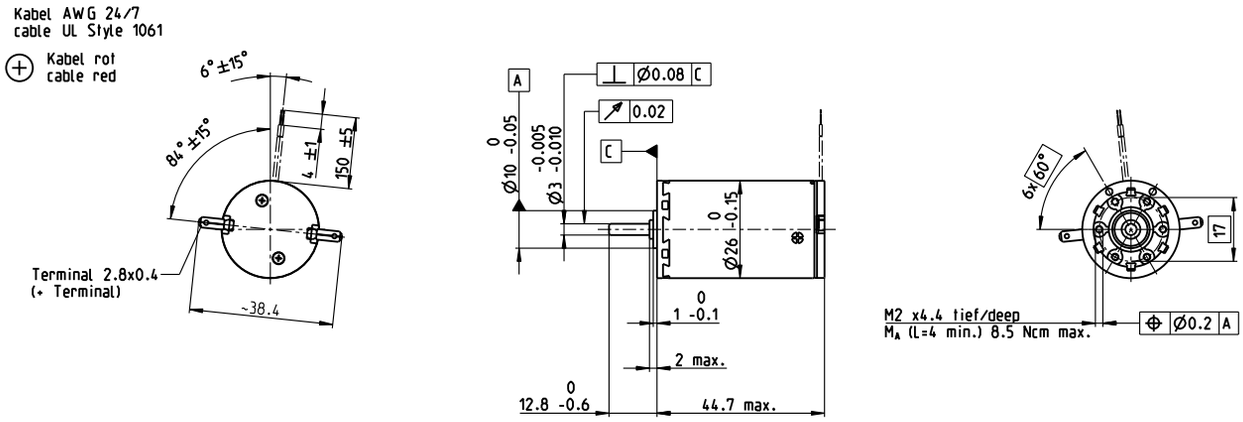
Gear
425_GP 26 A
426_GP 32 BZ
428_GP 32 A
429_GP 32 C
474–482_GP 32 S

Sensor
498_ENX 13 GAMA
505_ENX 25 IMR
536_Encoder HEDS 5540
538_Encoder HEDL 5540

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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A-max 26 ∅26 mm, graphite brushes, 11 watt



M 1:2

Stock program
Standard program
Special program (on request)

		Part numbers										
	with terminals	110935	110936	110937	110938	110939	110940	110941	110942	110943	110944	110945
	with cables	139852	353166	353167	353168	353169	206344	353171	314214	202893	353174	353175
Motor data												
	Values at nominal voltage											
1	Nominal voltage	V	6	7.2	12	15	18	24	30	36	42	48	48
2	No load speed	rpm	9740	10400	8190	8450	8040	8890	7050	7280	7880	7470	6010
3	No load current	mA	143	130	57	47.5	37.1	31.7	18.9	16.4	15.5	12.7	9.66
4	Nominal speed	rpm	9210	9700	6720	6620	6080	6910	5000	5230	5840	5390	3900
5	Nominal torque	mNm	5.48	6.26	14.2	17.4	18.7	18.4	18.2	18.2	18.1	17.8	17.9
6	Nominal current (max. continuous current)	A	1.08	1.08	1.08	1.08	0.919	0.749	0.47	0.404	0.373	0.305	0.247
7	Stall torque	mNm	102	96.4	80.2	80.5	77.1	83.3	63	65.2	70.3	64.5	51.4
8	Stall current	A	17.4	14.7	5.79	4.8	3.64	3.26	1.57	1.4	1.4	1.06	0.684
9	Max. efficiency	%	83	82	81	81	81	82	80	80	80	80	78
	Characteristics												
10	Terminal resistance	Ω	0.345	0.49	2.07	3.13	4.94	7.36	19.1	25.8	30.1	45.1	70.2
11	Terminal inductance	mH	0.04	0.051	0.227	0.333	0.529	0.77	1.9	2.58	2.99	4.34	6.68
12	Torque constant	mNm/A	5.84	6.57	13.9	16.8	21.2	25.5	40.1	46.7	50.3	60.6	75.2
13	Speed constant	rpm/V	1640	1450	689	569	451	374	238	205	190	158	127
14	Speed/torque gradient	rpm/mNm	96.6	109	103	106	105	108	113	113	113	117	119
15	Mechanical time constant	ms	14.6	14.7	14.6	14.7	14.7	14.7	14.9	14.9	14.9	15	15
16	Rotor inertia	gcm²	14.4	12.9	13.6	13.2	13.3	13.1	12.5	12.6	12.5	12.2	12.1

Specifications

Thermal data

17	Thermal resistance housing-ambient	13.2 K/W
18	Thermal resistance winding-housing	3.2 K/W
19	Thermal time constant winding	12.5 s
20	Thermal time constant motor	473 s
21	Ambient temperature	-30...+85°C
22	Max. winding temperature	+125°C

Mechanical data (ball bearings)

23	Max. speed	10400 rpm
24	Axial play	0.1 - 0.2 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	5 N
27	Max. force for press fits (static)	75 N
28	Max. radial load, 5 mm from flange	20 N

Mechanical data (sleeve bearings)

23	Max. speed	10400 rpm
24	Axial play	0.1 - 0.2 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1.7 N
27	Max. force for press fits (static)	80 N
28	Max. radial load, 5 mm from flange	5.5 N

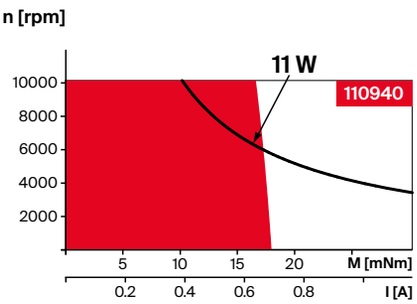
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	13
31	Weight of motor	117 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Sleeve bearings in place of ball bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

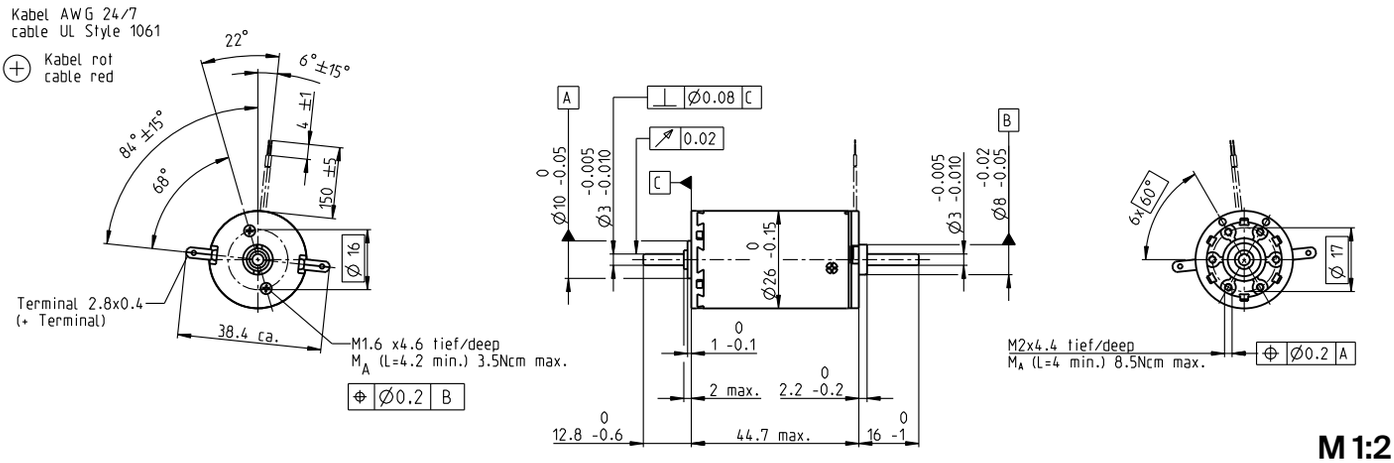
Details on catalog page 48

Gear
425_GP 26 A
426_GP 32 BZ
428_GP 32 A
429_GP 32 C
474–482_GP 32 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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A-max 26 ∅26 mm, graphite brushes, 11 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

	with terminals	110958	110959	110960	110961	110962	110963	110964	110965	110966	110967	110968
	with cables	353606	353607	353608	353609	353610	353611	353612	353613	353614	353615	353616
Motor data												
	Values at nominal voltage											
1	Nominal voltage	V	6	7.2	12	15	18	24	30	36	42	48	48
2	No load speed	rpm	9740	10400	8190	8450	8040	8890	7050	7280	7880	7470	6010
3	No load current	mA	143	130	57	47.5	37.1	31.7	18.9	16.4	15.5	12.7	9.66
4	Nominal speed	rpm	9210	9700	6720	6620	6080	6910	5000	5230	5840	5390	3900
5	Nominal torque	mNm	5.48	6.26	14.2	17.4	18.7	18.4	18.2	18.2	18.1	17.8	17.9
6	Nominal current (max. continuous current)	A	1.08	1.08	1.08	1.08	0.919	0.749	0.47	0.404	0.373	0.305	0.247
7	Stall torque	mNm	102	96.4	80.2	80.5	77.1	83.3	63	65.2	70.3	64.5	51.4
8	Stall current	A	17.4	14.7	5.79	4.8	3.64	3.26	1.57	1.4	1.4	1.06	0.684
9	Max. efficiency	%	83	82	81	81	81	82	80	80	80	80	78
	Characteristics												
10	Terminal resistance	Ω	0.345	0.49	2.07	3.13	4.94	7.36	19.1	25.8	30.1	45.1	70.2
11	Terminal inductance	mH	0.04	0.051	0.227	0.333	0.529	0.77	1.9	2.58	2.99	4.34	6.68
12	Torque constant	mNm/A	5.84	6.57	13.9	16.8	21.2	25.5	40.1	46.7	50.3	60.6	75.2
13	Speed constant	rpm/V	1640	1450	689	569	451	374	238	205	190	158	127
14	Speed / torque gradient	rpm/mNm	96.6	109	103	106	105	108	113	113	113	117	119
15	Mechanical time constant	ms	14.6	14.7	14.6	14.7	14.7	14.7	14.9	14.9	14.9	15	15
16	Rotor inertia	gcm²	14.4	12.9	13.6	13.2	13.3	13.1	12.5	12.6	12.5	12.2	12.1

Specifications

Thermal data

17	Thermal resistance housing-ambient	13.2 K/W
18	Thermal resistance winding-housing	3.2 K/W
19	Thermal time constant winding	12.5 s
20	Thermal time constant motor	473 s
21	Ambient temperature	-30...+85°C
22	Max. winding temperature	+125°C

Mechanical data (ball bearings)

23	Max. speed	10 400 rpm
24	Axial play	0.1 - 0.2 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	5 N
27	Max. force for press fits (static)	75 N
	(static, shaft supported)	1200 N
28	Max. radial load, 5 mm from flange	20 N

Mechanical data (sleeve bearings)

23	Max. speed	10 400 rpm
24	Axial play	0.1 - 0.2 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	1.7 N
27	Max. force for press fits (static)	80 N
	(static, shaft supported)	1200 N
28	Max. radial load, 5 mm from flange	5.5 N

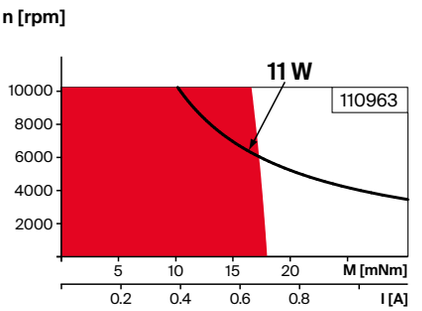
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	13
31	Weight of motor	119 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Sleeve bearings in place of ball bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

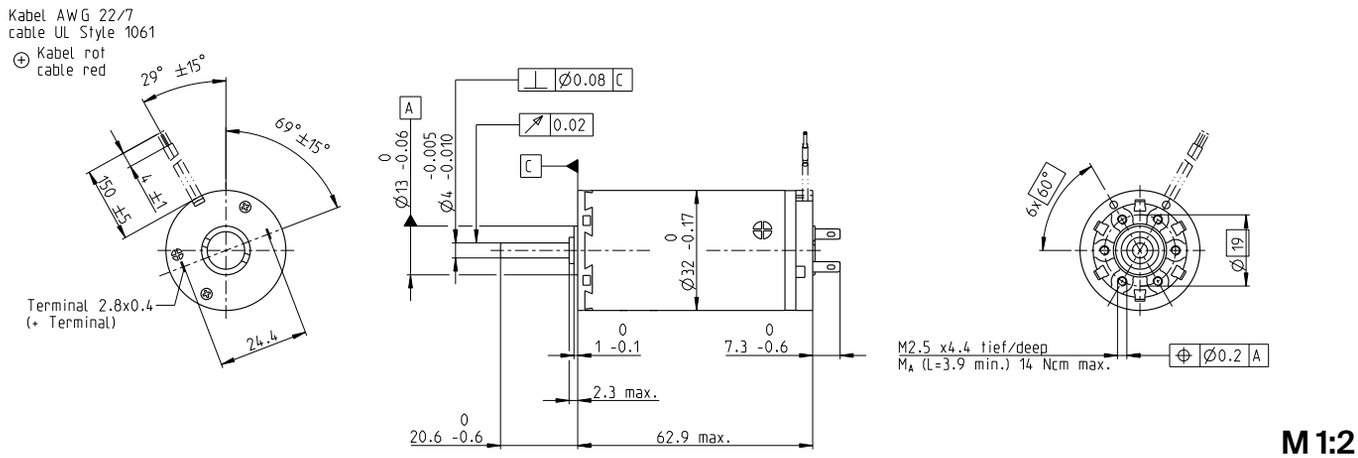
Gear
425_GP 26 A
426_GP 32 BZ
428_GP 32 A
429_GP 32 C
474–482_GP 32 S

Sensor
498_ENX 13 GAMA
505_ENX 25 IMR
536_Encoder HEDS 5540
538_Encoder HEDL 5540

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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A-max 32 ∅32 mm, graphite brushes, 20 watt



M 1:2

Stock program
Standard program
Special program (on request)

		Part numbers						
with terminals		236659	236660	236661	236662	236663	236664	236665
with cables		353230	353231	353232	262500	341970	353233	353234
Motor data								
Values at nominal voltage								
1 Nominal voltage	V	6	9	12	24	30	36	42
2 No load speed	rpm	4880	5000	4670	6460	6160	5860	5650
3 No load current	mA	123	84.2	58.2	42.8	32.3	25.3	20.8
4 Nominal speed	rpm	3400	3480	3170	5060	4740	4430	4210
5 Nominal torque	mNm	44.5	43.1	44	45.5	45.1	45.4	45
6 Nominal current (max. continuous current)	A	3.96	2.62	1.87	1.33	1.01	0.804	0.659
7 Stall torque	mNm	153	146	140	212	197	189	178
8 Stall current	A	13.2	8.57	5.77	6.02	4.27	3.24	2.54
9 Max. efficiency	%	80	80	80	84	83	83	83
Characteristics								
10 Terminal resistance	Ω	0.454	1.05	2.08	3.99	7.02	11.1	16.6
11 Terminal inductance	mH	0.06	0.13	0.264	0.556	0.954	1.52	2.22
12 Torque constant	mNm/A	11.6	17	24.3	35.2	46.1	58.2	70.4
13 Speed constant	rpm/V	825	562	394	271	207	164	136
14 Speed/torque gradient	rpm/mNm	32.4	34.8	33.8	30.8	31.6	31.3	31.9
15 Mechanical time constant	ms	15	14.9	14.7	14.6	14.6	14.6	14.7
16 Rotor inertia	gcm²	44.2	40.8	41.7	45.3	44.2	44.6	43.8

Specifications

Thermal data

17	Thermal resistance housing-ambient	7.5 K/W
18	Thermal resistance winding-housing	2.1 K/W
19	Thermal time constant winding	17.8 s
20	Thermal time constant motor	521 s
21	Ambient temperature	-20...+85°C
22	Max. winding temperature	+125°C

Mechanical data (ball bearings)

23	Max. speed	6000 rpm
24	Axial play	0.12 - 0.22 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	7.6 N
27	Max. force for press fits (static)	110 N
28	Max. radial load, 5 mm from flange	32 N

Mechanical data (sleeve bearings)

23	Max. speed	6000 rpm
24	Axial play	0.12 - 0.22 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	5 N
27	Max. force for press fits (static)	110 N
28	Max. radial load, 5 mm from flange	10.5 N

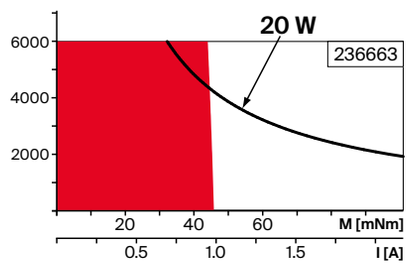
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	13
31	Weight of motor	240 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Sleeve bearings in place of ball bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

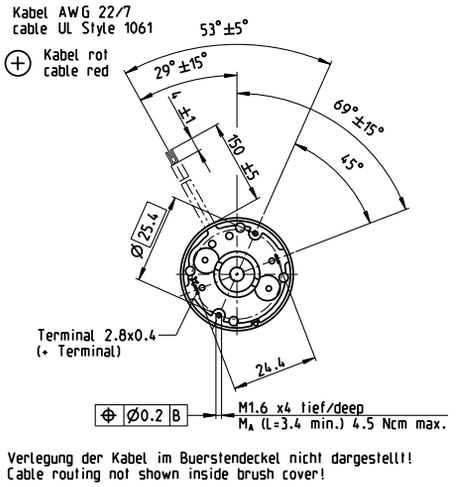
Details on catalog page 48

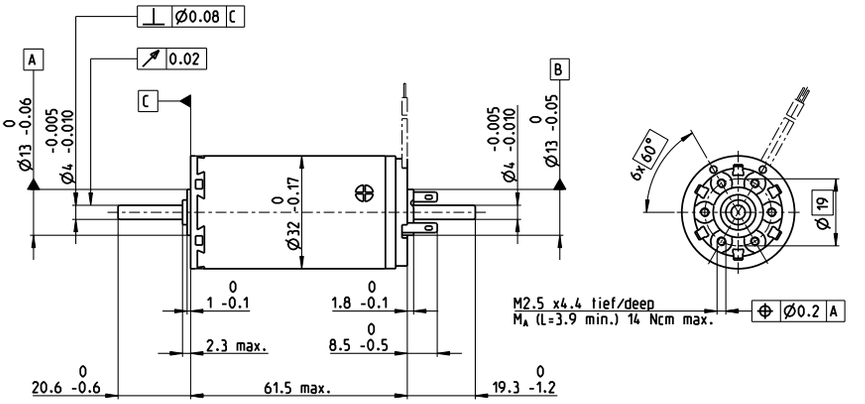
Gear
426_GP 32 BZ
428_GP 32 A
429_GP 32 C
474–482_GP 32 S

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5

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A-max 32 ∅32 mm, graphite brushes, 20 watt





M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

	with terminals	236666	236667	236668	236669	236670	236671	236672
	with cables	353236	353237	301030	353239	353240	353241	353242
Motor data								
	Values at nominal voltage							
1	Nominal voltage	V	6	9	12	24	30	36	42
2	No load speed	rpm	4880	5000	4670	6460	6160	5860	5650
3	No load current	mA	123	84.2	58.2	42.8	32.3	25.3	20.8
4	Nominal speed	rpm	3400	3480	3170	5060	4740	4430	4210
5	Nominal torque	mNm	44.5	43.1	44	45.5	45.1	45.4	45
6	Nominal current (max. continuous current)	A	3.96	2.62	1.87	1.33	1.01	0.804	0.659
7	Stall torque	mNm	153	146	140	212	197	189	178
8	Stall current	A	13.2	8.57	5.77	6.02	4.27	3.24	2.54
9	Max. efficiency	%	80	80	80	84	83	83	83
	Characteristics							
10	Terminal resistance	Ω	0.454	1.05	2.08	3.99	7.02	11.1	16.6
11	Terminal inductance	mH	0.06	0.13	0.264	0.556	0.954	1.52	2.22
12	Torque constant	mNm/A	11.6	17	24.3	35.2	46.1	58.2	70.4
13	Speed constant	rpm/V	825	562	394	271	207	164	136
14	Speed/torque gradient	rpm/mNm	32.4	34.8	33.8	30.8	31.6	31.3	31.9
15	Mechanical time constant	ms	15	14.9	14.7	14.6	14.6	14.6	14.7
16	Rotor inertia	gcm²	44.2	40.8	41.7	45.3	44.2	44.6	43.8

Specifications

Thermal data

17	Thermal resistance housing-ambient	7.5 K/W
18	Thermal resistance winding-housing	2.1 K/W
19	Thermal time constant winding	17.8 s
20	Thermal time constant motor	521 s
21	Ambient temperature	-20...+85°C
22	Max. winding temperature	+125°C

Mechanical data (ball bearings)

23	Max. speed	6000 rpm
24	Axial play	0.12 - 0.22 mm
25	Radial play	0.025 mm
26	Max. axial load (dynamic)	7.6 N
27	Max. force for press fits (static)	110 N
	(static, shaft supported)	2000 N
28	Max. radial load, 5 mm from flange	32 N

Mechanical data (sleeve bearings)

23	Max. speed	6000 rpm
24	Axial play	0.12 - 0.22 mm
25	Radial play	0.012 mm
26	Max. axial load (dynamic)	5.0 N
27	Max. force for press fits (static)	110 N
	(static, shaft supported)	2000 N
28	Max. radial load, 5 mm from flange	10.5 N

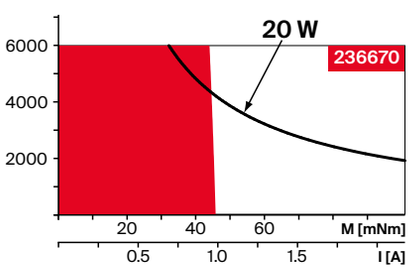
Other specifications

29	Number of pole pairs	1
30	Number of commutator segments	13
31	Weight of motor	240 g

Values listed in the table are nominal.
Explanation of the figures on page 94.

Option
Sleeve bearings in place of ball bearings

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient = Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 48

Gear
426_GP 32 BZ
428_GP 32 A
429_GP 32 C
474–482_GP 32 S

Sensor
506_ENX 32 IMR
536_Encoder HEDS 5540
538_Encoder HEDL 5540

Motor Control
550_ESCON Module 24/2
550_ESCON 36/2 DC
551_ESCON Module 50/5
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

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Brushless DC motors (BLDC) with ironless or iron core windings

Standard specification no. 101	90
Terminology explanations	190
ECX SPEED	193–232
ECX PRIME	235–240
ECX TORQUE	243–245
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ECX FLAT	257–265
EC	269–275
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EC-4pole	291–297
EC-i	300–315
EC-flat	319–329
EC-frameless flat	333–338
EC-frameless DT	341–348

Explanations of maxon terminology EC motor

maxon

Dimensional drawings
Presentation of the views according to the projection method E (ISO).  All dimensions in [mm].

Motor Data
The values in lines 2 – 15 are valid when using block commutation.

1 Nominal voltage U_N [Volt]
is the applied voltage between two powered phases in block commutation. See page 66 for the timing diagram of the voltage in the three phases. All nominal data (lines 2 – 9) refer to this voltage. Lower and higher voltages are permissible, provided that limits are not exceeded.

2 No load speed n_0 [rpm] ±10%
is the speed at which the unloaded motor runs with the nominal voltage applied. It is approximately proportional to the applied voltage.

3 No load current I_0 [mA] ±50%
This is the typical current that the unloaded motor draws when operating at nominal voltage. It increases with rising speed owing to bearing friction and iron losses. No load friction depends heavily on temperature. In extended operation, the motor heats up and the no load friction and no load current decrese.

4 Nominal speed n_N [rpm]
is the speed set for operation at nominal voltage and nominal torque at a motor temperature of 25 °C.

5 Nominal torque M_N [mNm]
is the torque generated for operation at nominal voltage and nominal current at a motor temperature of 25 °C. It is at the limit of the motor's continuous operation range. Higher torques heat up the winding too much.

6 Nominal current I_N [A]
is the current in the active phase in block commutation that generates the nominal torque at the given nominal speed (= max. permissible continuous load current). The maximum winding temperature is reached at 25 °C ambient temperature in continuous operation with I_N. I_N decreases as speed increases due to additional losses in the lamination.

7 Stall torque M_H [mNm]
For ironless windings, this is the calculated load torque that brings the shaft to a standstill at nominal voltage. For windings with an iron core, this is the measured value, as they are subject to the saturation effect.

8 Stall current I_A [A]
is the quotient from nominal voltage and the motor's terminal resistance. Stall current is equivalent to stall torque. With larger motors, I_A cannot often be reached due to the amplifier's current limits.

9 Max. efficiency η_{max} [%]
is the optimal relationship between input and output power at nominal voltage. It also doesn't always denote the optimal operating point.

10 Terminal resistance phase to phase R [Ω]
is determined by the resistance at 25 °C between two connections of the default configuration.

11 Terminal inductance phase to phase L [mH]
is the winding inductance between two connections. It is measured at 1 kHz, sinusoidal.

12 Torque constant k_M [mNm/A]
This may also be referred to as «specific torque» and represents the quotient from generated torque and applicable current.

13 Speed constant k_n [rpm/V]
indicates the theoretical no load speed per volt of applied voltage, disregarding friction losses.

14 Speed/torque gradient
Δ_n/Δ_M [rpm/mNm]
The speed/torque gradient is an indicator of the motor's performance. The smaller the value, the more powerful the motor and consequently the less motor speed varies with load variations. It is based on the quotient of ideal no load speed and ideal stall torque (tolerance ±20%).
The real characteristic curve depends on the speed for EC motors with slotted winding (EC flat and EC-i); it is steeper at high speeds and flatter at slow speeds. The real gradient at nominal voltage can be approximated by a straight line between no load speed and the nominal operating point (see page 83).

15 Mechanical time constant τ_m [ms]
is the time required for the rotor to accelerate from standstill to 63% of its no load speed.

16 Rotor moment of inertia J_R [gcm²]
is the mass moment of inertia of the rotor, based on the axis of rotation.

17 Thermal resistance housing-ambient R_{th2} [K/W]
and
18 Thermal resistance winding-housing R_{th1} [K/W]
Characteristic values of thermal contact resistance without additional heat sinking. Lines 17 and 18 combined define the maximum heating at a given power loss (load). Thermal resistance R_{th2} on motors with metal flanges can decrease by up to 80% if the motor is coupled directly to a good heat-conducting (e.g. metallic) mounting rather than a plastic panel.

19 Thermal time constant winding τ_w [s]
and
20 Thermal time constant motor τ_s [s]
These are the typical reaction times for a temperature change of winding and motor. It can be seen that the motor reacts much more sluggishly in thermal terms than the winding. The values are calculated from the product of thermal capacity and given heat resistances.

21 Ambient temperature [°C]
Operating temperature range. This derives from the heat reliability of the materials used and viscosity of bearing lubrication.

22 Max. winding temperature [°C]
Maximum permissible winding temperature.

23 Max. speed n_{max} [rpm]
is the maximum recommended speed based on thermal and mechanical perspectives. A reduced service life can be expected at higher speeds.

24 Axial play [mm]
On motors that are not preloaded, these are the tolerance limits for the bearing play. A preload cancels out the axial play up to the specified axial force. When load is applied in the direction of the preload force (away from the flange), the axial play is always zero. The length tolerance of the shaft includes the maximum axial play.

25 Radial play [mm]
Radial play is the bearing's radial movement. A spring is utilized to preload the motor's bearings, eliminating radial play up to a given axial load.

26/27 Max. axial load [N]
Dynamic: axial loading permissible in operation. If different values apply for traction and thrust, the smaller value is given.
Static: maximum axial force that does not cause permanent damage when applied to the front of the shaft at standstill.
Shaft supported: maximum axial force applying to the shaft at standstill if the force is not input at the other shaft end. This is not possible for motors with only one shaft end.

28 Max. radial load [N]
The value is given for a typical distance from the front flange. As the distance increases, this value decreases.

29 Number of pole pairs
Number of north poles of the permanent magnet. The phase streams and commutation signals pass through per revolution p cycles. Servo-controllers require the correct details of the number of pole pairs.

30 Number of phases
All maxon EC motors have three phases.

31 Weight of motor [g]

32 Typical noise level [dBA]
Is the statistical average of the noise level measured in accordance with the maxon standard (10 cm distance radially to the drive, no-load operation at a certain speed. The drive lies freely on a plastic foam mat in the noise chamber).
The acoustic noise level depends on a number of factors, such as component tolerances, and it is greatly influenced by the overall system in which the drive is installed. When the drive is installed in an unfavorable constellation, the noise level may be significantly higher than the noise level of the drive alone.
The acoustic noise level is measured and determined during product qualification. In manufacturing, a structure-borne noise test is performed with defined limits. Impermissible deviations can thus be identified.

33 Max. torque M_{max} [mNm]
Maximum torque the motor can briefly deliver. It is limited by the overload protection of the electronics.

34 Max. current I_{max} [A]
Surge current with which the peak torque is generated at nominal voltage. With an active speed controller, surge current is not proportionate to the torque, but also depends on the supply voltage. As a result, this value only applies at nominal voltage.

35 Type of control
«Speed» means that the drive is fitted with an integral speed controller. «Controlled» means that the drive is fitted with true commutation electronics.

36 Supply voltage $+V_{CC}$ [V]
Range of supply voltages measured in respect of GND at which the drive functions.

37 Speed set value input U_C [V]
Range of analog voltage for set speed value measured in respect of GND. For 2 wire solutions, the supply voltage acts as speed setting at the same time.

38 Scaling Set speed value input k_c [rpm/V]
Set speed value n_c is based on the product $n_c = k_c \cdot U_c$.

39 Speed range
Achievable speeds in the controlled range.

40 Max. acceleration
The set speed value follows a sudden set point change with a ramp. This value indicates the increase in the ramp.

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maxon ECX SPEED

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ECX SPEED 4 L ∅4 mm, 1 Watt		194
ECX SPEED 6 M ∅6 mm, 1.5 Watt		195
ECX SPEED 6 M ∅6 mm, 2 Watt, High Power		196
ECX SPEED 8 M ∅8 mm, 2 Watt		197
ECX SPEED 8 M ∅8 mm, 3 Watt, High Power		198
ECX SPEED 10 M ∅10 mm, 8 Watt		199
ECX SPEED 10 L ∅10 mm, 16 Watt	NEW	200
ECX SPEED 13 M ∅13 mm, 12 Watt		201
ECX SPEED 13 M ∅13 mm, 25 Watt, High Power		202
ECX SPEED 13 M ∅13 mm, 25 Watt, sterilizable		203
ECX SPEED 13 M ∅13 mm, 25 Watt, sterilizable ceramic		204
ECX SPEED 13 L ∅13 mm, 25 Watt		205
ECX SPEED 13 L ∅13 mm, 50 Watt, High Power		206
ECX SPEED 13 L ∅13 mm, 50 Watt, sterilizable		207
ECX SPEED 13 L ∅13 mm, 50 Watt, sterilizable ceramic		208
ECX SPEED 16 M ∅16 mm, 20 Watt		209
ECX SPEED 16 M ∅16 mm, 40 Watt, High Power		210
ECX SPEED 16 M ∅16 mm, 40 Watt, sterilizable		211
ECX SPEED 16 M ∅16 mm, 40 Watt, sterilizable ceramic		212
ECX SPEED 16 L ∅16 mm, 40 Watt		213
ECX SPEED 16 L ∅16 mm, 80 Watt, High Power		214
ECX SPEED 16 L ∅16 mm, 80 Watt, sterilizable		215
ECX SPEED 16 L ∅16 mm, 80 Watt, sterilizable ceramic		216
ECX SPEED 19 M ∅19 mm, 30 Watt		217
ECX SPEED 19 M ∅19 mm, 60 Watt, High Power		218
ECX SPEED 19 M ∅19 mm, 60 Watt, sterilizable		219
ECX SPEED 19 M ∅19 mm, 60 Watt, sterilizable ceramic		220
ECX SPEED 19 L ∅19 mm, 60 Watt		221
ECX SPEED 19 L ∅19 mm, 120 Watt, High Power		222
ECX SPEED 19 L ∅19 mm, 120 Watt, sterilizable		223
ECX SPEED 19 L ∅19 mm, 120 Watt, sterilizable ceramic		224
ECX SPEED 22 M ∅22 mm, 40 Watt		225
ECX SPEED 22 M ∅22 mm, 80 Watt, High Power		226
ECX SPEED 22 M ∅22 mm, 80 Watt, sterilizable		227
ECX SPEED 22 M ∅22 mm, 80 Watt, sterilizable ceramic		228
ECX SPEED 22 L ∅22 mm, 80 Watt		229
ECX SPEED 22 L ∅22 mm, 120 Watt, High Power		230
ECX SPEED 22 L ∅22 mm, 120 Watt, sterilizable		231
ECX SPEED 22 L ∅22 mm, 120 Watt, sterilizable ceramic		232



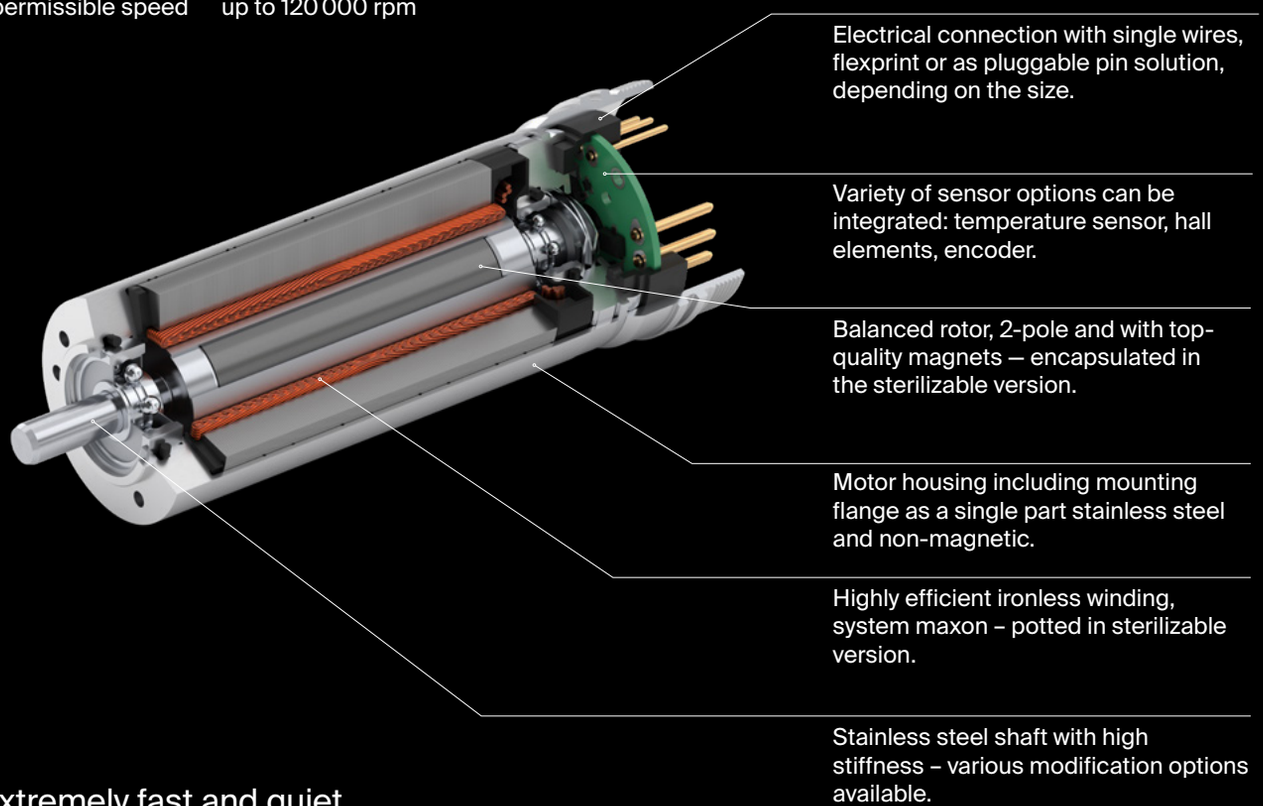
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maxon ECX SPEED program

The brushless ECX SPEED series of motors has been optimized for high speeds (up to 120 000 rpm). Depending on the application, different versions are available: Standard, high power, sterilizable (up to 2000 cycles) or with ceramic bearings for very high speed. Select your mechanical and electrical interface online. The ECX program is fully configurable and is ready for shipping in 11 working days.

Key data

Motor ∅	4...22 mm
Motor length	19...60 mm
Power	0.5...120 W
Nominal torque	up to 34 mNm
Max. permissible speed	up to 120 000 rpm



- → Extremely fast and quiet
- → Autoclavable up to 2000 times (sterilizable version)
- → Low noise and low vibration
- → The ironless winding with no cogging torque
- → Minimal heat build-up
- → Easily configured online

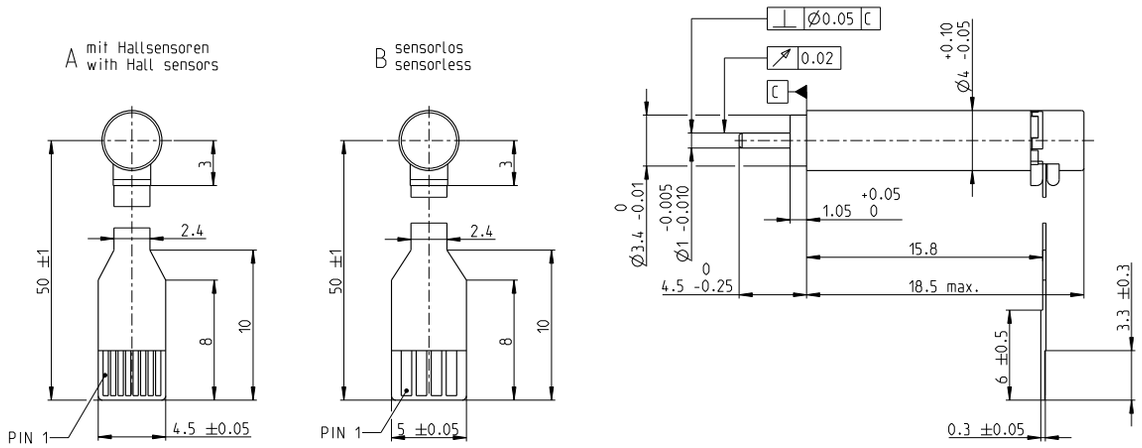
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ECX SPEED 4 M ∅4 mm, brushless, BLDC motor



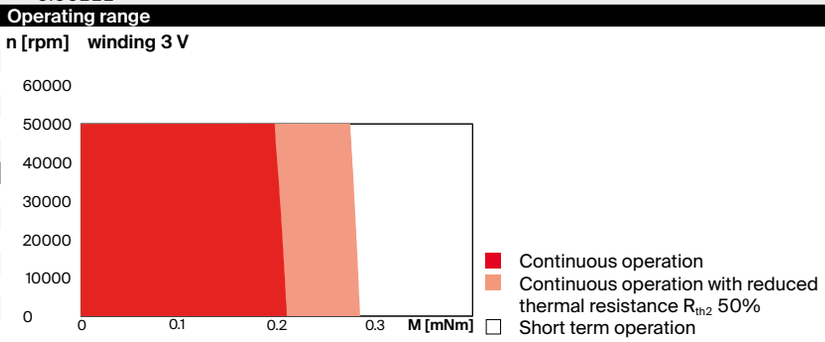
Key data: 0.5/1.0 W, 0.23 mNm, 50 000 rpm



M 2:1

	Motor data			
1_	Nominal voltage	V	3	6
2_	No load speed	rpm	35300	35400
3_	No load current	mA	28.8	14.4
4_	Nominal speed	rpm	12100	13400
5_	Nominal torque	mNm	0.229	0.239
6_	Nominal current (max. continuous current)	A	0.322	0.167
7_	Stall torque	mNm	0.367	0.403
8_	Stall current	A	0.481	0.264
9_	Max. efficiency	%	58.1	59.7
10_	Terminal resistance	Ω	6.23	22.8
11_	Terminal inductance	mH	0.0749	0.285
12_	Torque constant	mNm/A	0.763	1.53
13_	Speed constant	rpm/V	12500	6240
14_	Speed/torque gradient	rpm/mNm	102000	92900
15_	Mechanical time constant	ms	1.19	1.08
16_	Rotor inertia	gcm²	0.00111	0.00111
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	96.7	
18_	Thermal resistance winding-housing	K/W	15.2	
19_	Thermal time constant winding	s	0.738	
20_	Thermal time constant motor	s	58.5	
21_	Ambient temperature	°C	-20...+80	
22_	Max. winding temperature	°C	125	
	Mechanical data			
23_	Max. speed	rpm	50 000	
24_	Max. Axial play	mm	0.06	
	Preload	N	-	
	Direction of force		-	
25_	Radial play		0.012	
26_	Max. axial load (dynamic)	N	0.1	
27_	Max. force for press fits (static)	N	5	
	(static, shaft supported)	N	10	
28_	Max. radial load [mm from flange]	N	0.2 [2]	
	Other specifications			
29_	Number of pole pairs		1	
30_	Number of phases		3	
31_	Weight of motor	g	1.2	
32_	Typical noise level [rpm]	dBA	46 [50 000]	

Operating range



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
370_GPX 4 C	2–4	for motor type A: 493_ENX 4 MAG	564_EPOS4 Module 24/1.5 566_EPOS4 Compact 24/1.5

Connection motor with hall sensor (A)
FPC Flexprint 8-pole, pitch 0.5 mm
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 V_{Hall} 2.5...5.5 VDC
Pin 5 GND
Pin 6 Hall sensor 1
Pin 7 Hall sensor 2
Pin 8 Hall sensor 3
Output signals: CMOS compatible push-pull stage
Output current per channel: max. 0.5 mA

Connection motor sensorless (B)
FPC flexprint 4-pole, pitch 1.0 mm:
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Configuration

Shaft front: length/diameter
Electrical connection: Flex cable/round cable

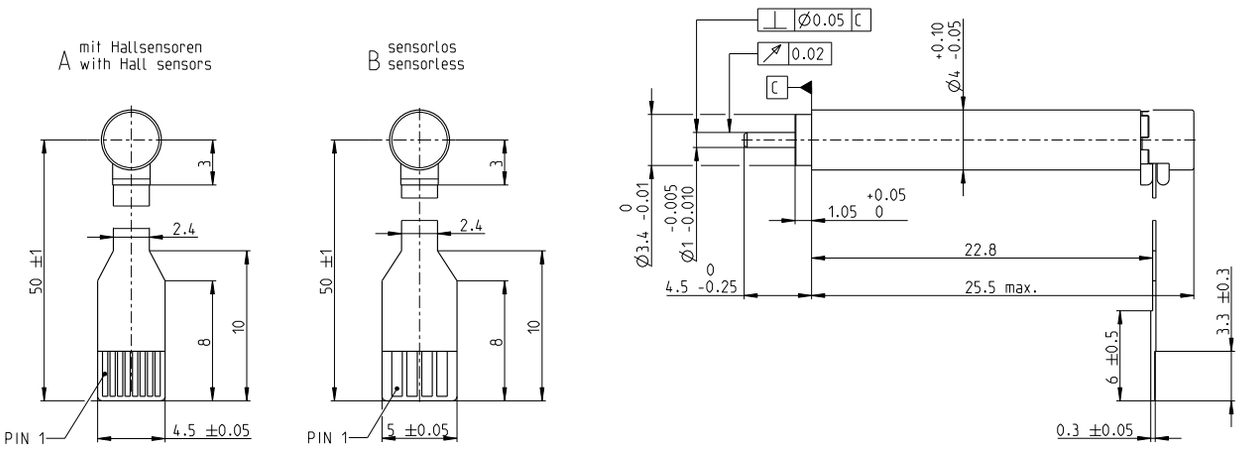
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ECX SPEED 4 L ∅4 mm, brushless, BLDC motor



Key data: 1/1.6 W, 0.34 mNm, 50 000 rpm

ECX SPEED



M 2:1

	Motor data			
1_	Nominal voltage	V	3	6
2_	No load speed	rpm	40700	30500
3_	No load current	mA	55.6	18.9
4_	Nominal speed	rpm	23000	13400
5_	Nominal torque	mNm	0.338	0.341
6_	Nominal current (max. continuous current)	A	0.545	0.206
7_	Stall torque	mNm	0.817	0.641
8_	Stall current	A	1.22	0.36
9_	Max. efficiency	%	62.6	60
10_	Terminal resistance	Ω	2.46	16.7
11_	Terminal inductance	mH	0.0458	0.323
12_	Torque constant	mNm/A	0.67	1.78
13_	Speed constant	rpm/V	14300	5360
14_	Speed/torque gradient	rpm/mNm	52300	50200
15_	Mechanical time constant	ms	0.903	0.867
16_	Rotor inertia	gcm²	0.00165	0.00165

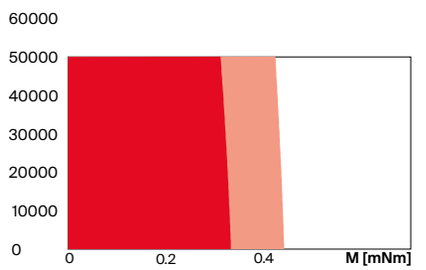
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	84
18_	Thermal resistance winding-housing	K/W	16.7
19_	Thermal time constant winding	s	1.31
20_	Thermal time constant motor	s	76.4
21_	Ambient temperature	°C	-20...+80
22_	Max. winding temperature	°C	125

	Mechanical data		
23_	Max. speed	rpm	50 000
24_	Max. Axial play	mm	0.06
	Preload	N	-
	Direction of force		-
25_	Radial play		0.012
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	5
	(static, shaft supported)	N	10
28_	Max. radial load [mm from flange]	N	0.2 [2]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	1.8
32_	Typical noise level [rpm]	dBA	47 [50 000]

Operating range

n [rpm] winding 3 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
370_GPX 4 C	2–4	for motor type A: 493_ENX 4 MAG	564_EPOS4 Module 24/1.5 566_EPOS4 Compact 24/1.5

Connection motor with hall sensor (A)
FPC Flexprint 8-pole, pitch 0.5 mm
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 V_{Hall} 2.5...5.5 VDC
Pin 5 GND
Pin 6 Hall sensor 1
Pin 7 Hall sensor 2
Pin 8 Hall sensor 3
Output signals: CMOS compatible push-pull stage
Output current per channel: max. 0.5 mA

Connection motor sensorless (B)
FPC flexprint 4-pole, pitch 1.0 mm:
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Configuration

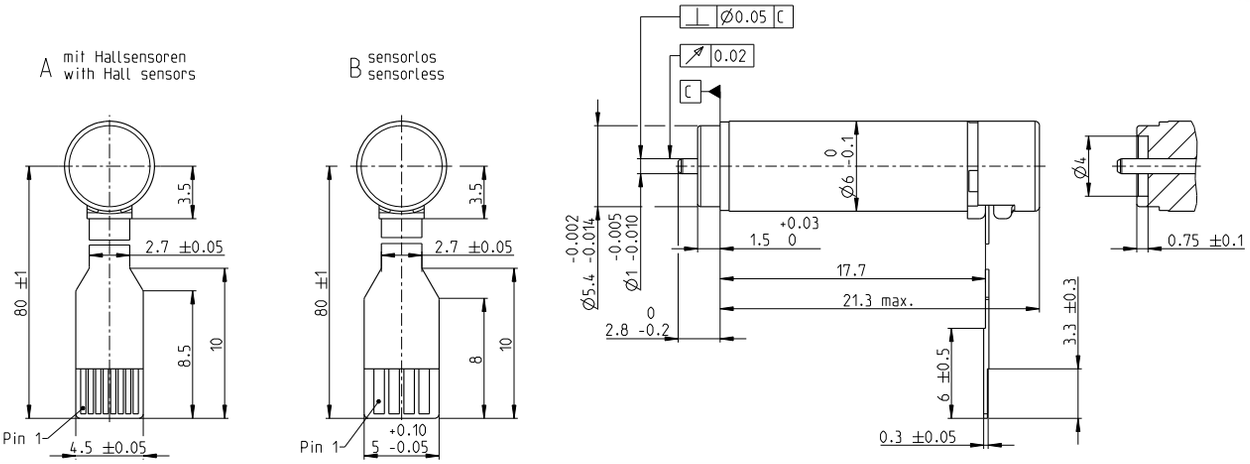
Shaft front: length/diameter
Electrical connection: Flex cable/round cable

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ECX SPEED 6 M ∅6 mm, brushless, BLDC motor

Key data: 1.5/3.0 W, 0.33 mNm, 100 000 rpm





M 2:1

	Motor data			
1_	Nominal voltage	V	6	12
2_	No load speed	rpm	44200	33300
3_	No load current	mA	46.5	16.2
4_	Nominal speed	rpm	25500	13900
5_	Nominal torque	mNm	0.334	0.322
6_	Nominal current (max. continuous current)	A	0.314	0.116
7_	Stall torque	mNm	0.832	0.59
8_	Stall current	A	0.688	0.188
9_	Max. efficiency	%	56.2	51.3
10_	Terminal resistance	Ω	8.72	63.8
11_	Terminal inductance	mH	0.0652	0.436
12_	Torque constant	mNm/A	1.21	3.14
13_	Speed constant	rpm/V	7900	3040
14_	Speed/torque gradient	rpm/mNm	57000	61800
15_	Mechanical time constant	ms	4.2	4.55
16_	Rotor inertia	gcm²	0.00703	0.00703

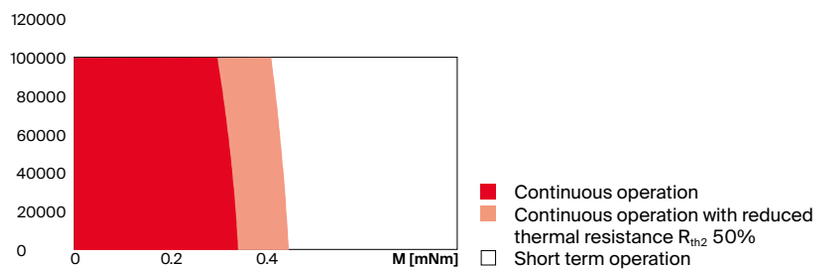
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	67.1
18_	Thermal resistance winding-housing	K/W	16.8
19_	Thermal time constant winding	s	1.69
20_	Thermal time constant motor	s	71.8
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	125

	Mechanical data ball bearings		
23_	Max. speed	rpm	100 000
24_	Axial play	mm	0...0.07
	Preload	N	0.15
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	10
	(static, shaft supported)	N	110
28_	Max. radial load [mm from flange]	N	2 [2]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	3
32_	Typical noise level [rpm]	dBA	44 [50 000]

Operating range

n [rpm] winding 6 V



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
371_GPX 6 A	1–5	for motor type A: 494_ENX 6 MAG	564_EPOS4 Module 24/1.5 566_EPOS4 Compact 24/1.5

Connection motor with hall sensor (A)
FPC Flexprint 8-pole, pitch 0.5 mm
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 V_{Hall} 2.5...5.5 VDC
Pin 5 GND
Pin 6 Hall sensor 1
Pin 7 Hall sensor 2
Pin 8 Hall sensor 3
Output signals: CMOS compatible push-pull stage
Output current per channel: max. 0.5 mA

Connection motor sensorless (B)
FPC flexprint 4-pole, pitch 1.0 mm:
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Configuration

Shaft front: length
Electrical connection: Flexprint/pins (on request)

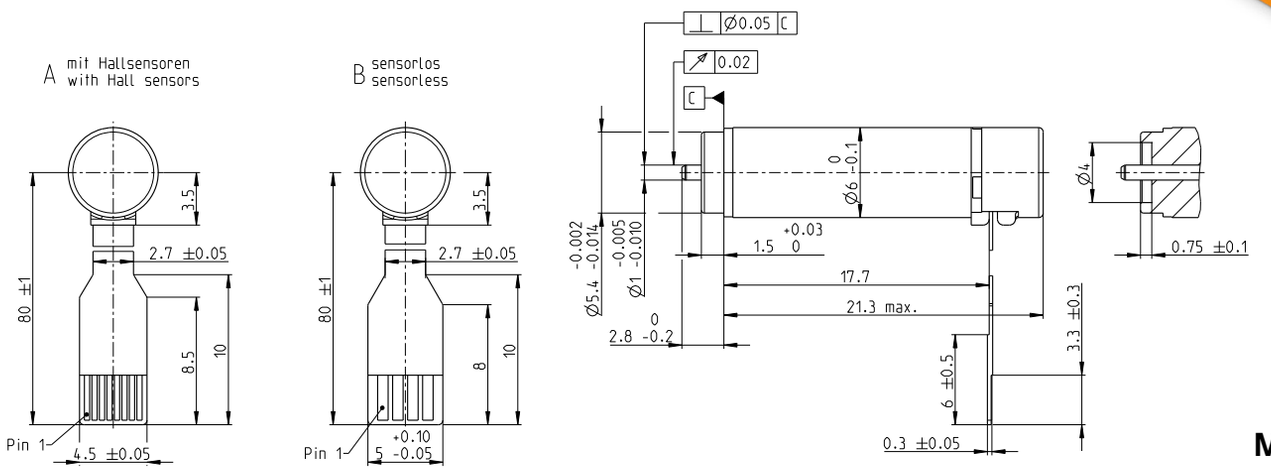
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ECX SPEED 6 M ∅6 mm, brushless, BLDC motor

High Power

Key data: 2/4 W, 0.42 mNm, 100 000 rpm





	Motor data				
1_	Nominal voltage	V	3	6	12
2_	No load speed	rpm	74400	62700	63400
3_	No load current	mA	149	58.8	29.8
4_	Nominal speed	rpm	52300	44900	46800
5_	Nominal torque	mNm	0.413	0.412	0.425
6_	Nominal current (max. continuous current)	A	1.24	0.517	0.268
7_	Stall torque	mNm	1.45	1.52	1.7
8_	Stall current	A	3.92	1.72	0.97
9_	Max. efficiency	%	65.7	67.1	68.7
10_	Terminal resistance	Ω	0.766	3.49	12.4
11_	Terminal inductance	mH	0.00529	0.0301	0.118
12_	Torque constant	mNm/A	0.37	0.882	1.75
13_	Speed constant	rpm/V	25800	10800	5460
14_	Speed/torque gradient	rpm/mNm	53400	42800	38500
15_	Mechanical time constant	ms	3.93	3.15	2.84
16_	Rotor inertia	gcm²	0.00703	0.00703	0.00703

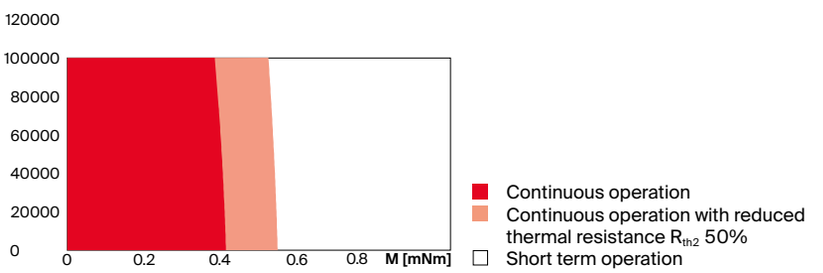
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	65.8
18_	Thermal resistance winding-housing	K/W	13.2
19_	Thermal time constant winding	s	1.34
20_	Thermal time constant motor	s	70.4
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	125

	Mechanical data ball bearings		
23_	Max. speed	rpm	100 000
24_	Axial play	mm	0...0.07
	Preload	N	0.15
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	0.1
27_	Max. force for press fits (static)	N	10
	(static, shaft supported)	N	110
28_	Max. radial load [mm from flange]	N	2 [2]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	3
32_	Typical noise level [rpm]	dBA	44 [50 000]

Operating range

n [rpm] winding 6 V



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
371_GPX 6 A	1–5	for motor type A: 494_ENX 6 MAG	564_EPOS4 Module 24/1.5 566_EPOS4 Compact 24/1.5

Connection motor with hall sensor (A)
FPC Flexprint 8-pole, pitch 0.5 mm
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 V_{Hall} 2.5...5.5 VDC
Pin 5 GND
Pin 6 Hall sensor 1
Pin 7 Hall sensor 2
Pin 8 Hall sensor 3
Output signals: CMOS compatible push-pull stage
Output current per channel: max. 0.5 mA

Connection motor sensorless (B)
FPC flexprint 4-pole, pitch 1.0 mm:
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Configuration

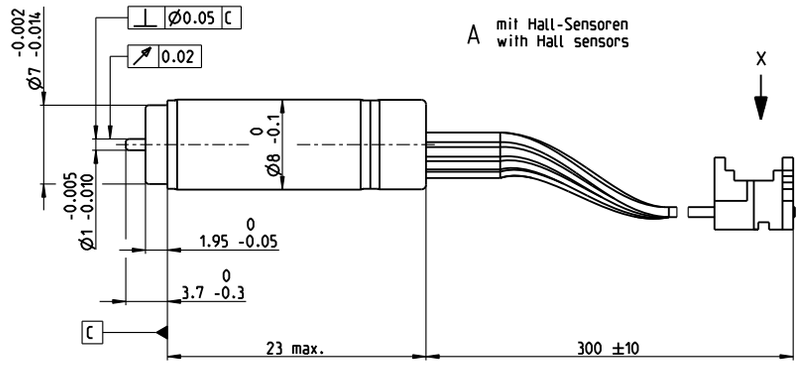
Shaft front: length
Electrical connection: Flexprint/pins (on request)

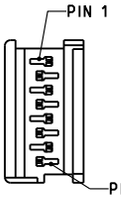
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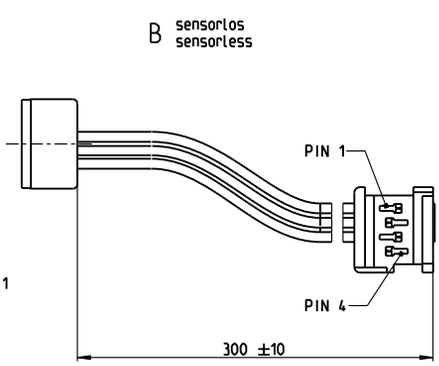
ECX SPEED 8 M ∅8 mm, brushless, BLDC motor

Key data: 2/4.7 W, 0.92 mNm, 50 000 rpm









Connector:
8 pole, 1.27 mm, MICA08
Lumberg Connect GmbH

Connector:
4 pole, 1.27 mm, MICA04
Lumberg Connect GmbH

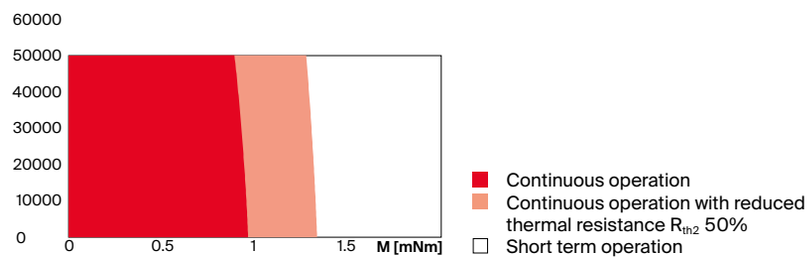
M 3:2

	Motor data				
1_	Nominal voltage	V	6	12	24
2_	No load speed	rpm	35400	43300	42200
3_	No load current	mA	105	69	33.2
4_	Nominal speed	rpm	24200	33100	32300
5_	Nominal torque	mNm	0.917	0.874	0.877
6_	Nominal current (max. continuous current)	A	0.687	0.406	0.198
7_	Stall torque	mNm	3.04	3.88	3.92
8_	Stall current	A	1.98	1.54	0.755
9_	Max. efficiency	%	61	63	64
10_	Terminal resistance	Ω	3.02	7.8	31.8
11_	Terminal inductance	mH	0.039	0.106	0.447
12_	Torque constant	mNm/A	1.53	2.51	5.19
13_	Speed constant	rpm/V	6230	3780	1840
14_	Speed/torque gradient	rpm/mNm	12300	11700	11300
15_	Mechanical time constant	ms	3.21	3.06	2.95
16_	Rotor inertia	gcm²	0.0249	0.0249	0.0249

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	51.2
18_	Thermal resistance winding-housing	K/W	3.5
19_	Thermal time constant winding	s	0.811
20_	Thermal time constant motor	s	154
21_	Ambient temperature[1]	°C	-20...+85
22_	Max. winding temperature	°C	+125
	Mechanical data ball bearings		
23_	Max. speed	rpm	50 000
24_	Axial play	mm	0...0.07
	Preload	N	0.3
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	0.2
27_	Max. force for press fits (static)	N	10
	(static, shaft supported)	N	110
28_	Max. radial load [mm from flange]	N	2 [2]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	6
32_	Typical noise level [rpm]	dBA	49 [50 000]

Operating range

n [rpm] Winding 12 V



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
372_GPX 8 A	1–5	for motor type A: 495_ENX 8 MAG	547_DEC Module 24/2 550_ESCON Module 24/2 551_ESCON 36/3 EC 551_ESCON Module 50/4 EC-S 557_ESCON2 Nano 24/2 564_EPOS4 Module 24/1.5 566_EPOS4 Compact 24/1.5

Connection A (flat band cable AWG 28, pitch 1.27 mm)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 V_{Hall} 2.5...5.5 VDC
Pin 5 GND
Pin 6 Hall sensor 1
Pin 7 Hall sensor 2
Pin 8 Hall sensor 3
Output signal: CMOS compatible
Output current per channel: max 0.5 mA

Connection B (flat band cable AWG 28, pitch 1.27 mm)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Configuration

Shaft front: length
Electric connection: pins/flexprint/cable length
Cable insulation: PVC/PO/FEP

[1] For type A:
PVC-cable (-20...85°C)
PO- and FEP cable (-30...85°C)
For type B:
PVC-cable (-20...100°C)
PO- and FEP cable (-40...100°C)

Cable and plug configuration: Adapter Micromotor (Part number 498157) required for all maxon controllers.

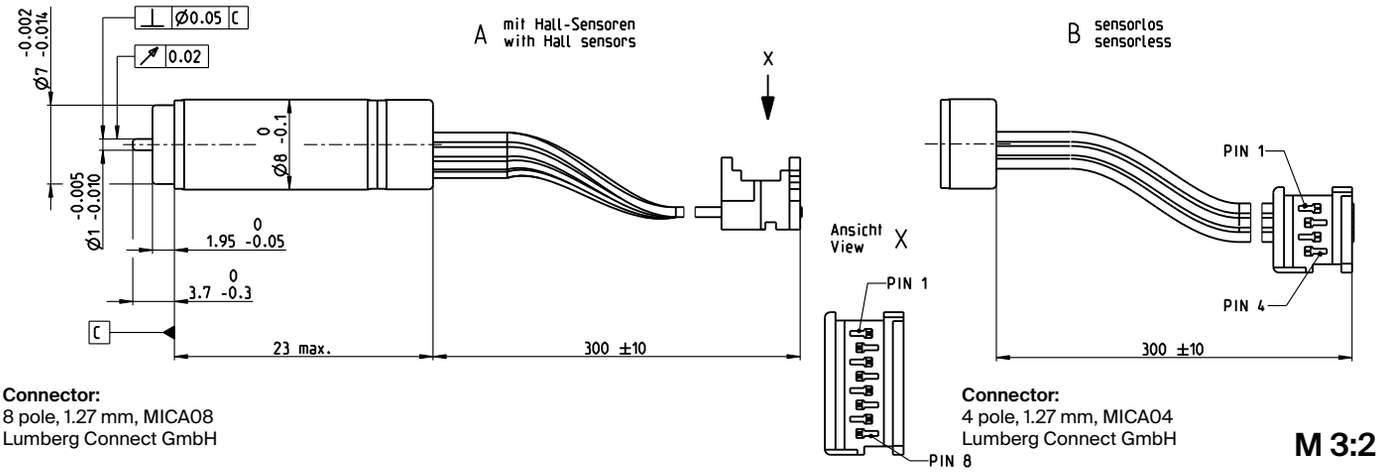
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ECX SPEED 8 M ∅8 mm, brushless, BLDC motor

High Power

Key data: 3/6 W, 1.26 mNm, 50 000 rpm





Connector:
8 pole, 1.27 mm, MICA08
Lumberg Connect GmbH

Connector:
4 pole, 1.27 mm, MICA04
Lumberg Connect GmbH

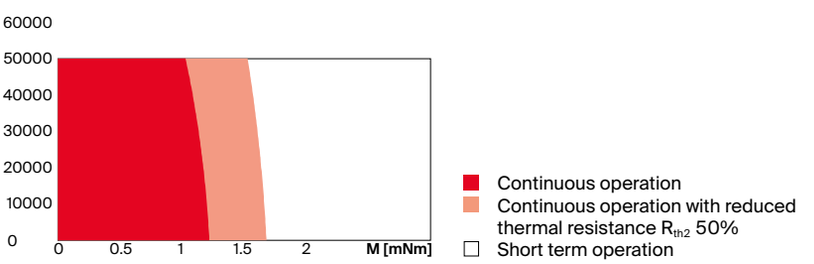
M 3:2

	Motor data				
1_	Nominal voltage	V	6	9	12
2_	No load speed	rpm	35500	29100	30500
3_	No load current	mA	128	63.4	50.9
4_	Nominal speed	rpm	26700	21200	22800
5_	Nominal torque	mNm	1.23	1.26	1.26
6_	Nominal current (max. continuous current)	A	0.902	0.497	0.391
7_	Stall torque	mNm	5.18	4.83	5.18
8_	Stall current	A	3.34	1.7	1.43
9_	Max. efficiency	%	66	66	67
10_	Terminal resistance	Ω	1.8	5.3	8.38
11_	Terminal inductance	mH	0.026	0.089	0.144
12_	Torque constant	mNm/A	1.55	2.84	3.62
13_	Speed constant	rpm/V	6160	3360	2640
14_	Speed/torque gradient	rpm/mNm	7130	6260	6110
15_	Mechanical time constant	ms	1.86	1.64	1.6
16_	Rotor inertia	gcm²	0.0249	0.0249	0.0249

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	51.2
18_	Thermal resistance winding-housing	K/W	4.11
19_	Thermal time constant winding	s	0.874
20_	Thermal time constant motor	s	154
21_	Ambient temperature[1]	°C	-20...+85
22_	Max. winding temperature	°C	+125
	Mechanical data ball bearings		
23_	Max. speed	rpm	50 000
24_	Axial play	mm	0...0.07
	Preload	N	0.3
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	0.2
27_	Max. force for press fits (static)	N	10
	(static, shaft supported)	N	110
28_	Max. radial load [mm from flange]	N	2 [2]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	6
32_	Typical noise level [rpm]	dBA	49 [50 000]

Operating range

n [rpm] Winding 9 V



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
372_GPX 8 A	1–5	for motor type A: 495_ENX 8 MAG	547_DEC Module 24/2 550_ESCON Module 24/2 551_ESCON 36/3 EC 551_ESCON Module 50/4 EC-S 557_ESCON2 Nano 24/2 564_EPOS4 Module 24/1.5 566_EPOS4 Compact 24/1.5

Connection A (flat band cable AWG 28, pitch 1.27 mm)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 V_{Hall} 2.5...5.5 VDC
Pin 5 GND
Pin 6 Hall sensor 1
Pin 7 Hall sensor 2
Pin 8 Hall sensor 3
Output signal: CMOS compatible
Output current per channel: max 0.5 mA

Connection B (flat band cable AWG 28, pitch 1.27 mm)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Configuration

Shaft front: length
Electric connection: pins/flexprint/cable length
Cable insulation: PVC/PO/FEP

[1] For type A:
PVC-cable (-20...85°C)
PO- and FEP cable (-30...85°C)
For type B:
PVC-cable (-20...100°C)
PO- and FEP cable (-40...100°C)

Cable and plug configuration: Adapter Micromotor (Part number 498157) required for all maxon controllers.

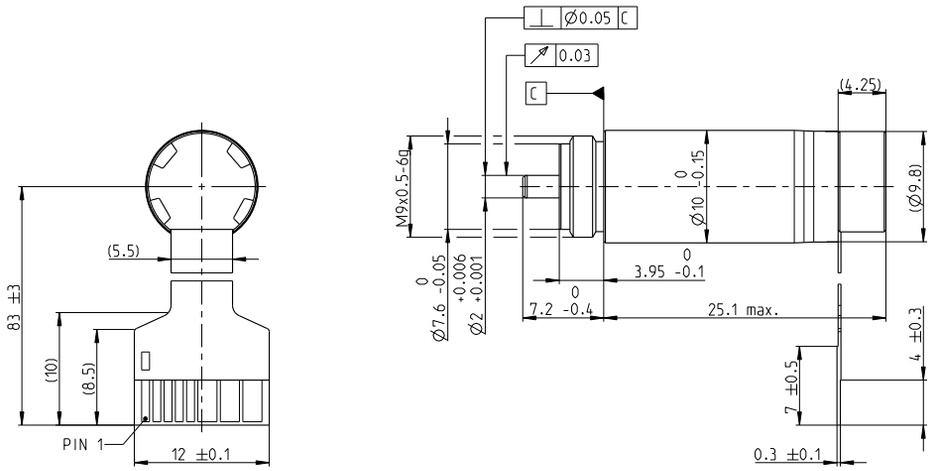
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ECX SPEED 10 M ∅10 mm, brushless, BLDC motor

High Power

Key Data: 8/10.7 W, 1.8 mNm, 65 000 rpm





M 3:2

EC Motor (BLDC Motor)

	Motor data				
1_	Nominal voltage	V	9	18	36
2_	No load speed	rpm	59400	59500	58800
3_	No load current	mA	169	84.5	41.5
4_	Nominal speed	rpm	52300	53400	52800
5_	Nominal torque	mNm	1.83	1.85	1.83
6_	Nominal current (max. continuous current)	A	1.44	0.728	0.356
7_	Stall torque	mNm	15.6	18.5	18.4
8_	Stall current	A	11	6.5	3.19
9_	Max. efficiency	%	77	79	79
10_	Terminal resistance	Ω	0.82	2.77	11.3
11_	Terminal inductance	mH	0.00599	0.0239	0.0982
12_	Torque constant	mNm/A	1.42	2.85	5.77
13_	Speed constant	rpm/V	6700	3350	1650
14_	Speed/torque gradient	rpm/mNm	3860	3260	3230
15_	Mechanical time constant	ms	2.35	1.98	1.97
16_	Rotor inertia	gcm²	0.0581	0.0581	0.0581

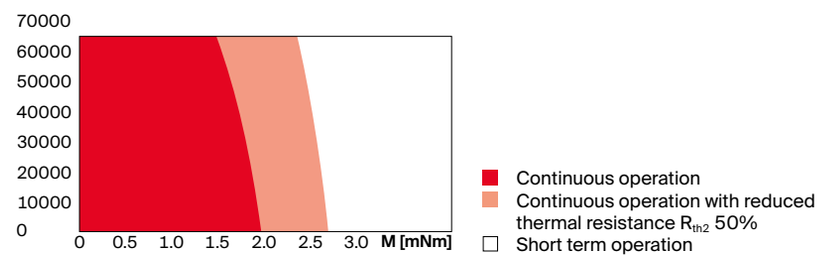
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	39.8
18_	Thermal resistance winding-housing	K/W	4.43
19_	Thermal time constant winding	s	2.05
20_	Thermal time constant motor	s	178
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	65 000
24_	Axial play	mm	0...0.14
	Preload	N	0.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	0.5
27_	Max. force for press fits (static)	N	5.9
	(static, shaft supported)	N	400
28_	Max. radial load [mm from flange]	N	4.7 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	12
32_	Typical noise level [rpm]	dBA	55 [50 000]

Operating range

n [rpm] winding 36 V



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
373_GPX 10 A	1–5	496_ENX 10 MAG INT	547_DEC Module 24/2
374_GPX 12 A/C	1–4		550_ESCON Module 24/2
375_GPX 12 LN/LZ	1–4		551_ESCON 36/3 EC
376_GPX 12 HP	2–4		557_ESCON2 Nano 24/2
			564_EPOS4 Module 24/1.5
			566_EPOS4 Compact 24/1.5

Connection flexprint cable (FPC)
Pin 1 V_{CC} 3.3...6.0 V
Pin 2 Hall sensor 3
Pin 3 Hall sensor 1
Pin 4 Hall sensor 2
Pin 5 GND
Pin 6 Motor winding 3
Pin 7 Motor winding 2
Pin 8 Motor winding 1
Output signals: CMOS compatible push-pull stage
Signal voltage, high: 3.3 V
Hall signals are generated by the MAG sensor.

Possible matching connectors for the FPC connection:
11-pole, 1.0 mm pitch, e.g., Molex 52207-1185
Available maxon adapter connectors: 220300, 418719

Configuration

Front flange: center thread/without thread
Shaft, front: length/diameter

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ECX SPEED 10 L ∅10 mm, brushless, BLDC motor

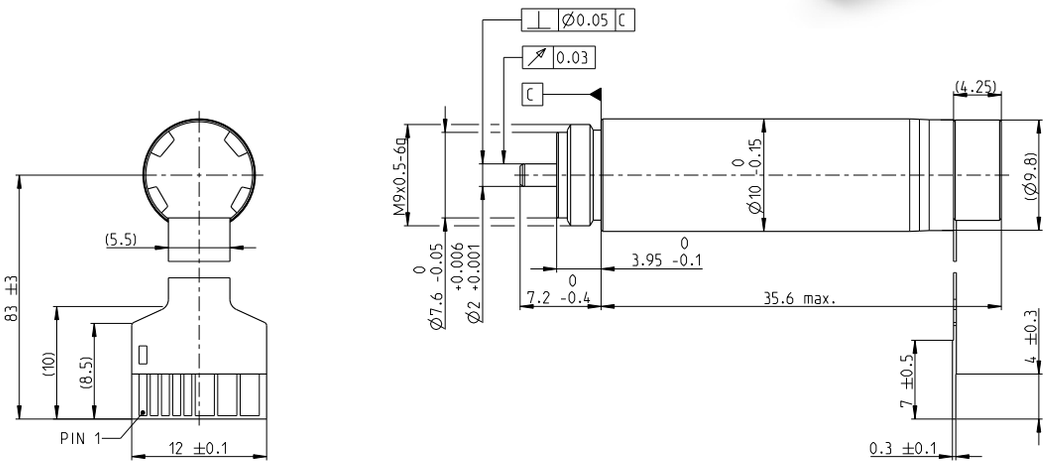
NEW

High Power

Key Data: 16/19.1 W, 3.3 mNm, 65 000 rpm



ECX SPEED



M 3:2

	Motor data				
1_	Nominal voltage	V	12	24	36
2_	No load speed	rpm	56100	56100	56200
3_	No load current	mA	163	81.4	54.3
4_	Nominal speed	rpm	50500	51400	51600
5_	Nominal torque	mNm	3.34	3.31	3.38
6_	Nominal current (max. continuous current)	A	1.79	0.889	0.604
7_	Stall torque	mNm	36.5	42.9	46.1
8_	Stall current	A	18	10.6	7.59
9_	Max. efficiency	%	82	84	84
10_	Terminal resistance	Ω	0.666	2.27	4.74
11_	Terminal inductance	mH	0.0214	0.0855	0.192
12_	Torque constant	mNm/A	2.02	4.05	6.07
13_	Speed constant	rpm/V	4720	2360	1570
14_	Speed/torque gradient	rpm/mNm	1550	1320	1230
15_	Mechanical time constant	ms	5.67	4.83	4.49
16_	Rotor inertia	gcm²	0.349	0.349	0.349

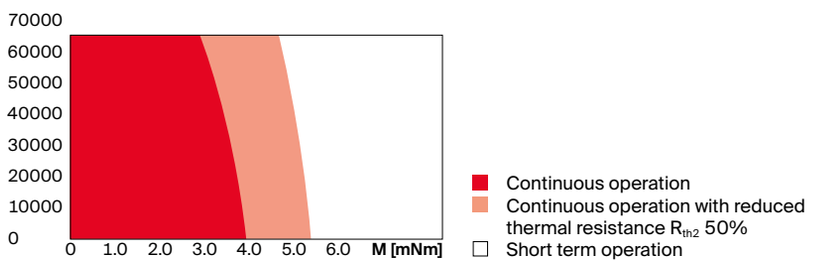
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	31.4
18_	Thermal resistance winding-housing	K/W	3.39
19_	Thermal time constant winding	s	2.35
20_	Thermal time constant motor	s	187
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	65 000
24_	Axial play	mm	0...0.28
	Preload	N	0.4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	0.4
27_	Max. force for press fits (static)	N	5.9
	(static, shaft supported)	N	400
28_	Max. radial load [mm from flange]	N	6.0 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	20
32_	Typical noise level [rpm]	dBA	53 [50 000]

Operating range

n [rpm] winding 36 V



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
373_GPX 10 A	1–5	496_ENX 10 MAG INT	547_DEC Module 24/2
374_GPX 12 A/C	1–4		550_ESCON Module 24/2
375_GPX 12 LN/LZ	1–4		551_ESCON 36/3 EC
376_GPX 12 HP	2–4		557_ESCON2 Nano 24/2
			563_EPOS4 Micro 24/5 ECAT
			565_EPOS4 Compact 24/5 3-axes
			564_EPOS4 Module 24/1.5
			566_EPOS4 Compact 24/1.5

Connection flexprint cable (FPC)
Pin 1 V_{CC} 3.3 ... 6.0 V
Pin 2 Hall sensor 3
Pin 3 Hall sensor 1
Pin 4 Hall sensor 2
Pin 5 GND
Pin 6 Motor winding 3
Pin 7 Motor winding 2
Pin 8 Motor winding 1
Output signals: CMOS compatible push-pull stage
Signal voltage, high: 3.3 V
Hall signals are generated by the MAG sensor.

Possible matching connectors for the FPC connection:
11-pole, 1.0 mm pitch, e.g., Molex 52207-1185
Available maxon adapter connectors: 220300, 418719

Configuration

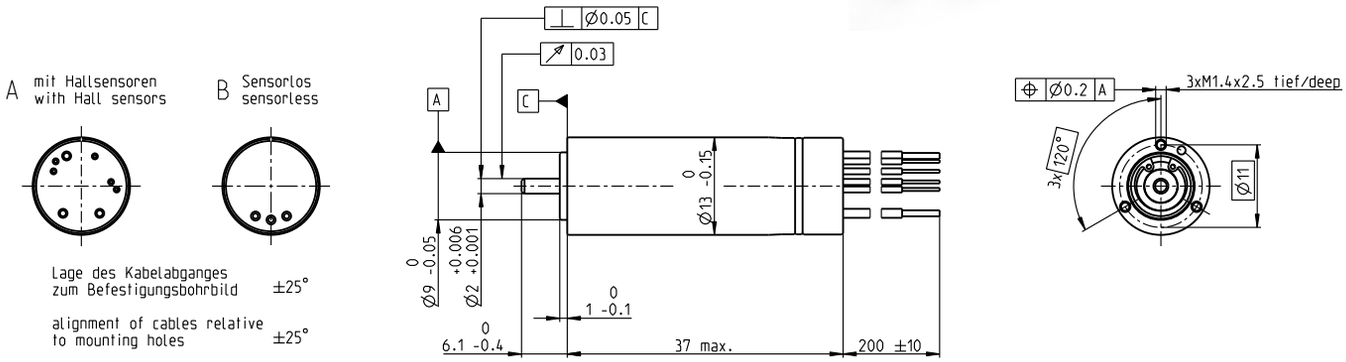
Front flange: center thread/without thread
Shaft, front: length/diameter

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ECX SPEED 13 M ∅13 mm, brushless, BLDC motor

Key data: 12/18 W, 4.2 mNm, 50 000 rpm





M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	45700	45500	44300	44700
3_	No load current	mA	80.8	60.3	38.8	29.4
4_	Nominal speed	rpm	38400	38400	36900	37300
5_	Nominal torque	mNm	4.21	4.23	4.05	3.99
6_	Nominal current (max. continuous current)	A	1.2	0.899	0.56	0.419
7_	Stall torque	mNm	27.9	28.3	25.4	25.1
8_	Stall current	A	7.49	5.68	3.32	2.48
9_	Max. efficiency	%	80.7	80.8	79.9	79.8
10_	Terminal resistance	Ω	2.4	4.22	10.9	19.3
11_	Terminal inductance	mH	0.0546	0.0978	0.232	0.404
12_	Torque constant	mNm/A	3.72	4.98	7.66	10.1
13_	Speed constant	rpm/V	2570	1920	1250	943
14_	Speed/torque gradient	rpm/mNm	1660	1630	1770	1800
15_	Mechanical time constant	ms	4.23	4.15	4.51	4.6
16_	Rotor inertia	gcm²	0.244	0.244	0.244	0.244

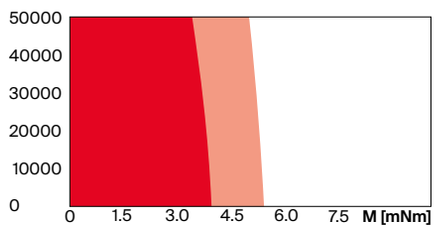
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	20
18_	Thermal resistance winding-housing	K/W	2.21
19_	Thermal time constant winding	s	1.31
20_	Thermal time constant motor	s	306
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	50 000
24_	Axial play	mm	0...0.28
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	50
	(static, shaft supported)	N	1500
28_	Max. radial load [mm from flange]	N	6 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	31
32_	Typical noise level [rpm]	dBA	46 [50 000]

Operating range

n [rpm] winding 36 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
377_GPX 13 SPEED	1–3
378_GPX 14 A/C	1–2 [3–4]
379_GPX 14 LN/LZ	1–2 [3–4]
380_GPX 14 HP	2–3 [4]
381_GPX 16 A/C	3–4
382_GPX 16 LN/LZ	3–4
383_GPX 16 HP	4

Sensor
for motor type A:
513_ENX 13 EASY INT
for motor type B:
513_ENX 13 EASY INT Abs.

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG A: 26, B: 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 28)

orange	V_{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Configuration

Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection/connector
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

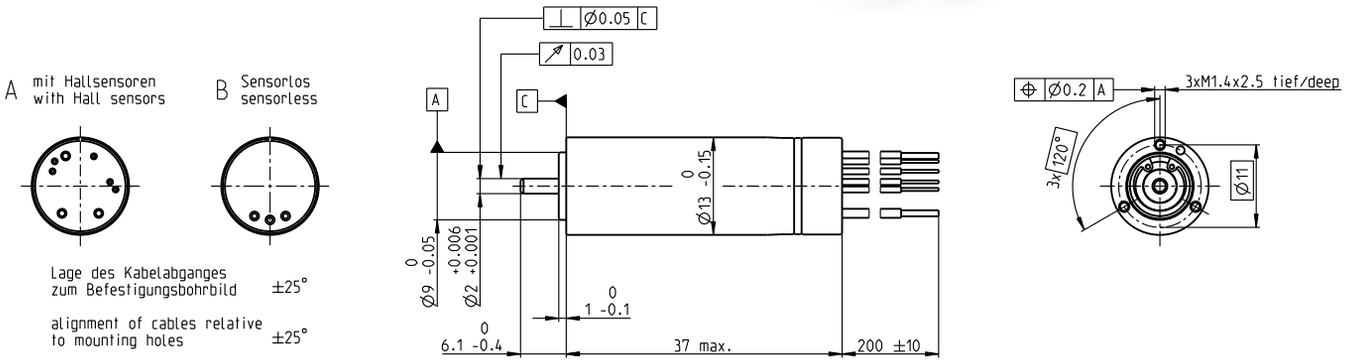
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ECX SPEED 13 M ∅13 mm, brushless, BLDC motor

High Power

Key data: 25/36 W, 5.8 mNm, 70 000 rpm





M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	66800	66800	66800	64100
3_	No load current	mA	99.1	74.4	49.6	35
4_	Nominal speed	rpm	61400	61600	61600	59100
5_	Nominal torque	mNm	5.88	5.84	5.52	5.72
6_	Nominal current (max. continuous current)	A	2.37	1.76	1.12	0.831
7_	Stall torque	mNm	80.2	84.3	79.4	80.7
8_	Stall current	A	31.3	24.7	15.5	11.3
9_	Max. efficiency	%	89.2	89.4	89.1	89.3
10_	Terminal resistance	Ω	0.576	0.973	2.33	4.24
11_	Terminal inductance	mH	0.0204	0.0362	0.0814	0.157
12_	Torque constant	mNm/A	2.57	3.42	5.13	7.13
13_	Speed constant	rpm/V	3720	2790	1860	1340
14_	Speed/torque gradient	rpm/mNm	835	795	844	797
15_	Mechanical time constant	ms	2.13	2.03	2.16	2.04
16_	Rotor inertia	gcm²	0.244	0.244	0.244	0.244

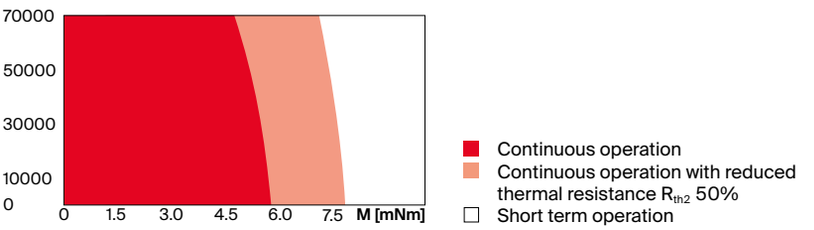
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	20
18_	Thermal resistance winding-housing	K/W	2.53
19_	Thermal time constant winding	s	1.71
20_	Thermal time constant motor	s	311
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	70 000
24_	Axial play	mm	0...0.28
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	50
	(static, shaft supported)	N	1500
28_	Max. radial load [mm from flange]	N	6 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	31
32_	Typical noise level [rpm]	dBA	46 [50 000]

Operating range

n [rpm] winding 36 V



Connection A and B, motor (Cable AWG A: 26, B: 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 28)

orange	V_{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
377_GPX 13 SPEED	1–3	for motor type A:	547_DEC Module 24/2
378_GPX 14 A/C	1–2 [3–4]	513_ENX 13 EASY INT	547_DEC Module 50/5
379_GPX 14 LN/LZ	1–2 [3–4]	for motor type B:	550_ESCON Module 24/2
380_GPX 14 HP	2–3 [4]	513_ENX 13 EASY INT Abs.	551_ESCON 36/3 EC
381_GPX 16 A/C	3–4		551_ESCON Module 50/4 EC-S
382_GPX 16 LN/LZ	3–4		551_ESCON Module 50/5
383_GPX 16 HP	4		553_ESCON 50/5
			557_ESCON2 Nano 24/2
			557_ESCON2 Micro 60/5
			563_EPOS4 Micro 24/5
			564_EPOS4 Module 24/1.5
			564_EPOS4 Module 50/5
			565_EPOS4 Compact 24/5 3-axes
			566_EPOS4 Compact 24/1.5
			567_EPOS4 Compact 50/5
			569_EPOS4 50/5
			570_EPOS4 Disk 60/8

Configuration

Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection/connector
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

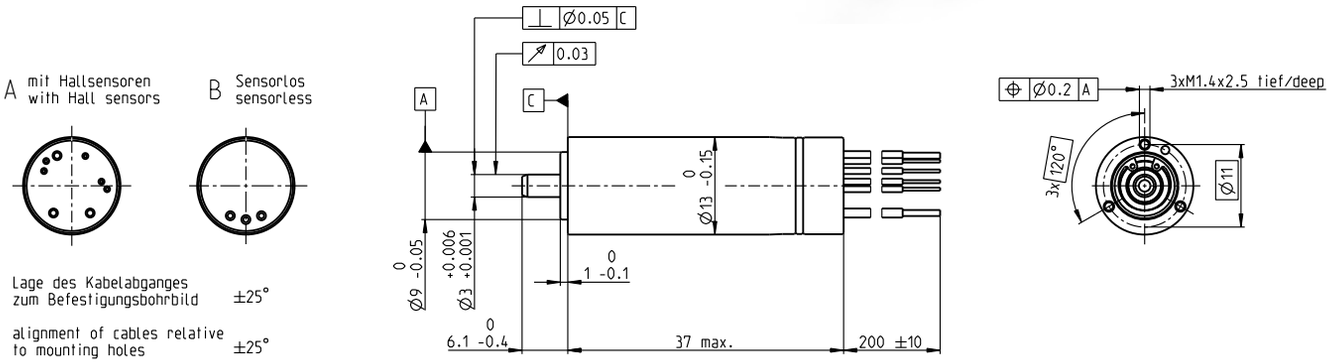
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ECX SPEED 13 M ∅13 mm, brushless, BLDC motor

Sterilizable

Key data: 25/40 W, 4.9 mNm, 90 000 rpm





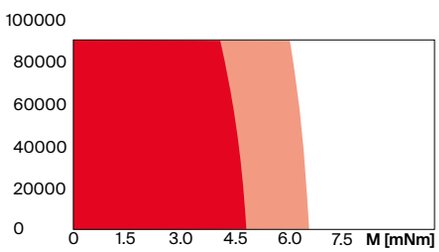
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	79000	79000	78900	75800
3_	No load current	mA	209	157	105	73.2
4_	Nominal speed	rpm	72500	72800	72800	69800
5_	Nominal torque	mNm	4.92	4.89	4.61	4.77
6_	Nominal current (max. continuous current)	A	2.45	1.83	1.16	0.856
7_	Stall torque	mNm	67.6	71	66.8	68
8_	Stall current	A	31.3	24.7	15.5	11.3
9_	Max. efficiency	%	84.7	85	84.6	84.9
10_	Terminal resistance	Ω	0.576	0.973	2.33	4.24
11_	Terminal inductance	mH	0.0207	0.0369	0.0829	0.16
12_	Torque constant	mNm/A	2.16	2.88	4.32	6
13_	Speed constant	rpm/V	4420	3310	2210	1590
14_	Speed/torque gradient	rpm/mNm	1180	1120	1190	1120
15_	Mechanical time constant	ms	1.6	1.52	1.62	1.53
16_	Rotor inertia	gcm²	0.13	0.13	0.13	0.13

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	20
18_	Thermal resistance winding-housing	K/W	2.5
19_	Thermal time constant winding	s	1.69
20_	Thermal time constant motor	s	313
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	90 000
24_	Axial play	mm	0...0.28
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	50
	(static, shaft supported)	N	1500
28_	Max. radial load [mm from flange]	N	6 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	32
32_	Typical noise level [rpm]	dBA	46 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
377_GPX 13 SPEED	1–3	for motor type A: 513_ENX 13 EASY INT for motor type B: 513_ENX 13 EASY INT Abs.	547_DEC Module 24/2 547_DEC Module 50/5 550_ESCON Module 24/2 551_ESCON 36/3 EC 551_ESCON Module 50/4 EC-S 551_ESCON Module 50/5 553_ESCON 50/5 557_ESCON2 Nano 24/2 557_ESCON2 Micro 60/5 563_EPOS4 Micro 24/5 564_EPOS4 Module 24/1.5 564_EPOS4 Module 50/5 565_EPOS4 Compact 24/5 3-axes 566_EPOS4 Compact 24/1.5 567_EPOS4 Compact 50/5 569_EPOS4 50/5 570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG A: 26, B: 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 28)

orange	V_{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Configuration

Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

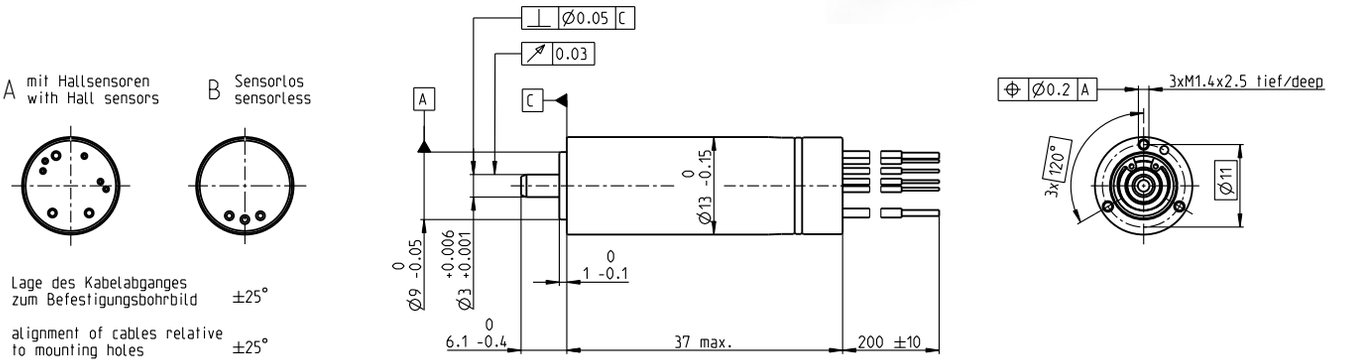
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ECX SPEED 13 M ∅13 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key data: 25/48 W, 4.9 mNm, 120 000 rpm





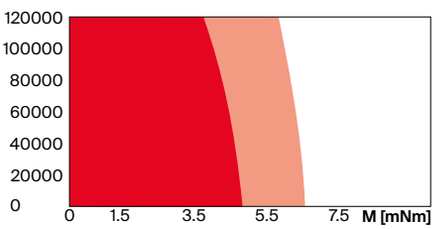
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	79000	79000	79000	75800
3_	No load current	mA	209	157	96	73.2
4_	Nominal speed	rpm	72500	72800	72800	69800
5_	Nominal torque	mNm	4.92	4.89	4.67	4.77
6_	Nominal current (max. continuous current)	A	2.45	1.83	1.16	0.856
7_	Stall torque	mNm	67.6	71	66.8	68
8_	Stall current	A	31.3	24.7	15.5	11.3
9_	Max. efficiency	%	84.7	85	85.1	84.9
10_	Terminal resistance	Ω	0.576	0.973	2.33	4.24
11_	Terminal inductance	mH	0.0207	0.0369	0.0829	0.16
12_	Torque constant	mNm/A	2.16	2.88	4.32	6
13_	Speed constant	rpm/V	4420	3310	2210	1590
14_	Speed/torque gradient	rpm/mNm	1180	1120	1190	1120
15_	Mechanical time constant	ms	1.6	1.52	1.62	1.53
16_	Rotor inertia	gcm²	0.13	0.13	0.13	0.13

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	20
18_	Thermal resistance winding-housing	K/W	2.5
19_	Thermal time constant winding	s	1.69
20_	Thermal time constant motor	s	313
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	120 000
24_	Axial play	mm	0...0.28
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	50
	(static, shaft supported)	N	1500
28_	Max. radial load [mm from flange]	N	6 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	32
32_	Typical noise level [rpm]	dBA	46 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
377_GPX 13 SPEED	1–3	for motor type A: 513_ENX 13 EASY INT for motor type B: 513_ENX 13 EASY INT Abs.	547_DEC Module 24/2 547_DEC Module 50/5 550_ESCON Module 24/2 551_ESCON 36/3 EC 551_ESCON Module 50/4 EC-S 551_ESCON Module 50/5 553_ESCON 50/5 557_ESCON2 Nano 24/2 557_ESCON2 Micro 60/5 563_EPOS4 Micro 24/5 564_EPOS4 Module 24/1.5 564_EPOS4 Module 50/5 565_EPOS4 Compact 24/5 3-axes 566_EPOS4 Compact 24/1.5 567_EPOS4 Compact 50/5 569_EPOS4 50/5 570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG A: 26, B: 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 28)

orange	V_{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Configuration

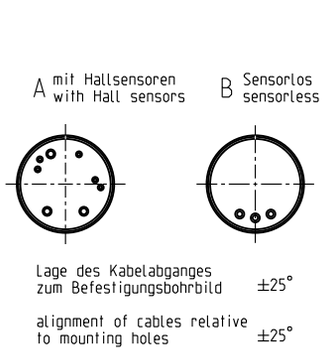
Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

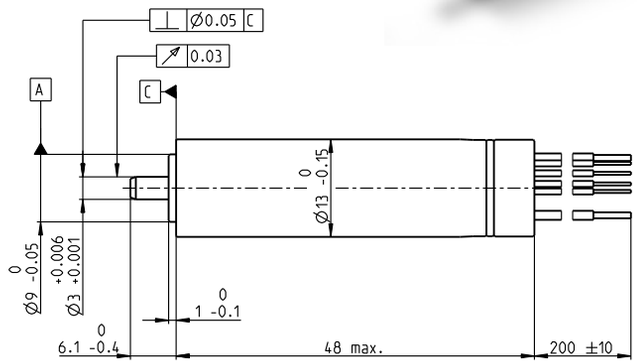
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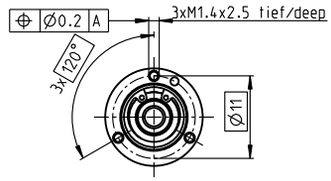
ECX SPEED 13 L ∅13 mm, brushless, BLDC motor

Key data: 25/25 W, 5.5 mNm, 50 000 rpm









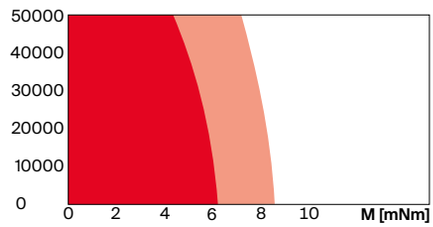
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	41900	42800	42000	42400
3_	No load current	mA	169	130	84.4	64.2
4_	Nominal speed	rpm	37500	38600	37900	38200
5_	Nominal torque	mNm	5.16	5.41	5.57	5.45
6_	Nominal current (max. continuous current)	A	1.42	1.14	0.762	0.567
7_	Stall torque	mNm	51.3	58.9	60.4	59.3
8_	Stall current	A	12.7	11.1	7.47	5.55
9_	Max. efficiency	%	79	80.1	80.5	80.3
10_	Terminal resistance	Ω	1.42	2.16	4.82	8.64
11_	Terminal inductance	mH	0.0453	0.0776	0.181	0.316
12_	Torque constant	mNm/A	4.04	5.29	8.08	10.7
13_	Speed constant	rpm/V	2360	1800	1180	894
14_	Speed/torque gradient	rpm/mNm	830	736	705	724
15_	Mechanical time constant	ms	3.25	2.88	2.76	2.83
16_	Rotor inertia	gcm²	0.374	0.374	0.374	0.374

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	19.5
18_	Thermal resistance winding-housing	K/W	2
19_	Thermal time constant winding	s	2.12
20_	Thermal time constant motor	s	328
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	50 000
24_	Axial play	mm	0...0.28
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	50
	(static, shaft supported)	N	1500
28_	Max. radial load [mm from flange]	N	6 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	41
32_	Typical noise level [rpm]	dBA	47 [50 000]

Operating range

n [rpm] winding 36 V



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
377_GPX 13 SPEED	1–3
378_GPX 14 A/C	1–2 [3–4]
379_GPX 14 LN/LZ	1–2 [3–4]
380_GPX 14 HP	2–3 [4]
381_GPX 16 A/C	3–4
382_GPX 16 LN/LZ	3–4
383_GPX 16 HP	4

Sensor
for motor type A:
513_ENX 13 EASY INT
for motor type B:
513_ENX 13 EASY INT Abs.

Motor Control
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
553_ESCON 50/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG A: 26, B: 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 28)

orange	V_{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Configuration

Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection/connector
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

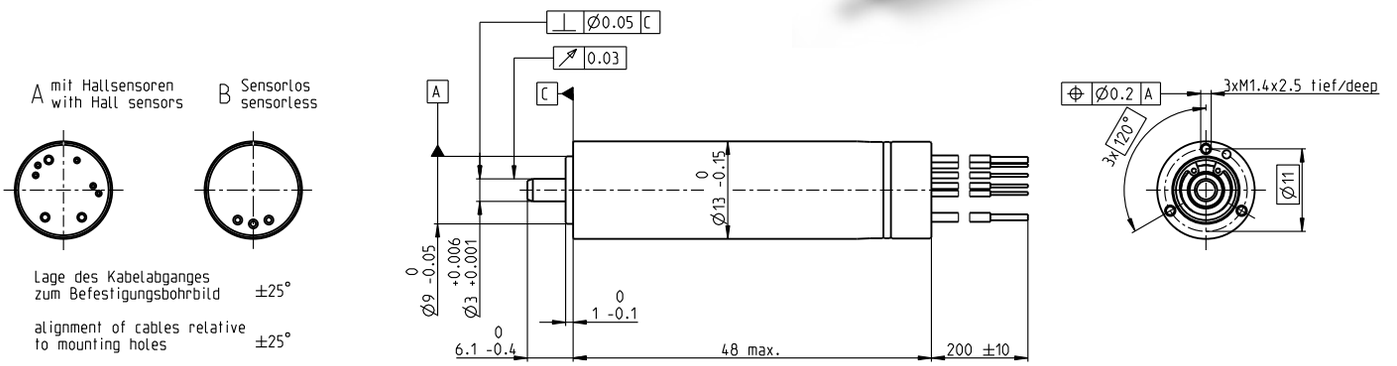
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ECX SPEED 13 L ∅13 mm, brushless, BLDC motor

High Power

Key data: 50/54 W, 8.5 mNm, 70 000 rpm





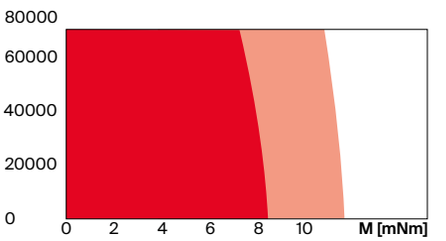
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	67300	65800	67300	61700
3_	No load current	mA	113	82.2	56.6	37.4
4_	Nominal speed	rpm	63000	61700	63300	57700
5_	Nominal torque	mNm	8.28	8.57	8.27	8.5
6_	Nominal current (max. continuous current)	A	3.33	2.52	1.66	1.17
7_	Stall torque	mNm	151	163	163	152
8_	Stall current	A	59.1	46.8	31.9	20.5
9_	Max. efficiency	%	91.5	91.9	91.8	91.7
10_	Terminal resistance	Ω	0.304	0.512	1.13	2.34
11_	Terminal inductance	mH	0.0166	0.0309	0.0664	0.141
12_	Torque constant	mNm/A	2.55	3.48	5.1	7.42
13_	Speed constant	rpm/V	3750	2750	1870	1290
14_	Speed/torque gradient	rpm/mNm	447	405	414	406
15_	Mechanical time constant	ms	1.63	1.48	1.51	1.48
16_	Rotor inertia	gcm²	0.349	0.349	0.349	0.349

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	19.5
18_	Thermal resistance winding-housing	K/W	1.6
19_	Thermal time constant winding	s	1.68
20_	Thermal time constant motor	s	329
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	70 000
24_	Axial play	mm	0...0.28
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	50
	(static, shaft supported)	N	1500
28_	Max. radial load [mm from flange]	N	6 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	42
32_	Typical noise level [rpm]	dBA	47 [50 000]

Operating range

n [rpm] winding 36 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Connection A and B, motor (Cable AWG A: 26, B: 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 28)

orange	V_{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Modular system Details on catalog page 44

Gear	Stages [opt.]
377_GPX 13 SPEED	1–3
378_GPX 14 A/C	1–2 [3–4]
379_GPX 14 LN/LZ	1–2 [3–4]
380_GPX 14 HP	2–3 [4]
381_GPX 16 A/C	3–4
382_GPX 16 LN/LZ	3–4
383_GPX 16 HP	4

Sensor

for motor type A:
513_ENX 13 EASY INT
for motor type B:
513_ENX 13 EASY INT Abs.

Motor Control

547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection/connector
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

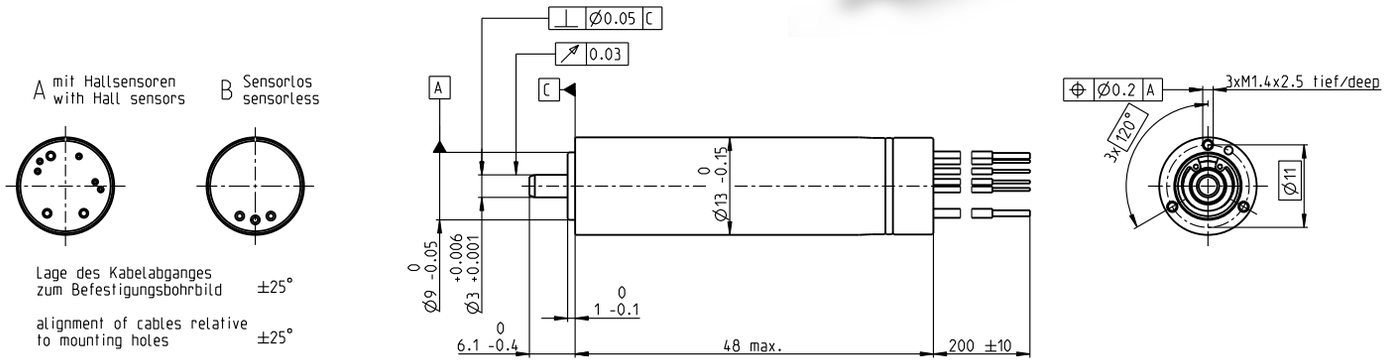
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ECX SPEED 13 L ∅13 mm, brushless, BLDC motor

Sterilizable

Key data: 50/62 W, 7.5 mNm, 90 000 rpm





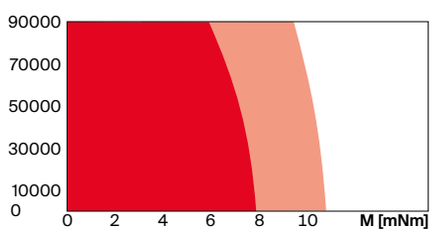
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	71000	69500	71000	65100
3_	No load current	mA	225	162	112	72.1
4_	Nominal speed	rpm	66400	65300	67100	61200
5_	Nominal torque	mNm	7.29	7.57	7.26	7.56
6_	Nominal current (max. continuous current)	A	3.22	2.44	1.6	1.14
7_	Stall torque	mNm	126	143	149	142
8_	Stall current	A	52.3	43.4	30.8	20.2
9_	Max. efficiency	%	87.6	88.4	88.5	88.6
10_	Terminal resistance	Ω	0.344	0.552	1.17	2.38
11_	Terminal inductance	mH	0.0128	0.0238	0.0512	0.108
12_	Torque constant	mNm/A	2.41	3.29	4.82	7.01
13_	Speed constant	rpm/V	3960	2910	1980	1360
14_	Speed/torque gradient	rpm/mNm	567	489	480	462
15_	Mechanical time constant	ms	1.87	1.61	1.58	1.52
16_	Rotor inertia	gcm²	0.315	0.315	0.315	0.315

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	19.5
18_	Thermal resistance winding-housing	K/W	2.04
19_	Thermal time constant winding	s	2.13
20_	Thermal time constant motor	s	397
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	90 000
24_	Axial play	mm	0...0.28
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	50
	(static, shaft supported)	N	1500
28_	Max. radial load [mm from flange]	N	6 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	42
32_	Typical noise level [rpm]	dBA	47 [50 000]

Operating range

n [rpm] winding 36 V



135°C SSS

Sterilization information

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
377_GPX 13 SPEED	1–3

Sensor
for motor type A:
513_ENX 13 EASY INT
for motor type B:
513_ENX 13 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
557_ESCON2 Micro 60/5
553_ESCON 50/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG A: 26, B: 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 28)

orange	V_{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Configuration

Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

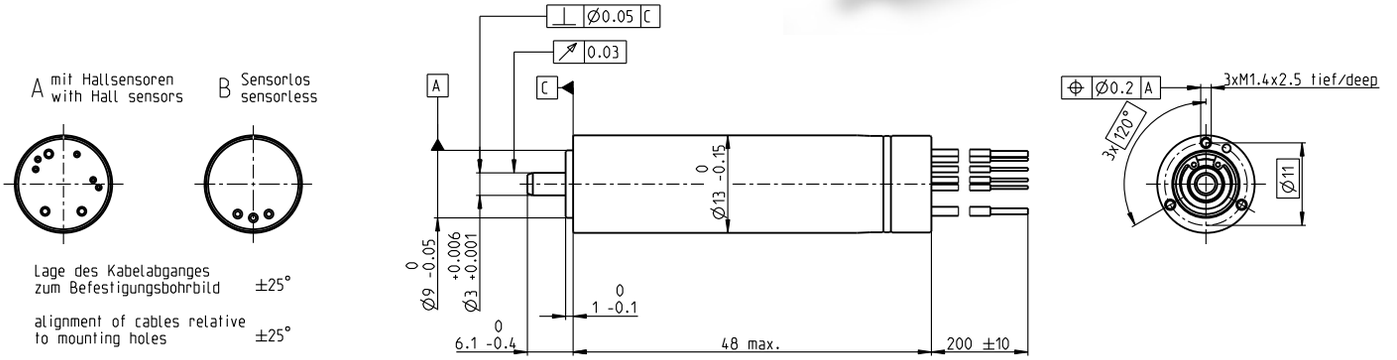
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ECX SPEED 13 L ∅13 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key data: 50/59 W, 7.5 mNm, 120 000 rpm





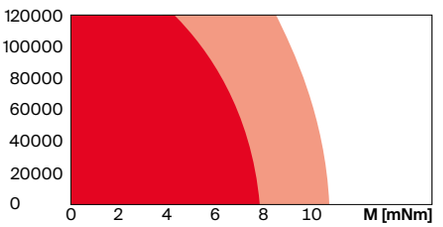
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	71000	69500	71000	65100
3_	No load current	mA	224	162	112	72
4_	Nominal speed	rpm	66400	65300	67100	61200
5_	Nominal torque	mNm	7.3	7.57	7.26	7.56
6_	Nominal current (max. continuous current)	A	3.22	2.44	1.6	1.14
7_	Stall torque	mNm	126	143	149	142
8_	Stall current	A	52.3	43.4	30.8	20.2
9_	Max. efficiency	%	87.6	88.4	88.5	88.6
10_	Terminal resistance	Ω	0.344	0.552	1.17	2.38
11_	Terminal inductance	mH	0.0128	0.0238	0.0512	0.108
12_	Torque constant	mNm/A	2.41	3.29	4.82	7.01
13_	Speed constant	rpm/V	3960	2910	1980	1360
14_	Speed/torque gradient	rpm/mNm	567	489	480	462
15_	Mechanical time constant	ms	1.87	1.61	1.58	1.52
16_	Rotor inertia	gcm²	0.315	0.315	0.315	0.315

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	19.5
18_	Thermal resistance winding-housing	K/W	2.04
19_	Thermal time constant winding	s	2.13
20_	Thermal time constant motor	s	397
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	120 000
24_	Axial play	mm	0...0.28
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	50
	(static, shaft supported)	N	1500
28_	Max. radial load [mm from flange]	N	6 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	42
32_	Typical noise level [rpm]	dBA	47 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
377_GPX 13 SPEED	1–3	for motor type A: 513_ENX 13 EASY INT for motor type B: 513_ENX 13 EASY INT Abs.	547_DEC Module 50/5 551_ESCON 36/3 EC 551_ESCON Module 50/4 EC-S 551_ESCON Module 50/5 553_ESCON 50/5 557_ESCON2 Micro 60/5 563_EPOS4 Micro 24/5 564_EPOS4 Module 50/5 565_EPOS4 Compact 24/5 3-axes 567_EPOS4 Compact 50/5 569_EPOS4 50/5 570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG A: 26, B: 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 28)

orange	V_{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Configuration

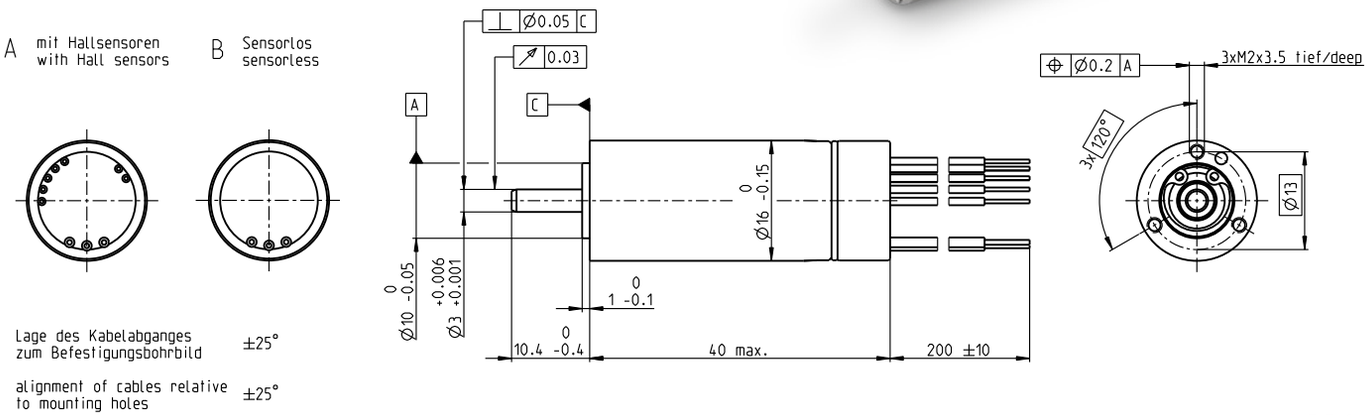
Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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ECX SPEED 16 M ∅16 mm, brushless, BLDC motor

Key data: 20/22 W, 4.7 mNm, 55 000 rpm





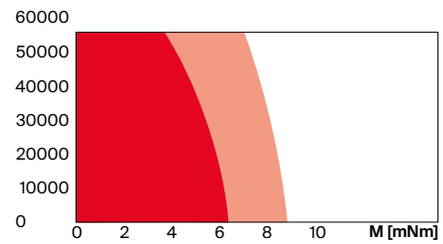
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	49000	49100	49100	49000
3_	No load current	mA	231	173	116	86.7
4_	Nominal speed	rpm	45000	45200	45400	45200
5_	Nominal torque	mNm	4.34	4.54	4.68	4.38
6_	Nominal current (max. continuous current)	A	1.46	1.14	0.781	0.553
7_	Stall torque	mNm	58	64	68.7	60.7
8_	Stall current	A	16.8	13.9	9.94	6.59
9_	Max. efficiency	%	78.6	79.5	80.1	79
10_	Terminal resistance	Ω	1.07	1.73	3.62	7.29
11_	Terminal inductance	mH	0.0453	0.0805	0.181	0.322
12_	Torque constant	mNm/A	3.45	4.61	6.91	9.21
13_	Speed constant	rpm/V	2760	2070	1380	1040
14_	Speed/torque gradient	rpm/mNm	858	778	725	820
15_	Mechanical time constant	ms	7.25	6.57	6.12	6.92
16_	Rotor inertia	gcm²	0.806	0.806	0.806	0.806

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	16.1
18_	Thermal resistance winding-housing	K/W	1.52
19_	Thermal time constant winding	s	1.83
20_	Thermal time constant motor	s	391
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	55 000
24_	Axial play	mm	0...0.29
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	60
	(static, shaft supported)	N	2500
28_	Max. radial load [mm from flange]	N	10 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	49
32_	Typical noise level [rpm]	dBA	50 [50 000]

Operating range

n [rpm] winding 36 V



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
381_GPX 16 A/C	1–2 [3–4]
382_GPX 16 LN/LZ	1–2 [3–4]
383_GPX 16 HP	2–3 [4]
385_GPX 16 SPEED	1–2
386_GPX 19 A/C	3–4
387_GPX 19 LN/LZ	3–4
388_GPX 19 HP	4
389_GPX 19 SPEED	[3]

Sensor
for motor type A:
514_ENX 16 EASY INT
for motor type B:
514_ENX 16 EASY INT Abs.

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG 22)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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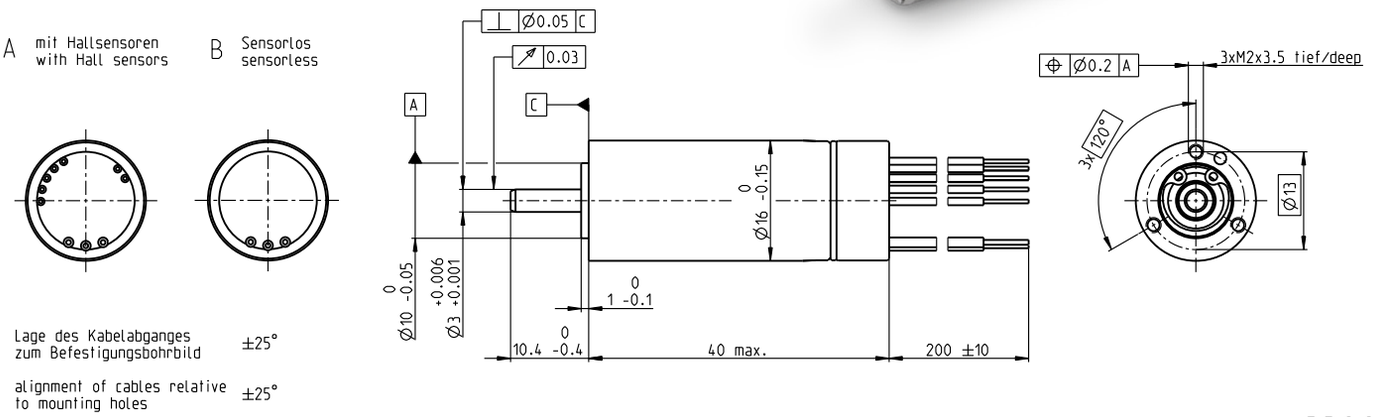
ECX SPEED 16 M ∅16 mm, brushless, BLDC motor

High Power

Key data: 40/50 W, 8.9 mNm, 70 000 rpm



ECX SPEED



M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	51900	54900	53100	53100
3_	No load current	mA	103	83	52.9	39.7
4_	Nominal speed	rpm	47300	50300	48600	48700
5_	Nominal torque	mNm	8.95	8.56	8.79	8.83
6_	Nominal current (max. continuous current)	A	2.78	2.11	1.4	1.05
7_	Stall torque	mNm	116	119	121	123
8_	Stall current	A	35.1	28.5	18.8	14.3
9_	Max. efficiency	%	89.5	89.6	89.7	89.8
10_	Terminal resistance	Ω	0.512	0.841	1.92	3.35
11_	Terminal inductance	mH	0.0336	0.0534	0.129	0.229
12_	Torque constant	mNm/A	3.3	4.16	6.46	8.61
13_	Speed constant	rpm/V	2890	2300	1480	1110
14_	Speed/torque gradient	rpm/mNm	449	464	439	432
15_	Mechanical time constant	ms	3.82	3.95	3.74	3.67
16_	Rotor inertia	gcm²	0.812	0.812	0.812	0.812

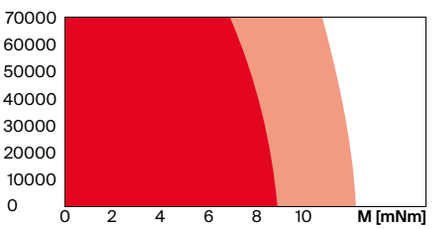
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	16.1
18_	Thermal resistance winding-housing	K/W	1.8
19_	Thermal time constant winding	s	2.16
20_	Thermal time constant motor	s	398
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	70 000
24_	Axial play	mm	0...0.29
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	60
	(static, shaft supported)	N	2500
28_	Max. radial load [mm from flange]	N	10 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	50
32_	Typical noise level [rpm]	dBA	50 [50 000]

Operating range

n [rpm] winding 36 V



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
381_GPX 16 A/C	1–2 [3–4]
382_GPX 16 LN/LZ	1–2 [3–4]
383_GPX 16 HP	2–3 [4]
385_GPX 16 SPEED	1–2
386_GPX 19 A/C	3–4
387_GPX 19 LN/LZ	3–4
388_GPX 19 HP	4
389_GPX 19 SPEED	[3]

Sensor
for motor type A:
514_ENX 16 EASY INT
for motor type B:
514_ENX 16 EASY INT Abs.

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG 22)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

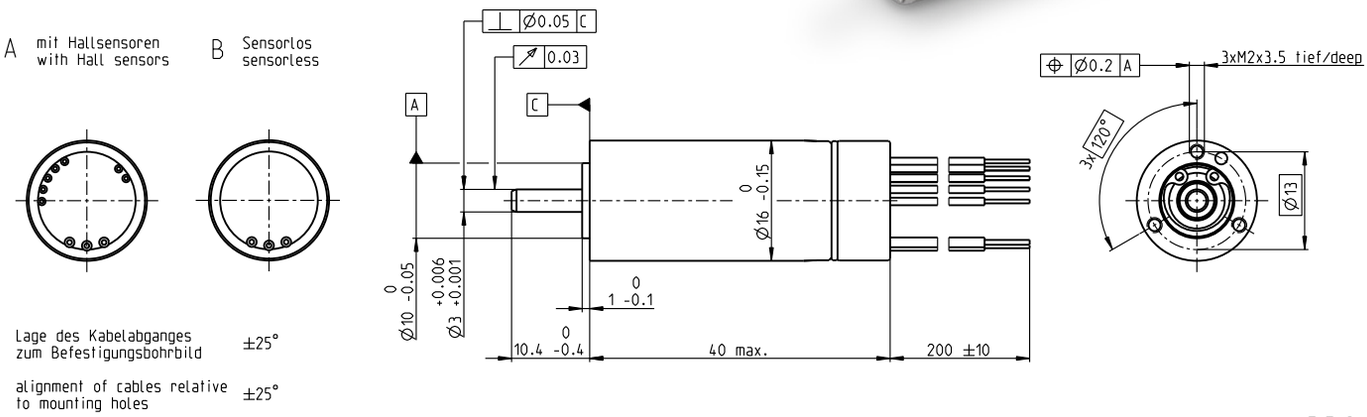
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ECX SPEED 16 M ∅16 mm, brushless, BLDC motor

Sterilizable

Key data: 40/48 W, 7.6 mNm, 70 000 rpm





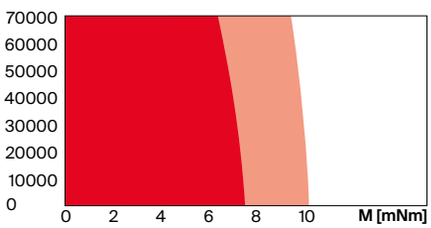
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	59900	63400	56200	57400
3_	No load current	mA	199	163	90.4	70
4_	Nominal speed	rpm	54600	58100	50900	52200
5_	Nominal torque	mNm	7.63	7.29	7.37	7.4
6_	Nominal current (max. continuous current)	A	2.83	2.16	1.28	0.987
7_	Stall torque	mNm	100	102	89.8	93.6
8_	Stall current	A	35.1	28.5	14.8	11.8
9_	Max. efficiency	%	85.7	85.7	85.2	85.4
10_	Terminal resistance	Ω	0.512	0.841	2.43	4.06
11_	Terminal inductance	mH	0.033	0.0524	0.15	0.255
12_	Torque constant	mNm/A	2.85	3.59	6.07	7.93
13_	Speed constant	rpm/V	3350	2660	1570	1200
14_	Speed/torque gradient	rpm/mNm	603	623	631	618
15_	Mechanical time constant	ms	3.72	3.84	3.89	3.81
16_	Rotor inertia	gcm²	0.589	0.589	0.589	0.589

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	16.1
18_	Thermal resistance winding-housing	K/W	1.8
19_	Thermal time constant winding	s	2.16
20_	Thermal time constant motor	s	400
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	70 000
24_	Axial play	mm	0...0.29
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	60
	(static, shaft supported)	N	2500
28_	Max. radial load [mm from flange]	N	10 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	50
32_	Typical noise level [rpm]	dBA	50 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
384_GPX 16 HP	1–3
385_GPX 16 SPEED	1–2
389_GPX 19 SPEED	[3]

Sensor
for motor type A:
514_ENX 16 EASY INT
for motor type B:
514_ENX 16 EASY INT Abs.

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG 22)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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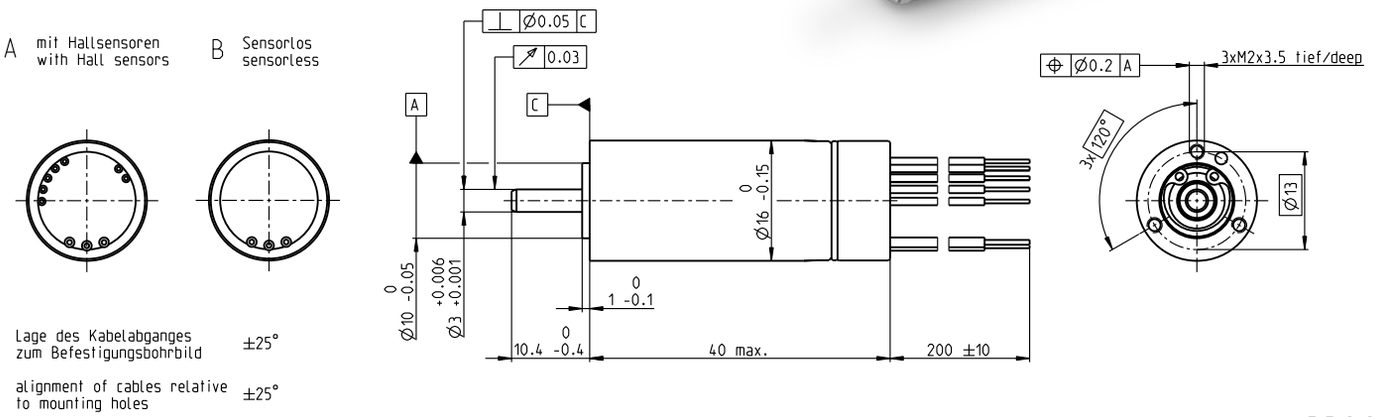
ECX SPEED 16 M ∅16 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key data: 40/60 W, 7.6 mNm, 120 000 rpm



ECX SPEED



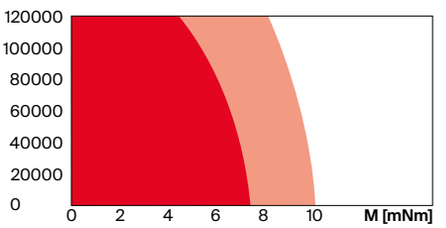
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	59900	63400	56200	57400
3_	No load current	mA	200	163	90.5	70
4_	Nominal speed	rpm	54600	58100	50900	52200
5_	Nominal torque	mNm	7.63	7.29	7.37	7.4
6_	Nominal current (max. continuous current)	A	2.83	2.16	1.28	0.987
7_	Stall torque	mNm	100	102	89.8	93.6
8_	Stall current	A	35.1	28.5	14.8	11.8
9_	Max. efficiency	%	85.7	85.7	85.2	85.4
10_	Terminal resistance	Ω	0.512	0.841	2.43	4.06
11_	Terminal inductance	mH	0.033	0.0524	0.15	0.255
12_	Torque constant	mNm/A	2.85	3.59	6.07	7.93
13_	Speed constant	rpm/V	3350	2660	1570	1200
14_	Speed/torque gradient	rpm/mNm	603	623	631	618
15_	Mechanical time constant	ms	3.72	3.84	3.89	3.81
16_	Rotor inertia	gcm²	0.589	0.589	0.589	0.589

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	16.1
18_	Thermal resistance winding-housing	K/W	1.8
19_	Thermal time constant winding	s	2.16
20_	Thermal time constant motor	s	400
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	120 000
24_	Axial play	mm	0...0.29
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	60
	(static, shaft supported)	N	2500
28_	Max. radial load [mm from flange]	N	10 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	50
32_	Typical noise level [rpm]	dBA	50 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
384_GPX 16 HP	1–3
385_GPX 16 SPEED	1–2
389_GPX 19 SPEED	[3]

Sensor
for motor type A:
514_ENX 16 EASY INT
for motor type B:
514_ENX 16 EASY INT Abs.

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG 22)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

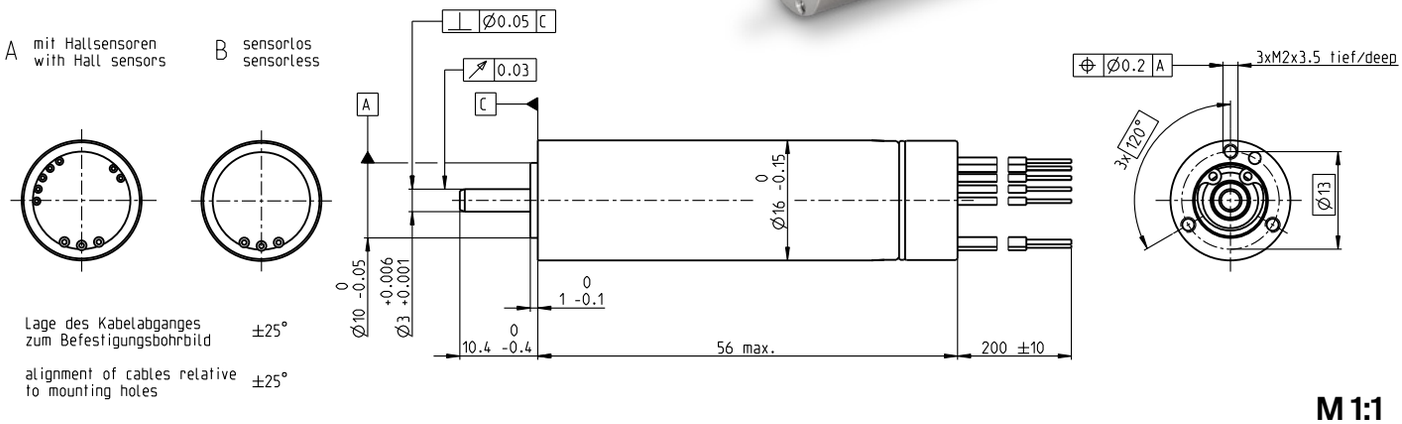
Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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ECX SPEED 16 L ∅16 mm, brushless, BLDC motor

Key data: 40/43 W, 9.5 mNm, 50 000 rpm





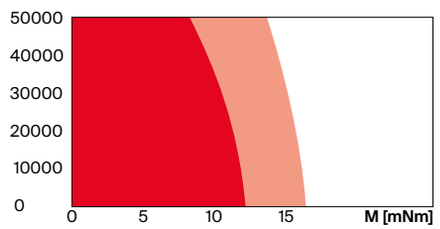
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	46300	46300	47100	47500
3_	No load current	mA	295	221	152	115
4_	Nominal speed	rpm	43100	43200	44200	44800
5_	Nominal torque	mNm	9.01	9.1	9.37	9.54
6_	Nominal current (max. continuous current)	A	2.71	2.05	1.43	1.1
7_	Stall torque	mNm	147	154	175	187
8_	Stall current	A	39.8	31.4	24.1	19.6
9_	Max. efficiency	%	83.8	84.2	85.1	85.5
10_	Terminal resistance	Ω	0.453	0.765	1.49	2.45
11_	Terminal inductance	mH	0.0246	0.0437	0.095	0.166
12_	Torque constant	mNm/A	3.68	4.91	7.25	9.58
13_	Speed constant	rpm/V	2590	1940	1320	997
14_	Speed/torque gradient	rpm/mNm	318	303	271	255
15_	Mechanical time constant	ms	3.32	3.16	2.83	2.66
16_	Rotor inertia	gcm²	0.997	0.997	0.997	0.997

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	13.5
18_	Thermal resistance winding-housing	K/W	2.34
19_	Thermal time constant winding	s	4.91
20_	Thermal time constant motor	s	471
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	50 000
24_	Axial play	mm	0...0.29
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	60
	(static, shaft supported)	N	2500
28_	Max. radial load [mm from flange]	N	10 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	70
32_	Typical noise level [rpm]	dBA	52 [50 000]

Operating range

n [rpm] winding 36 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
381_GPX 16 A/C	1–2 [3–4]
382_GPX 16 LN/LZ	1–2 [3–4]
383_GPX 16 HP	2–3 [4]
385_GPX 16 SPEED	1–2
386_GPX 19 A/C	3–4
387_GPX 19 LN/LZ	3–4
388_GPX 19 HP	4
389_GPX 19 SPEED	[3]

Sensor
for motor type A:
514_ENX 16 EASY INT
for motor type B:
514_ENX 16 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG 22)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

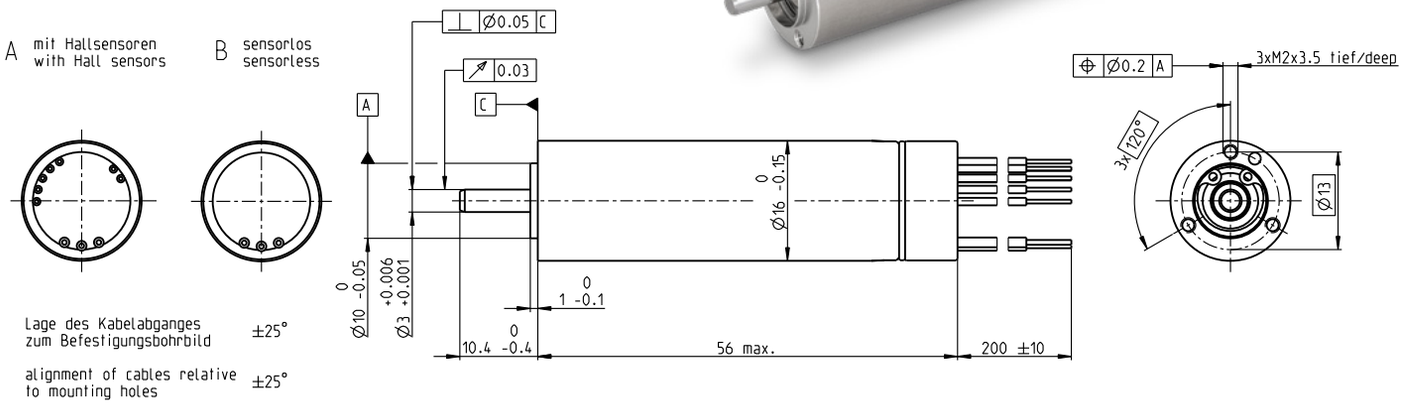
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ECX SPEED 16 L ∅16 mm, brushless, BLDC motor

High Power

Key data: 80/93 W, 16.1 mNm, 70 000 rpm





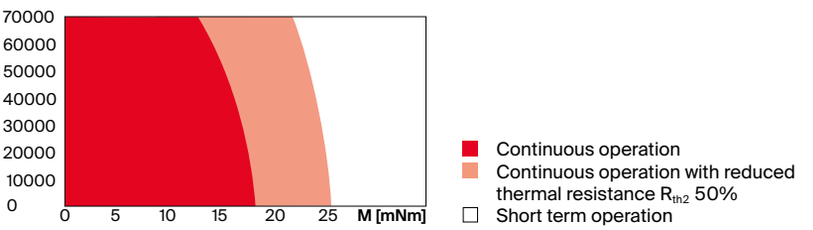
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	61200	61200	61200	61200
3_	No load current	mA	219	164	110	82.1
4_	Nominal speed	rpm	58000	58300	58400	58400
5_	Nominal torque	mNm	15.5	16.1	15.4	14.8
6_	Nominal current (max. continuous current)	A	5.69	4.41	2.83	2.05
7_	Stall torque	mNm	366	431	438	419
8_	Stall current	A	131	115	78.1	56
9_	Max. efficiency	%	92	92.6	92.7	92.5
10_	Terminal resistance	Ω	0.138	0.208	0.461	0.858
11_	Terminal inductance	mH	0.0114	0.0202	0.0454	0.0808
12_	Torque constant	mNm/A	2.8	3.74	5.61	7.48
13_	Speed constant	rpm/V	3410	2550	1700	1280
14_	Speed/torque gradient	rpm/mNm	167	142	140	146
15_	Mechanical time constant	ms	2.1	1.79	1.76	1.84
16_	Rotor inertia	gcm²	1.2	1.2	1.2	1.2

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	13.5
18_	Thermal resistance winding-housing	K/W	0.58
19_	Thermal time constant winding	s	1.37
20_	Thermal time constant motor	s	483
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	70 000
24_	Axial play	mm	0...0.29
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	60
	(static, shaft supported)	N	2500
28_	Max. radial load [mm from flange]	N	10 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	72
32_	Typical noise level [rpm]	dBA	52 [50 000]

Operating range

n [rpm] winding 36 V



Connection A and B, motor (Cable AWG 22)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Modular system Details on catalog page 44

Gear	Stages [opt.]
381_GPX 16 A/C	1–2 [3–4]
382_GPX 16 LN/LZ	1–2 [3–4]
383_GPX 16 HP	2–3 [4]
385_GPX 16 SPEED	1–2
386_GPX 19 A/C	3–4
387_GPX 19 LN/LZ	3–4
388_GPX 19 HP	4
389_GPX 19 SPEED	[3]

Sensor
for motor type A:
514_ENX 16 EASY INT
for motor type B:
514_ENX 16 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

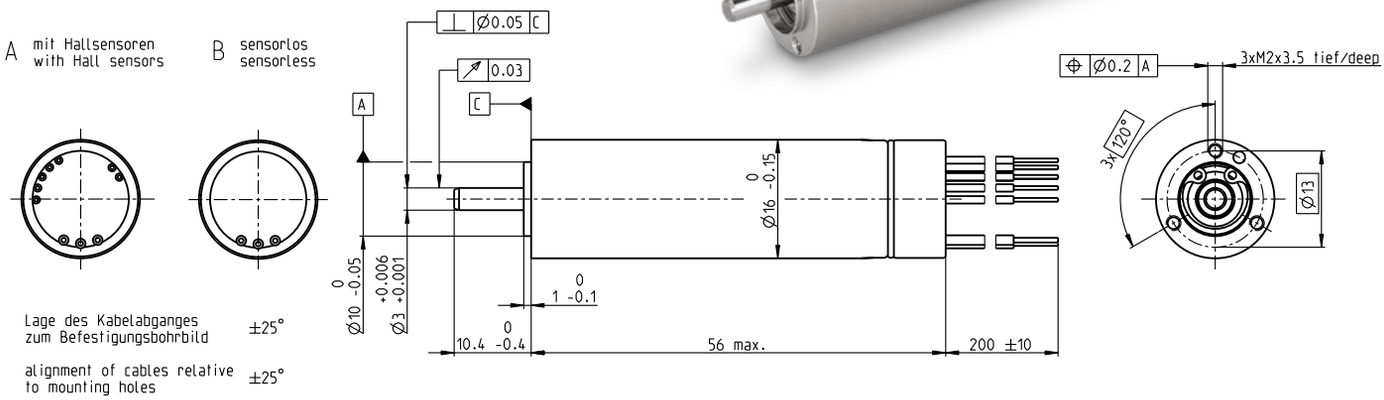
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ECX SPEED 16 L ∅16 mm, brushless, BLDC motor

Sterilizable

Key data: 80/103 W, 15.6 mNm, 70 000 rpm





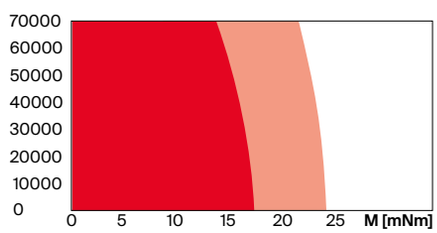
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	64600	64600	64600	64600
3_	No load current	mA	482	361	241	181
4_	Nominal speed	rpm	61200	61500	61700	61700
5_	Nominal torque	mNm	15	15.6	15	14.4
6_	Nominal current (max. continuous current)	A	6.08	4.71	3.03	2.19
7_	Stall torque	mNm	346	408	414	396
8_	Stall current	A	131	115	78.1	56
9_	Max. efficiency	%	88.5	89.3	89.4	89.2
10_	Terminal resistance	Ω	0.138	0.208	0.461	0.858
11_	Terminal inductance	mH	0.01	0.0178	0.04	0.0712
12_	Torque constant	mNm/A	2.65	3.53	5.3	7.07
13_	Speed constant	rpm/V	3600	2700	1800	1350
14_	Speed/torque gradient	rpm/mNm	187	159	157	164
15_	Mechanical time constant	ms	1.87	1.59	1.56	1.63
16_	Rotor inertia	gcm²	0.952	0.952	0.952	0.952

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	13.5
18_	Thermal resistance winding-housing	K/W	0.58
19_	Thermal time constant winding	s	1.28
20_	Thermal time constant motor	s	490
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	70 000
24_	Axial play	mm	0...0.29
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	60
	(static, shaft supported)	N	2500
28_	Max. radial load [mm from flange]	N	10 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	73
32_	Typical noise level [rpm]	dBA	52 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
384_GPX 16 HP	1–3
385_GPX 16 SPEED	1–2
389_GPX 19 SPEED	[3]

Sensor
for motor type A:
514_ENX 16 EASY INT
for motor type B:
514_ENX 16 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/8
567_EPOS4 Compact 50/5
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V_{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

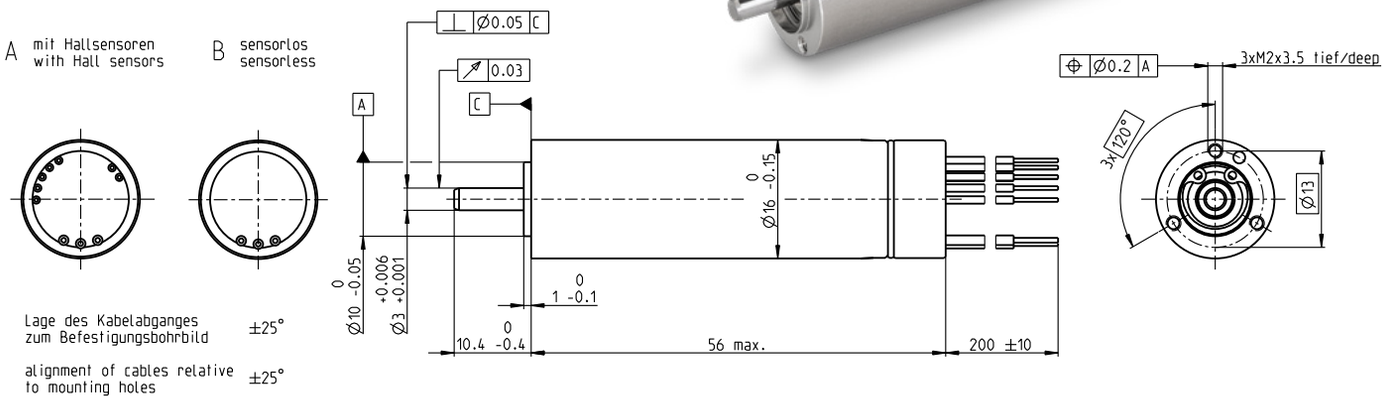
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ECX SPEED 16 L ∅16 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key data: 80/109 W, 15.6 mNm, 120 000 rpm





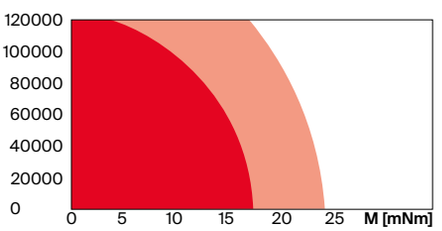
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	64600	64600	64600	64600
3_	No load current	mA	481	361	241	180
4_	Nominal speed	rpm	61200	61500	61700	61700
5_	Nominal torque	mNm	15	15.6	15	14.4
6_	Nominal current (max. continuous current)	A	6.08	4.71	3.03	2.19
7_	Stall torque	mNm	346	408	414	396
8_	Stall current	A	131	115	78.1	56
9_	Max. efficiency	%	88.5	89.3	89.4	89.2
10_	Terminal resistance	Ω	0.138	0.208	0.461	0.858
11_	Terminal inductance	mH	0.01	0.0178	0.04	0.0712
12_	Torque constant	mNm/A	2.65	3.53	5.3	7.07
13_	Speed constant	rpm/V	3600	2700	1800	1350
14_	Speed/torque gradient	rpm/mNm	187	159	157	164
15_	Mechanical time constant	ms	1.87	1.59	1.56	1.63
16_	Rotor inertia	gcm²	0.952	0.952	0.952	0.952

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	13.5
18_	Thermal resistance winding-housing	K/W	0.58
19_	Thermal time constant winding	s	1.14
20_	Thermal time constant motor	s	490
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	120 000
24_	Axial play	mm	0...0.29
	Preload	N	1.5
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.5
27_	Max. force for press fits (static)	N	60
	(static, shaft supported)	N	2500
28_	Max. radial load [mm from flange]	N	10 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	73
32_	Typical noise level [rpm]	dBA	52 [50 000]

Operating range

n [rpm] winding 36 V



135°C SSS

Sterilization information

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
384_GPX 16 HP	1–3
385_GPX 16 SPEED	1–2
389_GPX 19 SPEED	[3]

Sensor
for motor type A:
514_ENX 16 EASY INT
for motor type B:
514_ENX 16 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 22)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

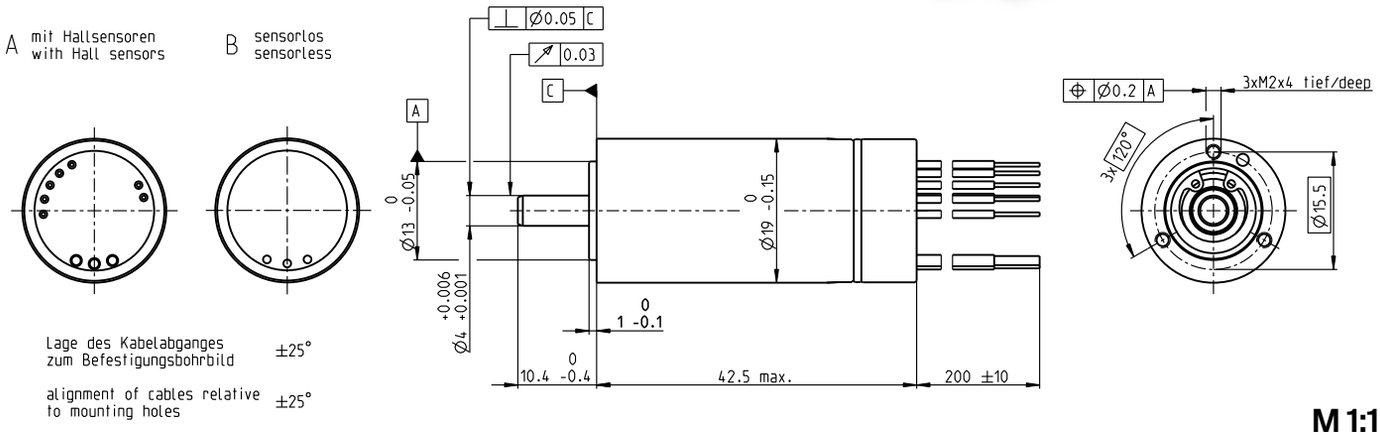
Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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ECX SPEED 19 M ∅19 mm, brushless, BLDC motor

Key data: 30/41 W, 9.0 mNm, 50 000 rpm





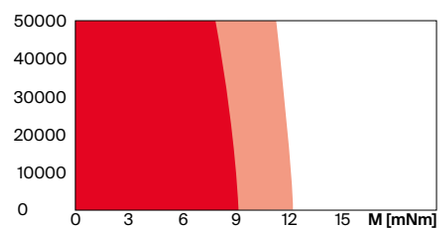
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	46500	49100	46500	48400
3_	No load current	mA	151	121	75.7	59.7
4_	Nominal speed	rpm	41300	44000	41400	43200
5_	Nominal torque	mNm	9.04	8.91	8.99	8.47
6_	Nominal current (max. continuous current)	A	2.57	2.01	1.28	0.946
7_	Stall torque	mNm	92.5	98.9	94.4	89.6
8_	Stall current	A	25.2	21.3	12.8	9.54
9_	Max. efficiency	%	85.1	85.5	85.3	84.8
10_	Terminal resistance	Ω	0.715	1.13	2.8	5.03
11_	Terminal inductance	mH	0.0513	0.0817	0.205	0.336
12_	Torque constant	mNm/A	3.67	4.64	7.35	9.4
13_	Speed constant	rpm/V	2600	2060	1300	1020
14_	Speed/torque gradient	rpm/mNm	506	500	496	544
15_	Mechanical time constant	ms	6.09	6.02	5.97	6.56
16_	Rotor inertia	gcm²	1.15	1.15	1.15	1.15

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	12.4
18_	Thermal resistance winding-housing	K/W	2.77
19_	Thermal time constant winding	s	5.55
20_	Thermal time constant motor	s	513
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	50 000
24_	Axial play	mm	0...0.29
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	70
	(static, shaft supported)	N	5000
28_	Max. radial load [mm from flange]	N	12 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	71
32_	Typical noise level [rpm]	dBA	48 [50 000]

Operating range

n [rpm] winding 36 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
386_GPX 19 A/C	1–2 [3–4]
387_GPX 19 LN/LZ	1–2 [3–4]
388_GPX 19 HP	2–3 [4]
389_GPX 19 SPEED	1–2
390_GPX 22 A/C	3–4
391_GPX 22 LN/LZ	3–4
392_GPX 22 HP	4
395_GPX 22 SPEED	[3]

Sensor
for motor type A:
515_ENX 19 EASY INT
for motor type B:
515_ENX 19 EASY INT Abs.

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

Connection A and B, motor (Cable AWG 20)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

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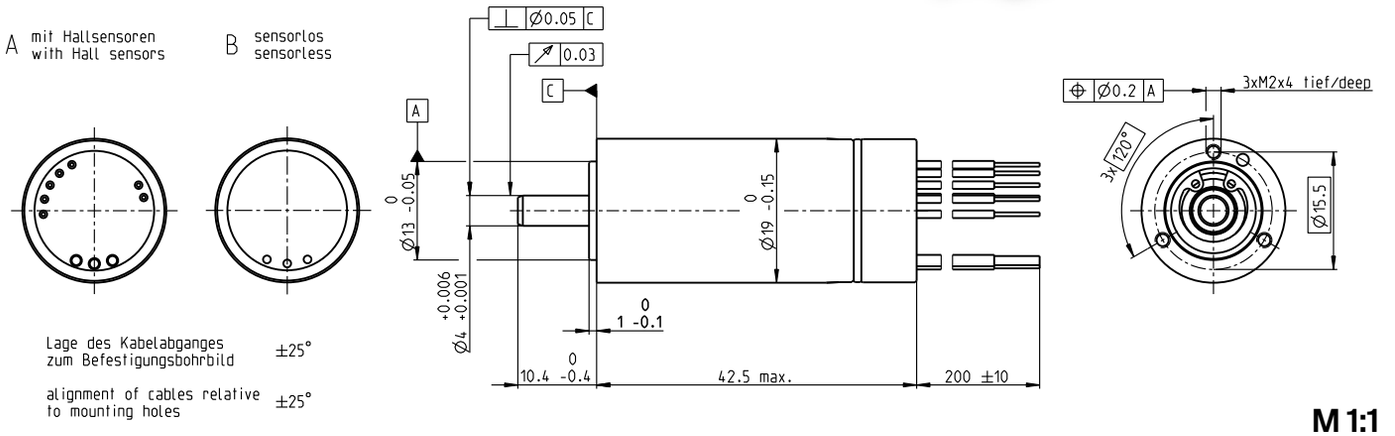
ECX SPEED 19 M ∅19 mm, brushless, BLDC motor

High Power

Key data: 60/79 W, 13.7 mNm, 65 000 rpm



ECX SPEED



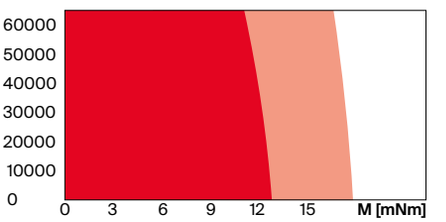
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	57200	55700	55700	54700
3_	No load current	mA	169	124	82.4	60.6
4_	Nominal speed	rpm	52400	50900	51100	50200
5_	Nominal torque	mNm	13.7	12.5	12.9	13.2
6_	Nominal current (max. continuous current)	A	4.65	3.12	2.14	1.61
7_	Stall torque	mNm	203	174	190	196
8_	Stall current	A	67.7	42.4	31	23.5
9_	Max. efficiency	%	90.2	89.4	89.9	90
10_	Terminal resistance	Ω	0.266	0.566	1.16	2.04
11_	Terminal inductance	mH	0.0259	0.0486	0.109	0.202
12_	Torque constant	mNm/A	2.99	4.1	6.15	8.35
13_	Speed constant	rpm/V	3190	2330	1550	1140
14_	Speed/torque gradient	rpm/mNm	283	322	294	279
15_	Mechanical time constant	ms	3.88	4.41	4.03	3.83
16_	Rotor inertia	gcm²	1.31	1.31	1.31	1.31

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	12.4
18_	Thermal resistance winding-housing	K/W	0.75
19_	Thermal time constant winding	s	1.27
20_	Thermal time constant motor	s	513
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	65 000
24_	Axial play	mm	0...0.29
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	70
	(static, shaft supported)	N	5000
28_	Max. radial load [mm from flange]	N	12 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	71
32_	Typical noise level [rpm]	dBA	48 [50 000]

Operating range

n [rpm] winding 36 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Connection A and B, motor (Cable AWG 20)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Modular system Details on catalog page 44

Gear	Stages [opt.]
386_GPX 19 A/C	1–2 [3–4]
387_GPX 19 LN/LZ	1–2 [3–4]
388_GPX 19 HP	2–3 [4]
389_GPX 19 SPEED	1–2
390_GPX 22 A/C	3–4
391_GPX 22 LN/LZ	3–4
392_GPX 22 HP	4
395_GPX 22 SPEED	[3]

Sensor
for motor type A:
515_ENX 19 EASY INT
for motor type B:
515_ENX 19 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

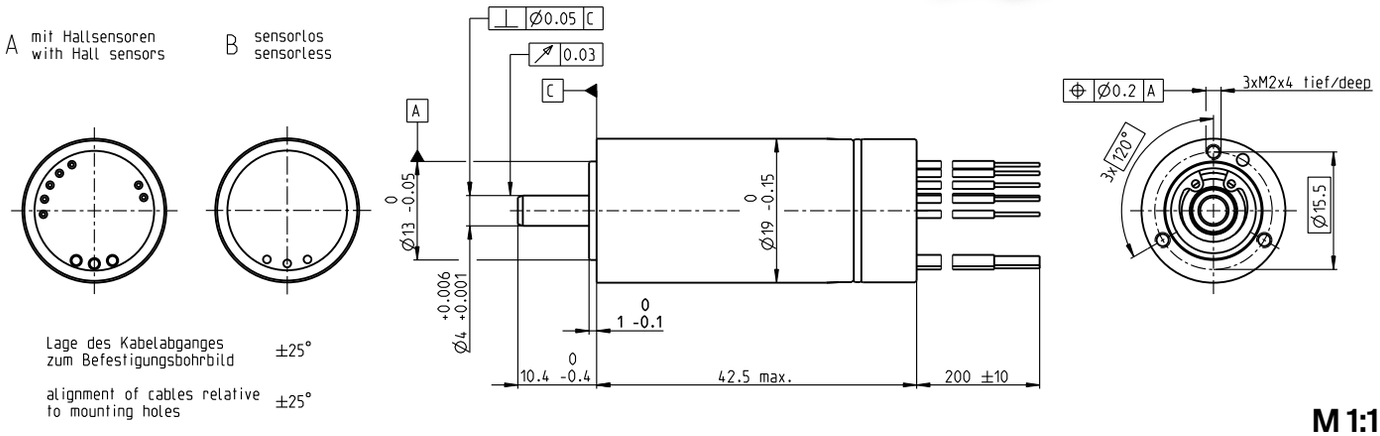
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ECX SPEED 19 M ∅19 mm, brushless, BLDC motor

Sterilizable

Key data: 60/73 W, 11.6 mNm, 70 000 rpm





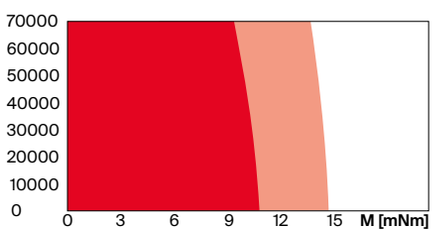
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	64800	64700	64700	63500
3_	No load current	mA	169	127	84.4	61.9
4_	Nominal speed	rpm	59600	59200	59500	58400
5_	Nominal torque	mNm	11.6	10.3	10.7	10.9
6_	Nominal current (max. continuous current)	A	4.49	3	2.06	1.55
7_	Stall torque	mNm	179	150	164	169
8_	Stall current	A	67.7	42.4	31	23.5
9_	Max. efficiency	%	90.2	89.4	89.8	90
10_	Terminal resistance	Ω	0.266	0.566	1.16	2.04
11_	Terminal inductance	mH	0.0235	0.0439	0.0989	0.183
12_	Torque constant	mNm/A	2.64	3.53	5.3	7.2
13_	Speed constant	rpm/V	3610	2700	1800	1330
14_	Speed/torque gradient	rpm/mNm	363	433	396	376
15_	Mechanical time constant	ms	4.38	5.22	4.77	4.53
16_	Rotor inertia	gcm²	1.15	1.15	1.15	1.15

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	12.4
18_	Thermal resistance winding-housing	K/W	1.6
19_	Thermal time constant winding	s	2.36
20_	Thermal time constant motor	s	513
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	70 000
24_	Axial play	mm	0...0.29
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	70
	(static, shaft supported)	N	5000
28_	Max. radial load [mm from flange]	N	12 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	72
32_	Typical noise level [rpm]	dBA	48 [50 000]

Operating range

n [rpm] winding 36 V



135°C SSS

Sterilization information

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
389_GPX 19 SPEED	1–2
395_GPX 22 SPEED	[3]

Sensor
for motor type A:
515_ENX 19 EASY INT
for motor type B:
515_ENX 19 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG 20)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

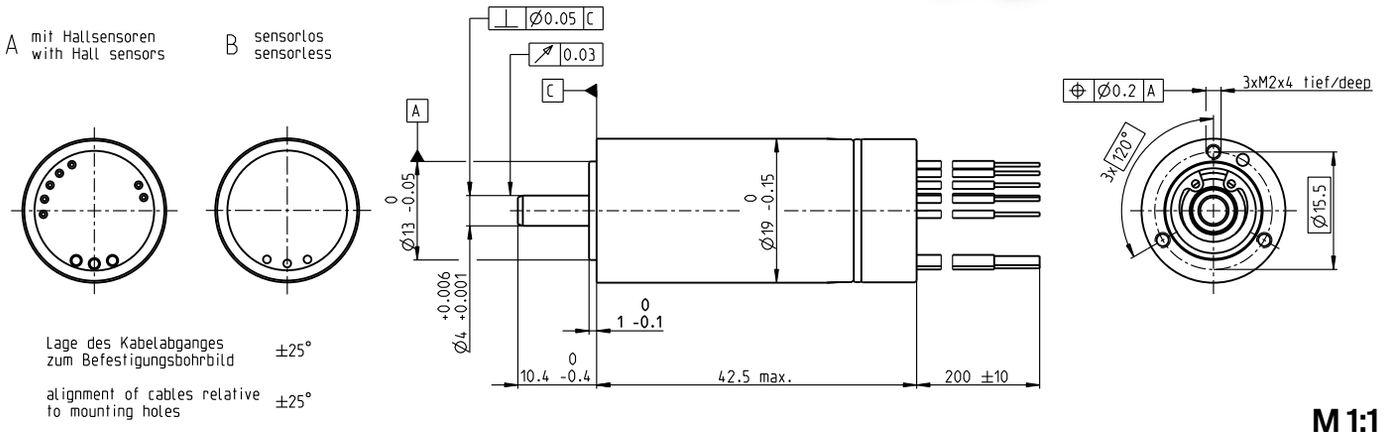
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ECX SPEED 19 M ∅19 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key data: 60/92 W, 11.6 mNm, 100 000 rpm





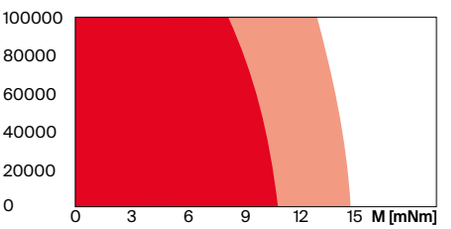
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	64800	64700	64700	63500
3_	No load current	mA	169	127	84.5	61.9
4_	Nominal speed	rpm	59600	59200	59500	58400
5_	Nominal torque	mNm	11.6	10.3	10.7	10.9
6_	Nominal current (max. continuous current)	A	4.49	3	2.06	1.55
7_	Stall torque	mNm	179	150	164	169
8_	Stall current	A	67.7	42.4	31	23.5
9_	Max. efficiency	%	90.2	89.4	89.8	90
10_	Terminal resistance	Ω	0.266	0.566	1.16	2.04
11_	Terminal inductance	mH	0.0235	0.0439	0.0989	0.183
12_	Torque constant	mNm/A	2.64	3.53	5.3	7.2
13_	Speed constant	rpm/V	3610	2700	1800	1330
14_	Speed/torque gradient	rpm/mNm	363	433	396	376
15_	Mechanical time constant	ms	4.38	5.22	4.77	4.53
16_	Rotor inertia	gcm²	1.15	1.15	1.15	1.15

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	12.4
18_	Thermal resistance winding-housing	K/W	1.6
19_	Thermal time constant winding	s	2.36
20_	Thermal time constant motor	s	513
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	100 000
24_	Axial play	mm	0...0.29
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	70
	(static, shaft supported)	N	5000
28_	Max. radial load [mm from flange]	N	12 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	72
32_	Typical noise level [rpm]	dBA	48 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
389_GPX 19 SPEED	1–2
395_GPX 22 SPEED	[3]

Sensor
for motor type A:
515_ENX 19 EASY INT
for motor type B:
515_ENX 19 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG 20)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V_{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

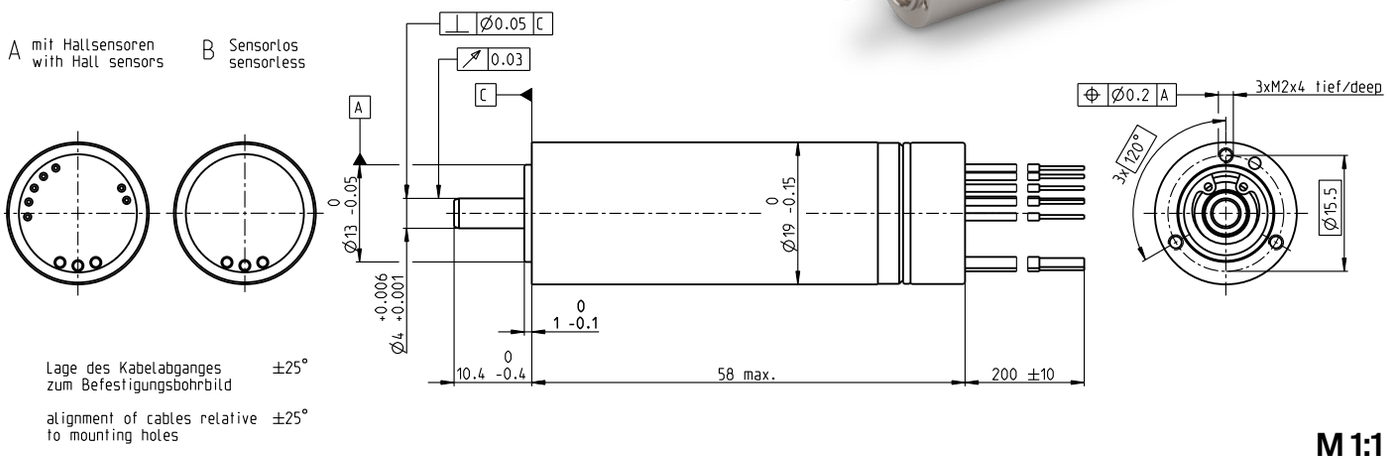
Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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ECX SPEED 19 L ∅19 mm, brushless, BLDC motor



Key data: 60/69 W, 14.8 mNm, 50 000 rpm



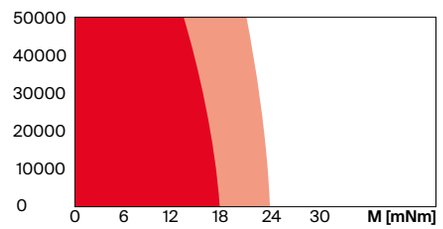
M 1:1

	Motor data				
1_	Nominal voltage	V	18	24	36
2_	No load speed	rpm	47500	48300	49200
3_	No load current	mA	354	273	187
4_	Nominal speed	rpm	43800	45000	46000
5_	Nominal torque	mNm	14.2	14.8	14.8
6_	Nominal current (max. continuous current)	A	4.23	3.37	2.28
7_	Stall torque	mNm	214	251	271
8_	Stall current	A	59.6	53.3	39
9_	Max. efficiency	%	85.4	86.4	86.8
10_	Terminal resistance	Ω	0.302	0.45	0.924
11_	Terminal inductance	mH	0.0231	0.0396	0.086
12_	Torque constant	mNm/A	3.6	4.71	6.94
13_	Speed constant	rpm/V	2660	2030	1380
14_	Speed/torque gradient	rpm/mNm	223	194	183
15_	Mechanical time constant	ms	3.9	3.39	3.2
16_	Rotor inertia	gcm²	1.67	1.67	1.67

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	10.1
18_	Thermal resistance winding-housing	K/W	1.2
19_	Thermal time constant winding	s	3.62
20_	Thermal time constant motor	s	418
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	50 000
24_	Axial play	mm	0...0.29
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	70
	(static, shaft supported)	N	5000
28_	Max. radial load [mm from flange]	N	12 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	100
32_	Typical noise level [rpm]	dBA	51 [50 000]

Operating range

n [rpm] winding 36 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
386_GPX 19 A/C	1–2 [3–4]
387_GPX 19 LN/LZ	1–2 [3–4]
388_GPX 19 HP	2–3 [4]
389_GPX 19 SPEED	1–2
390_GPX 22 A/C	3–4
391_GPX 22 LN/LZ	3–4
392_GPX 22 HP	4
395_GPX 22 SPEED	[3]

Sensor
for motor type A:
515_ENX 19 EASY INT
for motor type B:
515_ENX 19 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

Connection A and B, motor (Cable AWG 20)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

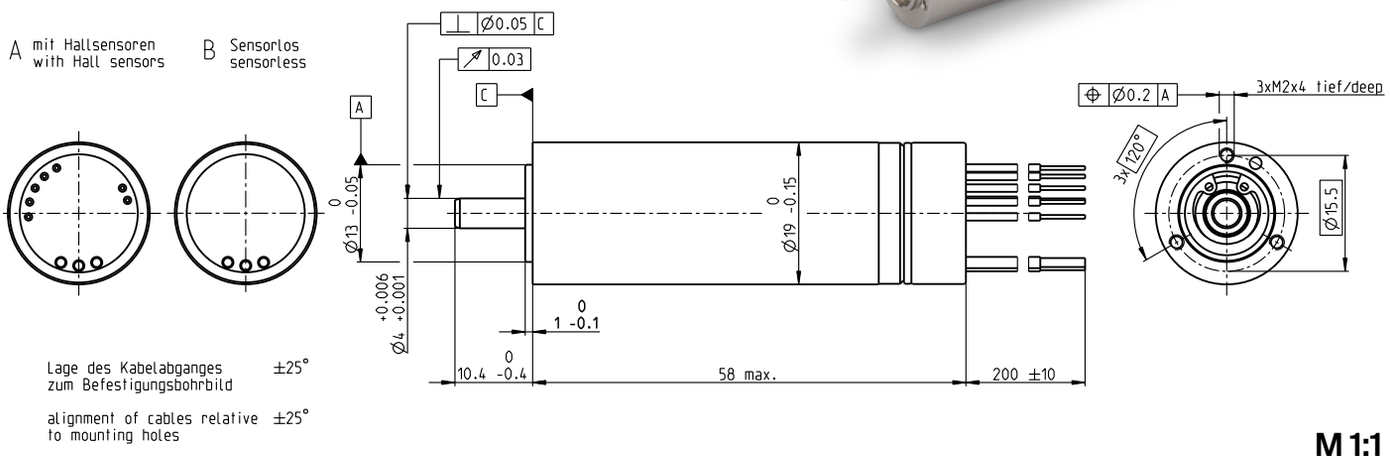
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ECX SPEED 19 L ∅19 mm, brushless, BLDC motor

High Power

Key data: 120/141 W, 24.7 mNm, 65 000 rpm





M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	57700	57700	54700	60200
3_	No load current	mA	327	245	150	131
4_	Nominal speed	rpm	54500	54700	51800	57400
5_	Nominal torque	mNm	24	23.7	24.7	22.8
6_	Nominal current (max. continuous current)	A	8.27	6.12	4.02	3.09
7_	Stall torque	mNm	589	630	665	703
8_	Stall current	A	198	159	106	92.6
9_	Max. efficiency	%	92.1	92.4	92.7	92.7
10_	Terminal resistance	Ω	0.0908	0.151	0.34	0.518
11_	Terminal inductance	mH	0.0124	0.0221	0.0555	0.0813
12_	Torque constant	mNm/A	2.97	3.96	6.28	7.6
13_	Speed constant	rpm/V	3210	2410	1520	1260
14_	Speed/torque gradient	rpm/mNm	98.1	91.7	82.4	85.8
15_	Mechanical time constant	ms	1.69	1.58	1.42	1.47
16_	Rotor inertia	gcm²	1.64	1.64	1.64	1.64

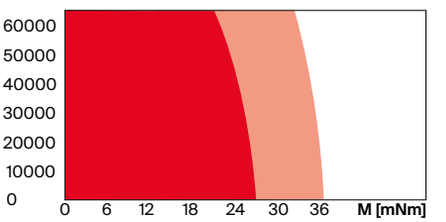
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	10.1
18_	Thermal resistance winding-housing	K/W	1.32
19_	Thermal time constant winding	s	4.01
20_	Thermal time constant motor	s	418
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	65 000
24_	Axial play	mm	0...0.29
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	70
	(static, shaft supported)	N	5000
28_	Max. radial load [mm from flange]	N	12 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	100
32_	Typical noise level [rpm]	dBA	51 [50 000]

Operating range

n [rpm] winding 36 V



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
386_GPX 19 A/C	1–2 [3–4]
387_GPX 19 LN/LZ	1–2 [3–4]
388_GPX 19 HP	2–3 [4]
389_GPX 19 SPEED	1–2
390_GPX 22 A/C	3–4
391_GPX 22 LN/LZ	3–4
392_GPX 22 HP	4
395_GPX 22 SPEED	[3]

Sensor
for motor type A:
515_ENX 19 EASY INT
for motor type B:
515_ENX 19 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 20)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

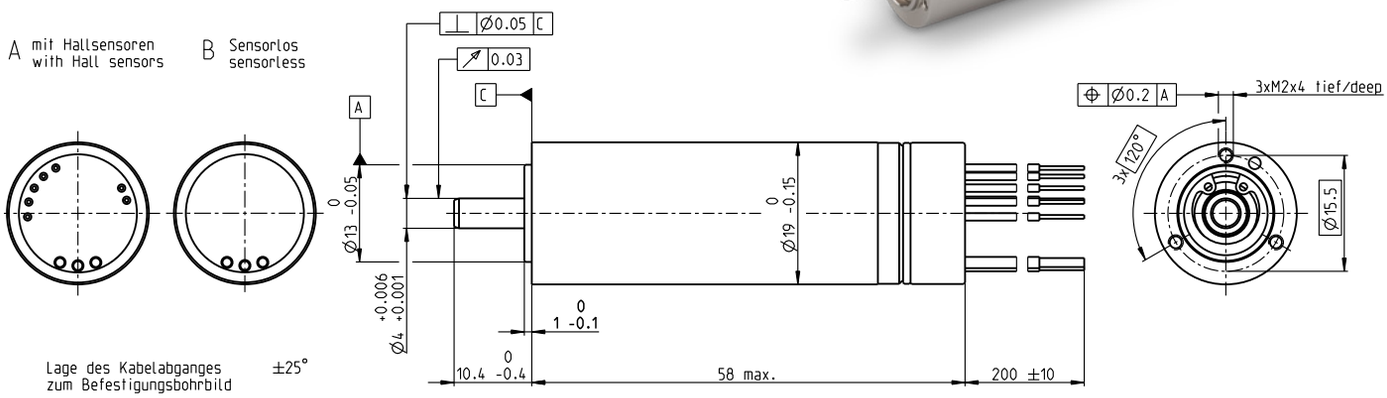
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ECX SPEED 19 L ∅19 mm, brushless, BLDC motor

Sterilizable

Key data: 120/151 W, 24.9 mNm, 70 000 rpm





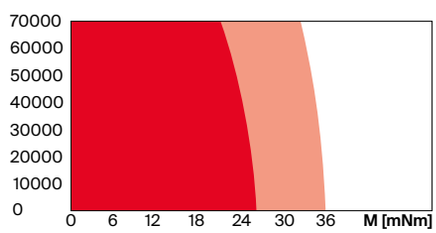
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	60200	60200	57100	62900
3_	No load current	mA	275	206	127	109
4_	Nominal speed	rpm	56600	56900	54000	59900
5_	Nominal torque	mNm	24.3	24	24.9	23.2
6_	Nominal current (max. continuous current)	A	8.69	6.43	4.2	3.26
7_	Stall torque	mNm	508	566	619	661
8_	Stall current	A	178	149	103	90.8
9_	Max. efficiency	%	92.3	92.7	93.1	93.2
10_	Terminal resistance	Ω	0.101	0.161	0.35	0.528
11_	Terminal inductance	mH	0.0101	0.018	0.0451	0.0662
12_	Torque constant	mNm/A	2.85	3.8	6.01	7.28
13_	Speed constant	rpm/V	3350	2510	1590	1310
14_	Speed/torque gradient	rpm/mNm	119	107	92.4	95.2
15_	Mechanical time constant	ms	2.22	2	1.73	1.79
16_	Rotor inertia	gcm²	1.79	1.79	1.79	1.79

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	10.1
18_	Thermal resistance winding-housing	K/W	0.9
19_	Thermal time constant winding	s	2.74
20_	Thermal time constant motor	s	418
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	70 000
24_	Axial play	mm	0...0.29
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	70
	(static, shaft supported)	N	5000
28_	Max. radial load [mm from flange]	N	12 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	100
32_	Typical noise level [rpm]	dBA	51 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
389_GPX 19 SPEED	1–2
395_GPX 22 SPEED	[3]

Sensor
for motor type A:
515_ENX 19 EASY INT
for motor type B:
515_ENX 19 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 20)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

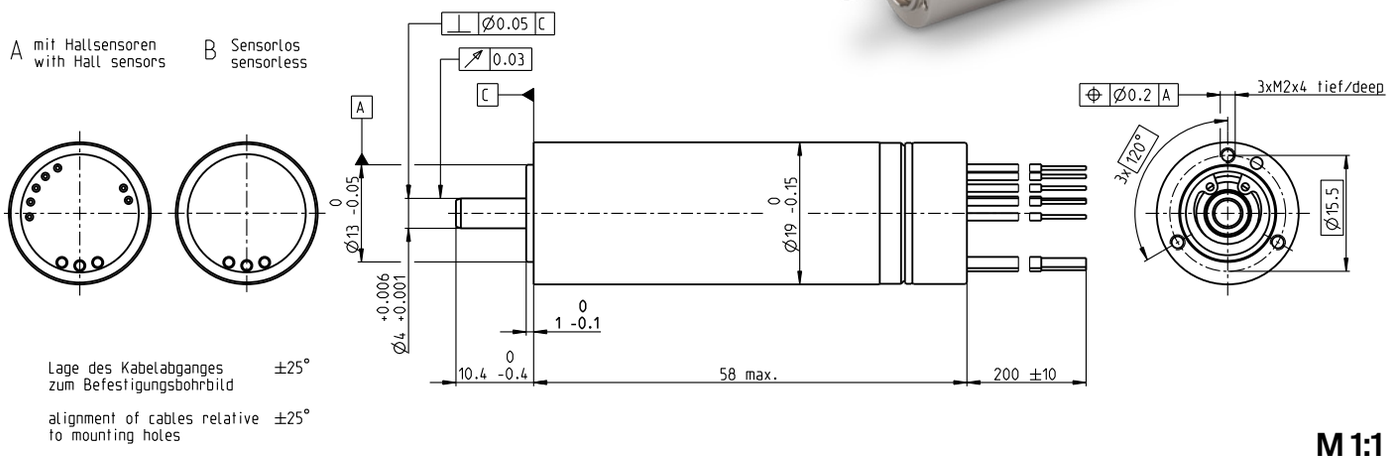
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ECX SPEED 19 L ∅19 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key data: 120/165 W, 24.9 mNm, 100 000 rpm





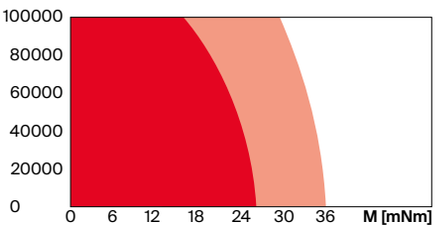
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	60200	60200	57100	62900
3_	No load current	mA	274	206	127	109
4_	Nominal speed	rpm	56600	56900	54000	59900
5_	Nominal torque	mNm	24.3	24	24.9	23.2
6_	Nominal current (max. continuous current)	A	8.69	6.43	4.2	3.26
7_	Stall torque	mNm	508	566	619	661
8_	Stall current	A	178	149	103	90.8
9_	Max. efficiency	%	92.3	92.7	93.1	93.2
10_	Terminal resistance	Ω	0.101	0.161	0.35	0.528
11_	Terminal inductance	mH	0.0101	0.018	0.0451	0.0662
12_	Torque constant	mNm/A	2.85	3.8	6.01	7.28
13_	Speed constant	rpm/V	3350	2510	1590	1310
14_	Speed/torque gradient	rpm/mNm	119	107	92.4	95.2
15_	Mechanical time constant	ms	2.22	2	1.73	1.79
16_	Rotor inertia	gcm²	1.79	1.79	1.79	1.79

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	10.1
18_	Thermal resistance winding-housing	K/W	0.9
19_	Thermal time constant winding	s	2.74
20_	Thermal time constant motor	s	418
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	100 000
24_	Axial play	mm	0...0.29
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	70
	(static, shaft supported)	N	5000
28_	Max. radial load [mm from flange]	N	12 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	100
32_	Typical noise level [rpm]	dBA	51 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
389_GPX 19 SPEED	1–2
395_GPX 22 SPEED	[3]

Sensor
for motor type A:
515_ENX 19 EASY INT
for motor type B:
515_ENX 19 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 20)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

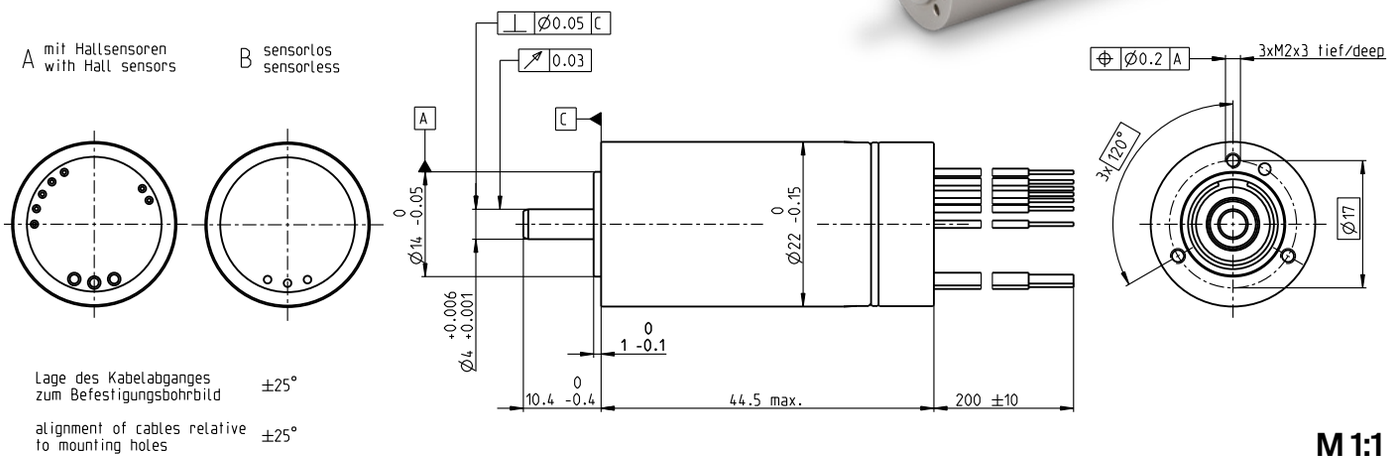
Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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ECX SPEED 22 M ∅22 mm, brushless, BLDC motor

Key data: 40/49 W, 11.7 mNm, 45 000 rpm





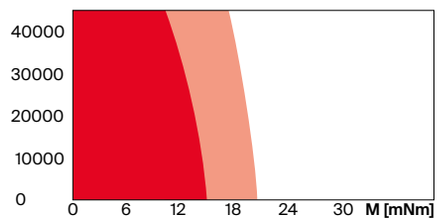
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	40200	39700	40300	40200
3_	No load current	mA	528	388	265	197
4_	Nominal speed	rpm	37200	36900	37600	37400
5_	Nominal torque	mNm	10.4	11.3	11.7	11.5
6_	Nominal current (max. continuous current)	A	2.93	2.32	1.63	1.2
7_	Stall torque	mNm	154	175	197	189
8_	Stall current	A	36.5	30.8	23.3	16.8
9_	Max. efficiency	%	78.3	79.6	80.5	80.2
10_	Terminal resistance	Ω	0.493	0.779	1.54	2.86
11_	Terminal inductance	mH	0.0294	0.0535	0.117	0.21
12_	Torque constant	mNm/A	4.21	5.68	8.42	11.3
13_	Speed constant	rpm/V	2270	1680	1130	848
14_	Speed/torque gradient	rpm/mNm	265	230	208	215
15_	Mechanical time constant	ms	5.92	5.14	4.63	4.8
16_	Rotor inertia	gcm²	2.13	2.13	2.13	2.13

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	11.3
18_	Thermal resistance winding-housing	K/W	1.34
19_	Thermal time constant winding	s	2.71
20_	Thermal time constant motor	s	314
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	45 000
24_	Axial play	mm	0...0.24
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	6000
28_	Max. radial load [mm from flange]	N	16 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	102
32_	Typical noise level [rpm]	dBA	53 [45 000]

Operating range

n [rpm] winding 36 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
390_GPX 22 A/C	1–2 [3–4]
391_GPX 22 LN/LZ	1–2 [3–4]
392_GPX 22 HP	2–3 [4]
394_GPX 22 UP	1–4
395_GPX 22 SPEED	1–2
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

Connection A and B, motor (Cable AWG 18)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25 °C: 10 kOhm ±1%, beta (25–85 °C): 3490 K

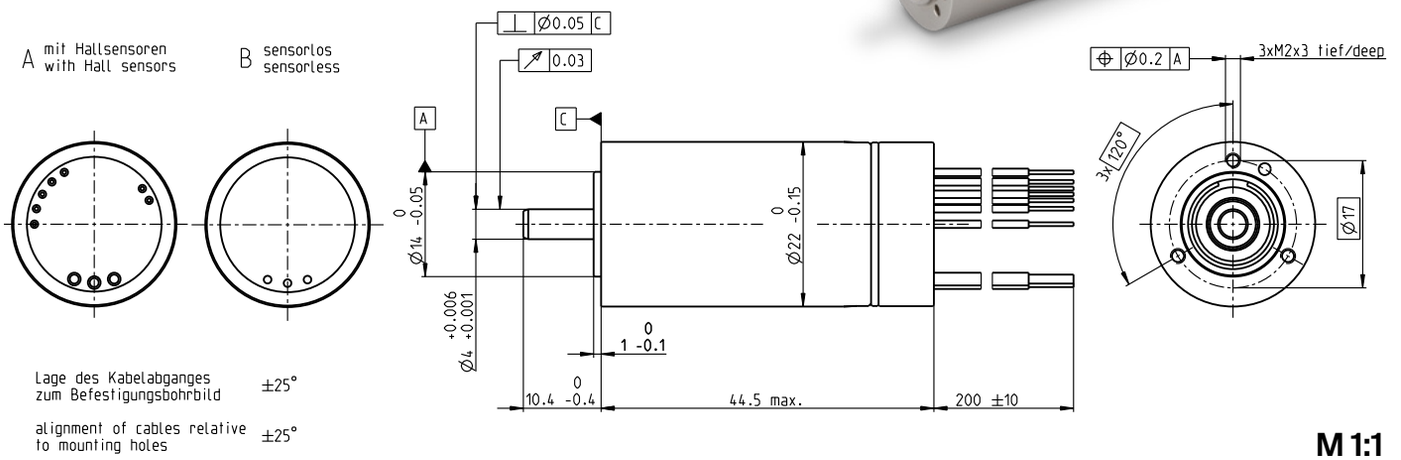
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ECX SPEED 22 M ∅22 mm, brushless, BLDC motor

High Power

Key data: 80/106 W, 20.2 mNm, 60 000 rpm





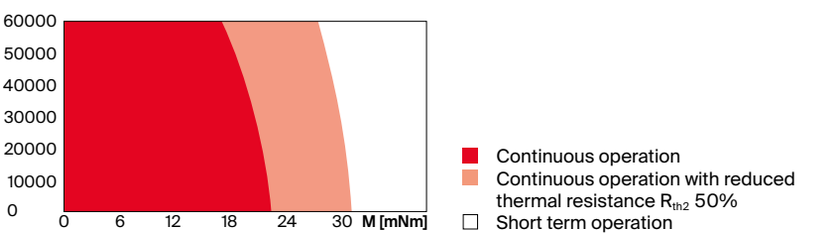
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	51500	58900	56200	53200
3_	No load current	mA	247	224	140	96.8
4_	Nominal speed	rpm	48700	56300	53700	50400
5_	Nominal torque	mNm	20.2	18.9	19.4	18
6_	Nominal current (max. continuous current)	A	6.24	5.03	3.29	2.17
7_	Stall torque	mNm	449	543	539	420
8_	Stall current	A	135	140	88.4	48.8
9_	Max. efficiency	%	91.7	92.2	92.2	91.3
10_	Terminal resistance	Ω	0.133	0.172	0.407	0.983
11_	Terminal inductance	mH	0.012	0.0163	0.0403	0.0801
12_	Torque constant	mNm/A	3.33	3.88	6.1	8.6
13_	Speed constant	rpm/V	2870	2460	1560	1110
14_	Speed/torque gradient	rpm/mNm	115	109	104	127
15_	Mechanical time constant	ms	2.59	2.45	2.35	2.86
16_	Rotor inertia	gcm²	2.15	2.15	2.15	2.15

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	11.3
18_	Thermal resistance winding-housing	K/W	0.6
19_	Thermal time constant winding	s	1.22
20_	Thermal time constant motor	s	314
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	60 000
24_	Axial play	mm	0...0.24
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	6000
28_	Max. radial load [mm from flange]	N	16 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	105
32_	Typical noise level [rpm]	dBA	53 [50 000]

Operating range

n [rpm] winding 36 V



Modular system Details on catalog page 44

Gear	Stages [opt.]
390_GPX 22 A/C	1–2 [3–4]
391_GPX 22 LN/LZ	1–2 [3–4]
392_GPX 22 HP	2–3 [4]
394_GPX 22 UP	1–4
395_GPX 22 SPEED	1–2
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

Connection A and B, motor (Cable AWG 18)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25 °C: 10 kOhm ±1%, beta (25–85 °C): 3490 K

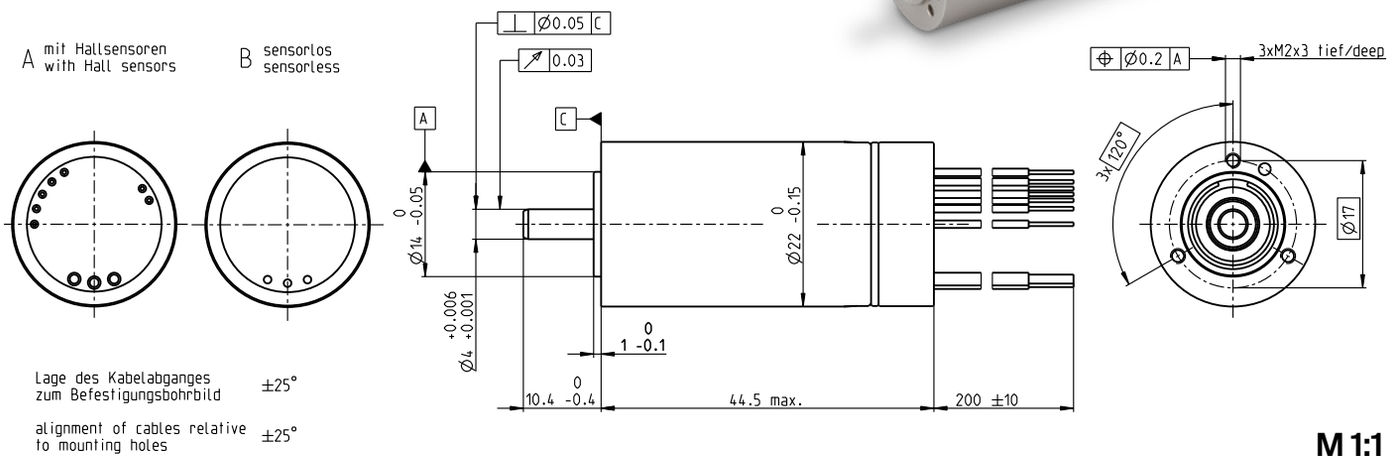
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ECX SPEED 22 M ∅22 mm, brushless, BLDC motor

Sterilizable

Key data: 80/95 W, 18 mNm, 60 000 rpm





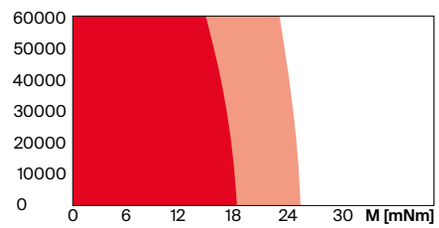
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	52700	54700	56800	54700
3_	No load current	mA	254	201	142	101
4_	Nominal speed	rpm	49300	51400	53500	51500
5_	Nominal torque	mNm	18	17.8	17	17.4
6_	Nominal current (max. continuous current)	A	5.72	4.4	2.92	2.16
7_	Stall torque	mNm	341	366	368	365
8_	Stall current	A	105	87.5	60.9	43.7
9_	Max. efficiency	%	90.5	90.7	90.7	90.7
10_	Terminal resistance	Ω	0.172	0.274	0.591	1.1
11_	Terminal inductance	mH	0.0164	0.0272	0.0567	0.109
12_	Torque constant	mNm/A	3.25	4.18	6.04	8.36
13_	Speed constant	rpm/V	2940	2290	1580	1140
14_	Speed/torque gradient	rpm/mNm	155	150	155	150
15_	Mechanical time constant	ms	3.1	3	3.1	3
16_	Rotor inertia	gcm²	1.91	1.91	1.91	1.91

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	11.3
18_	Thermal resistance winding-housing	K/W	0.6
19_	Thermal time constant winding	s	1.25
20_	Thermal time constant motor	s	314
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	60 000
24_	Axial play	mm	0...0.24
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	6000
28_	Max. radial load [mm from flange]	N	16 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	105
32_	Typical noise level [rpm]	dBA	54 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134 °C ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
393_GPX 22 HP	1–3
395_GPX 22 SPEED	1–2

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V_{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25 °C: 10 kOhm ±1%, beta (25–85 °C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

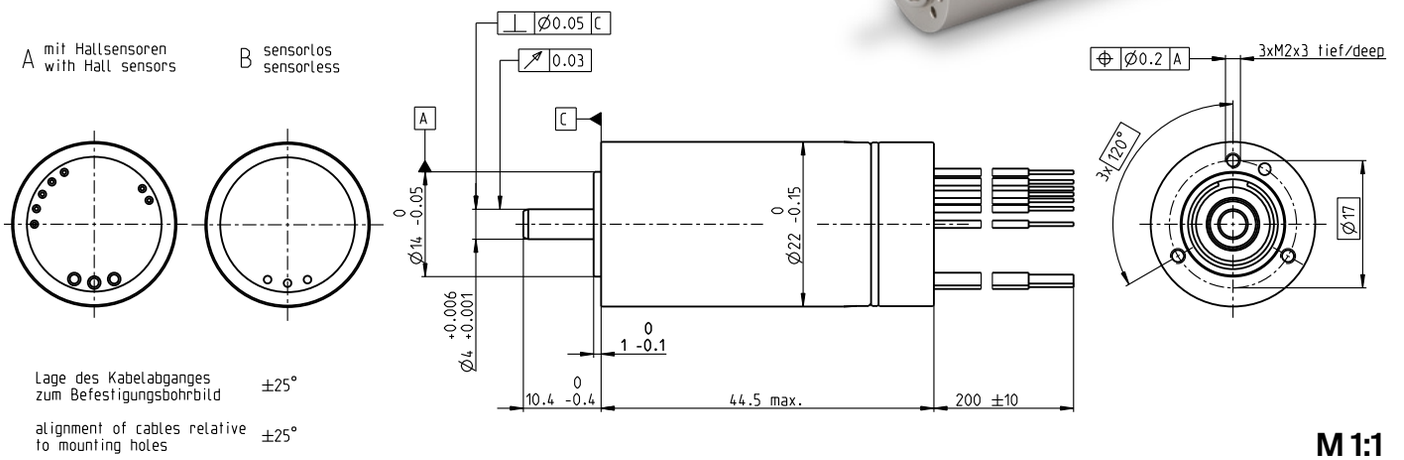
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ECX SPEED 22 M ∅22 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key data: 80/107 W, 18 mNm, 85 000 rpm





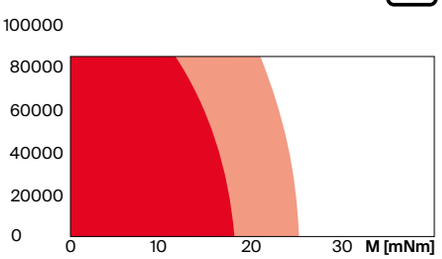
M 1:1

	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	52700	54700	56800	54700
3_	No load current	mA	254	201	142	101
4_	Nominal speed	rpm	49300	51400	53500	51500
5_	Nominal torque	mNm	18	17.8	17	17.4
6_	Nominal current (max. continuous current)	A	5.72	4.4	2.92	2.16
7_	Stall torque	mNm	341	366	368	365
8_	Stall current	A	105	87.5	60.9	43.7
9_	Max. efficiency	%	90.5	90.7	90.7	90.7
10_	Terminal resistance	Ω	0.172	0.274	0.591	1.1
11_	Terminal inductance	mH	0.0164	0.0272	0.0567	0.109
12_	Torque constant	mNm/A	3.25	4.18	6.04	8.36
13_	Speed constant	rpm/V	2940	2290	1580	1140
14_	Speed/torque gradient	rpm/mNm	155	150	155	150
15_	Mechanical time constant	ms	3.1	3	3.1	3
16_	Rotor inertia	gcm²	1.91	1.91	1.91	1.91

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	11.3
18_	Thermal resistance winding-housing	K/W	0.6
19_	Thermal time constant winding	s	1.25
20_	Thermal time constant motor	s	314
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	85 000
24_	Axial play	mm	0...0.24
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	6000
28_	Max. radial load [mm from flange]	N	16 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	105
32_	Typical noise level [rpm]	dBA	54 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134 °C ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
393_GPX 22 HP	1–3
395_GPX 22 SPEED	1–2

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V_{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25 °C: 10 kOhm ±1%, beta (25–85 °C): 3490 K

Configuration

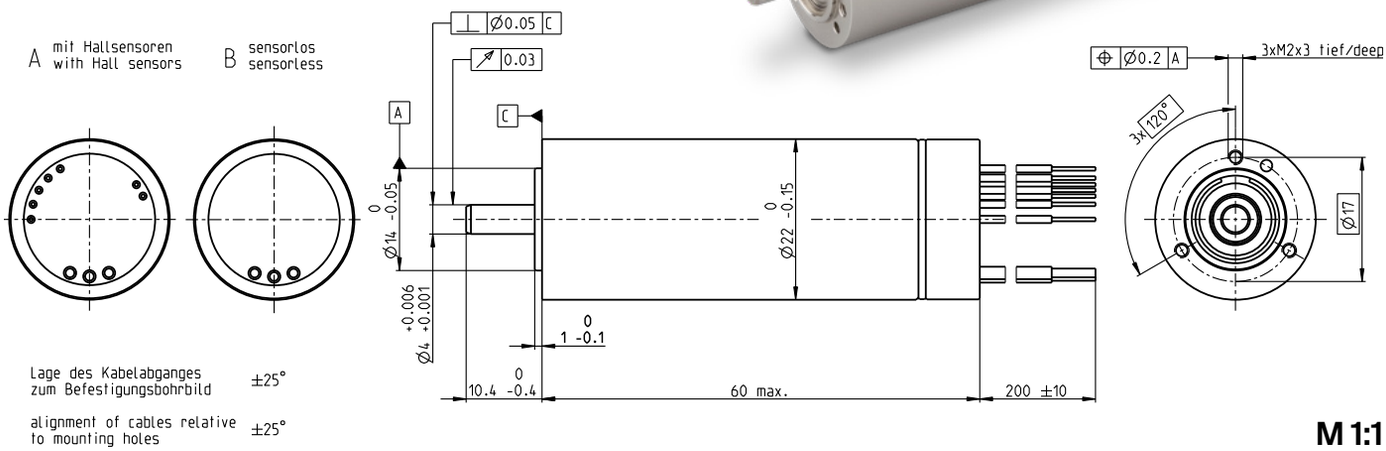
Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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ECX SPEED 22 L ∅22 mm, brushless, BLDC motor

Key data: 80/92 W, 25 mNm, 45 000 rpm





M 1:1

	Motor data				
1_	Nominal voltage	V	24	36	48
2_	No load speed	rpm	37300	36100	36700
3_	No load current	mA	281	178	137
4_	Nominal speed	rpm	34900	33700	34500
5_	Nominal torque	mNm	22.6	23.9	25
6_	Nominal current (max. continuous current)	A	3.94	2.67	2.12
7_	Stall torque	mNm	391	415	470
8_	Stall current	A	64	43.8	37.8
9_	Max. efficiency	%	87.4	87.8	88.5
10_	Terminal resistance	Ω	0.375	0.823	1.27
11_	Terminal inductance	mH	0.0295	0.071	0.122
12_	Torque constant	mNm/A	6.11	9.48	12.4
13_	Speed constant	rpm/V	1560	1010	769
14_	Speed/torque gradient	rpm/mNm	96.1	87.5	78.5
15_	Mechanical time constant	ms	3.91	3.56	3.2
16_	Rotor inertia	gcm^2	3.89	3.89	3.89

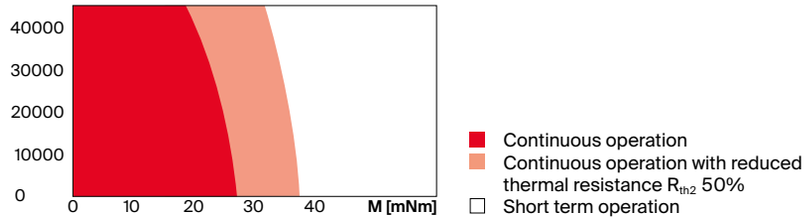
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	9
18_	Thermal resistance winding-housing	K/W	0.62
19_	Thermal time constant winding	s	1.95
20_	Thermal time constant motor	s	456
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	45 000
24_	Axial play	mm	0...0.24
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	6000
28_	Max. radial load [mm from flange]	N	16 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	141
32_	Typical noise level [rpm]	dBA	54 [45 000]

Operating range

n [rpm] winding 36 V



Modular system Details on catalog page 44

Gear	Stages [opt.]
390_GPX 22 A/C	1–2 [3–4]
391_GPX 22 LN/LZ	1–2 [3–4]
392_GPX 22 HP	2–3 [4]
394_GPX 22 UP	1–4
395_GPX 22 SPEED	1–2
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

Connection A and B, motor (Cable AWG 18)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25 °C: 10 kOhm ±1%, beta (25–85 °C): 3490 K

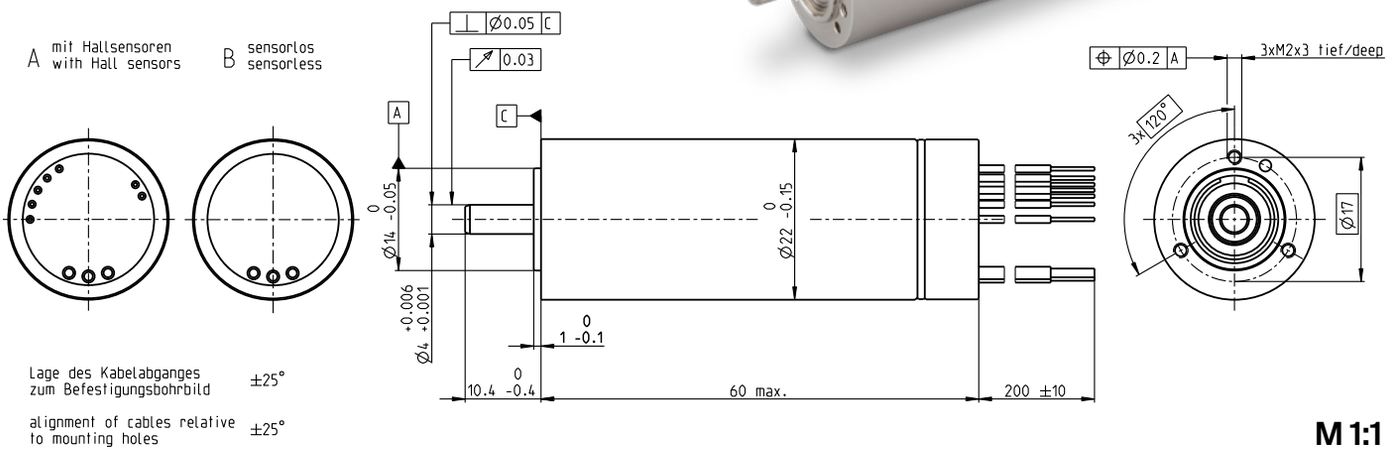
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ECX SPEED 22 L ∅22 mm, brushless, BLDC motor

High Power

Key data: 120/170 W, 34.4 mNm, 60 000 rpm





M 1:1

	Motor data				
1_	Nominal voltage	V	24	36	48
2_	No load speed	rpm	47600	49400	50400
3_	No load current	mA	280	198	154
4_	Nominal speed	rpm	45700	47700	48700
5_	Nominal torque	mNm	34.3	34.4	32.2
6_	Nominal current (max. continuous current)	A	7.34	5.11	3.66
7_	Stall torque	mNm	1120	1340	1280
8_	Stall current	A	233	193	141
9_	Max. efficiency	%	93.2	93.7	93.6
10_	Terminal resistance	Ω	0.103	0.187	0.341
11_	Terminal inductance	mH	0.0128	0.0266	0.0455
12_	Torque constant	mNm/A	4.81	6.95	9.09
13_	Speed constant	rpm/V	1980	1370	1050
14_	Speed/torque gradient	rpm/mNm	42.5	37	39.4
15_	Mechanical time constant	ms	1.75	1.53	1.63
16_	Rotor inertia	gcm²	3.94	3.94	3.94

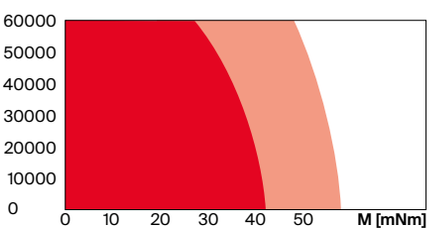
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	9
18_	Thermal resistance winding-housing	K/W	0.84
19_	Thermal time constant winding	s	2.77
20_	Thermal time constant motor	s	456
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	60 000
24_	Axial play	mm	0...0.24
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	6000
28_	Max. radial load [mm from flange]	N	16 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	148
32_	Typical noise level [rpm]	dBA	54 [50 000]

Operating range

n [rpm] winding 36 V



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
390_GPX 22 A/C	1–2 [3–4]
391_GPX 22 LN/LZ	1–2 [3–4]
392_GPX 22 HP	2–3 [4]
394_GPX 22 UP	1–4
395_GPX 22 SPEED	1–2
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Shaft rear: length
Electric connection: cable length/pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

Connection A and B, motor (Cable AWG 18)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3
Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)
purple NTC
purple NTC
Resistance 25 °C: 10 kOhm ±1%, beta (25–85 °C): 3490 K

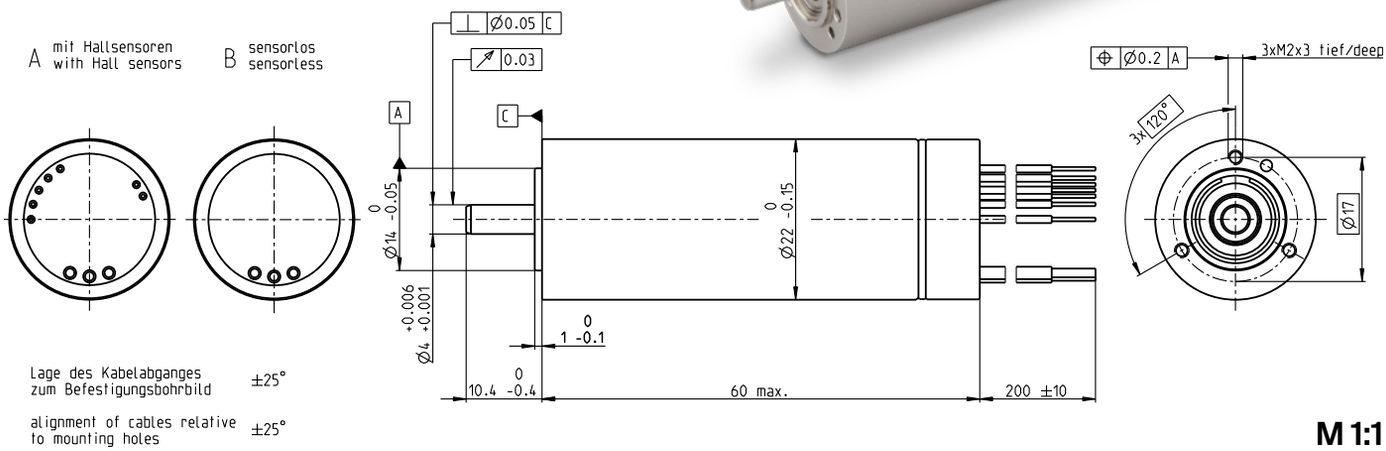
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ECX SPEED 22 L ∅22 mm, brushless, BLDC motor

Sterilizable

Key data: 120/171 W, 31 mNm, 60 000 rpm





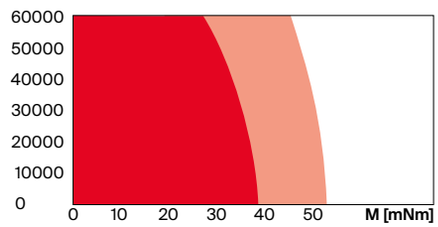
M 1:1

	Motor data				
1_	Nominal voltage	V	24	36	48
2_	No load speed	rpm	52700	54700	55800
3_	No load current	mA	365	259	201
4_	Nominal speed	rpm	50600	52800	53900
5_	Nominal torque	mNm	30.8	31	28.9
6_	Nominal current (max. continuous current)	A	7.39	5.14	3.69
7_	Stall torque	mNm	992	1190	1150
8_	Stall current	A	228	190	140
9_	Max. efficiency	%	92.3	92.8	92.6
10_	Terminal resistance	Ω	0.105	0.189	0.343
11_	Terminal inductance	mH	0.0114	0.0238	0.0407
12_	Torque constant	mNm/A	4.34	6.27	8.2
13_	Speed constant	rpm/V	2200	1520	1160
14_	Speed/torque gradient	rpm/mNm	53.2	45.9	48.7
15_	Mechanical time constant	ms	1.31	1.13	1.2
16_	Rotor inertia	gcm²	2.36	2.36	2.36

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	9
18_	Thermal resistance winding-housing	K/W	0.84
19_	Thermal time constant winding	s	2.96
20_	Thermal time constant motor	s	456
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	60 000
24_	Axial play	mm	0...0.24
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	6000
28_	Max. radial load [mm from flange]	N	16 [5]
	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	148
32_	Typical noise level [rpm]	dBA	55 [50 000]

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134 °C ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
393_GPX 22 HP	1–3
395_GPX 22 SPEED	1–2

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V_{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25 °C: 10 kOhm ±1%, beta (25–85 °C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

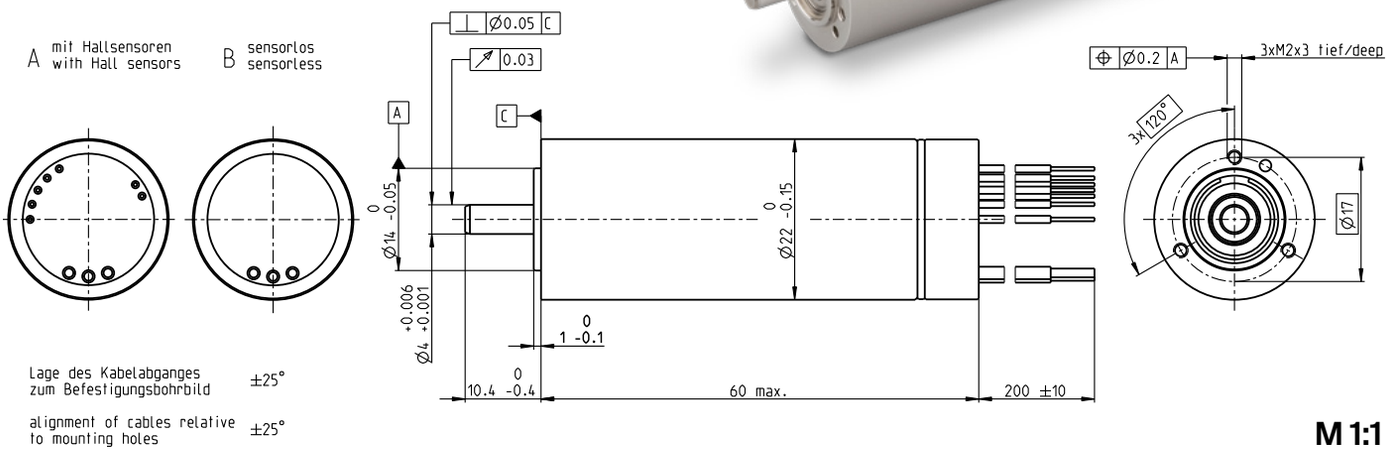
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ECX SPEED 22 L ∅22 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key data: 120/171 W, 31 mNm, 85 000 rpm





M 1:1

	Motor data				
1_	Nominal voltage	V	24	36	48
2_	No load speed	rpm	52700	54700	55800
3_	No load current	mA	365	259	201
4_	Nominal speed	rpm	50600	52800	53900
5_	Nominal torque	mNm	30.8	31	28.9
6_	Nominal current (max. continuous current)	A	7.39	5.14	3.69
7_	Stall torque	mNm	992	1190	1150
8_	Stall current	A	228	190	140
9_	Max. efficiency	%	92.3	92.8	92.6
10_	Terminal resistance	Ω	0.105	0.189	0.343
11_	Terminal inductance	mH	0.0114	0.0238	0.0407
12_	Torque constant	mNm/A	4.34	6.27	8.2
13_	Speed constant	rpm/V	2200	1520	1160
14_	Speed/torque gradient	rpm/mNm	53.2	45.9	48.7
15_	Mechanical time constant	ms	1.31	1.13	1.2
16_	Rotor inertia	gcm²	2.36	2.36	2.36

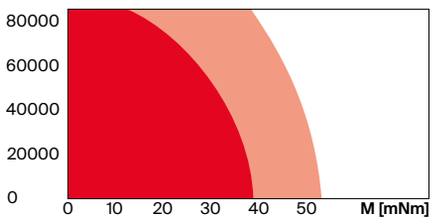
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	9
18_	Thermal resistance winding-housing	K/W	0.84
19_	Thermal time constant winding	s	2.96
20_	Thermal time constant motor	s	456
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	85 000
24_	Axial play	mm	0...0.24
	Preload	N	4
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	6000
28_	Max. radial load [mm from flange]	N	16 [5]

	Other specifications		
29_	Number of pole pairs		1
30_	Number of phases		3
31_	Weight of motor	g	148
32_	Typical noise level [rpm]	dBA	55 [50 000]

Operating range

n [rpm] winding 36 V



135°C SSS

Sterilization information

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature	+134 °C ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
393_GPX 22 HP	1–3
395_GPX 22 SPEED	1–2

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V_{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 67. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25 °C: 10 kOhm ±1%, beta (25–85 °C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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maxon ECX PRIME

can be configured online

Standard specification no. 101		90
Terminology explanations		190
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ECX PRIME 16 M ∅16 mm, 25 Watt	NEW	236
ECX PRIME 16 L ∅16 mm, 50 Watt		237
ECX PRIME 16 L ∅16 mm, 60 W, sterilizable ceramic		238
ECX PRIME 22 L ∅22 mm, 90 Watt	NEW	239
ECX PRIME 22 L ∅22 mm, 100 W, sterilizable ceramic	NEW	240



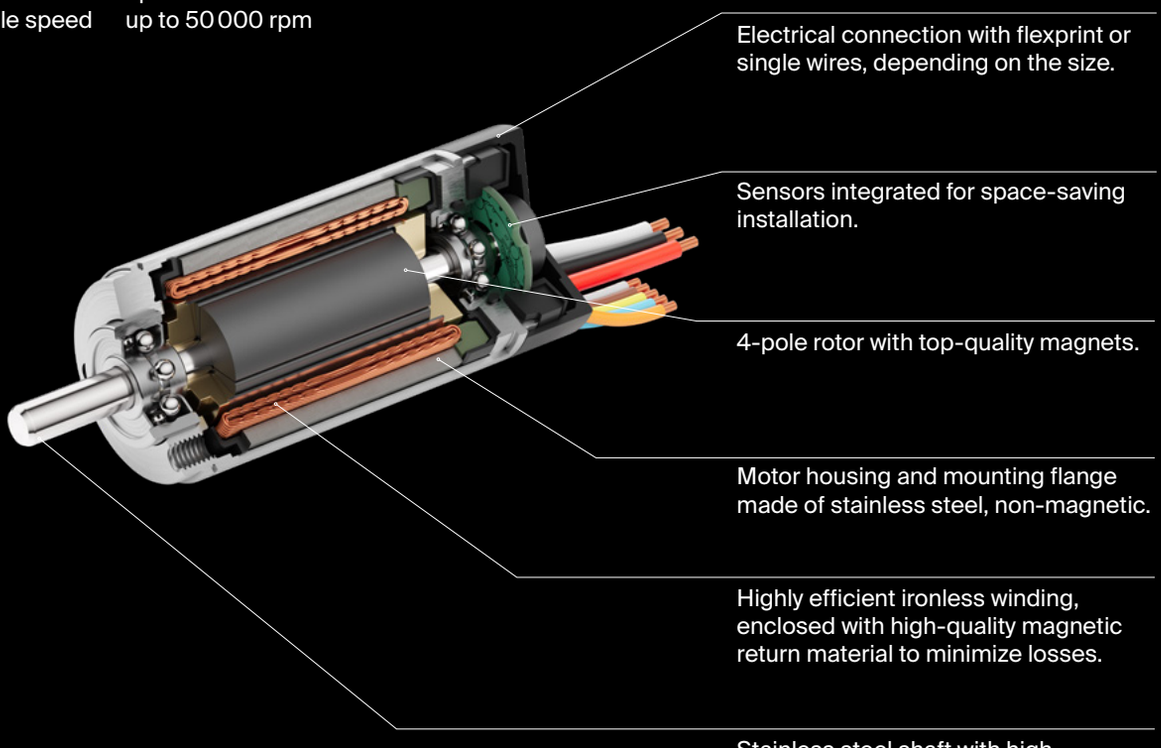
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maxon ECX PRIME program

The brushless ECX PRIME motors combine high speeds and high torques in a unique motor design. Equipped with high-quality magnets and iron materials, the ECX PRIME motors have an extremely rigid speed-torque characteristic, combined with excellent controller dynamics. The ECX program is fully configurable online.

Key data

Motor ∅	6...22 mm
Motor length	19.9...60 mm
Power	1.6...100 W
Nominal torque	up to 69 mNm
Max. permissible speed	up to 50 000 rpm



- → High torques combined with high speeds
- → The ironless winding with no cogging torque
- → High overload capacity
- → High speed stability
- → Autoclavable up to 1000x (sterilizable version)
- → Easily configured online

shop.maxongroup.com

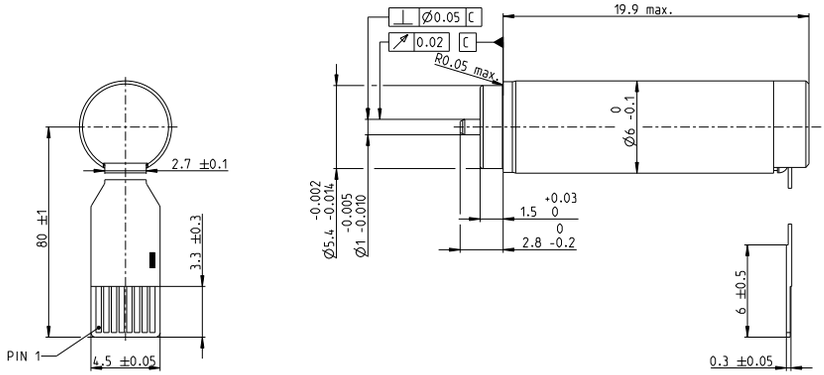
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ECX PRIME 6 M ∅6 mm, brushless, BLDC motor

High Power

Key data: 1.6/2.2 W, 0.57 mNm, 50 000 rpm



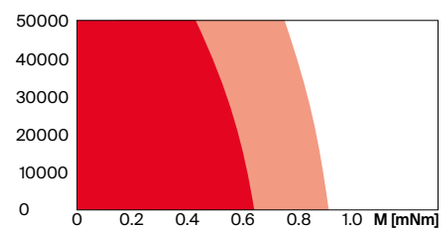


M 2:1

	Motor data			
1_	Nominal voltage	V	6	12
2_	No load speed	rpm	36300	36300
3_	No load current	mA	83.8	41.9
4_	Nominal speed	rpm	29500	29500
5_	Nominal torque	mNm	0.58	0.58
6_	Nominal current (max. continuous current)	A	0.458	0.229
7_	Stall torque	mNm	3.21	3.21
8_	Stall current	A	2.12	1.06
9_	Max. efficiency	%	65.3	65.3
10_	Terminal resistance	Ω	2.83	11.3
11_	Terminal inductance	mH	0.0187	0.0746
12_	Torque constant	mNm/A	1.52	3.03
13_	Speed constant	rpm/V	6300	3150
14_	Speed/torque gradient	rpm/mNm	11800	11800
15_	Mechanical time constant	ms	1.47	1.47
16_	Rotor inertia	gcm²	0.0119	0.0119
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	93.9	
18_	Thermal resistance winding-housing	K/W	2.98	
19_	Thermal time constant winding	s	0.358	
20_	Thermal time constant motor	s	138	
21_	Ambient temperature	°C	-20...+100	
22_	Max. winding temperature	°C	125	
	Mechanical data ball bearings			
23_	Max. speed	rpm	50 000	
24_	Axial play	mm	0...0.07	
	Preload	N	0.45	
	Direction of force		pull	
25_	Radial play		preloaded	
26_	Max. axial load (dynamic)	N	0.2	
27_	Max. force for press fits (static)	N	10	
	(static, shaft supported)	N	110	
28_	Max. radial load [mm from flange]	N	2 [2]	
	Other specifications			
29_	Number of pole pairs		2	
30_	Number of phases		3	
31_	Weight of motor	g	3	
32_	Typical noise level [rpm]	dBA	35 [20 000]	

Operating range

n [rpm] winding 6 V



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control[1]
371_GPX 6 A	1–5	494_ENX 6 MAG	564_EPOS4 Module 24/1.5 566_EPOS4 Compact 24/1.5 557_ESCON2 Nano 24/2

[1]ENX 6 MAG encoder and adapter 498157 required for all maxon controllers.

Connection motor with hall sensor (A)
FPC Flexprint 8-pole, pitch 0.5 mm
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 V_{CC} 3.0...3.6 V
Pin 5 GND
Pin 6 Hall sensor 1
Pin 7 Hall sensor 2
Pin 8 Hall sensor 3
Output signals: CMOS compatible push-pull stage
Hall signals are generated by the MAG sensor.

Configuration

Front flange: standard flange/threaded hole
Shaft front: length

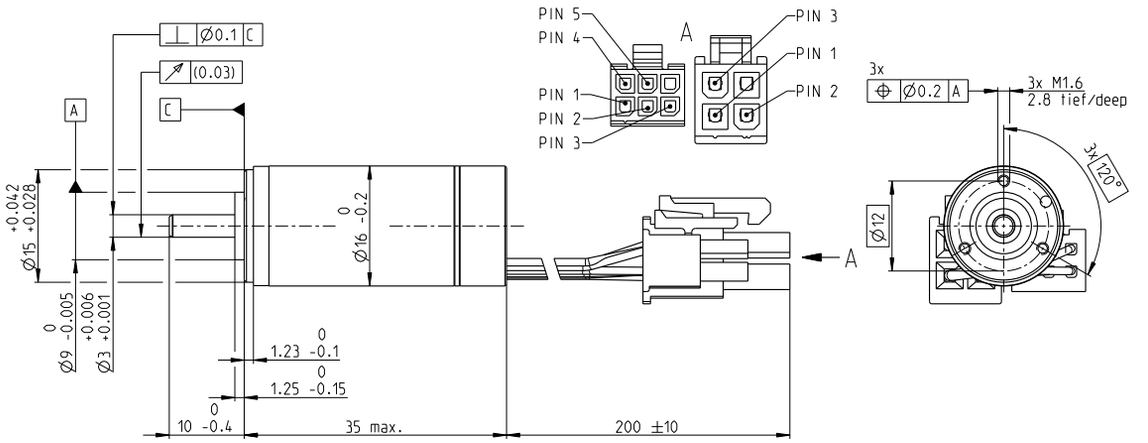
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ECX PRIME 16 M ∅16 mm, brushless, BLDC motor

NEW



Key Data: 25/32 W, 14.6 mNm, 25 000 rpm



M 1:1

	Motor data				
1_	Nominal voltage	V	12	18	24
2_	No load speed	rpm	15600	15600	15600
3_	No load current	mA	103	69	51.8
4_	Nominal speed	rpm	12800	12800	12900
5_	Nominal torque	mNm	14.2	14.2	14.6
6_	Nominal current (max. continuous current)	A	2.02	1.35	1.04
7_	Stall torque	mNm	85.6	86.5	91.5
8_	Stall current	A	11.7	7.91	6.27
9_	Max. efficiency	%	82.4	82.5	83
10_	Terminal resistance	Ω	1.02	2.28	3.83
11_	Terminal inductance	mH	0.0485	0.111	0.193
12_	Torque constant	mNm/A	7.29	10.9	14.6
13_	Speed constant	rpm/V	1310	873	655
14_	Speed/torque gradient	rpm/mNm	184	182	172
15_	Mechanical time constant	ms	1.98	1.96	1.85
16_	Rotor inertia	gcm²	1.03	1.03	1.03

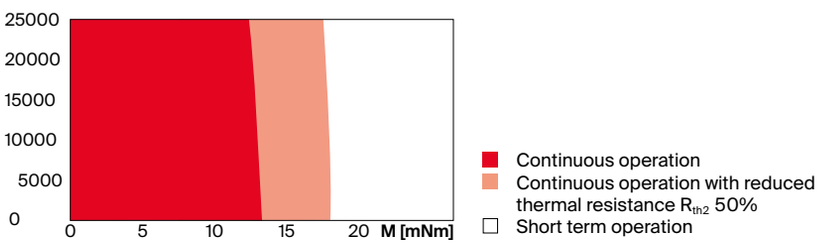
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	17.3
18_	Thermal resistance winding-housing	K/W	1.98
19_	Thermal time constant winding	s	3.75
20_	Thermal time constant motor	s	209
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	25 000
24_	Axial play	mm	0...0.14
	Preload	N	1.0
	Direction of force		push
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.0
27_	Max. force for press fits (static)	N	50
	(static, shaft supported)	N	1000
28_	Max. radial load [mm from flange]	N	10 [5]

	Other specifications		
29_	Number of pole pairs		2
30_	Number of phases		3
31_	Weight of motor	g	43
32_	Typical noise level [rpm]	dBA	50 [20 000]

Operating range

n [rpm] winding 12 V



Modular system Details on catalog page 44

Gear	Stages
381_GPX 16 A/C	1–2
382_GPX 16 LN/LZ	1–2
383_GPX 16 HP	2–3
386_GPX 19 A/C	3–4
387_GPX 19 LN/LZ	3–4
388_GPX 19 HP	4

Sensor
507_ENX 10 EASY
508_ENX 10 EASY XT
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Abs.
512_ENX 16 EASY Abs. XT
519_ENX 16 RIO

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
564_EPOS4 Module 50/5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

Connection motor (Cable AWG 22)
Pin 1 Motor winding 1 (red)
Pin 2 Motor winding 2 (black)
Pin 3 Motor winding 3 (white)
Pin 4 N.C.
Connector, Part number
Molex, 39-01-2040

Connection sensors (Cable AWG 26)
Pin 1 Hall sensor 1 (yellow)
Pin 2 Hall sensor 2 (brown)
Pin 3 Hall sensor 3 (grey)
Pin 4 GND (blue)
Pin 5 V_{Hall} 3...24 VDC (orange)
Pin 6 N.C.
Connector, Part number
Molex, 430-25-0600
Wiring diagram for Hall sensors see p. 67

Configuration

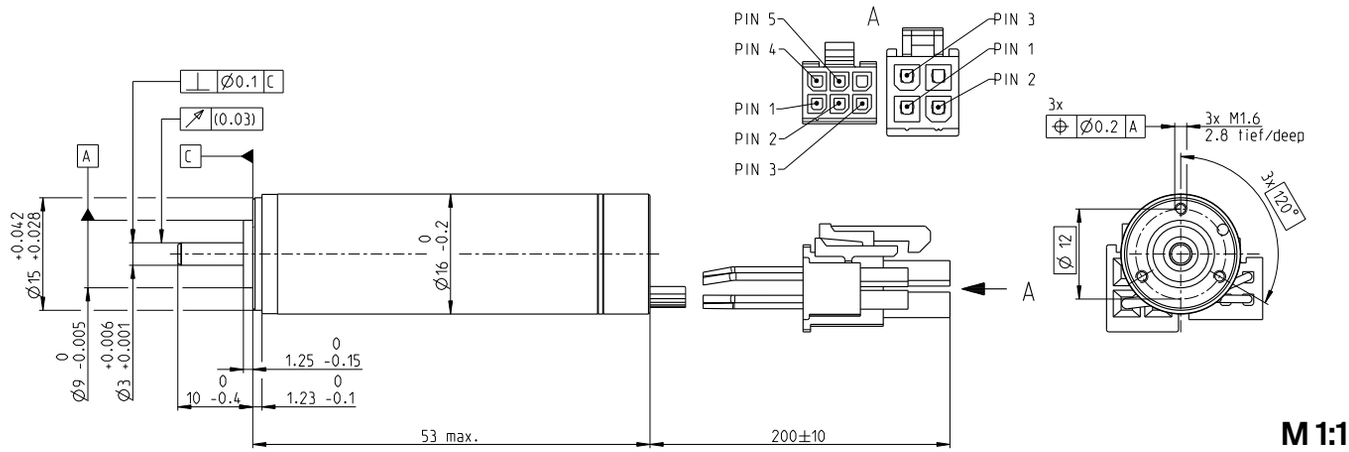
Flange back: end cap/flange with thread holes
Shaft front/back: length/diameter
Electric connection: cable length/connector/connection alignment

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ECX PRIME 16 L ∅16 mm, brushless, BLDC motor

Key Data: 50/53 W, 24.7 mNm, 25 000 rpm



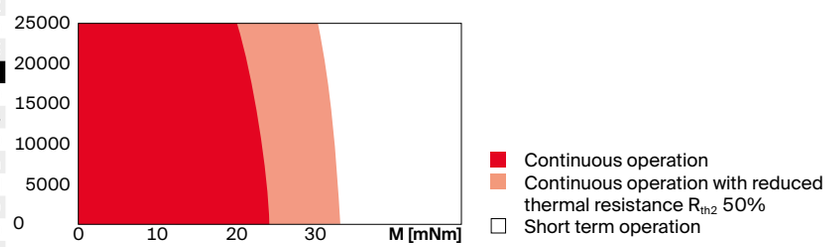


M 1:1

	Motor data			
1_	Nominal voltage	V	24	36
2_	No load speed	rpm	17700	19900
3_	No load current	mA	97.2	78.6
4_	Nominal speed	rpm	16200	18400
5_	Nominal torque	mNm	24.7	23.7
6_	Nominal current (max. continuous current)	A	1.99	1.45
7_	Stall torque	mNm	316	339
8_	Stall current	A	23.6	19.7
9_	Max. efficiency	%	87.8	88.1
10_	Terminal resistance	Ω	1.01	1.83
11_	Terminal inductance	mH	0.033	0.0586
12_	Torque constant	mNm/A	12.9	17.2
13_	Speed constant	rpm/V	740	555
14_	Speed/torque gradient	rpm/mNm	58.2	58.9
15_	Mechanical time constant	ms	1.39	1.41
16_	Rotor inertia	gcm²	2.28	2.28
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	16.7	
18_	Thermal resistance winding-housing	K/W	1.65	
19_	Thermal time constant winding	s	5.76	
20_	Thermal time constant motor	s	462	
21_	Ambient temperature	°C	-20...+100	
22_	Max. winding temperature	°C	155	
	Mechanical data ball bearings			
23_	Max. speed	rpm	25 000	
24_	Axial play	mm	0...0.14	
	Preload	N	1.0	
	Direction of force		push	
25_	Radial play		preloaded	
26_	Max. axial load (dynamic)	N	1.0	
27_	Max. force for press fits (static)	N	50	
	(static, shaft supported)	N	1000	
28_	Max. radial load [mm from flange]	N	10 [5]	
	Other specifications			
29_	Number of pole pairs		2	
30_	Number of phases		3	
31_	Weight of motor	g	66	
32_	Typical noise level [rpm]	dBA	52 [20 000]	

Operating range

n [rpm] winding 36 V



Modular system Details on catalog page 44

Gear	Stages	Sensor	Motor Control
381_GPX 16 A/C	1–2	507_ENX 10 EASY	547_DEC Module 50/5
382_GPX 16 LN/LZ	1–2	508_ENX 10 EASY XT	551_ESCON 36/3 EC
383_GPX 16 HP	2–3	509_ENX 16 EASY	551_ESCON Module 50/5
386_GPX 19 A/C	3–4	510_ENX 16 EASY XT	553_ESCON 50/5
387_GPX 19 LN/LZ	3–4	511_ENX 16 EASY Abs.	557_ESCON2 Micro 60/5
388_GPX 19 HP	4	512_ENX 16 EASY Abs. XT	564_EPOS4 Module 50/5
		519_ENX 16 RIO	567_EPOS4 Compact 50/5
			569_EPOS4 50/5
			570_EPOS4 Disk 60/8

Connection motor (Cable AWG 22)
Pin 1 Motor winding 1 (red)
Pin 2 Motor winding 2 (black)
Pin 3 Motor winding 3 (white)
Pin 4 N.C.
Connector, Part number
Molex, 39-01-2040

Connection sensors (Cable AWG 26)
Pin 1 Hall sensor 1 (yellow)
Pin 2 Hall sensor 2 (brown)
Pin 3 Hall sensor 3 (grey)
Pin 4 GND (blue)
Pin 5 V_{Hall} 3...24 VDC (orange)
Pin 6 N.C.
Connector, Part number
Molex, 430-25-0600
Wiring diagram for Hall sensors see p. 67

Configuration

Flange back: end cap/flange with thread holes
Shaft front/back: length/diameter
Electric connection: cable length/connector/connection alignment

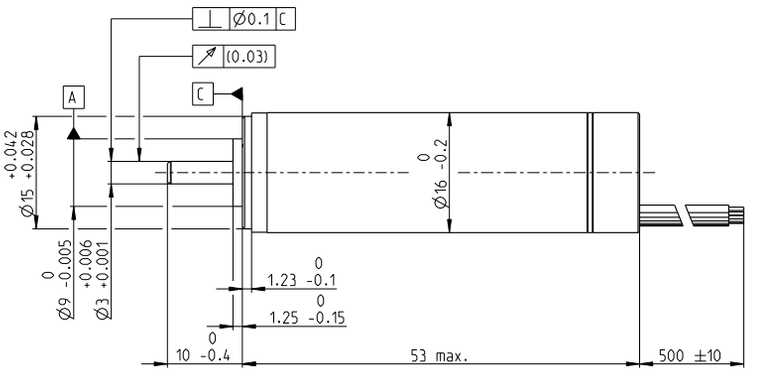
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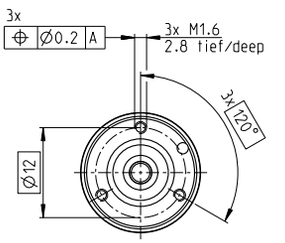
ECX PRIME 16 L ∅16 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key Data: 60/75 W, 25.3 mNm, 40 000 rpm





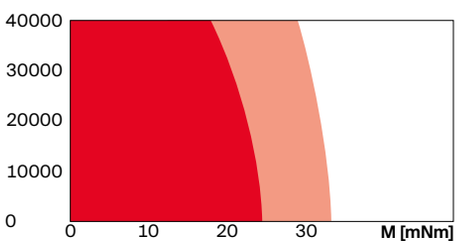


M 1:1

	Motor data			
1_	Nominal voltage	V	24	36
2_	No load speed	rpm	17700	19900
3_	No load current	mA	108	86.9
4_	Nominal speed	rpm	16100	18400
5_	Nominal torque	mNm	25.3	24.6
6_	Nominal current (max. continuous current)	A	2.06	1.51
7_	Stall torque	mNm	304	338
8_	Stall current	A	23.5	19.7
9_	Max. efficiency	%	87.2	87.4
10_	Terminal resistance	Ω	1.02	1.83
11_	Terminal inductance	mH	0.0329	0.0586
12_	Torque constant	mNm/A	12.9	17.2
13_	Speed constant	rpm/V	740	555
14_	Speed/torque gradient	rpm/mNm	58.5	59.1
15_	Mechanical time constant	ms	1.27	1.29
16_	Rotor inertia	gcm²	2.08	2.08
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	16.7	
18_	Thermal resistance winding-housing	K/W	1.65	
19_	Thermal time constant winding	s	5.69	
20_	Thermal time constant motor	s	459	
21_	Ambient temperature	°C	-40...+135	
22_	Max. winding temperature	°C	155	
	Mechanical data ball bearings			
23_	Max. speed	rpm	40 000	
24_	Axial play	mm	0...0.14	
	Preload	N	1.0	
	Direction of force		push	
25_	Radial play		preloaded	
26_	Max. axial load (dynamic)	N	1.0	
27_	Max. force for press fits (static)	N	50	
	(static, shaft supported)	N	1000	
28_	Max. radial load [mm from flange]	N	10 [5]	
	Other specifications			
29_	Number of pole pairs		2	
30_	Number of phases		3	
31_	Weight of motor	g	66	
32_	Typical noise level [rpm]	dBA	52 [20 000]	

Operating range

n [rpm] winding 36 V



Sterilization information

135°C SSS

Number of sterilization cycles: typically 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages
384_GPX 16 HP STE	1–3

Motor Control

547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5

Connection motor (Cable AWG 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection sensors (Cable AWG 26)

yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3
blue	GND
orange	V_{Hall} 3...24 VDC

Wiring diagram for Hall sensors see p. 67

Configuration

Flange back: end cap/flange with thread holes
Shaft front/back: length/diameter
Electric connection: cable length/connection alignment

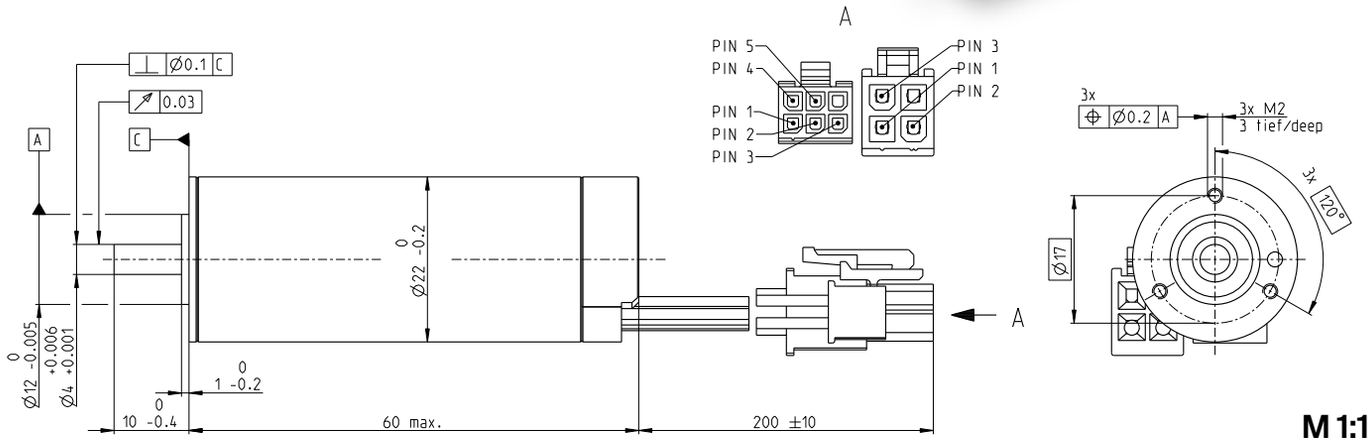
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ECX PRIME 22 L ∅22 mm, brushless, BLDC motor

NEW

Key Data: 90/106 W, 65.8 mNm, 25 000 rpm





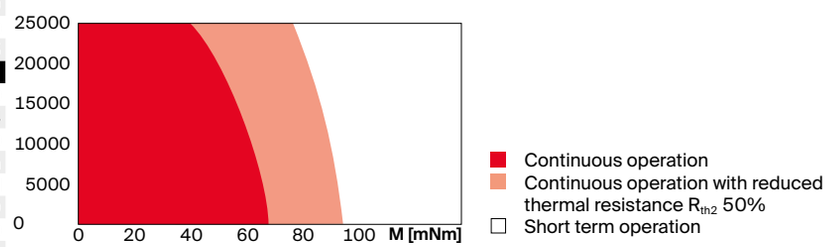
M 1:1

	Motor data					
1_	Nominal voltage	V	12	18	24	36
2_	No load speed	rpm	13100	14100	13100	13100
3_	No load current	mA	339	249	170	113
4_	Nominal speed	rpm	12200	13200	12300	12300
5_	Nominal torque	mNm	66	65.6	65.8	65.8
6_	Nominal current (max. continuous current)	A	7.78	5.6	3.92	2.61
7_	Stall torque	mNm	1020	1200	1120	1140
8_	Stall current	A	117	98.2	64.2	43.7
9_	Max. efficiency	%	90	90	90	90
10_	Terminal resistance	Ω	0.103	0.183	0.374	0.824
11_	Terminal inductance	mH	0.0084	0.0165	0.0336	0.0756
12_	Torque constant	mNm/A	8.7	12.2	17.4	26.1
13_	Speed constant	rpm/V	1100	784	549	366
14_	Speed/torque gradient	rpm/mNm	13	11.8	11.8	11.6
15_	Mechanical time constant	ms	1.56	1.42	1.42	1.39
16_	Rotor inertia	gcm²	11.5	11.5	11.5	11.5

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	11.1
18_	Thermal resistance winding-housing	K/W	0.57
19_	Thermal time constant winding	s	3.91
20_	Thermal time constant motor	s	849
21_	Ambient temperature	°C	-20...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	25 000
24_	Axial play	mm	0...0.14
	Preload	N	4.0
	Direction of force		push
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4.0
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	5300
28_	Max. radial load [mm from flange]	N	16 [5]
	Other specifications		
29_	Number of pole pairs		2
30_	Number of phases		3
31_	Weight of motor	g	153
32_	Typical noise level [rpm]	dBA	60 [20 000]

Operating range

n [rpm] winding 24 V



Connection motor (Cable AWG 20)
Pin 1 Motor winding 1 (red)
Pin 2 Motor winding 2 (black)
Pin 3 Motor winding 3 (white)
Pin 4 N.C.
Connector, Part number
Molex, 39-01-2040

Connection sensors (Cable AWG 26)
Pin 1 Hall sensor 1 (yellow)
Pin 2 Hall sensor 2 (brown)
Pin 3 Hall sensor 3 (grey)
Pin 4 GND (blue)
Pin 5 V_{Hall} 3...24 VDC (orange)
Pin 6 N.C.
Connector, Part number
Molex, 430-25-0600
Wiring diagram for Hall sensors see p. 67

Modular system Details on catalog page 44

Gear	Stages	Sensor	Motor Control
390_GPX 22 A/C	1–2	509_ENX 16 EASY	547_DEC Module 50/5
391_GPX 22 LN/LZ	1–2	510_ENX 16 EASY XT	551_ESCON Module 50/5
392_GPX 22 HP	2–3	511_ENX 16 EASY Abs.	552_ESCON Module 50/8 HE
394_GPX 22 UP	1–4	512_ENX 16 EASY Abs. XT	553_ESCON 50/5
396_GPX 26 A/C	3	518_ENX 22 EMT	553_ESCON 70/10
397_GPX 26 LN/LZ	3	519_ENX 16 RIO	557_ESCON2 Micro 60/5
398_GPX 26 HP	4		558_ESCON2 Module 60/12
			559_ESCON2 Compact 60/12
			564_EPOS4 Module 50/5
			565_EPOS4 Module 50/8
			567_EPOS4 Compact 50/5
			567_EPOS4 Compact 50/8
			569_EPOS4 50/5
			569_EPOS4 70/15
			570_EPOS4 Disk 60/8

Configuration

Flange back: end cap/flange with thread holes
Shaft front/back: length/diameter
Electric connection: cable length/connector/NTC-thermistor/ connection alignment

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ECX PRIME 22 L ∅22 mm, brushless, BLDC motor

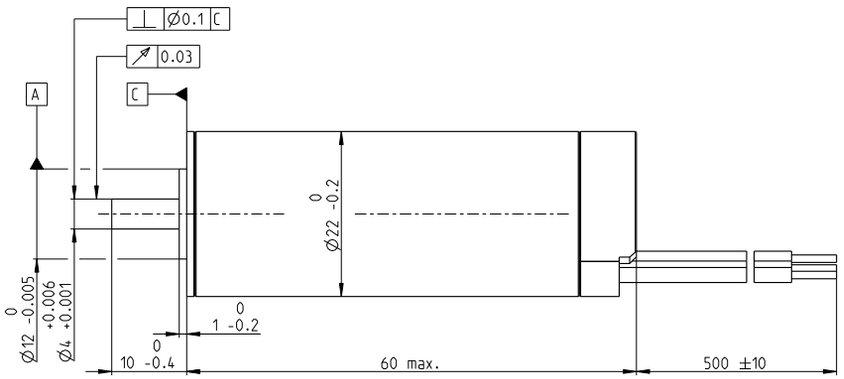
Sterilizable, ceramic bearings

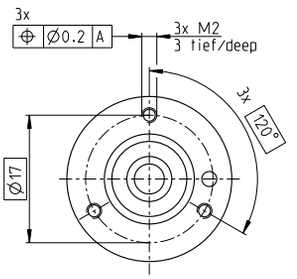
Key Data: 100/133 W, 69.1 mNm, 30 000 rpm

NEW



ECX PRIME





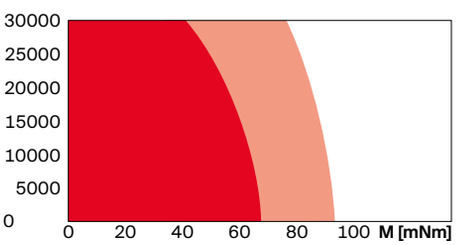
M 1:1

	Motor data					
1_	Nominal voltage	V	12	18	24	36
2_	No load speed	rpm	13600	14500	13600	13600
3_	No load current	mA	369	274	185	123
4_	Nominal speed	rpm	12400	13500	12600	12700
5_	Nominal torque	mNm	69.1	68.5	68.6	68.1
6_	Nominal current (max. continuous current)	A	8.51	6.04	4.23	2.8
7_	Stall torque	mNm	862	1080	1070	1110
8_	Stall current	A	102	91.2	63.4	43.8
9_	Max. efficiency	%	89	90	90	90
10_	Terminal resistance	Ω	0.117	0.197	0.378	0.822
11_	Terminal inductance	mH	0.0065	0.0127	0.026	0.0585
12_	Torque constant	mNm/A	8.42	11.8	16.8	25.3
13_	Speed constant	rpm/V	1130	810	567	378
14_	Speed/torque gradient	rpm/mNm	15.8	13.6	12.7	12.3
15_	Mechanical time constant	ms	1.9	1.63	1.53	1.48
16_	Rotor inertia	gcm²	11.5	11.5	11.5	11.5

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	11.1
18_	Thermal resistance winding-housing	K/W	0.57
19_	Thermal time constant winding	s	3.96
20_	Thermal time constant motor	s	849
21_	Ambient temperature	°C	-40...+135
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	30 000
24_	Axial play	mm	0...0.14
	Preload	N	4.0
	Direction of force		push
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4.0
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	5300
28_	Max. radial load [mm from flange]	N	16 [5]
	Other specifications		
29_	Number of pole pairs		2
30_	Number of phases		3
31_	Weight of motor	g	153
32_	Typical noise level [rpm]	dBA	60 [20 000]

Operating range

n [rpm] winding 24 V



135°C SSS

Sterilization information

Number of sterilization cycles: typically 1000

Sterilization with steam

Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages
393_GPX 22 HP STE	1–3

Motor Control

547_DEC Module 50/5
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12

Connection motor (Cable AWG 20)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection sensors (Cable AWG 26)

yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3
blue	GND
orange	V_{Hall} 3...24 VDC

Wiring diagram for Hall sensors see p. 67

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25 °C: 10 kOhm ±1%, beta (25–85 °C): 3490 K

Configuration

Flange back: end cap/flange with thread holes
Shaft front/back: length/diameter
Electric connection: cable length/connection alignment

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maxon ECX TORQUE

can be configured online

Standard specification no. 101	90
Terminology explanations	190
ECX TORQUE 22 M ∅22 mm, 30 Watt	243
ECX TORQUE 22 L ∅22 mm, 40 Watt	244
ECX TORQUE 22 XL ∅22 mm, 45 Watt	245



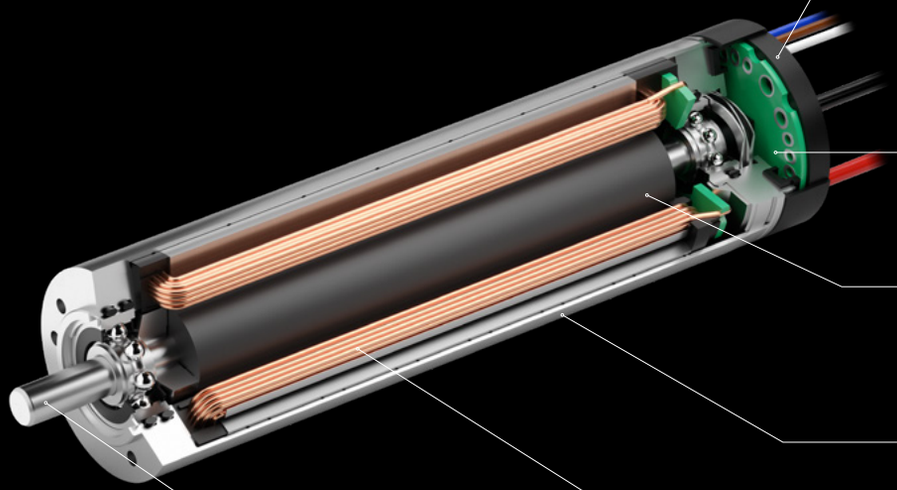
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maxon ECX TORQUE program

High torque density and unrivaled dynamics: The iron core winding and multi-pole rotor design of the brushless ECX TORQUE motors allow them to achieve a high torque density. The robust design and high build quality provide a long service life. ECX motors can be configured online and are ready for shipping in 11 working days.

Key data

Motor ∅	22 mm
Motor length	43...82 mm
Power	30...45 W
Nominal torque	up to 80 mNm
Max. permissible speed	up to 16 000 rpm



Electrical connection with single wires or as pluggable pin solution. Both versions are completely potted, for strain relief and to protect the motor against dirt.

Variety of sensor options can be integrated: temperature sensor, hall elements, encoder.

Multi-pole internal rotor with top-quality magnets for maximum torque.

Motor housing includes a mounting flange as a single part, stainless steel and non-magnetic.

Stator with iron core winding. High fill factor for max efficiency. Potted winding system for optimal heat dissipation and mechanical stability.

Stainless steel shaft with high stiffness – various modification options available.

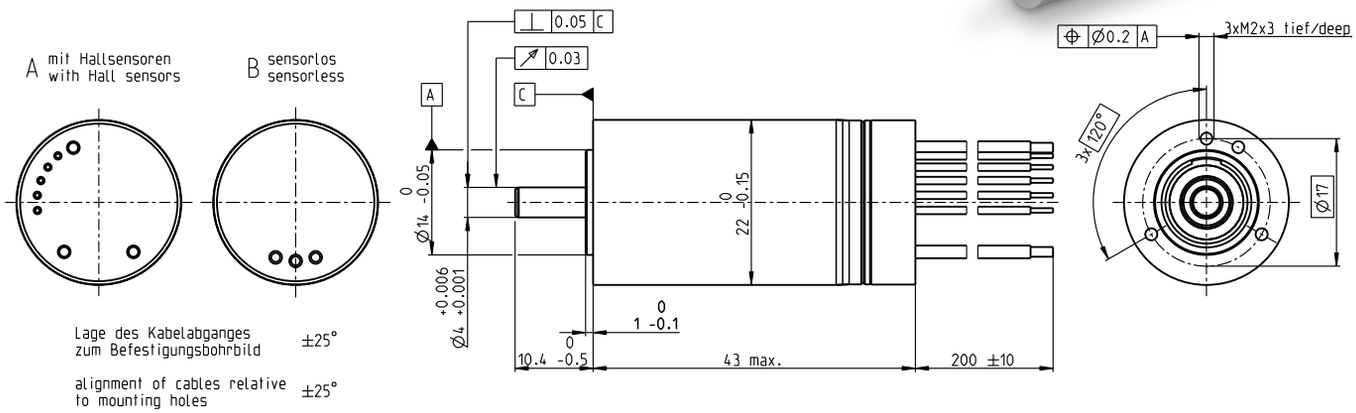
- → High torque density
- → Multi-pole internal-rotor motor with iron core winding
- → Mechanical time constants below one millisecond
- → Robust and durable design
- → Easily configured online

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ECX TORQUE 22 M ∅22 mm, brushless, BLDC motor

Key data: 30/43 W, 32.4 mNm, 16 000 rpm





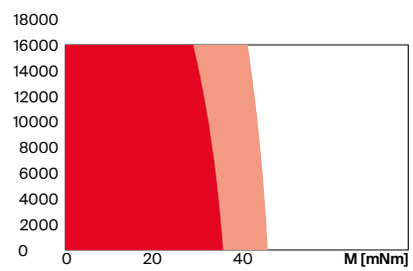
M 1:1

	Motor data						
1_	Nominal voltage	V	12	18	24	36	48
2_	No load speed	rpm	12700	14300	15300	15100	13000
3_	No load current	mA	220	175	145	94.8	56.5
4_	Nominal speed	rpm	10700	12200	13100	12900	10900
5_	Nominal torque	mNm	29.1	29.4	28.5	29.7	32.4
6_	Nominal current (max. continuous current)	A	3.18	2.41	1.88	1.28	0.885
7_	Stall torque	mNm	222	245	253	260	251
8_	Stall current	A	40.1	37.1	31.5	21.9	13.2
9_	Max. efficiency	%	85.7	86.6	86.8	87.2	87.2
10_	Terminal resistance	Ω	0.299	0.486	0.763	1.64	3.63
11_	Terminal inductance	mH	0.154	0.274	0.428	0.988	2.38
12_	Torque constant	mNm/A	8.88	11.8	14.8	22.5	34.9
13_	Speed constant	rpm/V	1080	806	645	424	273
14_	Speed/torque gradient	rpm/mNm	36.2	33.1	33.2	31	28.4
15_	Mechanical time constant	ms	0.652	0.596	0.599	0.558	0.512
16_	Rotor inertia	gcm²	1.72	1.72	1.72	1.72	1.72

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	15.7
18_	Thermal resistance winding-housing	K/W	4.48
19_	Thermal time constant winding	s	14.1
20_	Thermal time constant motor	s	644
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	16 000
24_	Axial play	mm	0...0.24
	Preload	N	4.0
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4.0
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	
28_	Max. radial load [mm from flange]	N	22 [5]
	Other specifications		
29_	Number of pole pairs		4
30_	Number of phases		3
31_	Weight of motor	g	82.1
32_	Typical noise level [rpm]	dBA	54 [12 000]

Operating range

n [rpm] winding 24 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
390_GPX 22 A/C	1–2
391_GPX 22 LN/LZ	1–2
392_GPX 22 HP	2–3
394_GPX 22 UP	1–4
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
567_EPOS4 Compact 50/5

Connection A and B, motor (Cable AWG 18)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{CC} 5 ±0.5 V
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Connection Temperature sensor (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±5%, beta (25–85°C): 3434 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/center thread
Shaft front: length/diameter
Electric connection (only for motor type A): cable length/ pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog accessories section.

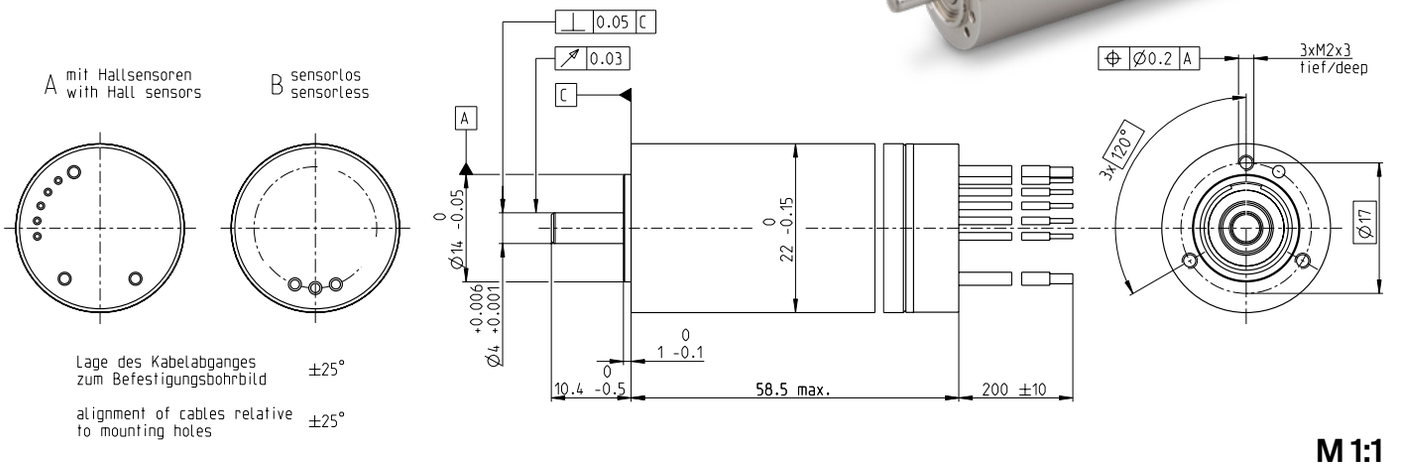
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ECX TORQUE 22 L ∅22 mm, brushless, BLDC motor

ECX TORQUE

Key data: 40/48 W, 48.8 mNm, 11000 rpm





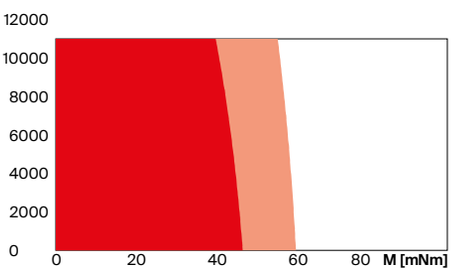
M 1:1

	Motor data						
1_	Nominal voltage	V	12	18	24	36	48
2_	No load speed	rpm	9380	10300	10300	10700	10900
3_	No load current	mA	224	172	129	90.7	69.9
4_	Nominal speed	rpm	7930	8840	8850	9190	9380
5_	Nominal torque	mNm	45.7	46.2	48.1	45.2	48.8
6_	Nominal current (max. continuous current)	A	3.7	2.74	2.13	1.39	1.14
7_	Stall torque	mNm	440	486	509	492	539
8_	Stall current	A	43.6	38.1	31.1	20.2	18.3
9_	Max. efficiency	%	86.2	87.2	87.5	87.2	88.2
10_	Terminal resistance	Ω	0.275	0.473	0.771	1.78	2.62
11_	Terminal inductance	mH	0.148	0.275	0.49	1.03	1.77
12_	Torque constant	mNm/A	12.1	16.5	22	31.9	41.8
13_	Speed constant	rpm/V	789	579	434	299	228
14_	Speed/torque gradient	rpm/mNm	17.9	16.6	15.2	16.7	14.3
15_	Mechanical time constant	ms	0.575	0.531	0.488	0.536	0.459
16_	Rotor inertia	gcm²	3.06	3.06	3.06	3.06	3.06

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	13.4
18_	Thermal resistance winding-housing	K/W	3.8
19_	Thermal time constant winding	s	19.4
20_	Thermal time constant motor	s	757
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	11000
24_	Axial play	mm	0...0.24
	Preload	N	4.0
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4.0
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	
28_	Max. radial load [mm from flange]	N	29 [5]
	Other specifications		
29_	Number of pole pairs		4
30_	Number of phases		3
31_	Weight of motor	g	113
32_	Typical noise level [rpm]	dBA	56 [9000]

Operating range

n [rpm] winding 24 V



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
390_GPX 22 A/C	1–2
391_GPX 22 LN/LZ	1–2
392_GPX 22 HP	2–3
394_GPX 22 UP	1–4
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
567_EPOS4 Compact 50/5

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/center thread
Shaft front: length/diameter
Electric connection (only for motor type A): cable length/ pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog accessories section.

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V_{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Connection Temperature sensor (Cable AWG 26)

purple	NTC
purple	NTC

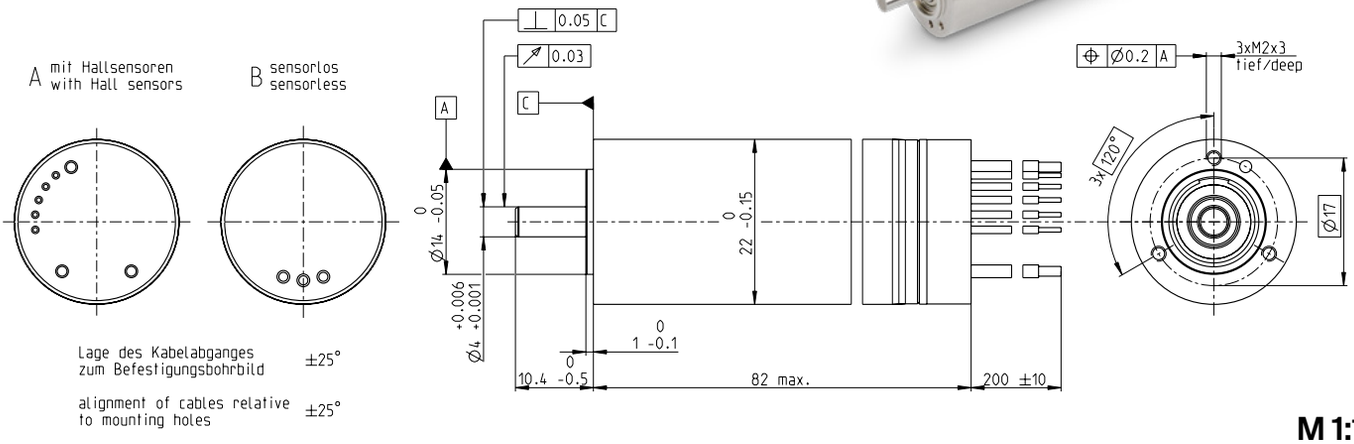
Resistance 25°C: 10 kOhm ±5%, beta (25–85°C): 3434 K

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ECX TORQUE 22 XL ∅22 mm, brushless, BLDC motor

Key data: 45/55 W, 79.9 mNm, 8000 rpm





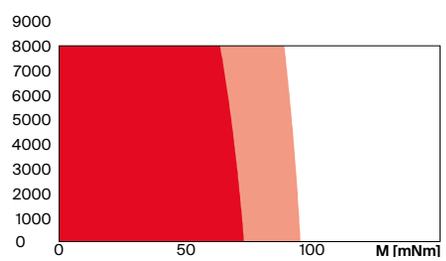
M 1:1

	Motor data						
1_	Nominal voltage	V	12	18	24	36	48
2_	No load speed	rpm	6690	6030	6030	6230	6350
3_	No load current	mA	224	129	96.8	67.6	52
4_	Nominal speed	rpm	5610	4990	5000	5190	5320
5_	Nominal torque	mNm	71.6	74.5	77.5	73.2	79.9
6_	Nominal current (max. continuous current)	A	4.15	2.58	2.01	1.31	1.08
7_	Stall torque	mNm	548	537	564	543	610
8_	Stall current	A	41.1	23.8	19.4	12.5	11.6
9_	Max. efficiency	%	85.8	85.8	86.3	85.8	87.0
10_	Terminal resistance	Ω	0.292	0.757	1.24	2.87	4.13
11_	Terminal inductance	mH	0.162	0.449	0.798	1.68	2.88
12_	Torque constant	mNm/A	17	28.3	37.7	54.6	71.6
13_	Speed constant	rpm/V	563	338	253	175	133
14_	Speed/torque gradient	rpm/mNm	9.7	9.05	8.33	9.19	7.7
15_	Mechanical time constant	ms	0.505	0.471	0.434	0.478	0.401
16_	Rotor inertia	gcm²	4.97	4.97	4.97	4.97	4.97

	Thermal data		
17_	Thermal resistance housing-ambient	K/W	10.9
18_	Thermal resistance winding-housing	K/W	2.46
19_	Thermal time constant winding	s	20.3
20_	Thermal time constant motor	s	883
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155
	Mechanical data ball bearings		
23_	Max. speed	rpm	8000
24_	Axial play	mm	0...0.24
	Preload	N	4.0
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4.0
27_	Max. force for press fits (static)	N	110
	(static, shaft supported)	N	
28_	Max. radial load [mm from flange]	N	33 [5]
	Other specifications		
29_	Number of pole pairs		4
30_	Number of phases		3
31_	Weight of motor	g	162
32_	Typical noise level [rpm]	dBA	60 [5000]

Operating range

n [rpm] winding 24 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
390_GPX 22 A/C	1–2
391_GPX 22 LN/LZ	1–2
392_GPX 22 HP	2–3
394_GPX 22 UP	1–4
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
for motor type A:
516_ENX 22 EASY INT
for motor type B:
516_ENX 22 EASY INT Abs.

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
567_EPOS4 Compact 50/5

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/center thread
Shaft front: length/diameter
Electric connection (only for motor type A): cable length/ pin connection/connector
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog accessories section.

Connection A and B, motor (Cable AWG 18)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)
orange V_{CC} 5 ±0.5 V
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Connection Temperature sensor (Cable AWG 26)
purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±5%, beta (25–85°C): 3434 K

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For your personal notes

maxon IDX

can be configured online

Standard specification no. 101	90
Terminology explanations	190
IDX 56 S □56 mm, 270 Watt	249
IDX 56 M □56 mm, 330 Watt	250
IDX 56 L □56 mm, 400 Watt	251
IDX 70 S □70 mm, 600 Watt	252
IDX 70 M □70 mm, 800 Watt	253
IDX 70 L □70 mm, 900 Watt	254



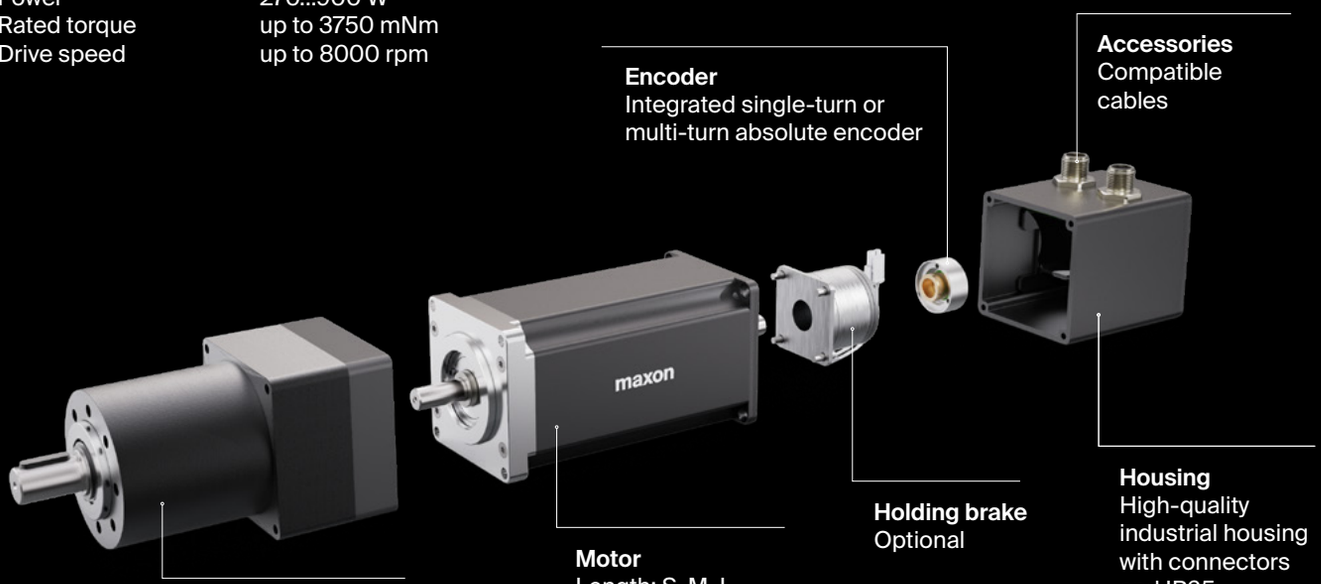
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maxon IDX Program

The compact brushless EC-i motor combined with a high-quality sensor in robust industrial housing is ideally suited to demanding speed and positioning tasks. This motor is also available as a drive with integrated positioning and speed controller.

Key data

Drive □	56...70 mm
Drive length	107...193 mm
Power	270...900 W
Rated torque	up to 3750 mNm
Drive speed	up to 8000 rpm



Encoder
Integrated single-turn or multi-turn absolute encoder

Accessories
Compatible cables

Gearheads
Stages: 1–3
Variants: Standard, reduced noise level, ultra performance

Motor
Length: S, M, L
Winding: 24 V, 48 V, 60 V
Flange: A flange, C flange

Holding brake
Optional

Housing
High-quality industrial housing with connectors and IP65 protection class

- → High continuous torque
- → Outstanding energy efficiency
- → Maximum power density
- → Unmatched precision in dynamic motion
- → IP65-protected design
- → Easily configured online

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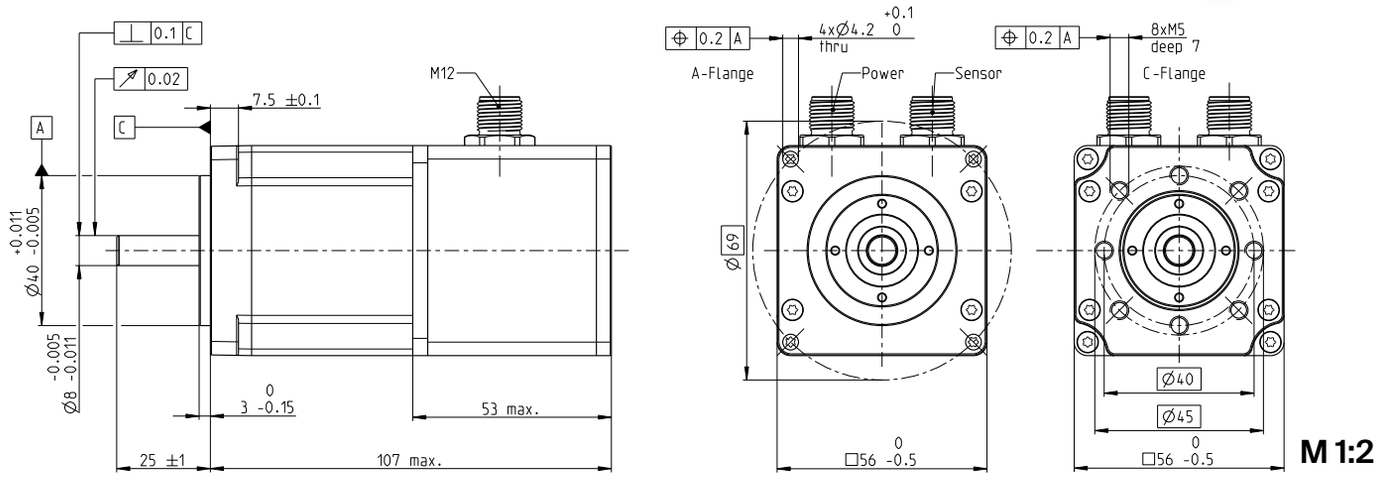
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IDX 56 S ☐56 mm, brushless, BLDC motor

IP65 motor with industrial housing

Key Data: 270/305 W, 469 mNm, 8000 rpm



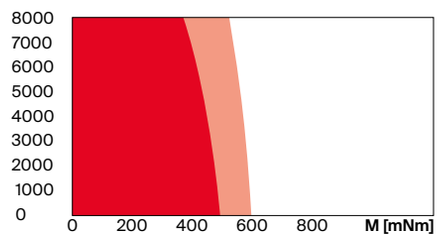


M 1:2

	Motor data			
1_	Nominal voltage	V	24	48
2_	No load speed	rpm	7010	7010
3_	No load current	mA	710	355
4_	Nominal speed	rpm	5660	5660
5_	Nominal torque	mNm	470	475
6_	Nominal current (max. continuous current)	A	12.9	6.49
7_	Stall torque	mNm	2960	3020
8_	Stall current	A	305	161
9_	Max. efficiency	%	90.3	90.6
10_	Terminal resistance	Ω	0.0787	0.299
11_	Terminal inductance	mH	0.121	0.485
12_	Torque constant	mNm/A	32.3	64.6
13_	Speed constant	rpm/V	296	148
14_	Speed/torque gradient	rpm/mNm	0.72	0.683
15_	Mechanical time constant	ms	0.807	0.766
16_	Rotor inertia	gcm²	107	107
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	2.32	
18_	Thermal resistance winding-housing	K/W	1.4	
19_	Thermal time constant winding	s	31.9	
20_	Thermal time constant motor	s	687	
21_	Ambient temperature	°C	-40...+100	
22_	Max. winding temperature	°C	155	
	Mechanical data ball bearings			
23_	Max. speed	rpm	8000	
24_	Axial play	mm	0...0.14	
	Preload	N	16	
	Direction of force		pull	
25_	Radial play		preloaded	
26_	Max. axial load (dynamic)	N	12	
27_	Max. force for press fits (static)	N	150	
	(static, shaft supported)	N		
28_	Max. radial load [mm from flange]	N	110 [12.5]	
	Other specifications			
29_	Number of pole pairs		8	
30_	Number of phases		3	
31_	Weight of motor	g	574	
32_	Typical noise level [rpm]	dBA	55 [4000]	
	Protection class without shaft		IP65	

Operating range

n [rpm] winding 48 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Power Connection (M12, male, 5 poles, L-coded)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	U_{brake} + (optional)
Pin 5	U_{brake} GND (optional)

Sensor Connection (M12, male, 17 poles, A-coded)

Pin assignment available in encoder data sheet.

NTC resistor 25 °C: 10 kΩ ±1%, beta (25–100 °C): 3460 K

Compatible cables available online in the configurator.

Modular system Details on catalog page 44

Gear	Stages [opt.]
406_GPX 52 A/UP	1–3
407_GPX 52 LN	1–3
456_GSW 62	
458_GB 80	1
459_GB 12	1

Sensor
517_ENX 22 EASY INT
518_ENX 22 EMT INT

Accessories
592_Brake AB 42 S

Motor Control
552_ESCON Module 50/8
552_ESCON Module 50/8 HE
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
565_EPOS4 Module 50/15
568_EPOS4 Compact 50/15
569_EPOS4 70/15

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface: SSI/BiSS-C
Shaft: standard/short

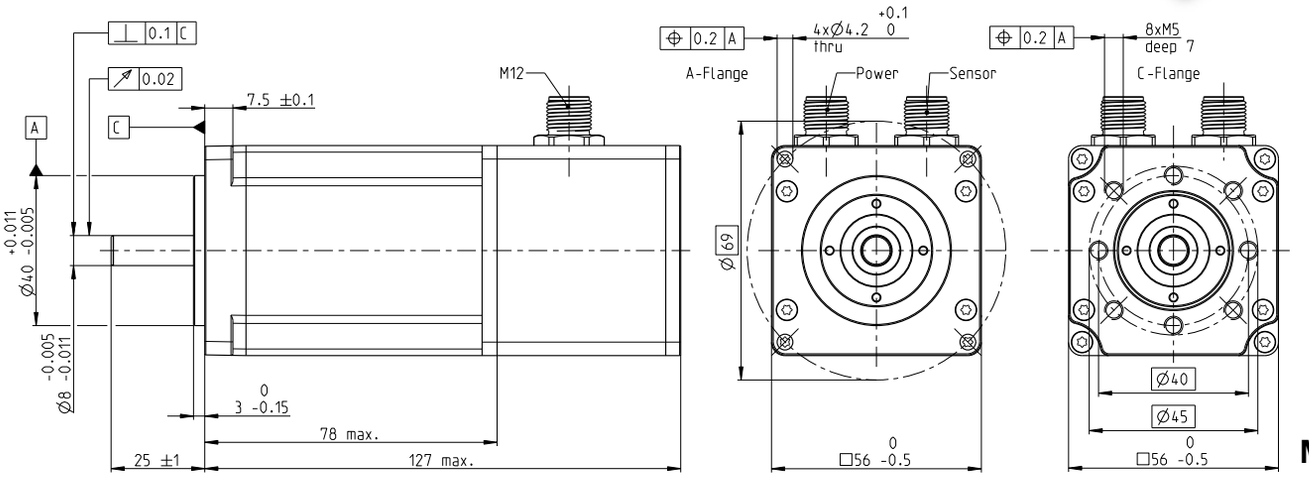
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IDX 56 M ☐56 mm, brushless, BLDC motor

IP65 motor with industrial housing

Key Data: 330/375 W, 640 mNm, 8000 rpm



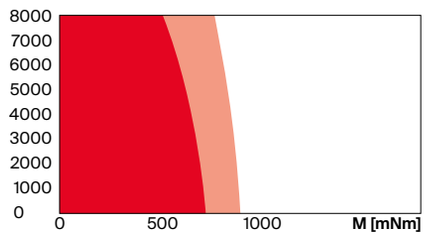


M 1:2

	Motor data			
1_	Nominal voltage	V	24	48
2_	No load speed	rpm	5740	7270
3_	No load current	mA	911	653
4_	Nominal speed	rpm	4870	6350
5_	Nominal torque	mNm	645	563
6_	Nominal current (max. continuous current)	A	15.2	8.6
7_	Stall torque	mNm	4280	4800
8_	Stall current	A	406	333
9_	Max. efficiency	%	90.5	91.1
10_	Terminal resistance	Ω	0.0592	0.144
11_	Terminal inductance	mH	0.0939	0.234
12_	Torque constant	mNm/A	39.5	62.4
13_	Speed constant	rpm/V	242	153
14_	Speed/torque gradient	rpm/mNm	0.362	0.354
15_	Mechanical time constant	ms	0.644	0.629
16_	Rotor inertia	gcm²	170	170
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	2.69	
18_	Thermal resistance winding-housing	K/W	1.07	
19_	Thermal time constant winding	s	36.8	
20_	Thermal time constant motor	s	1100	
21_	Ambient temperature	°C	-40...+100	
22_	Max. winding temperature	°C	155	
	Mechanical data ball bearings			
23_	Max. speed	rpm	8000	
24_	Axial play	mm	0...0.14	
	Preload	N	16	
	Direction of force		pull	
25_	Radial play		preloaded	
26_	Max. axial load (dynamic)	N	12	
27_	Max. force for press fits (static)	N	150	
	(static, shaft supported)	N		
28_	Max. radial load [mm from flange]	N	110 [12.5]	
	Other specifications			
29_	Number of pole pairs		8	
30_	Number of phases		3	
31_	Weight of motor	g	815	
32_	Typical noise level [rpm]	dBA	54 [4000]	
	Protection class without shaft		IP65	

Operating range

n [rpm] winding 48 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Power Connection (M12, male, 5 poles, L-coded)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	U_{brake} + (optional)
Pin 5	U_{brake} GND (optional)

Sensor Connection (M12, male, 17 poles, A-coded)
Pin assignment available in encoder data sheet.

NTC resistor 25 °C: 10 kΩ ±1%, beta (25–100 °C): 3460 K

Compatible cables available online in the configurator.

Modular system Details on catalog page 44

Gear	Stages [opt.]
406_GPX 52 A/UP	1–3
407_GPX 52 LN	1–3
456_GSW 62	
458_GB 80	1
459_GB 12	1

Sensor
517_ENX 22 EASY INT
518_ENX 22 EMT INT

Accessories
592_Brake AB 42 S

Motor Control
552_ESCON Module 50/8
552_ESCON Module 50/8 HE
553_ESCON 70/10
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
565_EPOS4 Module 50/15
568_EPOS4 Compact 50/15
569_EPOS4 70/15

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface: SSI/BiSS-C
Shaft: standard/short

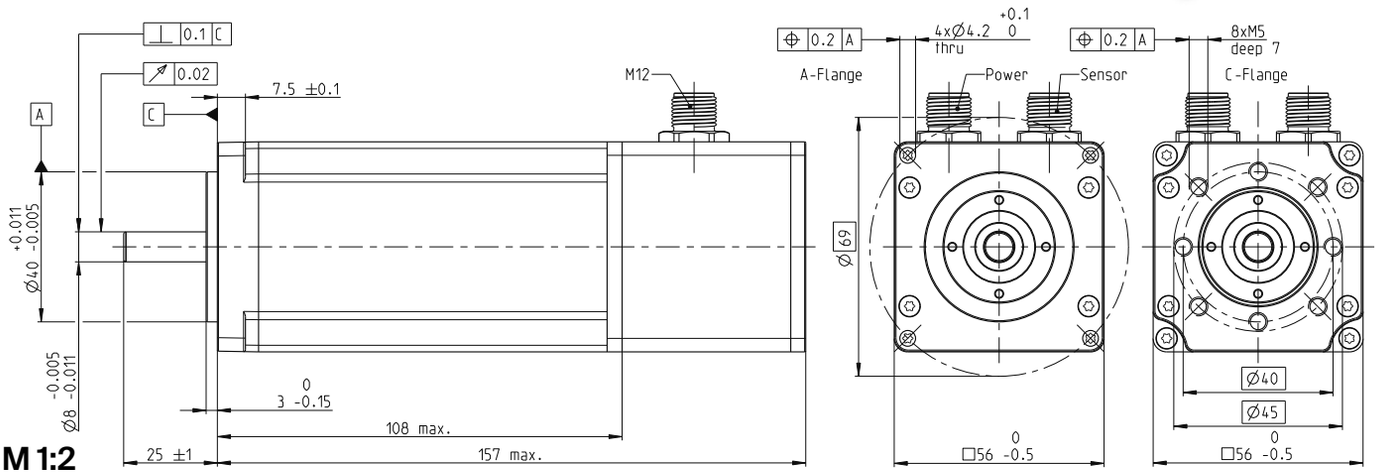
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IDX 56 L ☐56 mm, brushless, BLDC motor

IP65 motor with industrial housing

Key Data: 400/457 W, 1040 mNm, 6000 rpm



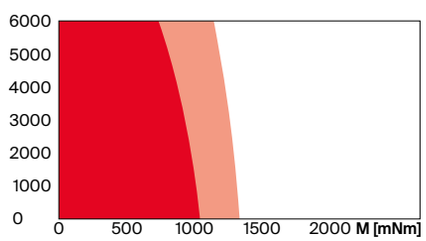


M 1:2

	Motor data			
1_	Nominal voltage	V	24	48
2_	No load speed	rpm	3430	5440
3_	No load current	mA	693	673
4_	Nominal speed	rpm	2900	4800
5_	Nominal torque	mNm	1040	897
6_	Nominal current (max. continuous current)	A	14.8	10.3
7_	Stall torque	mNm	7760	8910
8_	Stall current	A	256	329
9_	Max. efficiency	%	87.9	90.4
10_	Terminal resistance	Ω	0.0938	0.146
11_	Terminal inductance	mH	0.138	0.221
12_	Torque constant	mNm/A	66.2	83.6
13_	Speed constant	rpm/V	144	114
14_	Speed/torque gradient	rpm/mNm	0.204	0.199
15_	Mechanical time constant	ms	0.567	0.552
16_	Rotor inertia	gcm²	265	265
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	2.2	
18_	Thermal resistance winding-housing	K/W	0.68	
19_	Thermal time constant winding	s	37.9	
20_	Thermal time constant motor	s	1320	
21_	Ambient temperature	°C	-40...+100	
22_	Max. winding temperature	°C	155	
	Mechanical data ball bearings			
23_	Max. speed	rpm	6000	
24_	Axial play	mm	0...0.14	
	Preload	N	16	
	Direction of force		pull	
25_	Radial play		preloaded	
26_	Max. axial load (dynamic)	N	12	
27_	Max. force for press fits (static)	N	150	
	(static, shaft supported)	N		
28_	Max. radial load [mm from flange]	N	110 [12.5]	
	Other specifications			
29_	Number of pole pairs		8	
30_	Number of phases		3	
31_	Weight of motor	g	1196	
32_	Typical noise level [rpm]	dBA	58 [4000]	
	Protection class without shaft		IP65	

Operating range

n [rpm] winding 48 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Power Connection (M12, male, 5 poles, L-coded)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	U_{brake} + (optional)
Pin 5	U_{brake} GND (optional)

Sensor Connection (M12, male, 17 poles, A-coded)
Pin assignment available in encoder data sheet.

NTC resistor 25 °C: 10 kΩ ±1%, beta (25–100 °C): 3460 K

Compatible cables available online in the configurator.

Modular system Details on catalog page 44

Gear	Stages [opt.]
406_GPX 52 A/UP	1–3
407_GPX 52 LN	1–3
456_GSW 62	
458_GB 80	1
459_GB 12	1

Sensor
517_ENX 22 EASY INT
518_ENX 22 EMT INT

Accessories
592_Brake AB 42 S

552_ESCON Module 50/8
552_ESCON Module 50/8 HE
553_ESCON 70/10
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
565_EPOS4 Module 50/15
568_EPOS4 Compact 50/15
569_EPOS4 70/15

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface: SSI/BiSS-C
Shaft: standard/short

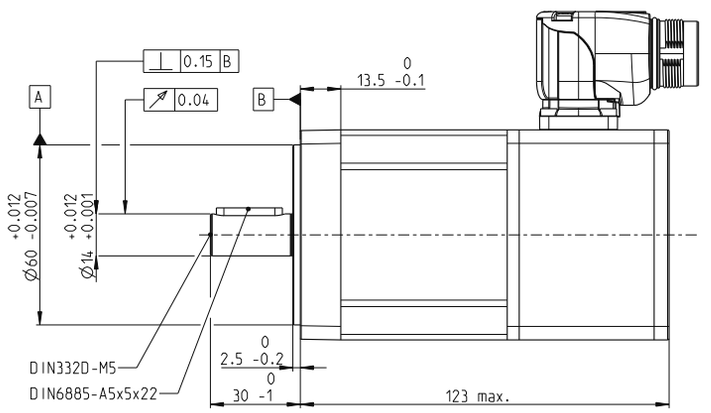
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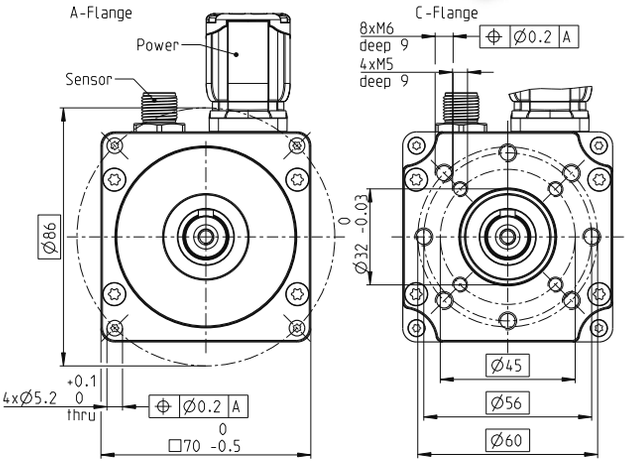
IDX 70 S □70 mm, brushless, BLDC motor

IP65 motor with industrial housing

Key Data: 600/651 W, 1520 mNm, 6000 rpm







M 1:2½

	Motor data				
1_	Nominal voltage	V	24	48	60
2_	No load speed	rpm	4770	4790	5000
3_	No load current	mA	1250	629	536
4_	Nominal speed	rpm	4090	4110	4310
5_	Nominal torque	mNm	1520	1510	1430
6_	Nominal current (max. continuous current)	A	29.2	14.6	11.6
7_	Stall torque	mNm	10200	10900	10800
8_	Stall current	A	1000	557	462
9_	Max. efficiency	%	92.9	93.2	93.1
10_	Terminal resistance	Ω	0.024	0.0862	0.13
11_	Terminal inductance	mH	0.058	0.235	0.344
12_	Torque constant	mNm/A	47.7	95	114
13_	Speed constant	rpm/V	200	101	83.9
14_	Speed/torque gradient	rpm/mNm	0.101	0.0912	0.0957
15_	Mechanical time constant	ms	0.598	0.543	0.569
16_	Rotor inertia	gcm²	568	568	568

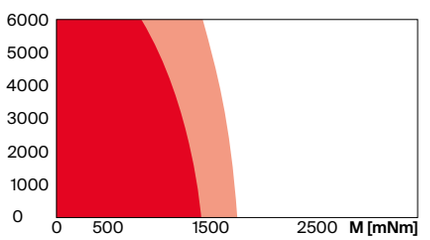
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	1.73
18_	Thermal resistance winding-housing	K/W	0.61
19_	Thermal time constant winding	s	38.9
20_	Thermal time constant motor	s	969
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	6000
24_	Axial play	mm	0.22
	Preload	N	28
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	22
27_	Max. force for press fits (static)	N	270
	(static, shaft supported)	N	
28_	Max. radial load [mm from flange]	N	300 [15]

	Other specifications		
29_	Number of pole pairs		8
30_	Number of phases		3
31_	Weight of motor	g	1595
32_	Typical noise level [rpm]	dBA	55 [3000]
	Protection class without shaft		IP65

Operating range

n [rpm] winding 48 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
408_GPX 70 A/UP	1–2	517_ENX 22 EASY INT	558_ESCON2 Module 60/30
409_GPX 70 LN	1–2	518_ENX 22 EMT INT	559_ESCON2 Compact 60/30
459_GB 12	1		565_EPOS4 Module 50/15
460_GB 9	1	**Accessories**	568–569_EPOS4 Compact 50/15
461_GB 65	2	593_Brake AB 60 S	569_EPOS4 70/15

Power Connection (M23, male, 6 poles, N-coded)

Pin 1	Motor winding 1
Pin 2	Motor winding 3
Pin 3	FE
Pin 4	U_{brake} + (optional)
Pin 5	U_{brake} GND (optional)
Pin 6	Motor winding 2

Sensor Connection (M12, male, 17 poles, A-coded)
Pin assignment available in encoder data sheet.

NTC resistor 25 °C: 10 kΩ ±1%, beta (25–100 °C): 3460 K

Compatible cables available online in the configurator.

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface: SSI/BiSS-C
Angle Power Connector: 0°/90°
Shaft: standard with feather key/small diameter without feather key

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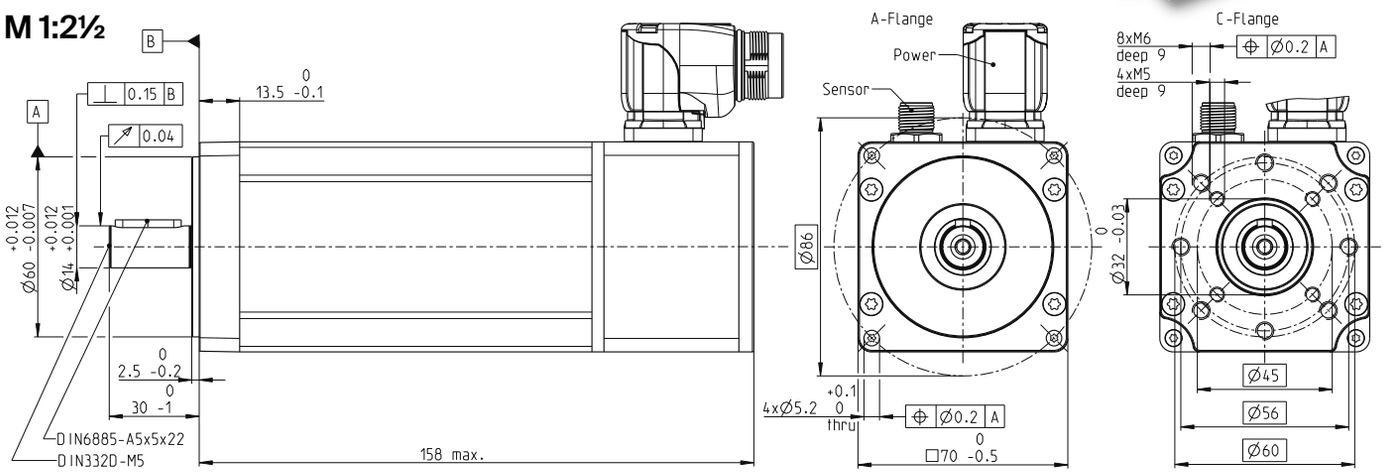
IDX 70 M ☐70 mm, brushless, BLDC motor

IP65 motor with industrial housing

Key Data: 800/890 W, 2650 mNm, 4000 rpm



M 1:2½



	Motor data			
1_	Nominal voltage	V	48	60
2_	No load speed	rpm	3670	3730
3_	No load current	mA	815	668
4_	Nominal speed	rpm	3130	3170
5_	Nominal torque	mNm	2530	2650
6_	Nominal current (max. continuous current)	A	18.6	15.7
7_	Stall torque	mNm	25400	27900
8_	Stall current	A	672	618
9_	Max. efficiency	%	93.0	93.3
10_	Terminal resistance	Ω	0.0715	0.097
11_	Terminal inductance	mH	0.246	0.373
12_	Torque constant	mNm/A	124	153
13_	Speed constant	rpm/V	76.9	62.5
14_	Speed/torque gradient	rpm/mNm	0.0443	0.0397
15_	Mechanical time constant	ms	0.487	0.437
16_	Rotor inertia	gcm²	1050	1050

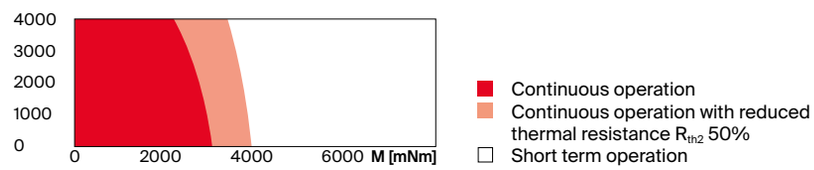
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	1.35
18_	Thermal resistance winding-housing	K/W	0.38
19_	Thermal time constant winding	s	40.7
20_	Thermal time constant motor	s	1130
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	4000
24_	Axial play	mm	0.22
	Preload	N	28
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	22
27_	Max. force for press fits (static)	N	270
	(static, shaft supported)	N	
28_	Max. radial load [mm from flange]	N	300 [15]

	Other specifications		
29_	Number of pole pairs		8
30_	Number of phases		3
31_	Weight of motor	g	2295
32_	Typical noise level [rpm]	dBA	60 [3000]
	Protection class without shaft		IP65

Operating range

n [rpm] winding 48 V



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
408_GPX 70 A/UP	1–2	517_ENX 22 EASY INT	558_ESCON2 Module 60/30
409_GPX 70 LN	1–2	518_ENX 22 EMT INT	559_ESCON2 Compact 60/30
459_GB 12	1		565_EPOS4 Module 50/15
460_GB 9	1	**Accessories**	568–569_EPOS4 Compact 50/15
461_GB 65	2	593_Brake AB 60 S	569_EPOS4 70/15

Power Connection (M23, male, 6 poles, N-coded)

Pin 1	Motor winding 1
Pin 2	Motor winding 3
Pin 3	FE
Pin 4	U_{brake} + (optional)
Pin 5	U_{brake} GND (optional)
Pin 6	Motor winding 2

Sensor Connection (M12, male, 17 poles, A-coded)
Pin assignment available in encoder data sheet.

NTC resistor 25 °C: 10 kΩ ±1%, beta (25–100 °C): 3460 K

Compatible cables available online in the configurator.

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface: SSI/BiSS-C
Angle Power Connector: 0°/90°
Shaft: standard with feather key/small diameter without feather key

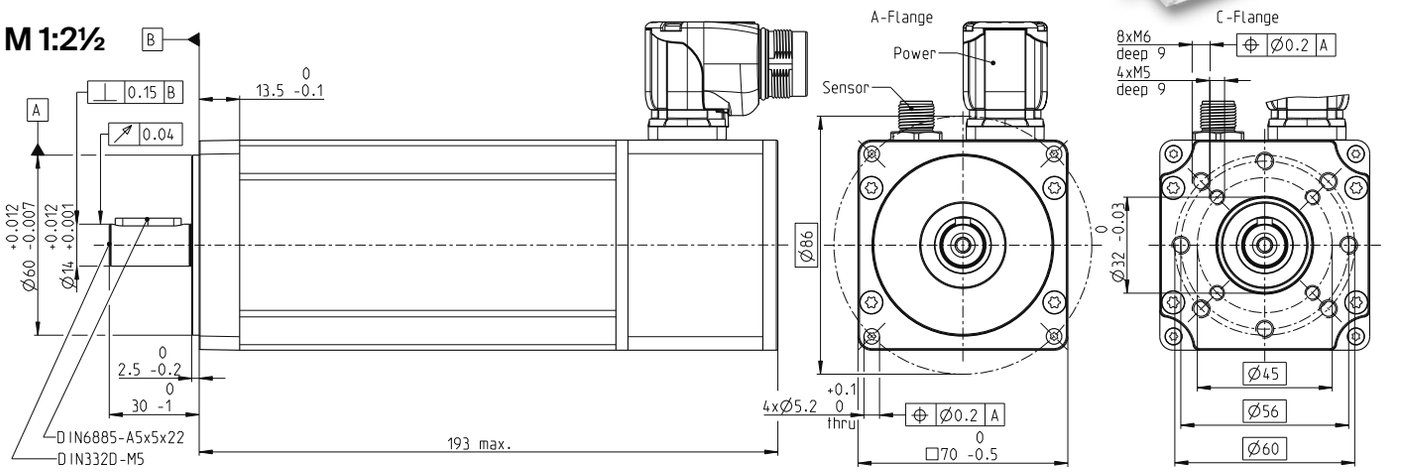
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IDX 70 L ☐70 mm, brushless, BLDC motor

IP65 motor with industrial housing

Key Data: 900/954 W, 3750 mNm, 3000 rpm





	Motor data			
1_	Nominal voltage	V	48	60
2_	No load speed	rpm	2780	3070
3_	No load current	mA	771	712
4_	Nominal speed	rpm	2430	2710
5_	Nominal torque	mNm	3750	3360
6_	Nominal current (max. continuous current)	A	21.3	17.1
7_	Stall torque	mNm	25800	25400
8_	Stall current	A	669	592
9_	Max. efficiency	%	93.2	93.1
10_	Terminal resistance	Ω	0.0718	0.101
11_	Terminal inductance	mH	0.221	0.287
12_	Torque constant	mNm/A	164	186
13_	Speed constant	rpm/V	58.2	51.4
14_	Speed/torque gradient	rpm/mNm	0.0254	0.028
15_	Mechanical time constant	ms	0.408	0.449
16_	Rotor inertia	gcm²	1530	1530

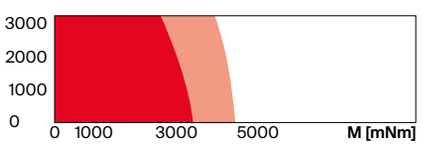
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	1.21
18_	Thermal resistance winding-housing	K/W	0.28
19_	Thermal time constant winding	s	46.8
20_	Thermal time constant motor	s	1820
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	3200
24_	Axial play	mm	0.22
	Preload	N	28
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	22
27_	Max. force for press fits (static)	N	270
	(static, shaft supported)	N	
28_	Max. radial load [mm from flange]	N	300 [15]

	Other specifications		
29_	Number of pole pairs		8
30_	Number of phases		3
31_	Weight of motor	g	2995
32_	Typical noise level [rpm]	dBA	65 [3000]
	Protection class without shaft		IP65

Operating range

n [rpm] winding 48 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Sensor	Motor Control
517_ENX 22 EASY INT	558_ESCON2 Module 60/30
518_ENX 22 EMT INT	559_ESCON2 Compact 60/30
	565_EPOS4 Module 50/15
Accessories	568–569_EPOS4 Compact 50/15
593_Brake AB 60 S	569_EPOS4 70/15

Power Connection (M23, male, 6 poles, N-coded)

Pin 1	Motor winding 1
Pin 2	Motor winding 3
Pin 3	FE
Pin 4	U_{brake} + (optional)
Pin 5	U_{brake} GND (optional)
Pin 6	Motor winding 2

Sensor Connection (M12, male, 17 poles, A-coded)
Pin assignment available in encoder data sheet.

NTC resistor 25 °C: 10 kΩ ±1%, beta (25–100 °C): 3460 K

Compatible cables available online in the configurator.

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface: SSI/BiSS-C
Angle Power Connector: 0°/90°
Shaft: standard with feather key/small diameter without feather key

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maxon ECX FLAT

Standard specification no. 101	90
Terminology explanations	190

ECX FLAT 22 S ∅22 mm, 4.5 Watt	257
ECX FLAT 22 S ∅22 mm, 17 Watt, High Torque	258
ECX FLAT 22 L ∅22 mm, 37 Watt	259
ECX FLAT 32 S ∅32 mm, 35 Watt	260
ECX FLAT 32 S ∅32 mm, 65 Watt, High Torque	261
ECX FLAT 32 L ∅32 mm, 100 Watt, High Torque	262
ECX FLAT 42 S ∅42 mm, 40 Watt	263
ECX FLAT 42 S ∅42 mm, 100 Watt, High Torque	264
ECX FLAT 42 M ∅42 mm, 150 Watt, High Torque	265



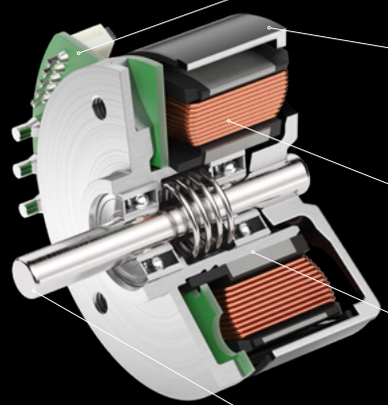
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maxon ECX FLAT program

The brushless ECX FLAT motor series is optimized for high torques and is suitable for small spaces. As a result of its innovative winding technology and high-performance rare-earth magnets, the ECX FLAT has a unique ratio of torque to size. There are two versions: the economical standard version or the high-torque version. The ECX FLAT program is fully configurable. Select your mechanical and electrical interface online.

Key data

Motor ∅	22...42 mm
Motor length	14...21.2 mm
Power	4.5...150 W
Nominal torque	up to 221 mNm
Max. permissible speed	up to 15 000 rpm



Electrical connection with flexible single wires and robust connection to the printed circuit board.

Rotor with ring magnets or single magnets and smart design for reducing vibrations.

Precision-manufactured winding with maximum fill factor.

Stator package optimally connected to the flange, for ideal heat dissipation.

Grooveless shaft ensures smooth running and extremely high torsional rigidity.

- → Top torque density
- → Short length
- → Attractive price/performance ratio
- → Open design for excellent heat dissipation at high speeds
- → Innovative design

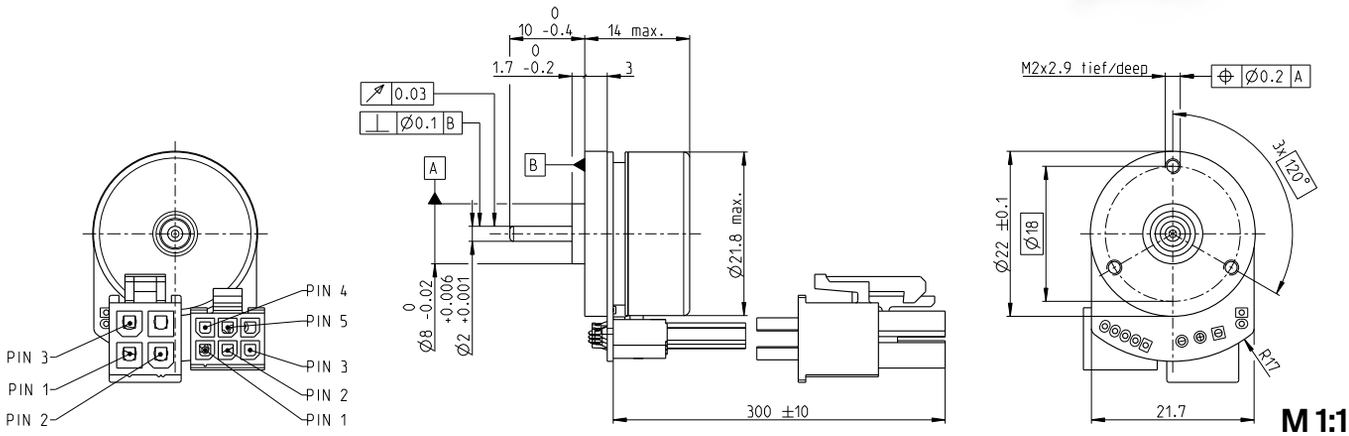
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ECX FLAT 22 S ∅22 mm, brushless, BLDC motor

Key data: 4.5/9.8 W, 7.99 mNm, 15 000 rpm



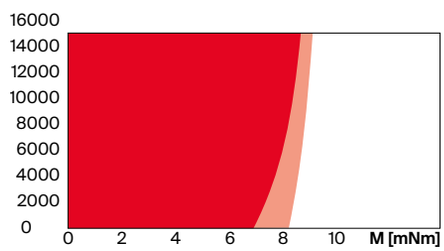


M 1:1

	Motor data			
1_	Nominal voltage	V	9	18
2_	No load speed	rpm	10100	10600
3_	No load current	mA	60.5	32.7
4_	Nominal speed	rpm	5240	5650
5_	Nominal torque	mNm	7.95	7.99
6_	Nominal current (max. continuous current)	A	0.977	0.514
7_	Stall torque[1]	mNm	22.7	23.7
8_	Stall current	A	2.84	1.57
9_	Max. efficiency	%	67.2	67.5
10_	Terminal resistance	Ω	3.16	11.5
11_	Terminal inductance	mH	0.6	2.18
12_	Torque constant	mNm/A	8.23	15.7
13_	Speed constant	rpm/V	1160	610
14_	Speed/torque gradient	rpm/mNm	447	446
15_	Mechanical time constant	ms	31.3	31.3
16_	Rotor inertia	gcm²	6.7	6.7
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	7.82	
18_	Thermal resistance winding-housing	K/W	9.6	
19_	Thermal time constant winding	s	6.47	
20_	Thermal time constant motor	s	18.7	
21_	Ambient temperature	°C	-40...+100	
22_	Max. winding temperature	°C	125	
	Mechanical data ball bearings			
23_	Max. speed	rpm	15 000	
24_	Axial play at axial load	< 1.5 N	0 mm	
		> 1.5 N	0.14 mm	
	Direction of force		pull	
25_	Radial play		preloaded	
26_	Max. axial load (dynamic)	N	1.8	
27_	Max. force for press fits (static)	N	26	
	(static, shaft supported)	N	200	
28_	Max. radial load [mm from flange]	N	3.5 [5]	
	Other specifications			
29_	Number of pole pairs		6	
30_	Number of phases		3	
31_	Weight of motor	g	28.2	

Operating range

n [rpm] winding 9 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
390_GPX 22 A/C	1–4
391_GPX 22 LN/LZ	1–4
392_GPX 22 HP	2–4
394_GPX 22 UP	1–4
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
490_ENX 22 MILE

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_Compact 24/5 EtherCAT 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

Configuration

Flange: standard flange/aluminum flange
Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder

Connections, motor (cable AWG 22)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Connector, Part number
Molex, 39-01-2040

Connections, sensors (cable AWG 28)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 3.5...24 VDC
Pin 6 N.C.

Connector, Part number
Molex, 43025-0600

Circuit diagram for Hall sensors see page 69.

[1]Calculation does not include saturation effect (p. 83/190)

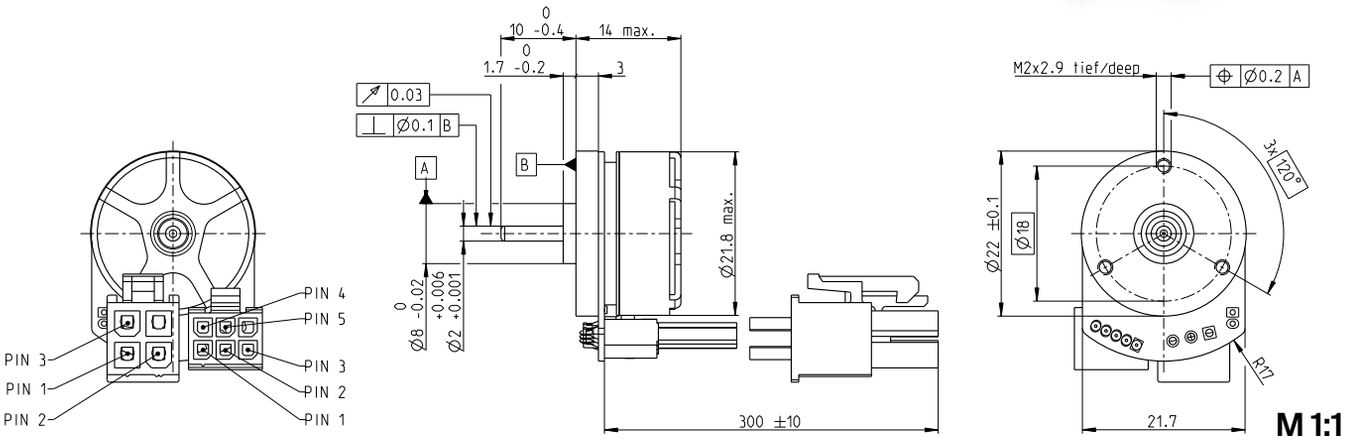
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ECX FLAT 22 S ∅22 mm, brushless, BLDC motor

High Torque

Key data: 17/23.7 W, 15.5 mNm, 15 000 rpm





M 1:1

	Motor data				
1_	Nominal voltage	V	12	18	24
2_	No load speed	rpm	13300	12100	12600
3_	No load current	mA	122	69.4	55.7
4_	Nominal speed	rpm	10300	9200	9650
5_	Nominal torque	mNm	15.1	15.5	15
6_	Nominal current (max. continuous current)	A	1.75	1.08	0.823
7_	Stall torque[1]	mNm	64.5	63.2	63.1
8_	Stall current	A	11.3	6.51	5.08
9_	Max. efficiency	%	80.7	80.8	80.5
10_	Terminal resistance	Ω	1.06	2.77	4.73
11_	Terminal inductance	mH	0.158	0.431	0.706
12_	Torque constant	mNm/A	8.47	14	17.9
13_	Speed constant	rpm/V	1130	682	533
14_	Speed/torque gradient	rpm/mNm	141	135	141
15_	Mechanical time constant	ms	7.15	6.82	7.13
16_	Rotor inertia	gcm²	4.84	4.84	4.84

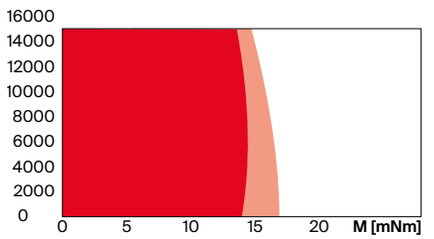
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	9.66
18_	Thermal resistance winding-housing	K/W	12.6
19_	Thermal time constant winding	s	9.94
20_	Thermal time constant motor	s	23.1
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	15 000
24_	Axial play at axial load	< 1.5 N	0 mm
		> 1.5 N	0.14 mm
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.8
27_	Max. force for press fits (static)	N	26
	(static, shaft supported)	N	200
28_	Max. radial load [mm from flange]	N	3.5 [5]

	Other specifications		
29_	Number of pole pairs		6
30_	Number of phases		3
31_	Weight of motor	g	26.4

Operating range

n [rpm] winding 24 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
390_GPX 22 A/C	1–4
391_GPX 22 LN/LZ	1–4
392_GPX 22 HP	2–4
394_GPX 22 UP	1–4
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
490_ENX 22 MILE

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_Compact 24/5 EtherCAT 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

Configuration

Flange: standard flange/aluminum flange
Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder

Connections, motor (cable AWG 22)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Connector, Part number
Molex, 39-01-2040

Connections, sensors (cable AWG 28)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 3.5...24 VDC
Pin 6 N.C.

Connector, Part number
Molex, 43025-0600

Circuit diagram for Hall sensors see page 69.

[1]Calculation does not include saturation effect (p. 83/190)

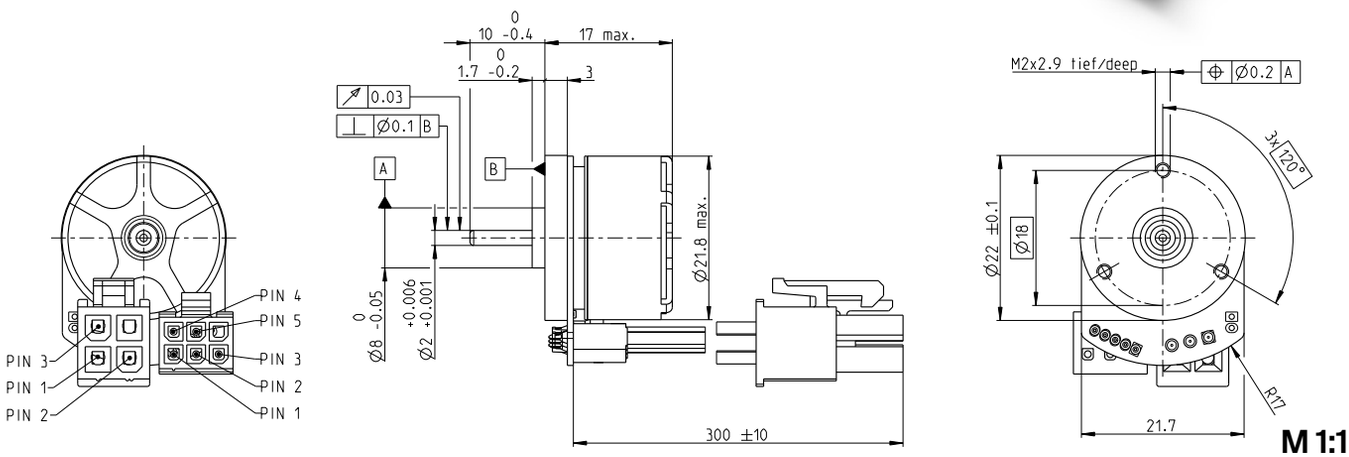
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ECX FLAT 22 L ∅22 mm, brushless, BLDC motor

High Torque

Key data: 37/46.8 W, 28.3 mNm, 15 000 rpm





M 1:1

	Motor data			
1_	Nominal voltage	V	18	36
2_	No load speed	rpm	11 800	11100
3_	No load current	mA	99.7	45.5
4_	Nominal speed	rpm	9070	8520
5_	Nominal torque	mNm	28.3	28
6_	Nominal current (max. continuous current)	A	1.89	0.885
7_	Stall torque[1]	mNm	129	126
8_	Stall current	A	12.5	5.67
9_	Max. efficiency	%	83.2	83.2
10_	Terminal resistance	Ω	1.44	6.34
11_	Terminal inductance	mH	0.26	1.16
12_	Torque constant	mNm/A	14.4	30.6
13_	Speed constant	rpm/V	661	313
14_	Speed/torque gradient	rpm/mNm	65.9	64.9
15_	Mechanical time constant	ms	4.7	4.64
16_	Rotor inertia	gcm²	6.82	6.82

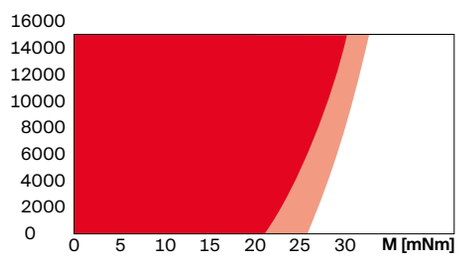
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	7.15
18_	Thermal resistance winding-housing	K/W	6.42
19_	Thermal time constant winding	s	6.7
20_	Thermal time constant motor	s	17.1
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	15 000
24_	Axial play at axial load	< 1.5 N	0 mm
		> 1.5 N	0.14 mm
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	1.8
27_	Max. force for press fits (static)	N	26
	(static, shaft supported)	N	200
28_	Max. radial load [mm from flange]	N	3.5 [5]

	Other specifications		
29_	Number of pole pairs		6
30_	Number of phases		3
31_	Weight of motor	g	32

Operating range

n [rpm] winding 18 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
390_GPX 22 A/C	1–4
391_GPX 22 LN/LZ	1–4
392_GPX 22 HP	2–4
394_GPX 22 UP	1–4
396_GPX 26 A/C	3
397_GPX 26 LN/LZ	3
398_GPX 26 HP	4

Sensor
490_ENX 22 MILE

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_Compact 24/5 EtherCAT 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

Configuration

Flange: standard flange/aluminum flange
Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder

Connections, motor (cable AWG 22)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Connector, Part number
Molex, 39-01-2040

Connections, sensors (cable AWG 28)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 3.5...24 VDC
Pin 6 N.C.

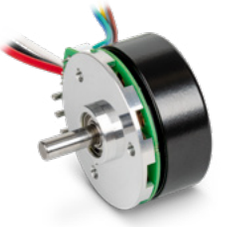
Connector, Part number
Molex, 43025-0600

Circuit diagram for Hall sensors see page 69.

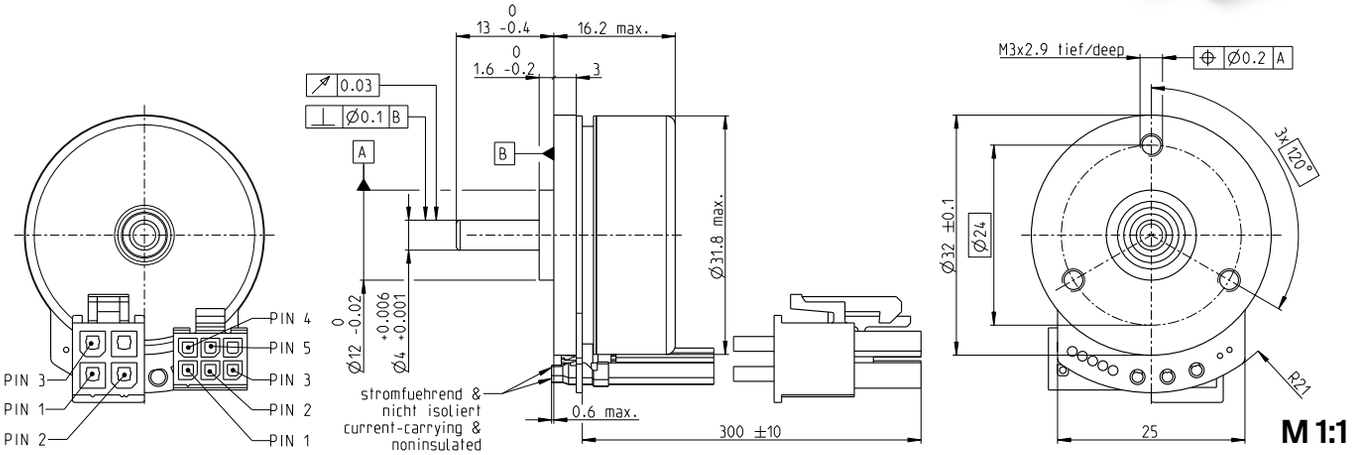
[1]Calculation does not include saturation effect (p. 83/190)

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ECX FLAT 32 S ∅32 mm, brushless, BLDC motor



Key data: 35/50.7 W, 35 mNm, 14000 rpm



	Motor data				
1_	Nominal voltage	V	12	24	48
2_	No load speed	rpm	11000	12200	13700
3_	No load current	mA	179	106	64.8
4_	Nominal speed	rpm	7320	8380	9600
5_	Nominal torque	mNm	35	33.6	32.3
6_	Nominal current (max. continuous current)	A	3.03	1.66	0.905
7_	Stall torque[1]	mNm	107	114	117
8_	Stall current	A	26.6	17.4	10.3
9_	Max. efficiency	%	76.7	77.3	77.2
10_	Terminal resistance	Ω	0.452	1.38	4.66
11_	Terminal inductance	mH	0.345	1.12	3.53
12_	Torque constant	mNm/A	10.2	18.3	32.6
13_	Speed constant	rpm/V	937	521	293
14_	Speed/torque gradient	rpm/mNm	41.6	39.2	41.8
15_	Mechanical time constant	ms	14.2	13.4	14.3
16_	Rotor inertia	gcm²	32.6	32.6	32.6

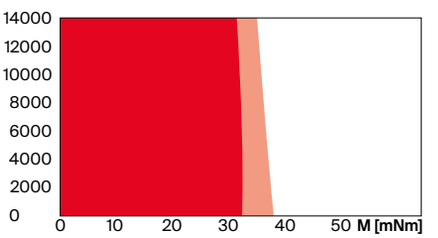
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	3.99
18_	Thermal resistance winding-housing	K/W	4.74
19_	Thermal time constant winding	s	11.3
20_	Thermal time constant motor	s	125
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	125

	Mechanical data ball bearings		
23_	Max. speed	rpm	14000
24_	Axial play at axial load	< 4 N	0 mm
		> 4 N	0.14 mm
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	45
	(static, shaft supported)	N	1000
28_	Max. radial load [mm from flange]	N	12 [5]

	Other specifications		
29_	Number of pole pairs		6
30_	Number of phases		3
31_	Weight of motor	g	62.9

Operating range

n [rpm] winding 24 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
399_GPX 32 A/C	1–3
400_GPX 32 LN/LZ	1–3
401_GPX 32 HP	2–4
402_GPX 32 UP	1–4
403_GPX 37 A	3
404_GPX 37 LN/LZ	3

Sensor
491_ENX 32 MILE

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_Compact 24/5 EtherCAT 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

Configuration

Flange: standard flange/aluminum flange
Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder

Connections, motor (cable AWG 20)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Connector, Part number
Molex, 39-01-2040

Connections, sensors (cable AWG 28)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 2.7...24 VDC
Pin 6 N.C.

Connector, Part number
Molex, 43025-0600

Circuit diagram for Hall sensors see page 69.

[1]calculation does not include saturation effect (p. 83/190)

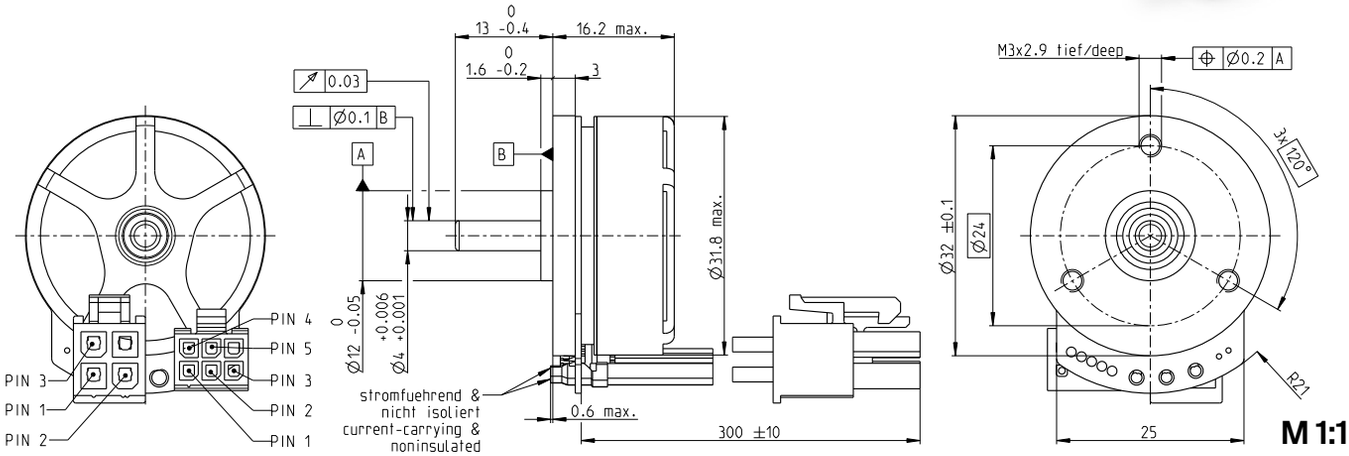
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ECX FLAT 32 S ∅32 mm, brushless, BLDC motor

High Torque

Key data: 65/145 W, 84.9 mNm, 14 000 rpm





	Motor data				
1_	Nominal voltage	V	18	24	48
2_	No load speed	rpm	11800	12600	13500
3_	No load current	mA	206	172	96.4
4_	Nominal speed	rpm	8740	9400	10400
5_	Nominal torque	mNm	81.5	83.1	84.9
6_	Nominal current (max. continuous current)	A	4.99	4.05	2.24
7_	Stall torque[1]	mNm	274	287	265
8_	Stall current	A	49.4	43.8	27.5
9_	Max. efficiency	%	87	87.5	88.4
10_	Terminal resistance	Ω	0.365	0.548	1.75
11_	Terminal inductance	mH	0.194	0.303	1.05
12_	Torque constant	mNm/A	14.4	18	33.7
13_	Speed constant	rpm/V	662	529	284
14_	Speed/torque gradient	rpm/mNm	16.7	16.1	14.7
15_	Mechanical time constant	ms	4.27	4.11	3.76
16_	Rotor inertia	gcm²	24.4	24.4	24.4

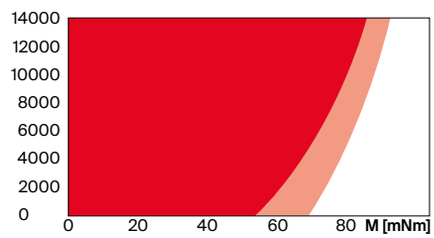
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	4.31
18_	Thermal resistance winding-housing	K/W	2.56
19_	Thermal time constant winding	s	7.33
20_	Thermal time constant motor	s	128
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	14000
24_	Axial play at axial load	< 4 N	0 mm
		> 4 N	0.14 mm
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	45
	(static, shaft supported)	N	1000
28_	Max. radial load [mm from flange]	N	12 [5]

	Other specifications		
29_	Number of pole pairs		6
30_	Number of phases		3
31_	Weight of motor	g	59.5

Operating range

n [rpm] winding 24 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
399_GPX 32 A/C	1–3
400_GPX 32 LN/LZ	1–3
401_GPX 32 HP	2–4
402_GPX 32 UP	1–4
403_GPX 37 A	3
404_GPX 37 LN/LZ	3

Sensor

491_ENX 32 MILE

Motor Control

547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_Compact 24/5 EtherCAT 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

Configuration

Flange: standard flange/aluminum flange
Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder

Connections, motor (cable AWG 20)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Connector, Part number
Molex, 39-01-2040

Connections, sensors (cable AWG 28)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 2.7...24 VDC
Pin 6 N.C.

Connector, Part number
Molex, 43025-0600

Circuit diagram for Hall sensors see page 69.

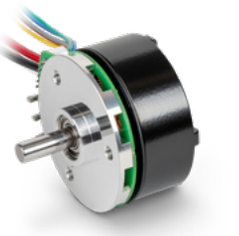
[1]calculation does not include saturation effect (p. 83/190)

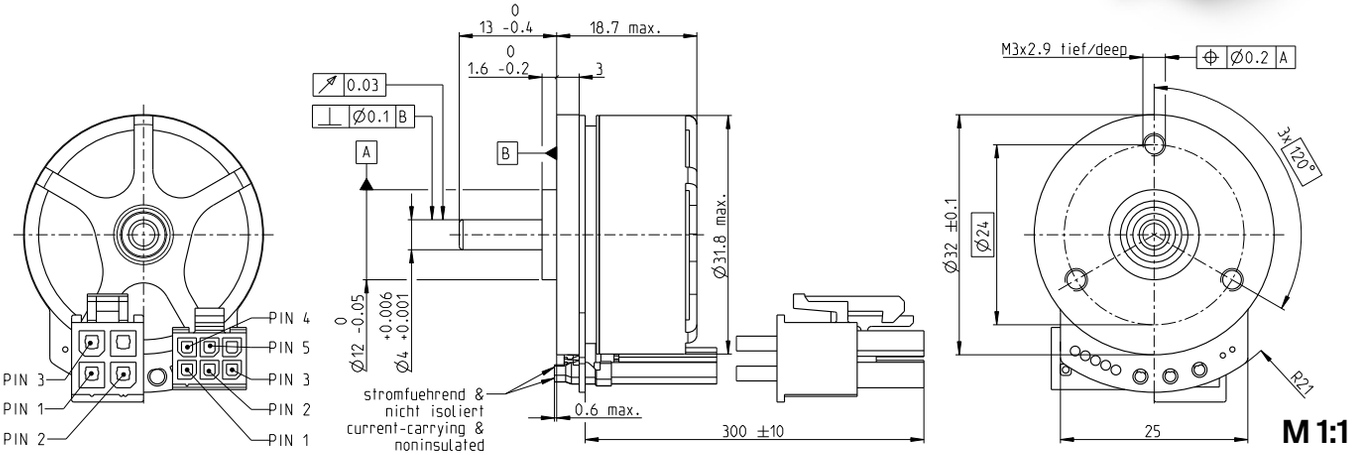
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ECX FLAT 32 L ∅32 mm, brushless, BLDC motor

High Torque

Key data: 100/168 W, 106 mNm, 14 000 rpm





	Motor data					
1_	Nominal voltage	V	18	24	36	48
2_	No load speed	rpm	10600	10600	12800	13800
3_	No load current	mA	238	179	161	138
4_	Nominal speed	rpm	8070	8100	9870	10700
5_	Nominal torque	mNm	94.4	103	105	106
6_	Nominal current (max. continuous current)	A	5.25	4.24	3.46	2.81
7_	Stall torque[1]	mNm	407	438	473	488
8_	Stall current	A	55.7	51.6	51.1	44.9
9_	Max. efficiency	%	87.4	88.5	89	89.2
10_	Terminal resistance	Ω	0.323	0.465	0.705	1.07
11_	Terminal inductance	mH	0.191	0.339	0.53	0.805
12_	Torque constant	mNm/A	16	21.3	26.6	32.8
13_	Speed constant	rpm/V	598	448	359	291
14_	Speed/torque gradient	rpm/mNm	12.1	9.79	9.5	9.47
15_	Mechanical time constant	ms	3.89	3.15	3.05	3.04
16_	Rotor inertia	gcm²	30.7	30.7	30.7	30.7

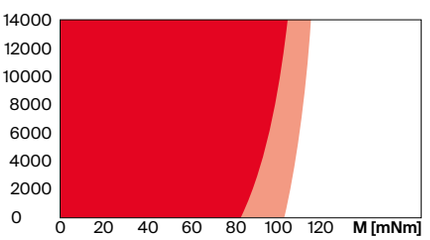
	Thermal data		
17_	Thermal resistance housing-ambient	K/W	4.31
18_	Thermal resistance winding-housing	K/W	3.1
19_	Thermal time constant winding	s	12.3
20_	Thermal time constant motor	s	153
21_	Ambient temperature	°C	-40...+100
22_	Max. winding temperature	°C	155

	Mechanical data ball bearings		
23_	Max. speed	rpm	14000
24_	Axial play at axial load	< 4 N	0 mm
		> 4 N	0.14 mm
	Direction of force		pull
25_	Radial play		preloaded
26_	Max. axial load (dynamic)	N	4
27_	Max. force for press fits (static)	N	45
	(static, shaft supported)	N	1000
28_	Max. radial load [mm from flange]	N	12 [5]

	Other specifications		
29_	Number of pole pairs		6
30_	Number of phases		3
31_	Weight of motor	g	71.2

Operating range

n [rpm] winding 24 V



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
399_GPX 32 A/C	1–3
400_GPX 32 LN/LZ	1–3
401_GPX 32 HP	2–4
402_GPX 32 UP	1–4
403_GPX 37 A	3
404_GPX 37 LN/LZ	3

Sensor
491_ENX 32 MILE

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/5
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 50/5
565_Compact 24/5 EtherCAT 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

Configuration

Flange: standard flange/aluminum flange
Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder

Connections, motor (cable AWG 20)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Connector, Part number
Molex, 39-01-2040

Connections, sensors (cable AWG 28)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 2.7...24 VDC
Pin 6 N.C.

Connector, Part number
Molex, 43025-0600

Circuit diagram for Hall sensors see page 69.

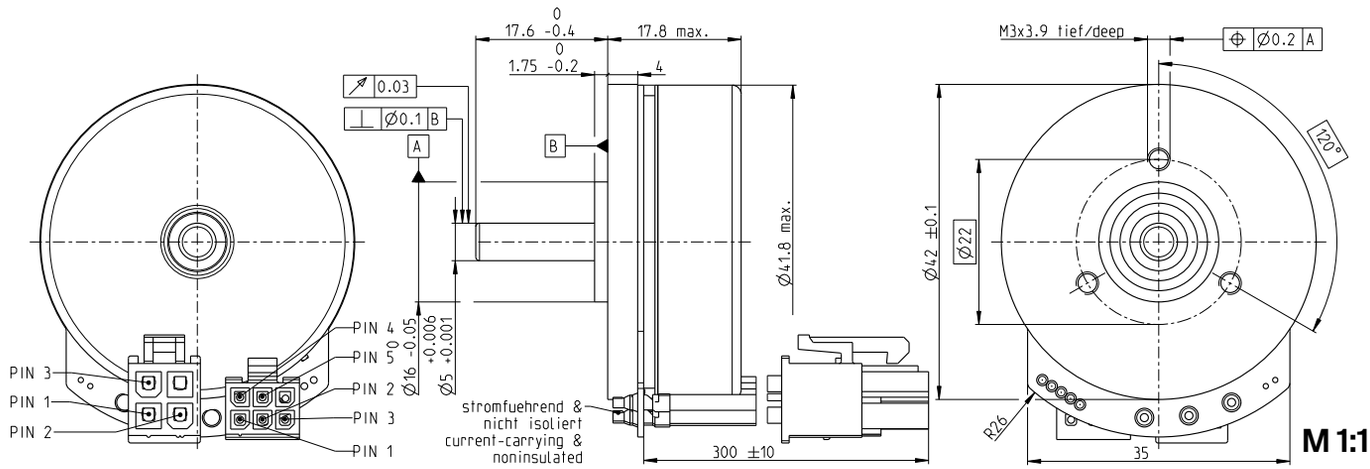
[1]calculation does not include saturation effect (p. 83/190)

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ECX FLAT 42 S ∅42 mm, brushless, BLDC motor



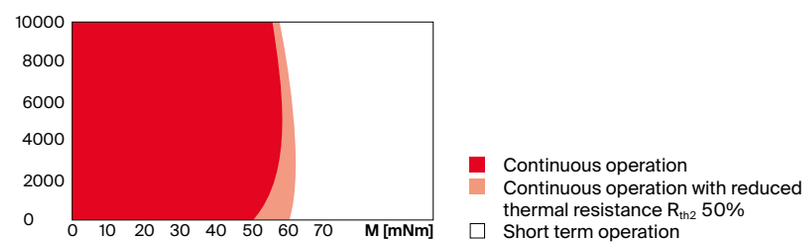
Key data: 40/58.4 W, 63.5 mNm, 10 000 rpm



	Motor data			
1_	Nominal voltage	V	24	48
2_	No load speed	rpm	8700	8970
3_	No load current	mA	174	91.4
4_	Nominal speed	rpm	6290	6540
5_	Nominal torque	mNm	59.8	63.5
6_	Nominal current (max. continuous current)	A	2.17	1.18
7_	Stall torque[1]	mNm	217	236
8_	Stall current	A	23.6	14.7
9_	Max. efficiency	%	77.5	78.6
10_	Terminal resistance	Ω	1.01	3.26
11_	Terminal inductance	mH	0.802	3.02
12_	Torque constant	mNm/A	25.7	49.8
13_	Speed constant	rpm/V	372	192
14_	Speed/torque gradient	rpm/mNm	14.7	12.6
15_	Mechanical time constant	ms	13.5	11.5
16_	Rotor inertia	gcm²	87.5	87.5
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	2.83	
18_	Thermal resistance winding-housing	K/W	5.82	
19_	Thermal time constant winding	s	19.9	
20_	Thermal time constant motor	s	157	
21_	Ambient temperature	°C	-40...+100	
22_	Max. winding temperature	°C	125	
	Mechanical data ball bearings			
23_	Max. speed	rpm	10 000	
24_	Axial play at axial load	< 6 N	0 mm	
		> 6 N	0.14 mm	
	Direction of force		pull	
25_	Radial play		preloaded	
26_	Max. axial load (dynamic)	N	6	
27_	Max. force for press fits (static)	N	86	
	(static, shaft supported)	N	1300	
28_	Max. radial load [mm from flange]	N	35 [5]	
	Other specifications			
29_	Number of pole pairs		8	
30_	Number of phases		3	
31_	Weight of motor	g	112	

Operating range

n [rpm] winding 24 V



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
405_GPX 42 C	1–4	492_ENX 42 MILE	547_DEC Module 24/2
405_GPX 42 UP	1–4		547_DEC Module 50/5
455_GSW 55 A			550_ESCON Module 24/2
			551_ESCON 36/3 EC
			551_ESCON Module 50/5
			553_ESCON 50/5
			557_ESCON2 Nano 24/2
			557_ESCON2 Micro 60/5
			563_EPOS4 Micro 24/5 CAN
			563_EPOS4 Micro 24/5 EtherCAT
			564_EPOS4 Module 50/5
			565_Comp. 24/5 EtherCAT 3-axes
			567_EPOS4 Compact 50/5
			569_EPOS4 50/5

Connections, motor (cable AWG 18)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Connector, Part number
Molex, 39-01-2040

Connections, sensors (cable AWG 28)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 2.7...24 VDC
Pin 6 N.C.

Connector, Part number
Molex, 43025-0600

Circuit diagram for Hall sensors see page 69.

[1]calculation does not include saturation effect (p. 83/190)

Configuration

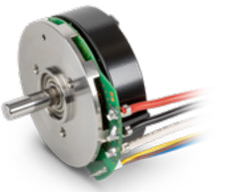
Flange: standard flange/aluminum flange
Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder

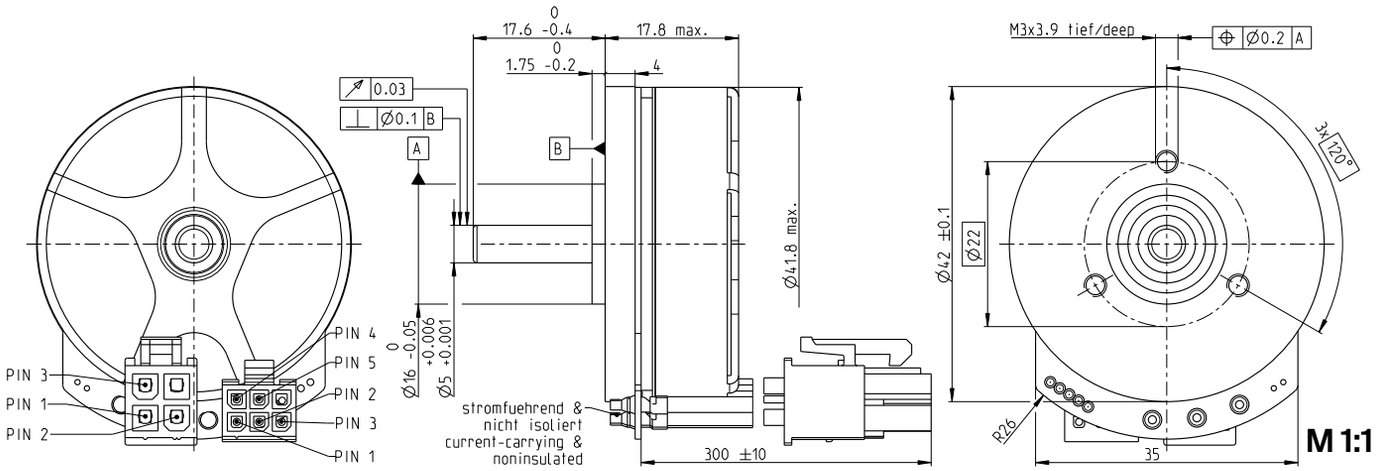
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ECX FLAT 42 S ∅42 mm, brushless, BLDC motor

High Torque

Key data: 100/131 W, 133 mNm, 10 000 rpm

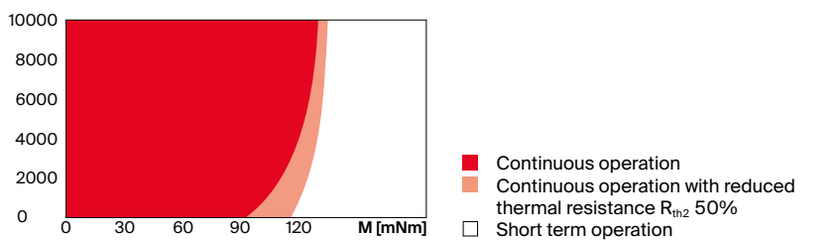




	Motor data			
1_	Nominal voltage	V	24	48
2_	No load speed	rpm	9150	8760
3_	No load current	mA	307	143
4_	Nominal speed	rpm	7320	7020
5_	Nominal torque	mNm	127	133
6_	Nominal current (max. continuous current)	A	5.2	2.57
7_	Stall torque[1]	mNm	604	632
8_	Stall current	A	64.5	34.1
9_	Max. efficiency	%	79.2	80.0
10_	Terminal resistance	Ω	0.372	1.41
11_	Terminal inductance	mH	0.185	0.807
12_	Torque constant	mNm/A	24.7	51.7
13_	Speed constant	rpm/V	386	185
14_	Speed/torque gradient	rpm/mNm	5.81	5.02
15_	Mechanical time constant	ms	3.97	3.43
16_	Rotor inertia	gcm²	65.3	65.3
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	2.19	
18_	Thermal resistance winding-housing	K/W	3.55	
19_	Thermal time constant winding	s	16.5	
20_	Thermal time constant motor	s	121	
21_	Ambient temperature	°C	-40...+100	
22_	Max. winding temperature	°C	155	
	Mechanical data ball bearings			
23_	Max. speed	rpm	10 000	
24_	Axial play at axial load	< 6 N	0 mm	
		> 6 N	0.14 mm	
	Direction of force		pull	
25_	Radial play		preloaded	
26_	Max. axial load (dynamic)	N	6	
27_	Max. force for press fits (static)	N	86	
	(static, shaft supported)	N	1300	
28_	Max. radial load [mm from flange]	N	35 [5]	
	Other specifications			
29_	Number of pole pairs		8	
30_	Number of phases		3	
31_	Weight of motor	g	106	

Operating range

n [rpm] winding 48 V



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor
405_GPX 42 C	1–4	492_ENX 42 MILE
405_GPX 42 UP	1–4	
455_GSW 55 A	1	
456_GSW 62 A	1	

Motor Control

547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/5
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 50/5
565_Comp. 24/5 EtherCAT 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5

Configuration

Flange: standard flange/aluminum flange
Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder

Connections, motor (cable AWG 18)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Connector, Part number
Molex, 39-01-2040

Connections, sensors (cable AWG 28)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 2.7...24 VDC
Pin 6 N.C.

Connector, Part number
Molex, 43025-0600

Circuit diagram for Hall sensors see page 69.

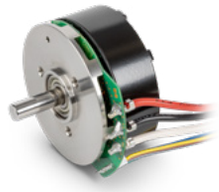
[1]calculation does not include saturation effect (p. 83/190)

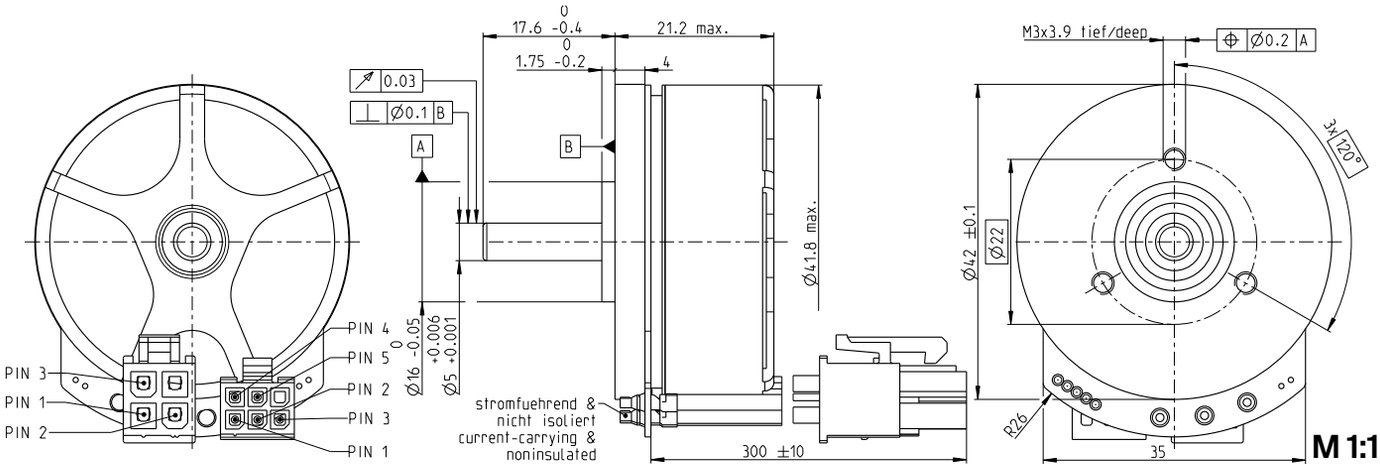
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ECX FLAT 42 M ∅42 mm, brushless, BLDC motor

High Torque

Key data: 150/224 W, 221 mNm, 10 000 rpm

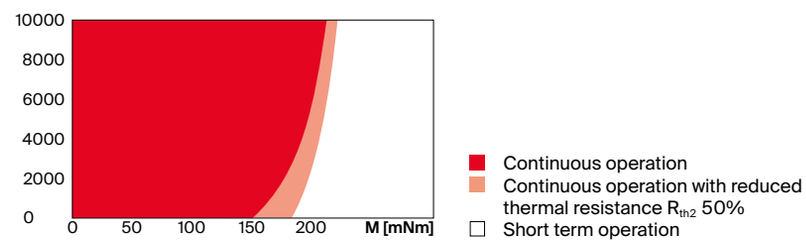




	Motor data			
1_	Nominal voltage	V	24	48
2_	No load speed	rpm	8050	7560
3_	No load current	mA	363	163
4_	Nominal speed	rpm	6470	6070
5_	Nominal torque	mNm	214	221
6_	Nominal current (max. continuous current)	A	7.34	3.53
7_	Stall torque[1]	mNm	1120	1140
8_	Stall current	A	103	51.4
9_	Max. efficiency	%	83.5	84.1
10_	Terminal resistance	Ω	0.233	0.934
11_	Terminal inductance	mH	0.153	0.698
12_	Torque constant	mNm/A	28.3	60.1
13_	Speed constant	rpm/V	339	159
14_	Speed/torque gradient	rpm/mNm	2.8	2.47
15_	Mechanical time constant	ms	2.53	2.23
16_	Rotor inertia	gcm²	86.2	86.2
	Thermal data			
17_	Thermal resistance housing-ambient	K/W	1.66	
18_	Thermal resistance winding-housing	K/W	3.01	
19_	Thermal time constant winding	s	20.1	
20_	Thermal time constant motor	s	92.2	
21_	Ambient temperature	°C	-40...+100	
22_	Max. winding temperature	°C	155	
	Mechanical data ball bearings			
23_	Max. speed	rpm	10 000	
24_	Axial play at axial load	< 6 N	0 mm	
		> 6 N	0.14 mm	
	Direction of force		pull	
25_	Radial play		preloaded	
26_	Max. axial load (dynamic)	N	6	
27_	Max. force for press fits (static)	N	86	
	(static, shaft supported)	N	1300	
28_	Max. radial load [mm from flange]	N	40 [5]	
	Other specifications			
29_	Number of pole pairs		8	
30_	Number of phases		3	
31_	Weight of motor	g	127	

Operating range

n [rpm] winding 24 V



Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
405_GPX 42 C	1–4	492_ENX 42 MILE	547_DEC Module 50/5
405_GPX 42 UP	1–4		551_ESCON 36/3 EC
455_GSW 55 A			551_ESCON Module 50/5
			553_ESCON 50/5
			553_ESCON 70/10
			557_ESCON2 Nano 24/2
			557_ESCON2 Micro 60/5
			563_EPOS4 Micro 24/5 CAN
			563_EPOS4 Micro 24/5 EtherCAT
			564_EPOS4 Module 50/5
			565_Comp. 24/5 EtherCAT 3-axes
			567_EPOS4 Compact 50/5
			567_EPOS4 Compact 50/8
			569_EPOS4 50/5
			570_EPOS4 Disk 60/8
			571_EPOS4 Disk 60/12

Configuration

Flange: standard flange/aluminum flange
Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder

Connections, motor (cable AWG 18)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 N.C.

Connector, Part number
Molex, 39-01-2040

Connections, sensors (cable AWG 28)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 2.7...24 VDC
Pin 6 N.C.

Connector, Part number
Molex, 43025-0600

Circuit diagram for Hall sensors see page 69.

[1]calculation does not include saturation effect (p. 83/190)

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For your personal notes

maxon EC

Standard specification no. 101		90
Terminology explanations		190
EC 22 ∅22 mm, 80 Watt	**HD**	269
EC 22 ∅22 mm, 240 Watt	**HD**	270
EC 32 ∅32 mm, 80 Watt		271
EC 40 ∅40 mm, 170 Watt		272
EC 45 ∅45 mm, 150 Watt		273
EC 45 ∅45 mm, 250 Watt		274
EC 60 ∅60 mm, 400 Watt		275



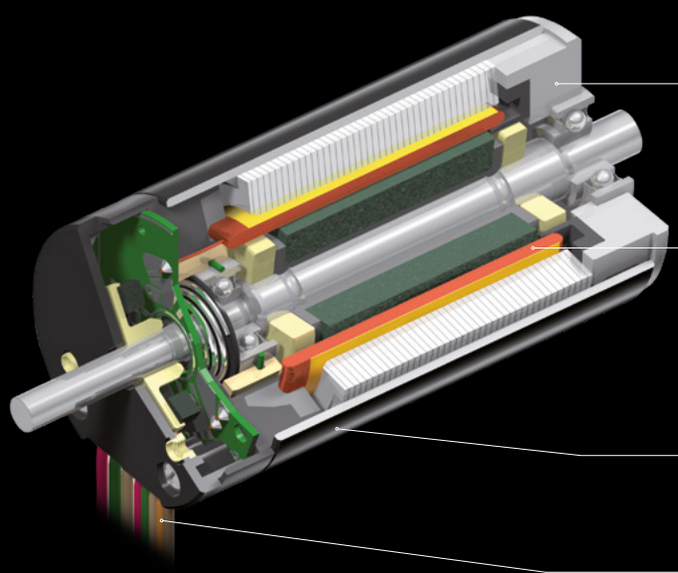
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maxon EC program

The electrically commutated maxon EC motors are longer-lasting than their counterparts in the DC range. The long life span offered by the brushless design is due to the use of preloaded ball bearings. The EC motors have excellent torque characteristics, high power, and a wide speed range. The outstanding controllability of the motors enables high-precision positioning tasks.

Key data

Motor ∅	22...60 mm
Motor length	60...180 mm
Power	80...400 W
Nominal torque	up to 800 mNm
Max. permissible speed	up to 25 000 rpm



Metal housing and flange ensure good heat dissipation and mechanical stability.

"The centerpiece" is the ironless maxon winding. Its physical design offer benefits such as a zero cogging torque, high efficiency and excellent control dynamics.

The motor housing is a steel tube – non-magnetic, rigid, coated.

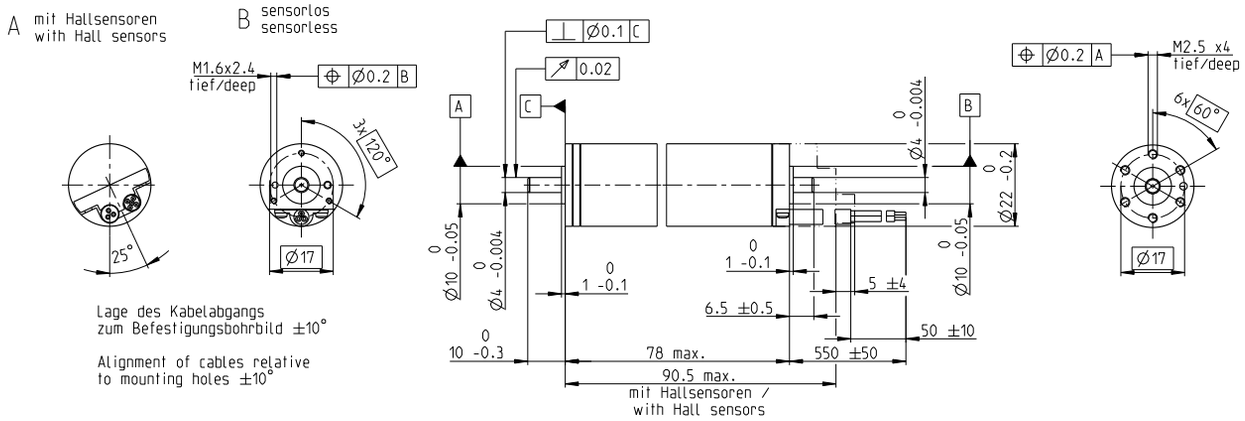
Strain-relieved cables; dust-protected depending on the size, with or without connector.

- → Designed for long uptime
- → Robust design
- → From diameter 45 mm with dust and splash protection
- → "Heavy Duty" version for extreme environmental conditions

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EC 22 ∅22 mm, brushless, 80 watt

Heavy Duty – for applications in air



M 1:2

Stock program
Standard program
Special program (on request)

	Part numbers
A with Hall sensors	426448
B sensorless	426449

Motor data									
	Values at nominal voltage and ambient temperature °C		25	100	150	200			
1	Nominal voltage	V	48	48	48	48			
2	No load speed	rpm	13200	13600	13800	14100			
3	No load current	mA	83.1	53.4	54.9	56.5			
4	Nominal speed[1]	rpm	11400	11700	12200	13200			
5	Nominal torque[1]	mNm	56.6	44	32.4	14.9			
6	Nominal current (max. continuous current)	A	1.72	1.35	1.03	0.515			
7	Stall torque	mNm	460	346	295	256			
8	Stall current	A	13.4	10.3	8.98	7.93			
9	Max. efficiency	%	85.2	86	85	84			
	Characteristics								
10	Terminal resistance phase to phase	Ω	3.59	4.64	5.35	6.05			
11	Terminal inductance phase to phase	mH	0.626	0.626	0.626	0.626			
12	Torque constant	mNm/A	34.4	33.5	32.9	32.3			
13	Speed constant	rpm/V	278	285	290	296			
14	Speed / torque gradient	rpm/mNm	29	39.5	47.2	55.4			
15	Mechanical time constant	ms	2.31	3.16	3.77	4.43			
16	Rotor inertia	gcm²	7.63	7.63	7.63	7.63			

[1] Values for operation in thermal equilibrium.

Specifications

Thermal data

17	Thermal resistance housing-ambient	9.12 K/W
18	Thermal resistance winding-housing	0.92 K/W
19	Thermal time constant winding	5.84 s
20	Thermal time constant motor	462 s
21	Ambient temperature*	-55...+200°C
22	Max. winding temperature	+240°C

Mechanical data (preloaded ball bearings)

23	Max. speed	20 000 rpm
24	Axial play at axial load < 5 N	0 mm
	> 5 N	max. 0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	8 N
27	Max. force for press fits (static)	98 N
	(static, shaft supported)	250 N
28	Max. radial load, 5 mm from flange	16 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	210 g

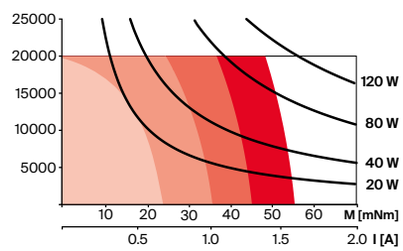
Connection A, motor cable PTFE (AWG 19)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors cable PTFE (AWG 24)
green V_{Hall} 4.5...24 V
blue GND
red Hall sensor 1
black Hall sensor 2
white Hall sensor 3

Connection B, motor cable PTFE (AWG 19)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

TA = 25°C
TA = 100°C
TA = 150°C
TA = 200°C

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and above listed ambient temperature, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Application

General
– extreme temperature applications
– vibration tested (according to MIL-STD810F/Jan2000 Fig. 514.5C-10)
– ultra-high vacuum applications (modifications necessary). low outgassing, can be baked out at 240 °C

Aerospace
– gas turbine starter/generators for aircraft engines
– regulation of combustion engines

Oil & Gas Industry
– oil, gas and geothermal wells

Robotics
– robotic exploration vehicles

Industry
– pumps and valves for liquid metal cooling systems/turbine fuel and steam control
– valve adjustment for gas and steam power plants

Notice

This motor contains leaded solder. It therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The motor may therefore only be used for devices that are not subject to this directive.

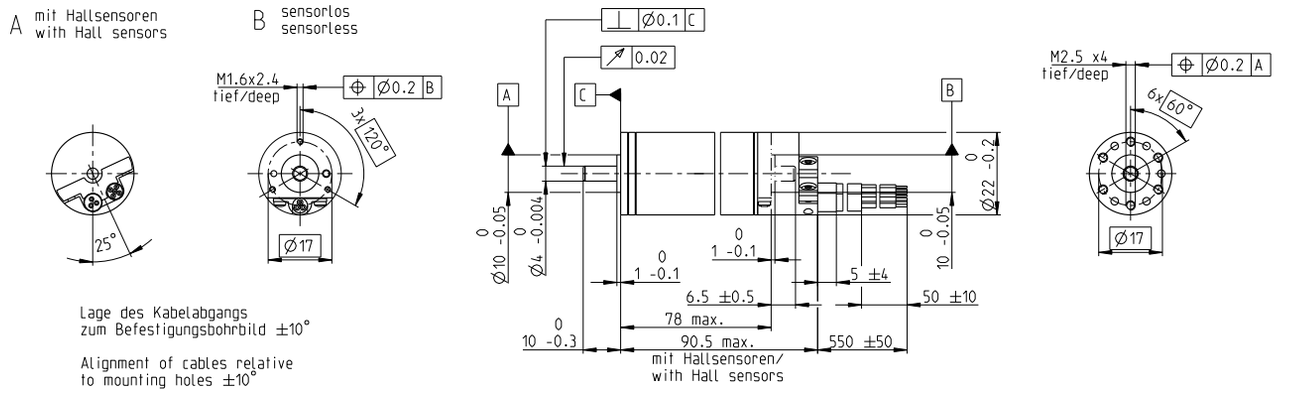
*The Hall sensors in this motor are rated for ambient temperatures up to 150 °C. The motor with Hall sensors is fully tested at 200 °C in the final inspection. Nevertheless, the Hall sensors may temporarily fail below 200 °C under certain conditions.

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EC 22 ∅22 mm, brushless, 240 watt

Heavy Duty – for applications in oil

EC



M 1:2

Stock program
Standard program
Special program (on request)

	Part numbers
A with Hall Sensors	426450
B sensorless	426451

Motor data						
Values at nominal voltage and ambient temperature °C		25	100	150	200	
1 Nominal voltage	V	48	48	48	48	
2 No load speed	rpm	12900	13400	13600	13800	
3 No load current	mA	384	177	183	188	
4 Nominal speed[1]	rpm	8410	8510	9130	10600	
5 Nominal torque[1]	mNm	149	120	92.2	55.8	
6 Nominal current (max. continuous current)	A	4.48	3.61	2.88	1.86	
7 Stall torque	mNm	460	346	295	256	
8 Stall current	A	13.4	10.3	8.98	7.93	
9 Max. efficiency	%	71	77	75	73	
Characteristics						
10 Terminal resistance phase to phase	Ω	3.59	4.64	5.35	6.05	
11 Terminal inductance phase to phase	mH	0.626	0.626	0.626	0.626	
12 Torque constant	mNm/A	34.4	33.5	32.9	32.3	
13 Speed constant	rpm/V	278	285	290	296	
14 Speed / torque gradient	rpm/mNm	29	39.5	47.2	55.4	
15 Mechanical time constant	ms	2.31	3.16	3.77	4.43	
16 Rotor inertia	gcm²	7.63	7.63	7.63	7.63	

[1] Values in thermal steady state.

Specifications

Thermal data

17	Thermal resistance housing-ambient	0.793 K/W
18	Thermal resistance winding-housing	0.754 K/W
19	Thermal time constant winding	4.78 s
20	Thermal time constant motor	40.2 s
21	Ambient temperature	-55...+200°C
22	Max. winding temperature	+240°C

Mechanical data (preloaded ball bearings)

23	Max. speed		20 000 rpm
24	Axial play at axial load	< 5 N	0 mm
		> 5 N	max. 0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		8 N
27	Max. force for press fits (static)		98 N
	(static, shaft supported)		250 N
28	Max. radial load, 5 mm from flange		16 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	210 g

Connection A, motor cable PTFE (AWG 19)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors cable PTFE (AWG 24)

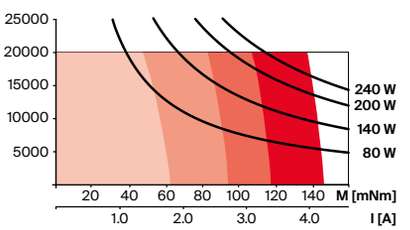
green	V_{Hall} 4.5...24 V
blue	GND
red	Hall sensor 1
black	Hall sensor 2
white	Hall sensor 3

Connection B, motor cable PTFE (AWG 19)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

TA = 25°C
TA = 100°C
TA = 150°C
TA = 200°C

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and above listed ambient temperature, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Application

General
- extreme temperature applications
- vibration tested according to MIL-STD810F/ Jan2000 Fig. 514.5C-10
- operation in oil and high pressure (only minimal lubrication, therefore use under rated ambient conditions is not suggested)

Oil & Gas Industry
- oil, gas and geothermal wells

Modular system

Details on catalog page 52

Gear
424_GP 22 HD

Notice

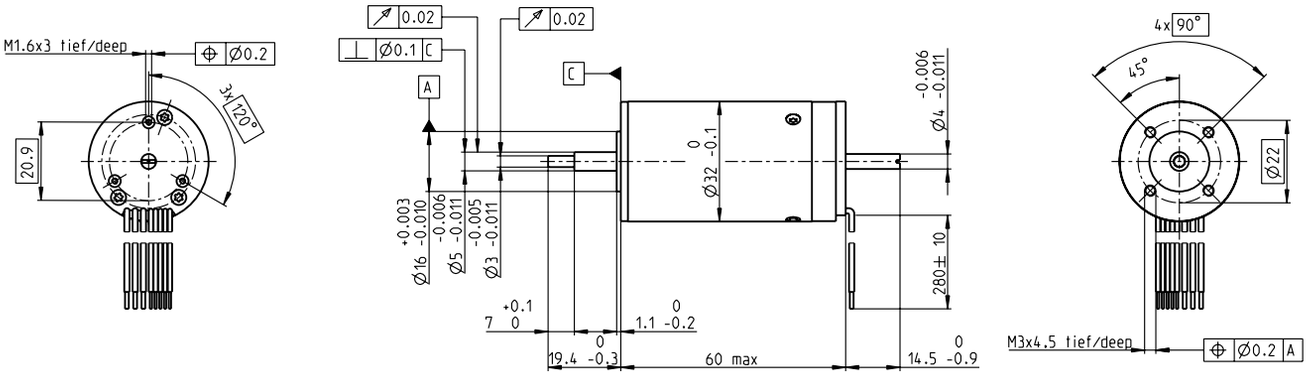
This motor contains leaded solder. It therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The motor may therefore only be used for devices that are not subject to this directive.

Reference medium: Shell Tellus oil T32
Operation in oil of different viscosity will affect the motor data.

*The Hall sensors in this motor are rated for ambient temperatures up to 150 °C. The motor with Hall sensors is fully tested at 200 °C in the final inspection. Nevertheless, the Hall sensors may temporarily fail below 200 °C under certain conditions.

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EC 32 ∅32 mm, brushless, 80 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

Motor data		118891	118892	118888	118889	118893	118890
Values at nominal voltage							
1 Nominal voltage	V	12	18	18	24	36	48
2 No load speed	rpm	15100	14300	13100	11000	14700	11300
3 No load current	mA	662	404	349	199	211	104
4 Nominal speed	rpm	13400	12700	11500	9450	13200	9740
5 Nominal torque	mNm	44.6	45.2	45.9	47.2	43.8	45.9
6 Nominal current (max. continuous current)	A	6.51	4.15	3.82	2.46	2.07	1.23
7 Stall torque	mNm	428	443	407	355	454	353
8 Stall current	A	57.2	37.4	31.4	17.3	19.7	8.84
9 Max. efficiency	%	80	81	81	80	81	80
Characteristics							
10 Terminal resistance phase to phase	Ω	0.21	0.481	0.573	1.39	1.83	5.43
11 Terminal inductance phase to phase	mH	0.03	0.0752	0.09	0.226	0.285	0.856
12 Torque constant	mNm/A	7.48	11.8	13	20.5	23.1	40
13 Speed constant	rpm/V	1280	806	737	465	414	239
14 Speed/torque gradient	rpm/mNm	35.8	32.7	32.6	31.5	32.8	32.5
15 Mechanical time constant	ms	7.49	6.86	6.82	6.59	6.87	6.8
16 Rotor inertia	gcm²	20	20	20	20	20	20

Specifications

Thermal data

17	Thermal resistance housing-ambient	5.4 K/W
18	Thermal resistance winding-housing	2.5 K/W
19	Thermal time constant winding	14.8 s
20	Thermal time constant motor	1180 s
21	Ambient temperature	-20...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed[1]		25 000 rpm
24	Axial play at axial load	< 8 N	0 mm
		> 8 N	max. 0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		5.6 N
27	Max. force for press fits (static)		98 N
	(static, shaft supported)		1200 N
28	Max. radial load, 5 mm from flange		28 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	270 g

Values listed in the table are nominal.

Connection motor (Cable AWG 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

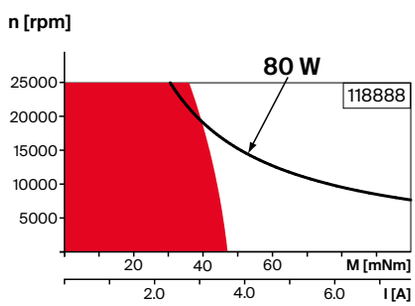
Connection sensors (Cable AWG 26)[1]

green	V_{Hall} 4.5...24 VDC
blue	GND
red/grey	Hall sensor 1
black/grey	Hall sensor 2
white/grey	Hall sensor 3

Wiring diagram for Hall sensors see p. 67

[1]Not lead through in combination with resolver.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

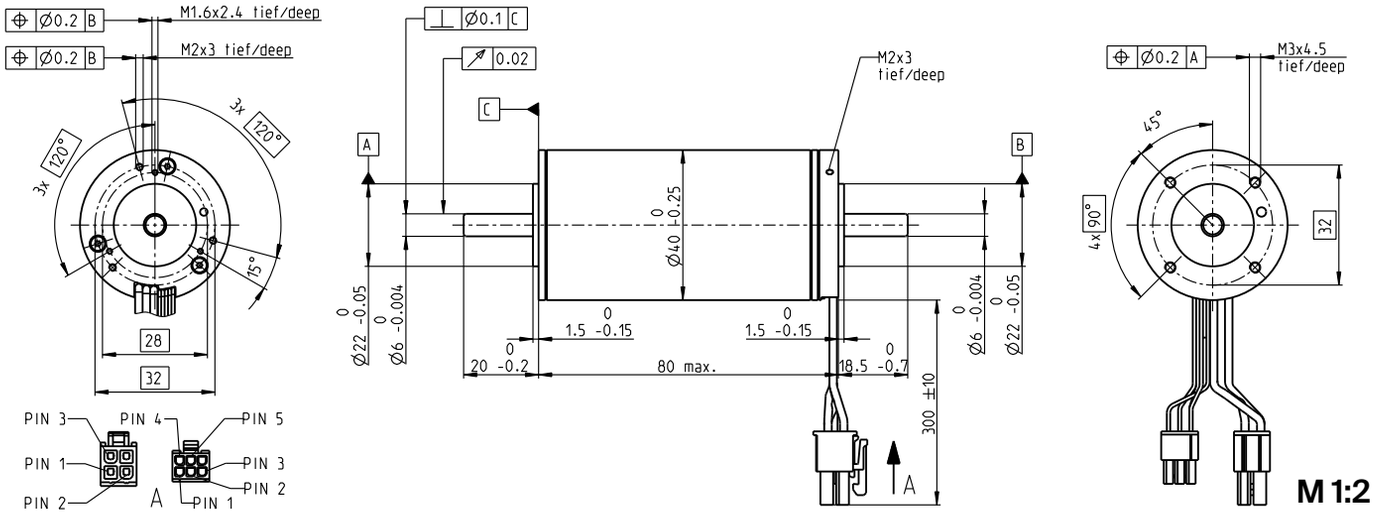
Gear
426_GP 32 BZ
428_GP 32 A
474–482_GP 32 S

Sensor
536_Encoder HEDS 5540
538_Encoder HEDL 5540
543_Resolver Res 26

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
552_ESCON Module 50/8 HE
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8 CAN
569_EPOS4 50/5
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC 40 ∅40 mm, brushless, 170 watt



Stock program
Standard program
Special program (on request)

Part numbers

	369146	393023	393024	393025
Motor data (provisional)				
Values at nominal voltage				
1 Nominal voltage V	15	24	42	48
2 No load speed rpm	9840	9840	10100	9840
3 No load current mA	654	408	243	204
4 Nominal speed rpm	9090	9130	9380	9150
5 Nominal torque mNm	169	163	160	163
6 Nominal current (max. continuous current) A	12.1	7.35	4.21	3.67
7 Stall torque mNm	2620	2660	2740	2760
8 Stall current A	181	115	69.1	59.6
9 Max. efficiency %	89	89	89	89
Characteristics				
10 Terminal resistance phase to phase Ω	0.0829	0.209	0.608	0.806
11 Terminal inductance phase to phase mH	0.0329	0.0843	0.246	0.337
12 Torque constant mNm/A	14.5	23.2	39.6	46.4
13 Speed constant rpm/V	659	412	241	206
14 Speed/torque gradient rpm/mNm	3.77	3.71	3.7	3.57
15 Mechanical time constant ms	2.12	2.09	2.08	2.01
16 Rotor inertia gcm²	53.8	53.8	53.8	53.8

Specifications

Thermal data

17 Thermal resistance housing-ambient	5.21 K/W
18 Thermal resistance winding-housing	1.05 K/W
19 Thermal time constant winding	18.7 s
20 Thermal time constant motor	1910 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	18 000 rpm
24 Axial play at axial load < 9 N	0 mm
> 9 N	max. 0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	23 N
27 Max. force for press fits (static)	106 N
(static, shaft supported)	5500 N
28 Max. radial load, 5 mm from flange	75 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	580 g

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Part number**
Molex	39-01-2040

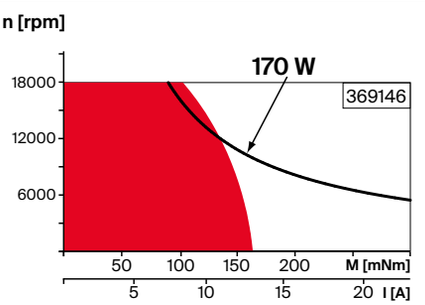
Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 3...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Part number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

Gear
436-438_GP 42 A
439-441_GP 42 C
443-444_GP 52 C

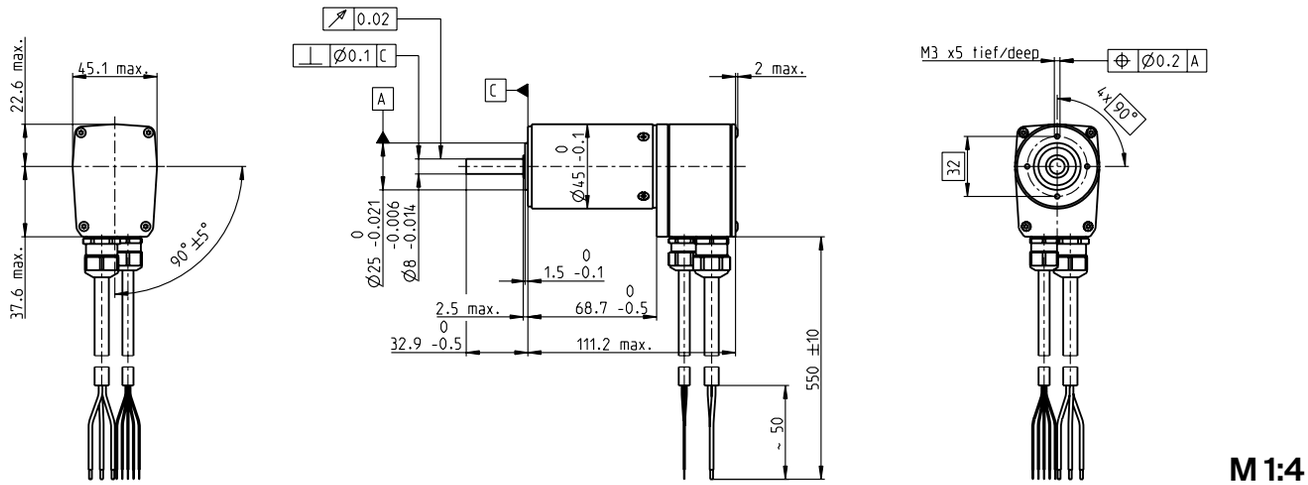
Sensor
536_Encoder HEDS 5540
538_Encoder HEDL 5540
543_Resolver Res 26

Accessories
589_Brake AB 32

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
551_ESCON Module 50/4 EC-S
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
568_EPOS4 Compact 50/15
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC 45 ∅45 mm, brushless, 150 watt



M 1:4

Stock program
Standard program
Special program (on request)

Part numbers

		136202	136196	136203	136197	136204	136198	136205	136200	136206	136201
Motor data											
	Values at nominal voltage										
1	Nominal voltage	V	12	12	18	18	24	24	36	36	48	48
2	No load speed	rpm	9780	5650	10300	5930	10500	6090	9360	5400	10200	5860
3	No load current	mA	1530	577	1120	419	879	328	471	177	411	154
4	Nominal speed	rpm	8410	4370	9000	4680	9290	4840	8150	4190	8960	4640
5	Nominal torque	mNm	174	186	171	184	169	183	179	191	174	187
6	Nominal current (max. continuous current)	A	16.2	9.65	11.2	6.72	8.55	5.13	5.29	3.14	4.21	2.52
7	Stall torque	mNm	1380	872	1540	931	1600	952	1560	911	1650	962
8	Stall current	A	119	43.6	93.3	32.6	74.8	25.6	43.1	14.5	37.2	12.5
9	Max. efficiency	%	79	79	80	79	80	79	81	80	81	80
	Characteristics											
10	Terminal resistance phase to phase	Ω	0.101	0.275	0.193	0.552	0.321	0.936	0.836	2.48	1.29	3.85
11	Terminal inductance phase to phase	mH	0.0266	0.0797	0.0542	0.163	0.0917	0.275	0.263	0.788	0.395	1.19
12	Torque constant	mNm/A	11.5	20	16.5	28.6	21.4	37.1	36.3	62.8	44.5	77.1
13	Speed constant	rpm/V	827	478	579	334	445	257	263	152	214	124
14	Speed/torque gradient	rpm/mNm	7.22	6.58	6.78	6.46	6.67	6.49	6.07	6	6.22	6.18
15	Mechanical time constant	ms	8.99	8.19	8.44	8.05	8.32	8.08	7.56	7.48	7.75	7.7
16	Rotor inertia	gcm²	119	119	119	119	119	119	119	119	119	119

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.9 K/W
18	Thermal resistance winding-housing	0.9 K/W
19	Thermal time constant winding	15.4 s
20	Thermal time constant motor	1600 s
21	Ambient temperatur	-20...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		15000 rpm
24	Axial play at axial load	< 20 N	0 mm
		> 20 N	max. 0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		16 N
27	Max. force for press fits (static)		182 N
	(static, shaft supported)		5000 N
28	Max. radial load, 5 mm from flange		140 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	850 g
	Protection to	IP54*

Values listed in the table are nominal.

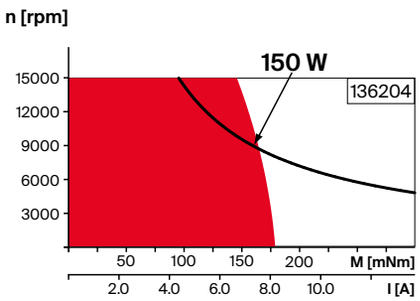
Connection motor (Cable AWG 16)
Cable 1 Motor winding 1
Cable 2 Motor winding 2
Cable 3 Motor winding 3

Connection sensors (Cable AWG 24)[1]
white Hall sensor 3
brown Hall sensor 2
green Hall sensor 1
yellow GND
grey V_{Hall} 4.5 ... 24 VDC
Wiring diagram for Hall sensors see p. 67

[1]Not lead through in combination with resolver.

*Protection level only when installed with flange-side seal.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

Gear
436-438_GP 42 A
439-441_GP 42 C
443-444_GP 52 C

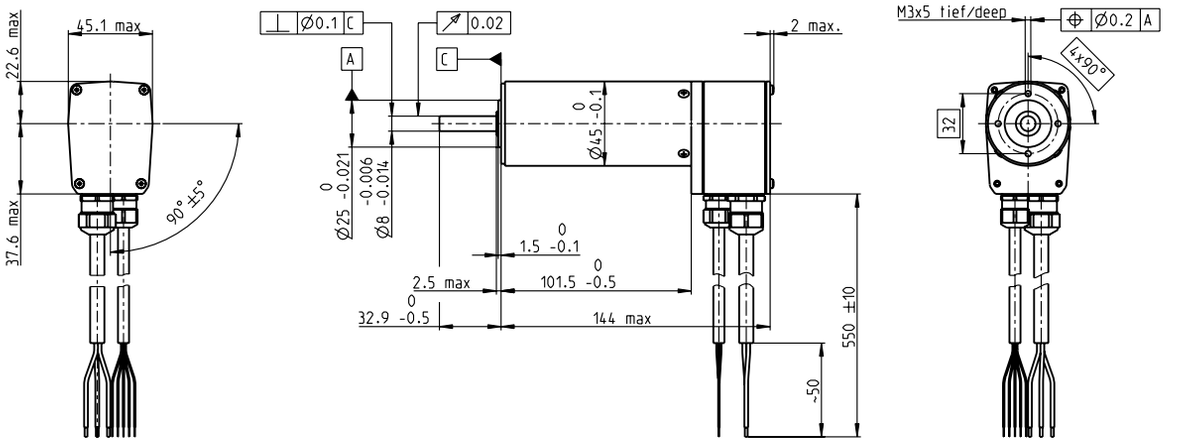
Sensor
540_Encoder HEDL 9140
543_Resolver Res 26

Accessories
588_Brake AB 28

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 Compact 50/15
569_EPOS4 50/5
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC 45 ∅45 mm, brushless, 250 watt



M 1:4

Stock program
Standard program
Special program (on request)

Part numbers

		136210	136207	136211	136208	136212	136209
Motor data							
Values at nominal voltage							
1 Nominal voltage	V	24	24	36	36	48	48
2 No load speed	rpm	8670	5000	10400	6010	10700	6160
3 No load current	mA	897	341	834	312	656	244
4 Nominal speed	rpm	7970	4300	9730	5320	10000	5490
5 Nominal torque	mNm	311	331	312	341	316	347
6 Nominal current (max. continuous current)	A	12.5	7.51	10.2	6.21	7.94	4.86
7 Stall torque	mNm	4400	2540	5750	3320	6110	3530
8 Stall current	A	167	55.8	175	58.3	143	47.7
9 Max. efficiency	%	86	85	87	86	87	87
Characteristics							
10 Terminal resistance phase to phase	Ω	0.143	0.43	0.206	0.617	0.336	1.01
11 Terminal inductance phase to phase	mH	0.0565	0.17	0.0883	0.265	0.149	0.448
12 Torque constant	mNm/A	26.3	45.5	32.8	56.9	42.7	73.9
13 Speed constant	rpm/V	364	210	291	168	224	129
14 Speed/torque gradient	rpm/mNm	1.98	1.98	1.82	1.82	1.76	1.76
15 Mechanical time constant	ms	4.34	4.34	3.99	3.99	3.85	3.85
16 Rotor inertia	gcm²	209	209	209	209	209	209

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.7 K/W
18	Thermal resistance winding-housing	1.1 K/W
19	Thermal time constant winding	31 s
20	Thermal time constant motor	1570 s
21	Ambient temperature	-20...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		12000 rpm
24	Axial play at axial load	< 20 N	0 mm
		> 20 N	max. 0.15 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		16 N
27	Max. force for press fits (static)		182 N
	(static, shaft supported)		5000 N
28	Max. radial load, 5 mm from flange		180 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	1150 g
	Protection to	IP54*

Values listed in the table are nominal.

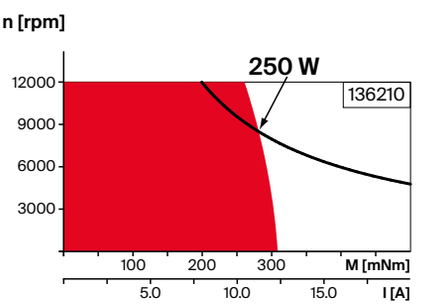
Connection motor (Cable AWG 16)
Cable 1 Motor winding 1
Cable 2 Motor winding 2
Cable 3 Motor winding 3

Connection sensors (Cable AWG 24)[1]
white Hall sensor 3
brown Hall sensor 2
green Hall sensor 1
yellow GND
grey V_{Hall} 4.5...24 VDC
Wiring diagram for Hall sensors see p. 67

[1]Not lead through in combination with resolver.

*Protection level only when installed with flange-side seal.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

Gear
436-438_GP 42 A
439-441_GP 42 C
443-444_GP 52 C
445_GP 62 A

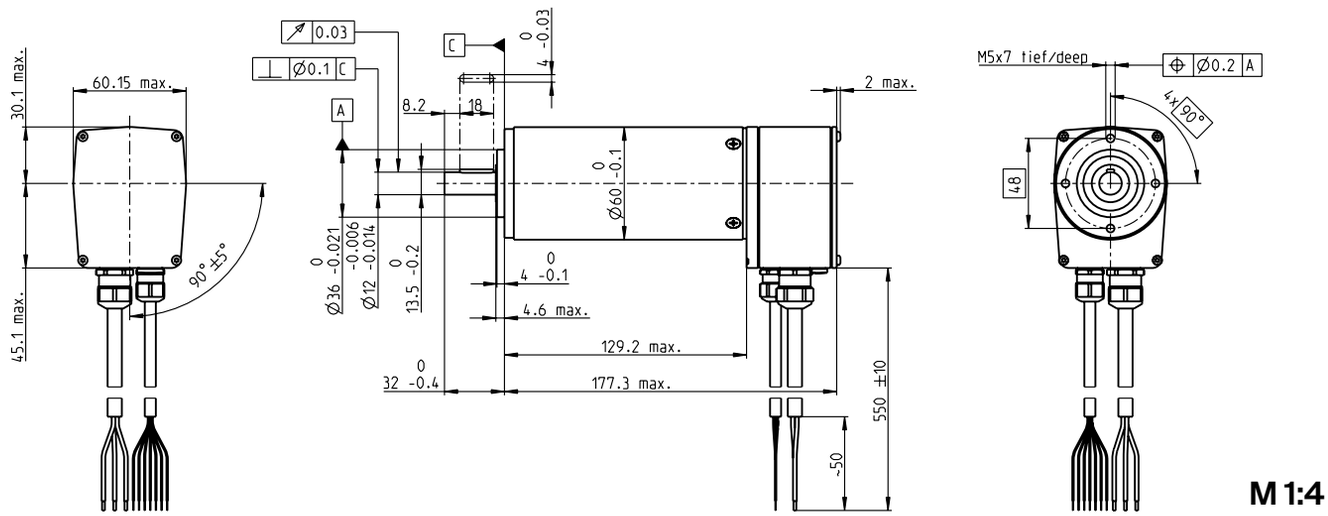
Sensor
540_Encoder HEDL 9140
543_Resolver Res 26

Accessories
588_Brake AB 28

Motor Control
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 Compact 50/15
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC 60 ∅60 mm, brushless, 400 watt



Stock program
Standard program
Special program (on request)

Part numbers

			167132	167131
Motor data				
	Values at nominal voltage			
1	Nominal voltage	V	48	48
2	No load speed	rpm	5370	3100
3	No load current	mA	670	268
4	Nominal speed	rpm	4960	2680
5	Nominal torque	mNm	768	843
6	Nominal current (max. continuous current)	A	9.56	5.9
7	Stall torque	mNm	11800	6820
8	Stall current	A	139	46.4
9	Max. efficiency	%	87	86
	Characteristics			
10	Terminal resistance phase to phase	Ω	0.345	1.03
11	Terminal inductance phase to phase	mH	0.273	0.82
12	Torque constant	mNm/A	84.9	147
13	Speed constant	rpm/V	113	65
14	Speed/torque gradient	rpm/mNm	0.457	0.457
15	Mechanical time constant	ms	3.98	3.98
16	Rotor inertia	gcm²	831	831

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.3 K/W
18	Thermal resistance winding-housing	0.5 K/W
19	Thermal time constant winding	33.9 s
20	Thermal time constant motor	1200 s
21	Ambient temperature	-20...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	7000 rpm
24	Axial play at axial load < 30 N	0 mm
	> 30 N	max. 0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	24 N
27	Max. force for press fits (static)	392 N
	(static, shaft supported)	6000 N
28	Max. radial load, 5 mm from flange	240 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	2450 g
	Protection to	IP54*

Values listed in the table are nominal.

Connection motor (Cable AWG 16)
Cable 1 Motor winding 1
Cable 2 Motor winding 2
Cable 3 Motor winding 3

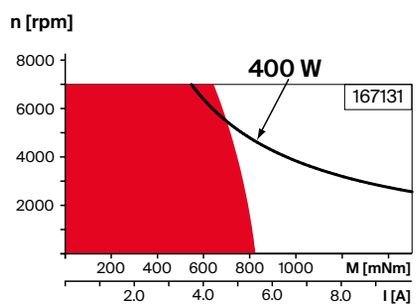
Connection sensors (Cable AWG 24)[1]
white Hall sensor 3
brown Hall sensor 2
green Hall sensor 1
yellow GND
grey V_{Hall} 4.5 ... 24 VDC
blue Temperature sensor (PTC)
pink Temperature sensor (PTC)

[1]Not lead through in combination with resolver.

Temperature monitoring, PTC resistance
Micropille 110°C, R 25°C < 0.7 kΩ,
R 115°C ≥ 2.66 kΩ, R 125°C ≥ 8.0 kΩ
Wiring diagram for Hall sensors see p. 67

*Protection level only when installed with flange-side seal.

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25°C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

Gear
446_GP 81 A

Sensor
540_Encoder HEDL 9140
543_Resolver Res 26

Accessories
590_Brake AB 41

Motor Control
547_DEC Module 50/5
551_ESCON Mod. 50/4 EC-S
552_ESCON Mod. 50/8 (HE)
553_ESCON 70/10
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
565_EPOS4 Module 50/15
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/8 CAN
568_EPOS4 Compact 50/15 CAN
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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For your personal notes

maxon EC-max

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EC-max 22 ∅22 mm, 25 Watt		283
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EC-max 30 ∅30 mm, 60 Watt		285
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EC-max 40 ∅40 mm, 120 Watt		287



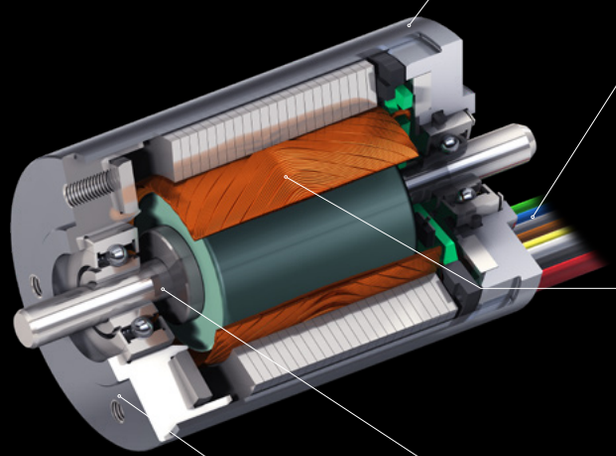
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maxon EC-max program

maxon EC-max drives takes the principle behind the A-max and RE-max programs one step further. The automated manufacturing ensures that the costs are kept low. Yet you can still tailor the products to your own needs: maxon EC-max stands for an optimal price/performance ratio, with all of the advantages offered by a brushless DC motor.

Key data

Motor ∅	16...40 mm
Motor length	24...88 mm
Power	5...120 W
Nominal torque	up to 200 mNm
Max. permissible speed	up to 20 000 rpm



The motor housing, a simple tube made of stainless steel – non magnetic, rigid, rust-proof.

Non-tension cables can be directed both radially and axially from the motor. Wide range of plug options.

The «heart» is the ironless winding, System maxon. This means physically dependent – advantages like no detent, high efficiency and excellent regulating dynamics.

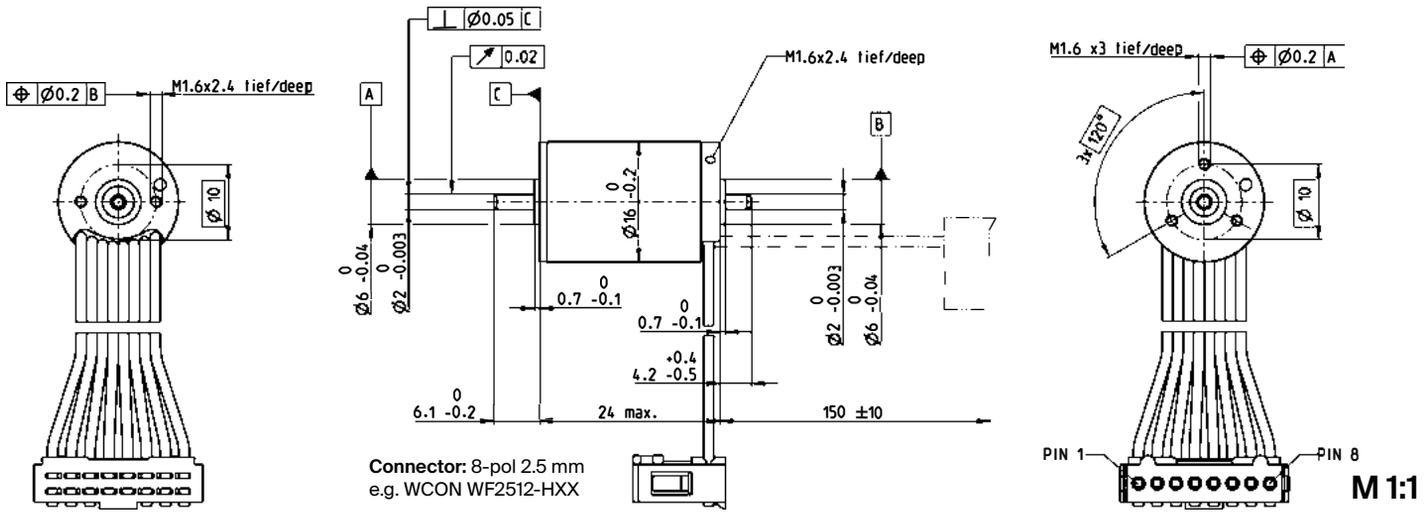
Shaft with no groove guarantees torsional stability and smooth running.

Metallic housing and flange allow good heat dissipation and mechanical stability.

- → Designed for long uptime
- → Robust steel casing
- → Attractive price-performance ratio
- → Speeds of up to 20 000 rpm
- → Rotor with one pole pair

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EC-max 16 ∅16 mm, brushless, 5 watt



Connector: 8-pol 2.5 mm
e.g. WCON WF2512-HXX

Stock program
Standard program
Special program (on request)

Part numbers

		283825	283826	283827	283828
Motor data					
	Values at nominal voltage				
1	Nominal voltage	V	4.5	6	9	12
2	No load speed	rpm	12800	13500	12600	13500
3	No load current	mA	148	120	72.4	60.2
4	Nominal speed	rpm	5170	5690	4920	5840
5	Nominal torque	mNm	3.33	3.2	3.29	3.23
6	Nominal current (max. continuous current)	A	1.18	0.903	0.574	0.456
7	Stall torque	mNm	5.82	5.79	5.64	5.95
8	Stall current	A	1.89	1.49	0.901	0.762
9	Max. efficiency	%	53	53	53	53
	Characteristics					
10	Terminal resistance phase to phase	Ω	2.38	4.04	9.99	15.7
11	Terminal inductance phase to phase	mH	0.0396	0.0634	0.163	0.254
12	Torque constant	mNm/A	3.08	3.9	6.26	7.8
13	Speed constant	rpm/V	3100	2450	1530	1220
14	Speed/torque gradient	rpm/mNm	2390	2540	2440	2470
15	Mechanical time constant	ms	10.7	11.4	10.9	11.1
16	Rotor inertia	gcm²	0.428	0.428	0.428	0.428

Specifications

Thermal data

17	Thermal resistance housing-ambient		23.5 K/W
18	Thermal resistance winding-housing		2.57 K/W
19	Thermal time constant winding		0.943 s
20	Thermal time constant motor		390 s
21	Ambient temperature		-40...+100°C
22	Max. winding temperature		+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		20 000 rpm
24	Axial play at axial load	< 1.5 N	0 mm
		> 1.5 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		1 N
27	Max. force for press fits (static)		18 N
	(static, shaft supported)		600 N
28	Max. radial load, 5 mm from flange		6 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	36 g

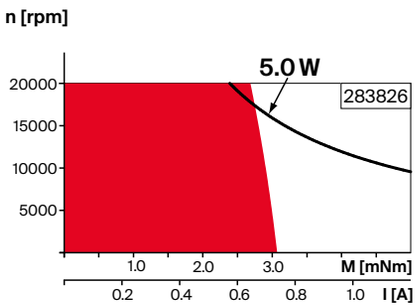
Values listed in the table are nominal.

Connection (Cable AWG 24)

brown	Motor winding 1	Pin 1
red	Motor winding 2	Pin 2
orange	Motor winding 3	Pin 3
yellow	V_{Hall} 3...24 VDC	Pin 4
green	GND	Pin 5
blue	Hall sensor 1	Pin 6
violet	Hall sensor 2	Pin 7
grey	Hall sensor 3	Pin 8

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25°C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

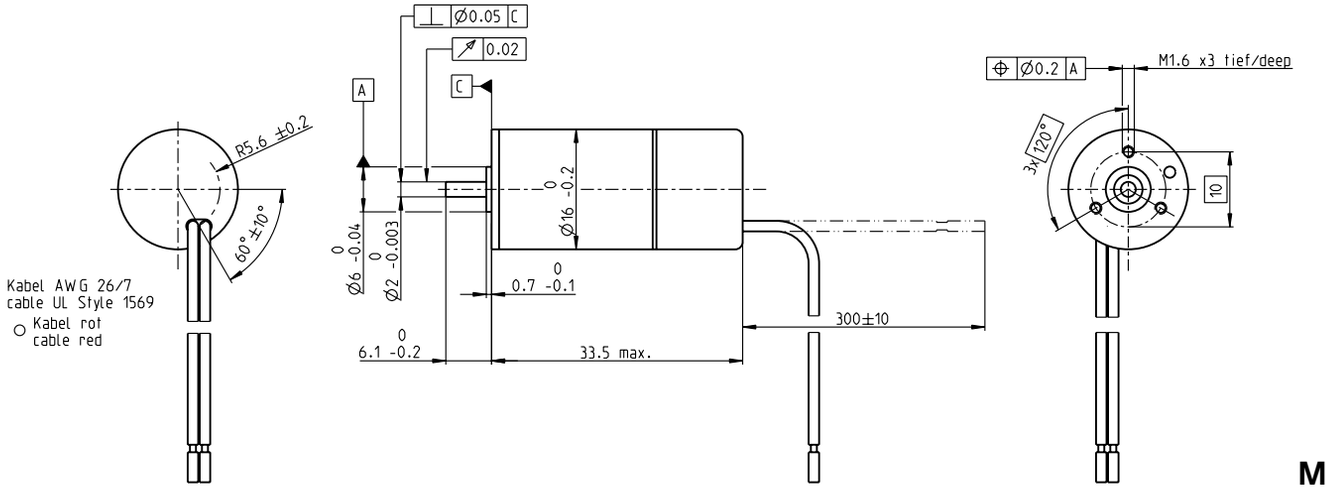
Gear
416_GP 16 A
417_GP 16 C
469–471_GP 16 S

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT

Motor Control
547_DEC Module 24/2
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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EC-max 16 2-wire ∅16 mm, brushless, 5 watt, with integrated electronics



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

	320816	320817	320818	320819
Motor data				
Values at nominal voltage				
1 Nominal voltage V	5	6	9	12
2 No load speed rpm	14200	13400	12600	13800
3 No load current mA	189	149	97.4	72.7
4 Nominal speed rpm	8280	7510	6970	8080
5 Nominal torque mNm	2.19	2.19	2.28	2.26
6 Nominal current (max. continuous current) A	0.903	0.714	0.465	0.37
7 Stall torque mNm	4.6	5.25	5.39	5.76
8 Stall current A	1.7	1.44	0.929	0.801
9 Max. efficiency %	47.3	46.4	46.2	49
Characteristics				
35 Type of control	controlled	controlled	controlled	controlled
36 Supply voltage $+V_{CC}$ V	5...15	5...15	5...15	5...15
12 Torque constant mNm/A	3.06	3.87	6.21	7.73
13 Speed constant rpm/V	3130	2470	1540	1230
14 Speed/torque gradient rpm/mNm	2440	2580	2480	2510
15 Mechanical time constant ms	10.9	11.6	11.1	11.3
16 Rotor inertia gcm²	0.428	0.428	0.428	0.428
39 Speed range rpm	14200-20000	11300-20000	6720-20000	5360-17400

Specifications

Thermal data

17	Thermal resistance housing-ambient	23.5 K/W
18	Thermal resistance winding-housing	2.57 K/W
19	Thermal time constant winding	0.943 s
20	Thermal time constant motor	390 s
21	Ambient temperature	-40...+85°C
22	Max. temperature of electronics (max. loading capacity of the motor is defined by the electronics)	+100°C

Mechanical data (preloaded ball bearings)

23	Max. speed		20 000 rpm
24	Axial play at axial load	< 1.5 N	0 mm
		> 1.5 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		1 N
27	Max. force for press fits (static)		18 N
28	Max. radial load, 5 mm from flange		6 N

Other specifications

31	Weight of motor	32 g
	Direction of rotation	Clockwise (CW)

Values listed in the table are nominal.

Connection (Cable AWG 26/7 UL Style 1569)

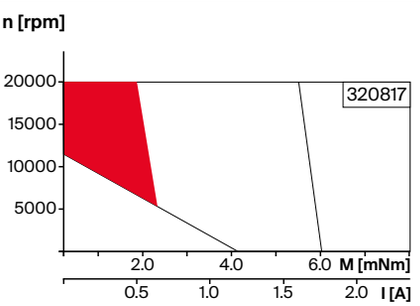
red	$+V_{CC}$
black	GND

Protective functions

Inverse-polarity protection up to max.	18 VDC
Blockage protection at speed	< 76 rpm
Temperature monitoring	> 104°C
Current limitation	1.6 A ± 15%
Low voltage monitoring	< 4 VDC

⚠ **Attention:** Operating voltage V_{CC} > 18 VDC will destroy the electronics
Option: Direction of rotation counter-clockwise (CCW)

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25°C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

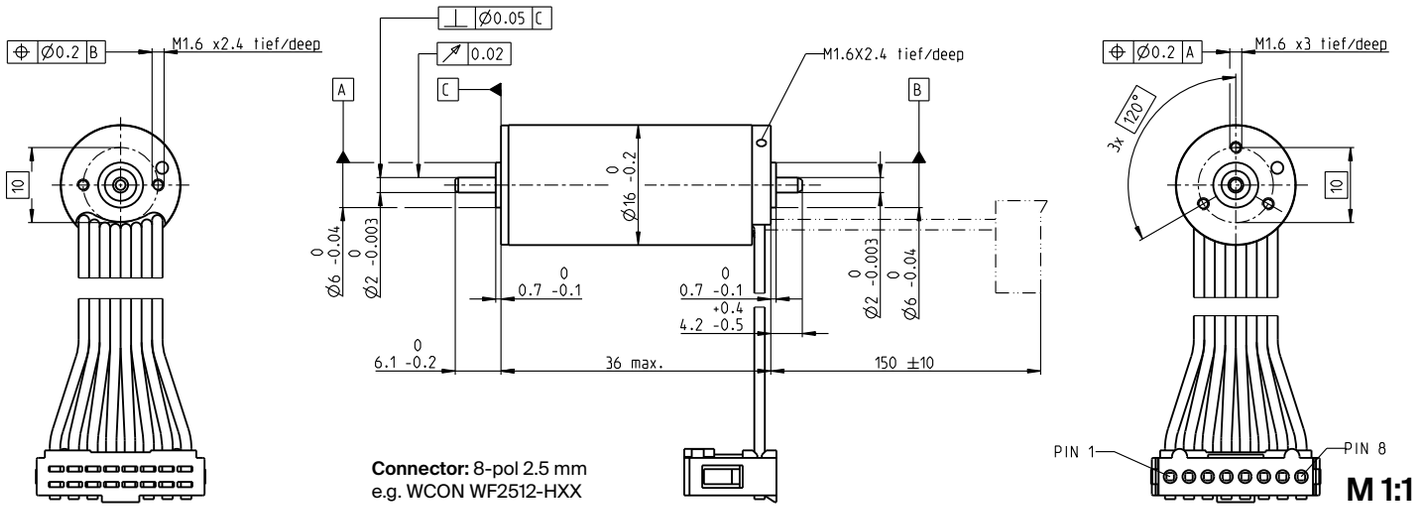
Modular system

Details on catalog page 52

Gear
416_GP 16 A

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EC-max 16 ∅16 mm, brushless, 8 watt



Connector: 8-pol 2.5 mm
e.g. WCON WF2512-HXX

Stock program
Standard program
Special program (on request)

Part numbers

		283831	283832	283833	283834	283835
Motor data						
	Values at nominal voltage					
1	Nominal voltage	V	6	9	12	18	24
2	No load speed	rpm	12000	11900	11900	11900	11900
3	No load current	mA	130	85.1	64.2	42.6	31.9
4	Nominal speed	rpm	7120	7090	7300	7170	7350
5	Nominal torque	mNm	7.66	7.8	8.02	7.87	8.19
6	Nominal current (max. continuous current)	A	1.76	1.17	0.909	0.593	0.461
7	Stall torque	mNm	19.2	19.8	21.1	20.3	22
8	Stall current	A	4.17	2.82	2.27	1.45	1.17
9	Max. efficiency	%	69	69	70	70	71
	Characteristics						
10	Terminal resistance phase to phase	Ω	1.44	3.19	5.3	12.4	20.5
11	Terminal inductance phase to phase	mH	0.034	0.079	0.14	0.317	0.566
12	Torque constant	mNm/A	4.61	7.02	9.32	14	18.7
13	Speed constant	rpm/V	2070	1360	1020	681	510
14	Speed/torque gradient	rpm/mNm	646	619	582	602	556
15	Mechanical time constant	ms	5.75	5.51	5.18	5.36	4.95
16	Rotor inertia	gcm²	0.85	0.85	0.85	0.85	0.85

Specifications

Thermal data

17	Thermal resistance housing-ambient		17.7 K/W
18	Thermal resistance winding-housing		1.41 K/W
19	Thermal time constant winding		0.9 s
20	Thermal time constant motor		427 s
21	Ambient temperature		-40...+100°C
22	Max. winding temperature		+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		20 000 rpm
24	Axial play at axial load	< 1.5 N	0 mm
		> 1.5 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		1 N
27	Max. force for press fits (static)		18 N
	(static, shaft supported)		400 N
28	Max. radial load, 5 mm from flange		6 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	52 g

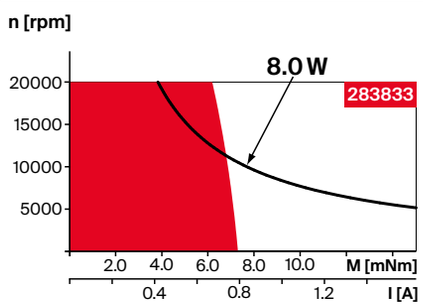
Values listed in the table are nominal.

Connection (Cable AWG 24)

brown	Motor winding 1	Pin 1
red	Motor winding 2	Pin 2
orange	Motor winding 3	Pin 3
yellow	V_{Hall} 3...24 VDC	Pin 4
green	GND	Pin 5
blue	Hall sensor 1	Pin 6
violet	Hall sensor 2	Pin 7
grey	Hall sensor 3	Pin 8

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25°C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

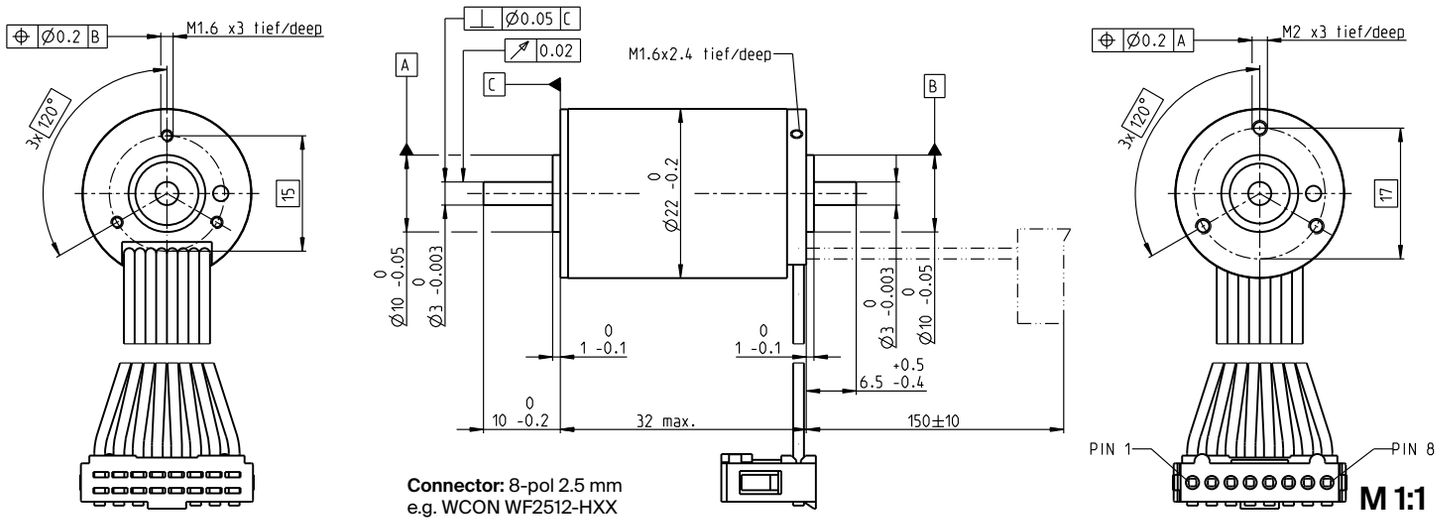
Gear
416_GP 16 A
417_GP 16 C
422_GP 22 C
469–471_GP 16 S
472/473_GP 22 S

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT

Motor Control
547_DEC Module 24/2
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5

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EC-max 22 ∅22 mm, brushless, 12 watt



Connector: 8-pol 2.5 mm
e.g. WCON WF2512-HXX

Stock program
Standard program
Special program (on request)

Part numbers

		283837	283838	283839	283840	283841
Motor data						
	Values at nominal voltage					
1	Nominal voltage	V	6	12	18	24	36
2	No load speed	rpm	11900	12100	12100	12100	12100
3	No load current	mA	301	155	103	77.3	51.6
4	Nominal speed	rpm	7920	8040	8250	8250	8210
5	Nominal torque	mNm	11	10.2	10.9	10.8	10.6
6	Nominal current (max. continuous current)	A	2.61	1.25	0.88	0.657	0.432
7	Stall torque	mNm	33.9	31.3	35.4	35.1	34.1
8	Stall current	A	7.36	3.47	2.6	1.94	1.25
9	Max. efficiency	%	65	63	65	65	65
	Characteristics						
10	Terminal resistance phase to phase	Ω	0.816	3.46	6.93	12.4	28.7
11	Terminal inductance phase to phase	mH	0.0315	0.121	0.275	0.488	1.09
12	Torque constant	mNm/A	4.61	9.02	13.6	18.1	27.2
13	Speed constant	rpm/V	2070	1060	701	526	352
14	Speed/torque gradient	rpm/mNm	366	406	356	360	372
15	Mechanical time constant	ms	8.63	9.56	8.39	8.47	8.75
16	Rotor inertia	gcm²	2.25	2.25	2.25	2.25	2.25

Specifications

Thermal data

17	Thermal resistance housing-ambient		13.5 K/W
18	Thermal resistance winding-housing		1.72 K/W
19	Thermal time constant winding		1.85 s
20	Thermal time constant motor		567 s
21	Ambient temperature		-40...+100°C
22	Max. winding temperature		+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		18000 rpm
24	Axial play at axial load	< 4 N	0 mm
		> 4 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		3.5 N
27	Max. force for press fits (static)		53 N
	(static, shaft supported)		1400 N
28	Max. radial load, 5 mm from flange		16 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	83 g

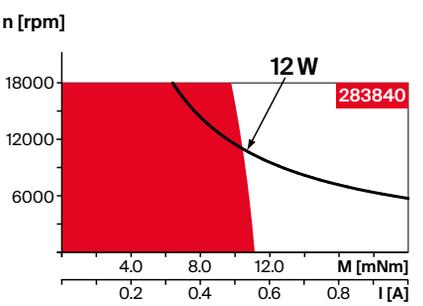
Values listed in the table are nominal.

Connection (Cable AWG 24)

brown	Motor winding 1	Pin 1
red	Motor winding 2	Pin 2
orange	Motor winding 3	Pin 3
yellow	V_{Hall} 3...24 VDC	Pin 4
green	GND	Pin 5
blue	Hall sensor 1	Pin 6
violet	Hall sensor 2	Pin 7
grey	Hall sensor 3	Pin 8

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25°C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

Gear
420_GP 22 A
422_GP 22 C
423_GP 22 HP
435_KD 32
472/473_GP 22 S

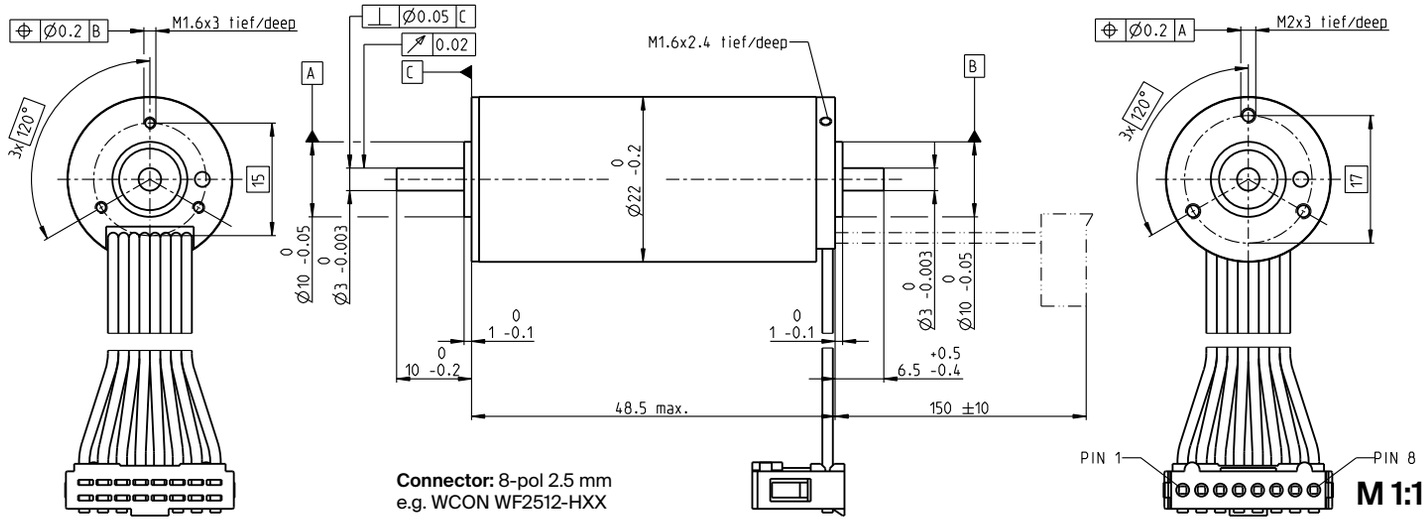
Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT

Accessories
584_Brake AB 20

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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EC-max 22 ∅22 mm, brushless, 25 watt



Connector: 8-pol 2.5 mm
e.g. WCON WF2512-HXX

Stock program
Standard program
Special program (on request)

Part numbers

		283856	283857	283858	283859	283860
Motor data						
	Values at nominal voltage					
1	Nominal voltage	V	12	18	24	36	48
2	No load speed	rpm	12400	12900	12900	12200	12900
3	No load current	mA	226	161	121	73.5	60.4
4	Nominal speed	rpm	9800	10300	10400	9630	10500
5	Nominal torque	mNm	23	21.8	22.7	22.5	23.2
6	Nominal current (max. continuous current)	A	2.71	1.8	1.4	0.872	0.716
7	Stall torque	mNm	114	112	121	111	127
8	Stall current	A	12.6	8.55	6.97	4	3.66
9	Max. efficiency	%	76	75	76	75	77
	Characteristics						
10	Terminal resistance phase to phase	Ω	0.955	2.1	3.44	9.01	13.1
11	Terminal inductance phase to phase	mH	0.05	0.103	0.182	0.462	0.729
12	Torque constant	mNm/A	9.1	13	17.4	27.7	34.8
13	Speed constant	rpm/V	1050	732	549	345	274
14	Speed/torque gradient	rpm/mNm	110	118	109	112	103
15	Mechanical time constant	ms	5.14	5.5	5.06	5.23	4.82
16	Rotor inertia	gcm²	4.45	4.45	4.45	4.45	4.45

Specifications

Thermal data

17	Thermal resistance housing-ambient		10.2 K/W
18	Thermal resistance winding-housing		1.02 K/W
19	Thermal time constant winding		1.99 s
20	Thermal time constant motor		628 s
21	Ambient temperature		-40...+100°C
22	Max. winding temperature		+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		18 000 rpm
24	Axial play at axial load	< 4 N	0 mm
		> 4 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		3.5 N
27	Max. force for press fits (static)		60 N
	(static, shaft supported)		1000 N
28	Max. radial load, 5 mm from flange		16 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	110 g

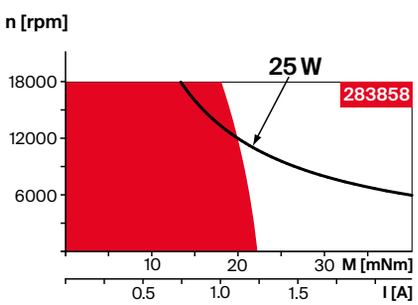
Values listed in the table are nominal.

Connection (Cable AWG 24)

brown	Motor winding 1	Pin 1
red	Motor winding 2	Pin 2
orange	Motor winding 3	Pin 3
yellow	V_{Hall} 3...24 VDC	Pin 4
green	GND	Pin 5
blue	Hall sensor 1	Pin 6
violet	Hall sensor 2	Pin 7
grey	Hall sensor 3	Pin 8

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25°C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

Gear
420_GP 22 A
423_GP 22 HP
429_GP 32 C
435_KD 32
472/473_GP 22 S
474–482_GP 32 S

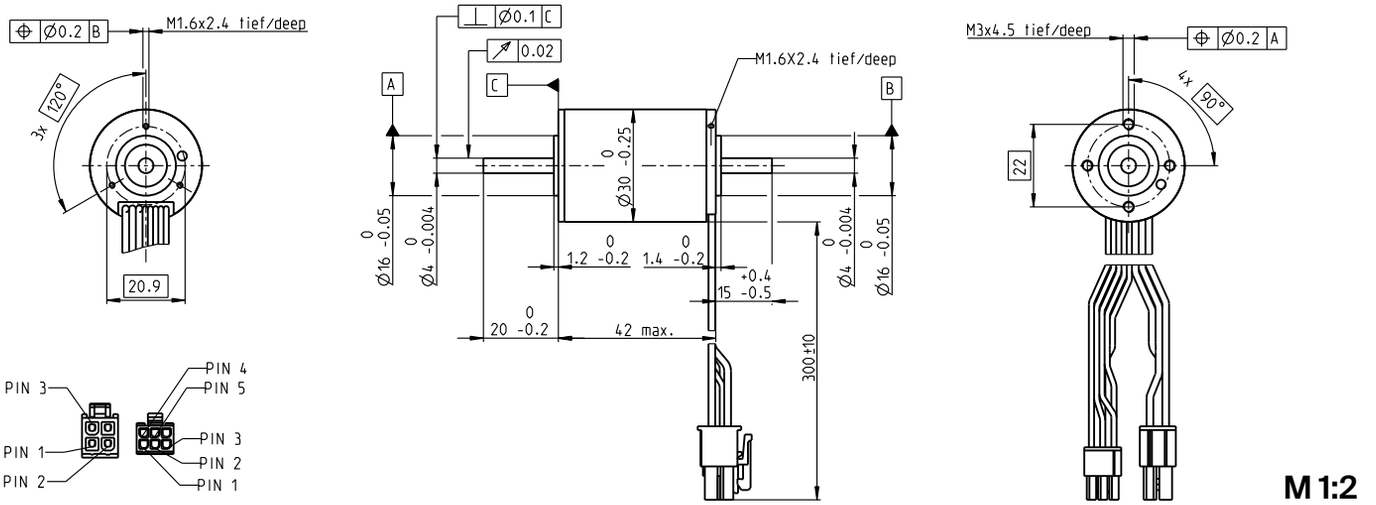
Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT

Accessories
584_Brake AB 20

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5

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EC-max 30 ∅30 mm, brushless, 40 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

	272766	272768	272769	272770
Motor data				
Values at nominal voltage				
1 Nominal voltage V	12	24	36	48
2 No load speed rpm	8680	9250	9150	9250
3 No load current mA	223	123	80.5	61.4
4 Nominal speed rpm	6630	7220	7090	7210
5 Nominal torque mNm	34.9	33.8	33.3	33.4
6 Nominal current (max. continuous current) A	2.88	1.49	0.97	0.738
7 Stall torque mNm	153	160	154	157
8 Stall current A	11.8	6.57	4.18	3.24
9 Max. efficiency %	75	75	75	75
Characteristics				
10 Terminal resistance phase to phase Ω	1.01	3.65	8.61	14.8
11 Terminal inductance phase to phase mH	0.088	0.31	0.713	1.24
12 Torque constant mNm/A	12.9	24.3	36.8	48.6
13 Speed constant rpm/V	738	393	259	197
14 Speed/torque gradient rpm/mNm	57.8	59.1	60.6	59.9
15 Mechanical time constant ms	6.66	6.81	6.98	6.9
16 Rotor inertia gcm²	11	11	11	11

Specifications

Thermal data

17	Thermal resistance housing-ambient	8.6 K/W
18	Thermal resistance winding-housing	1 K/W
19	Thermal time constant winding	3.25 s
20	Thermal time constant motor	777 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		15000 rpm
24	Axial play at axial load	< 6.0 N	0 mm
		> 6.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		5 N
27	Max. force for press fits (static)		98 N
	(static, shaft supported)		2000 N
28	Max. radial load, 5 mm from flange		25 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	195 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Part number**
Molex	39-01-2040

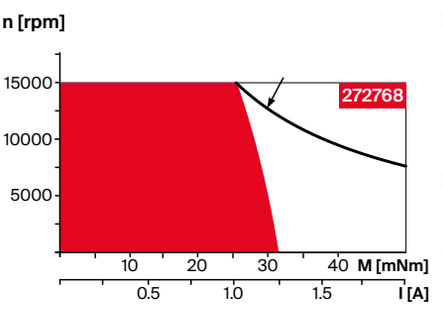
Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 3...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Part number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25°C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

Gear
428_GP 32 A
430_GP 32 C
432_GP 32 HP
435_KD 32
474–482_GP 32 S

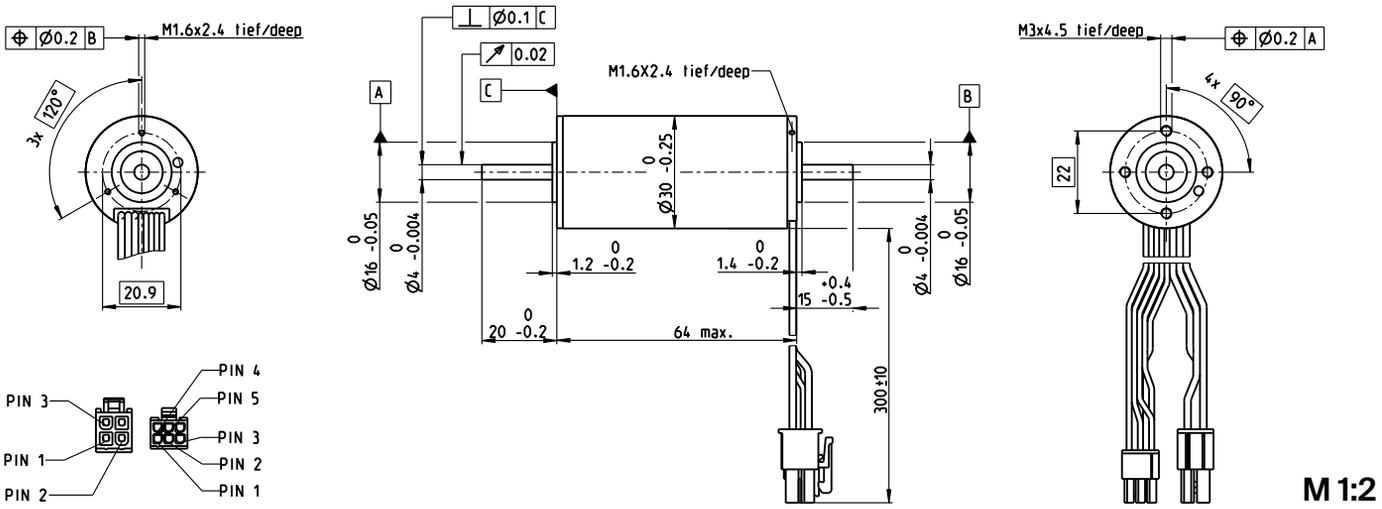
Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
539_Encoder HEDL 5540

Accessories
584_Brake AB 20

Motor Control
547_DEC Module 24/2
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
564_EPOS4 Module 24/1.5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-max 30 ∅30 mm, brushless, 60 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers	272762	272763	272764	272765
Motor data				
Values at nominal voltage				
1 Nominal voltage V	12	24	36	48
2 No load speed rpm	7980	9340	9490	9350
3 No load current mA	302	191	130	95.4
4 Nominal speed rpm	6590	8040	8270	8130
5 Nominal torque mNm	63.6	60.7	63.7	64.1
6 Nominal current (max. continuous current) A	4.72	2.66	1.88	1.4
7 Stall torque mNm	381	458	522	519
8 Stall current A	26.8	18.8	14.5	10.7
9 Max. efficiency %	80	81	82	82
Characteristics				
10 Terminal resistance phase to phase Ω	0.447	1.27	2.48	4.49
11 Terminal inductance phase to phase mH	0.049	0.143	0.312	0.573
12 Torque constant mNm/A	14.2	24.3	35.9	48.6
13 Speed constant rpm/V	672	393	266	197
14 Speed/torque gradient rpm/mNm	21.2	20.6	18.4	18.2
15 Mechanical time constant ms	4.86	4.73	4.21	4.17
16 Rotor inertia gcm²	21.9	21.9	21.9	21.9

Specifications

Thermal data

17 Thermal resistance housing-ambient		7.4 K/W
18 Thermal resistance winding-housing		0.5 K/W
19 Thermal time constant winding		2.76 s
20 Thermal time constant motor		1000 s
21 Ambient temperature		-40...+100°C
22 Max. winding temperature		+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed		15 000 rpm
24 Axial play at axial load	< 6.0 N	0 mm
	> 6.0 N	0.14 mm
25 Radial play		preloaded
26 Max. axial load (dynamic)		5 N
27 Max. force for press fits (static)		98 N
(static, shaft supported)		1300 N
28 Max. radial load, 5 mm from flange		25 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	305 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

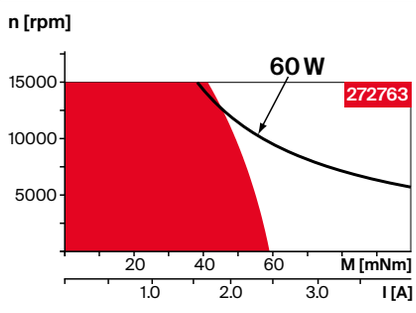
Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 3...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25°C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

Gear
428_GP 32 A
430_GP 32 C
432_GP 32 HP
435_KD 32
436-438_GP 42 A
439-441_GP 42 C
474-482_GP 32 S

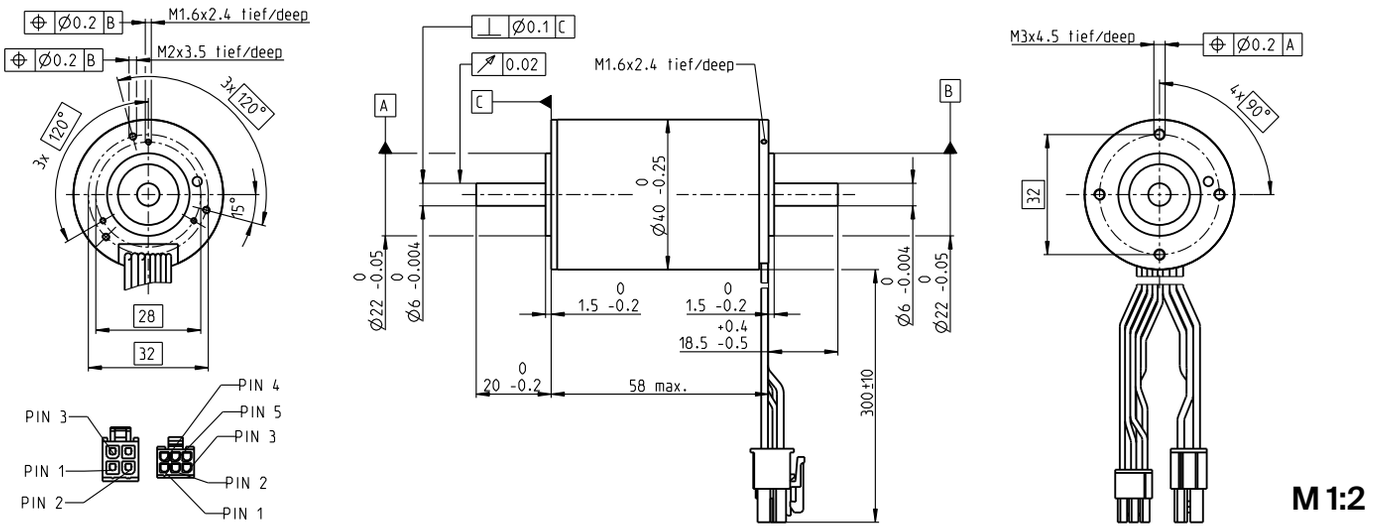
Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
539_Encoder HEDL 5540

Accessories
584_Brake AB 20

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-max 40 ∅40 mm, brushless, 70 watt



Stock program
Standard program
Special program (on request)

Part numbers

		283866	283867	283868	283869
Motor data					
	Values at nominal voltage				
1	Nominal voltage	V	12	24	36	48
2	No load speed	rpm	8030	8040	8470	9030
3	No load current	mA	584	292	209	173
4	Nominal speed	rpm	6410	6520	7030	7610
5	Nominal torque	mNm	89.7	89.6	95	94.2
6	Nominal current (max. continuous current)	A	6.88	3.44	2.55	2.02
7	Stall torque	mNm	466	497	595	636
8	Stall current	A	33.3	17.8	14.9	12.7
9	Max. efficiency	%	76	77	78	79
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.36	1.35	2.42	3.78
11	Terminal inductance phase to phase	mH	0.0464	0.186	0.379	0.592
12	Torque constant	mNm/A	14	28	40	50
13	Speed constant	rpm/V	682	341	239	191
14	Speed/torque gradient	rpm/mNm	17.6	16.5	14.4	14.4
15	Mechanical time constant	ms	9.41	8.82	7.74	7.73
16	Rotor inertia	gcm²	51.2	51.2	51.2	51.2

Specifications

Thermal data

17	Thermal resistance housing-ambient		4.63 K/W
18	Thermal resistance winding-housing		0.542 K/W
19	Thermal time constant winding		3.78 s
20	Thermal time constant motor		1060 s
21	Ambient temperature		-40...+100°C
22	Max. winding temperature		+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		12000 rpm
24	Axial play at axial load	< 10 N	0 mm
		> 10 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		8 N
27	Max. force for press fits (static)		211 N
	(static, shaft supported)		5000 N
28	Max. radial load, 5 mm from flange		80 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	460 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Part number**
Molex	39-01-2040

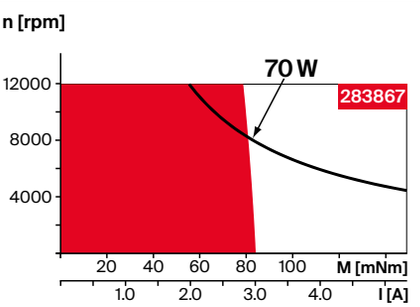
Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 3...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Part number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25°C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

Gear
436-438_GP 42 A
439-441_GP 42 C

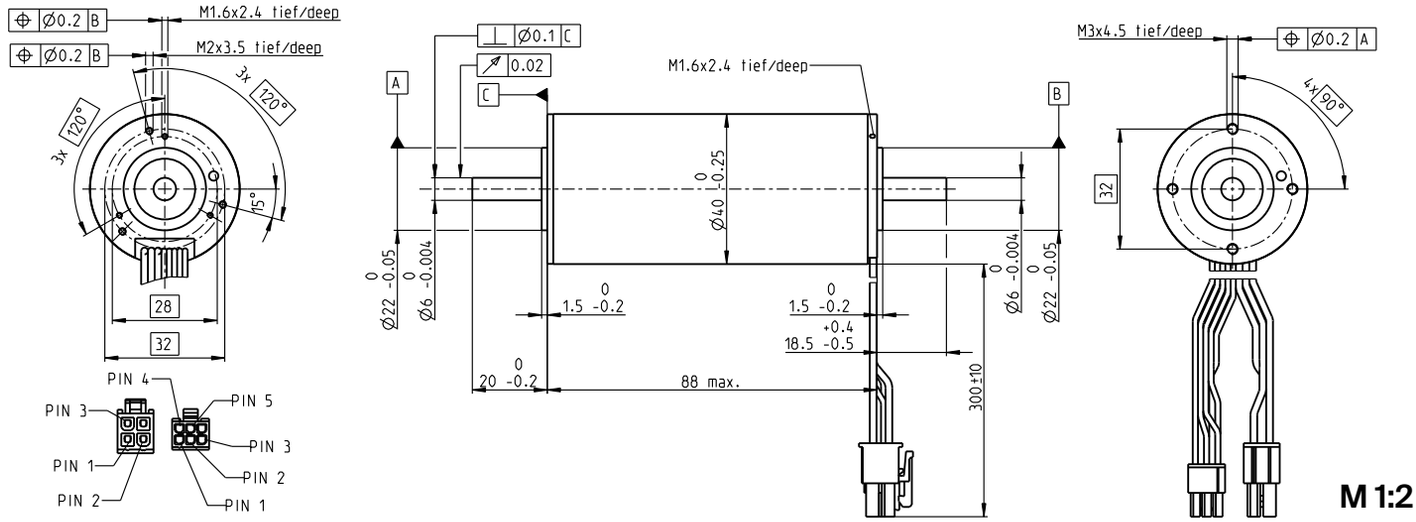
Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
539_Encoder HEDL 5540

Accessories
586_Brake AB 28

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/5
551_ESCON Module 50/4 EC-S
552_ESCON Module 50/8 HE
553_ESCON 50/5, 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5, 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-max 40 ∅40 mm, brushless, 120 watt



Stock program
Standard program
Special program (on request)

Part numbers

		283870	283871	283872	283873
Motor data					
	Values at nominal voltage				
1	Nominal voltage	V	48	48	48	48
2	No load speed	rpm	10100	7240	4720	3610
3	No load current	mA	310	188	104	72.8
4	Nominal speed	rpm	9250	6280	3770	2670
5	Nominal torque	mNm	170	185	203	211
6	Nominal current (max. continuous current)	A	4.06	3.1	2.19	1.74
7	Stall torque	mNm	2090	1490	1050	838
8	Stall current	A	46.7	23.7	10.9	6.68
9	Max. efficiency	%	85	83	82	80
	Characteristics					
10	Terminal resistance phase to phase	Ω	1.03	2.02	4.4	7.19
11	Terminal inductance phase to phase	mH	0.204	0.4	0.937	1.6
12	Torque constant	mNm/A	44.8	62.8	96.1	126
13	Speed constant	rpm/V	213	152	99.4	76.1
14	Speed/torque gradient	rpm/mNm	4.89	4.9	4.55	4.35
15	Mechanical time constant	ms	5.17	5.19	4.81	4.61
16	Rotor inertia	gcm²	101	101	101	101

Specifications

Thermal data

17	Thermal resistance housing-ambient	3.45 K/W
18	Thermal resistance winding-housing	0.29 K/W
19	Thermal time constant winding	3.96 s
20	Thermal time constant motor	1240 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		12000 rpm
24	Axial play at axial load	< 10 N	0 mm
		> 10 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		8 N
27	Max. force for press fits (static)		211 N
	(static, shaft supported)		4000 N
28	Max. radial load, 5 mm from flange		80 N

Other specifications

29	Number of pole pairs	1
30	Number of phases	3
31	Weight of motor	720 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Part number**
Molex	39-01-2040

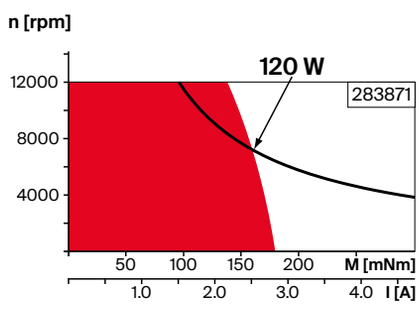
Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 3...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Part number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25°C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 52

Gear
436-438_GP 42 A
439-441_GP 42 C
444_GP 52 C

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
539_Encoder HEDL 5540

Accessories
586_Brake AB 28

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
551_ESCON Module 50/4 EC-S
553_ESCON 50/5
553_ESCON 70/10
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8 CAN
569_EPOS4 50/5
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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For your personal notes

maxon EC-4pole

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EC-4pole 30 ∅30 mm, 100 Watt, High Power		293
EC-4pole 30 ∅30 mm, 150 Watt, sterilizable		294
EC-4pole 30 ∅30 mm, 200 Watt, High Power		295
EC-4pole 32 ∅32 mm, 220 Watt	**HD**	296
EC-4pole 32 ∅32 mm, 480 Watt	**HD**	297



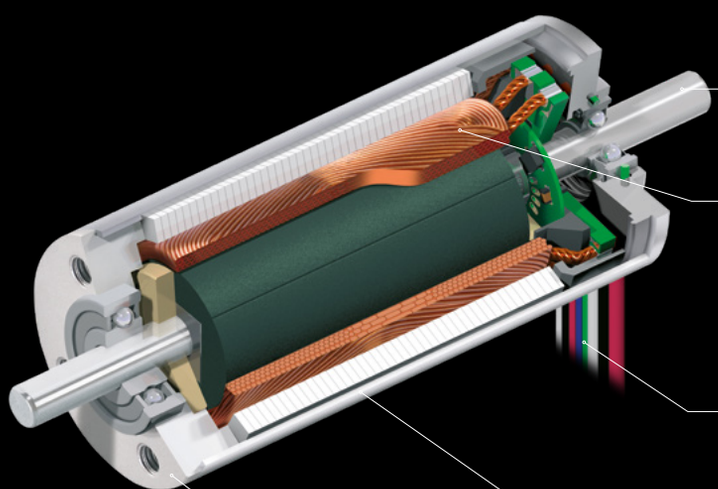
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maxon EC-4pole program

∅30 mm, 200 W. That is top performance. Their special winding technology and 4-pole magnets make maxon's brushless EC-4pole drives unbeatable when it comes to delivering the highest driving power per unit of volume and weight. The motors feature a no cogging torque, high efficiency, and excellent control dynamics. The metal housing ensures good heat dissipation and mechanical stability. When it comes to service life, these drives leave the competition far behind.

Key data

Motor ∅	22...32 mm
Motor length	47...162 mm
Power	90...480 W
Nominal torque	up to 800 mNm
Max. permissible speed	up to 25 000 rpm



Grooveless shaft ensures smooth running and extremely high torsional rigidity.

The centerpiece is the ironless maxon winding. Its physical design offer benefits such as: zero cogging torque, high efficiency and excellent control dynamics.

Strain-relieved cables can be routed away from the motor both radially and axially. Connectors are possible.

The motor housing is a steel tube – non-magnetic, rigid, stainless.

The metal housing and flange ensure good heat dissipation and mechanical stability.

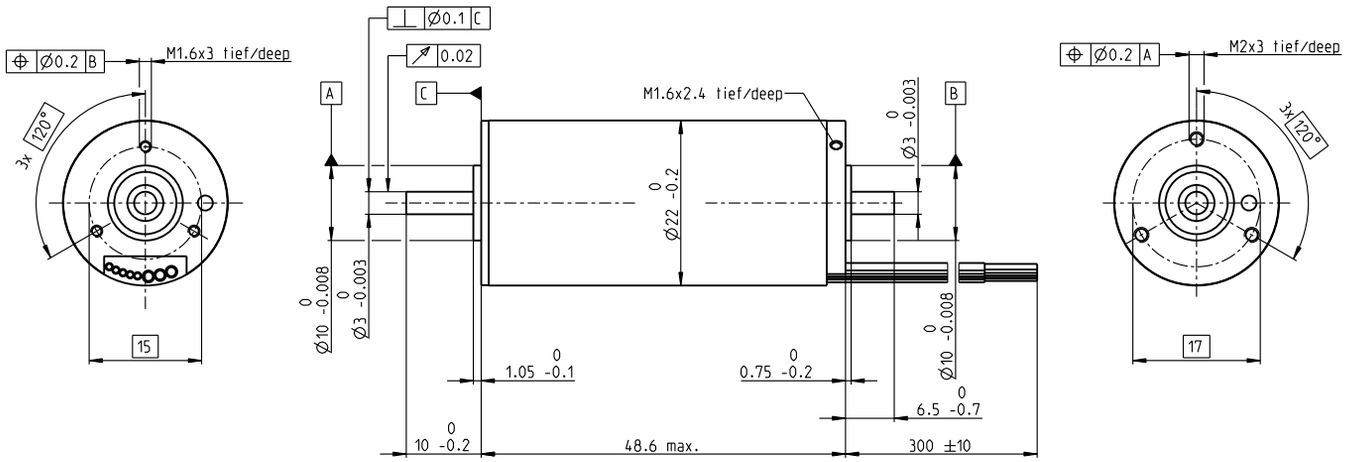
- → Maximum power density due to rotors with two pole pairs
- → maxon® winding with optimized interconnection of the partial windings
- → Speeds up to 25 000 rpm
- → High-quality magnetic return material to reduce eddy current losses
- → «Heavy Duty» version for extreme environmental conditions

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EC-4pole 22 ∅22 mm, brushless, 90 watt

High Power



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

		323217	323218	323219	323220	327739
Motor data						
	Values at nominal voltage					
1	Nominal voltage	V	18	24	36	48	48
2	No load speed	rpm	16200	16300	16300	16300	6900
3	No load current	mA	333	164	109	81.8	20.7
4	Nominal speed	rpm	14900	15000	14900	14900	5550
5	Nominal torque	mNm	42.6	45.1	43.7	42.6	43.9
6	Nominal current (max. continuous current)	A	4.32	3.34	2.16	1.58	0.679
7	Stall torque	mNm	588	639	612	586	234
8	Stall current	A	55.8	45.5	29.1	20.9	3.55
9	Max. efficiency	%	85.5	89	88	88	85
	Characteristics						
10	Terminal resistance phase to phase	Ω	0.323	0.527	1.24	2.3	13.5
11	Terminal inductance phase to phase	mH	0.0283	0.0503	0.113	0.201	1.11
12	Torque constant	mNm/A	10.5	14	21.1	28.1	66
13	Speed constant	rpm/V	907	680	453	340	145
14	Speed/torque gradient	rpm/mNm	27.8	25.5	26.7	27.9	29.7
15	Mechanical time constant	ms	1.61	1.48	1.55	1.62	1.72
16	Rotor inertia	gcm²	5.54	5.54	5.54	5.54	5.54

Specifications

Thermal data

17	Thermal resistance housing-ambient	12.2 K/W
18	Thermal resistance winding-housing	1.19 K/W
19	Thermal time constant winding	5.12 s
20	Thermal time constant motor	482 s
21	Ambient temperature	-20...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		25 000 rpm
24	Axial play at axial load	< 3.0 N	0 mm
		> 3.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		4 N
27	Max. force for press fits (static)		53 N
	(static, shaft supported)		1000 N
28	Max. radial load, 5 mm from flange		16 N

Other specifications

29	Number of pole pairs	2
30	Number of phases	3
31	Weight of motor	125 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

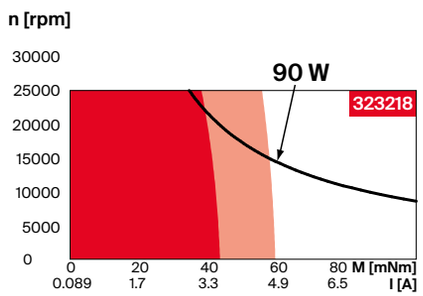
red	Motor winding 1
white	Motor winding 3
black	Motor winding 2

Connection sensors (Cable AWG 26)

red/grey	Hall sensor 1
black/grey	Hall sensor 2
white/grey	Hall sensor 3
green	V_{Hall} 3...24 VDC
blue	GND

Wiring diagram for Hall sensors see p. 67

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 52

Gear
423_GP 22 HP
430_GP 32 C
474-482_GP 32 S

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO

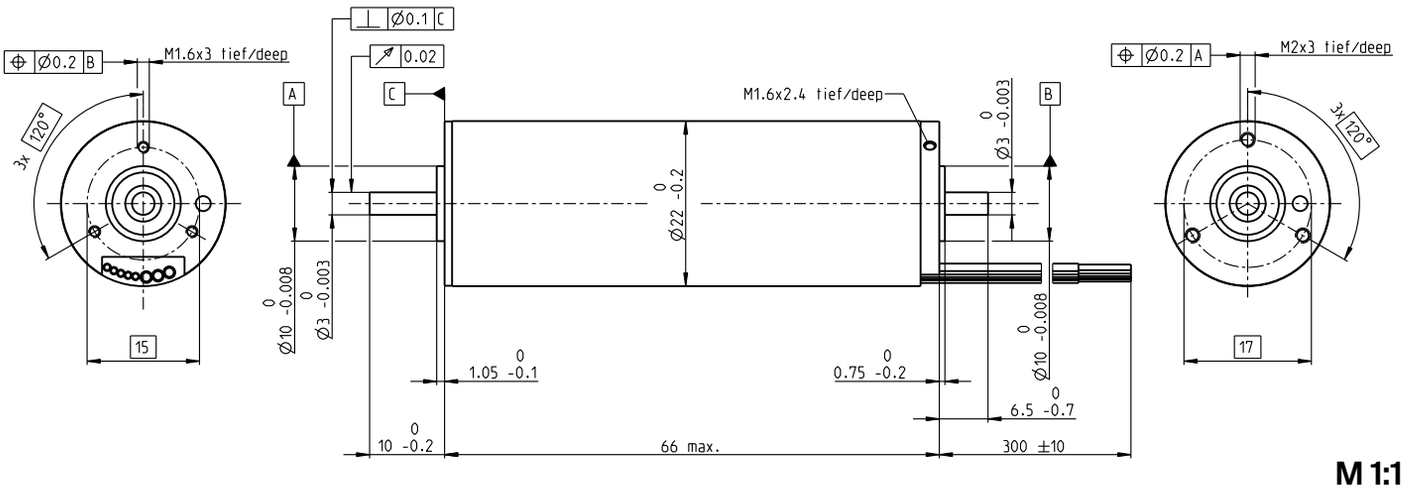
Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/5
551_ESCON Module 50/4 EC-S
553_ESCON 50/5
553_ESCON 70/10
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

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EC-4pole 22 ∅22 mm, brushless, 120 watt

High Power

EC-4pole



M 1:1

Stock program
Standard program
Special program (on request)

Part Numbers

	311535	311536	311537	311538
Motor data				
Values at nominal voltage				
1 Nominal voltage V	18	24	36	48
2 No load speed rpm	16800	16900	17800	16900
3 No load current mA	298	223	166	112
4 Nominal speed rpm	15700	15800	16800	15800
5 Nominal torque mNm	54	54.6	54	54.5
6 Nominal current (max. continuous current) A	5.55	4.21	2.95	2.1
7 Stall torque mNm	874	954	1090	1020
8 Stall current A	86	70.4	56.8	37.7
9 Max. efficiency %	89	89	90	90
Characteristics				
10 Terminal resistance phase to phase Ω	0.209	0.341	0.634	1.27
11 Terminal inductance phase to phase mH	0.017	0.031	0.062	0.123
12 Torque constant mNm/A	10.2	13.5	19.2	27.1
13 Speed constant rpm/V	940	705	497	352
14 Speed/torque gradient rpm/mNm	19.4	17.7	16.4	16.6
15 Mechanical time constant ms	1.81	1.65	1.53	1.54
16 Rotor inertia gcm²	8.91	8.91	8.91	8.91

Specifications

Thermal data

17 Thermal resistance housing-ambient	10.7 K/W
18 Thermal resistance winding-housing	0.7 K/W
19 Thermal time constant winding	4.66 s
20 Thermal time constant motor	936 s
21 Ambient temperature	-20...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	25 000 rpm
24 Axial play at axial load < 3.0 N	0 mm
> 3.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	4 N
27 Max. force for press fits (static)	53 N
(static, shaft supported)	600 N
28 Max. radial load, 5 mm from flange	16 N

Other specifications

29 Number of pole pairs	2
30 Number of phases	3
31 Weight of motor	175 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

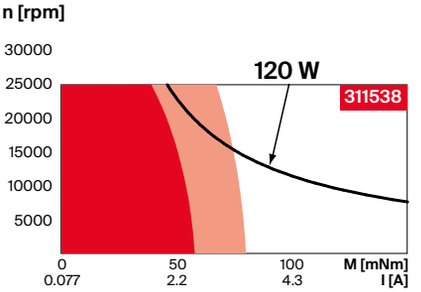
red	Motor winding 1
white	Motor winding 3
black	Motor winding 2

Connection sensors (Cable AWG 26)

red/grey	Hall sensor 1
black/grey	Hall sensor 2
white/grey	Hall sensor 3
green	V_{Hall} 3...24 VDC
blue	GND

Wiring diagram for Hall sensors see p. 67

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 52

Gear
423_GP 22 HP
430_GP 32 C
474–482_GP 32 S

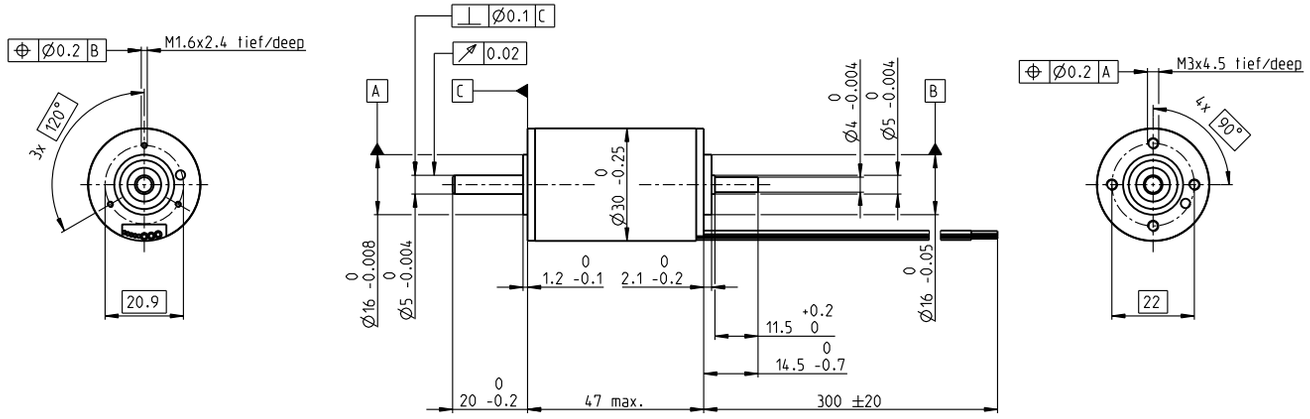
Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
551_ESCON Module 50/4 EC-S
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8

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EC-4pole 30 ∅30 mm, brushless, 100 watt

High Power



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

	309755	309756	309757	309758
Motor data				
Values at nominal voltage				
1 Nominal voltage V	18	24	36	48
2 No load speed rpm	17500	17500	17500	17500
3 No load current mA	505	379	253	189
4 Nominal speed rpm	16300	16300	16400	16400
5 Nominal torque mNm	72	68.8	74.3	73.4
6 Nominal current (max. continuous current) A	7.74	5.56	3.98	2.95
7 Stall torque mNm	1310	1270	1510	1500
8 Stall current A	133	96.9	77.2	57.4
9 Max. efficiency %	88.3	88.2	89.1	89.1
Characteristics				
10 Terminal resistance phase to phase Ω	0.135	0.248	0.466	0.836
11 Terminal inductance phase to phase mH	0.0166	0.0295	0.0664	0.118
12 Torque constant mNm/A	9.8	13.1	19.6	26.1
13 Speed constant rpm/V	974	731	487	365
14 Speed/torque gradient rpm/mNm	13.4	13.9	11.6	11.7
15 Mechanical time constant ms	2.57	2.65	2.22	2.24
16 Rotor inertia gcm²	18.3	18.3	18.3	18.3

Specifications

Thermal data

17 Thermal resistance housing-ambient	8.96 K/W
18 Thermal resistance winding-housing	0.74 K/W
19 Thermal time constant winding	4.12 s
20 Thermal time constant motor	968 s
21 Ambient temperature	-20...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	25 000 rpm
24 Axial play at axial load < 4.0 N	0 mm
> 4.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	5.5 N
27 Max. force for press fits (static)	73 N
(static, shaft supported)	2000 N
28 Max. radial load, 5 mm from flange	25 N

Other specifications

29 Number of pole pairs	2
30 Number of phases	3
31 Weight of motor	210 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

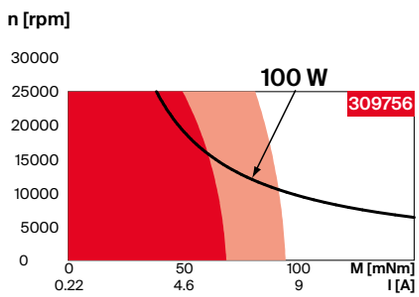
black	Motor winding 2
white	Motor winding 3
red	Motor winding 1

Connection sensors (Cable AWG 26)

black/grey	Hall sensor 2
blue	GND
green	V_{Hall} 3...24 VDC
red/grey	Hall sensor 1
white/grey	Hall sensor 3

Wiring diagram for Hall sensors see p. 67

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 52

Gear
430_GP 32 C
432_GP 32 HP
436-438_GP 42 A
439-441_GP 42 C
474–482_GP 32 S

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO

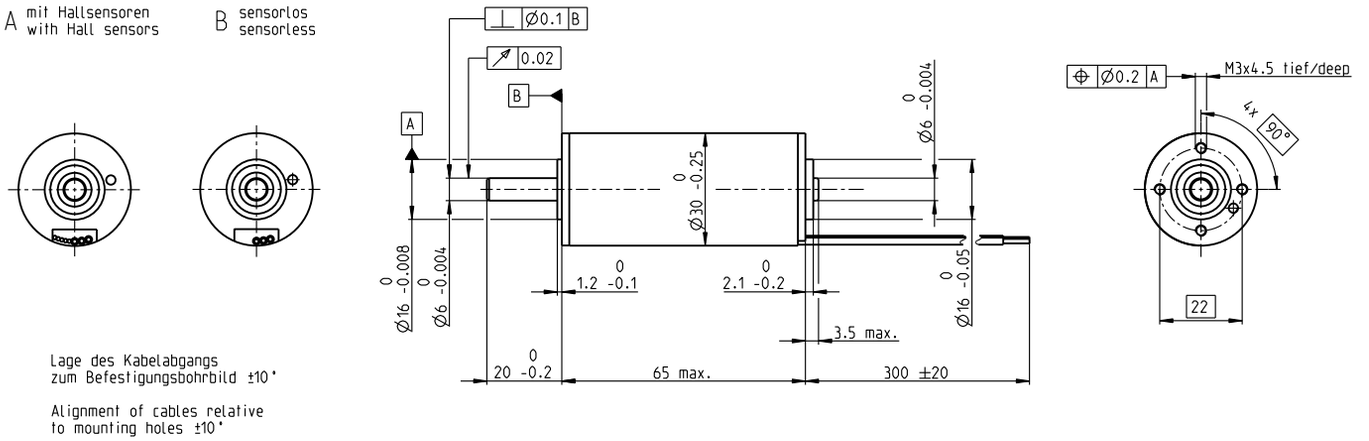
Accessories
584_Brake AB 20

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
551_ESCON Module 50/4 EC-S
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8 CAN
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-4pole 30 ∅30 mm, brushless, 150 watt

Sterilizable



M 1:2

Stock program
Standard program
Special program (on request)

	Part numbers	
A with Hall sensors	468311	468313
B sensorless	468312	468314

Motor data			
Values at nominal voltage			
1 Nominal voltage	V	24	32
2 No load speed	rpm	17100	13100
3 No load current	mA	944	429
4 Nominal speed	rpm	16600	12400
5 Nominal torque	mNm	84.6	106
6 Nominal current (max. continuous current)	A	7.23	4.9
7 Stall torque	mNm	3140	2320
8 Stall current	A	236	99.7
9 Max. efficiency	%	88	88
Characteristics			
10 Terminal resistance phase to phase	Ω	0.102	0.321
11 Terminal inductance phase to phase	mH	0.016	0.049
12 Torque constant	mNm/A	13.3	23.3
13 Speed constant	rpm/V	718	410
14 Speed/torque gradient	rpm/mNm	5.49	5.66
15 Mechanical time constant	ms	2.02	2.09
16 Rotor inertia	gcm²	35.2	35.2

Specifications

Thermal data

17	Thermal resistance housing-ambient	7.4 K/W
18	Thermal resistance winding-housing	0.209 K/W
19	Thermal time constant winding	2.11 s
20	Thermal time constant motor	1180 s
21	Ambient temperature	-40...+150°C
22	Max. permissible winding temperature	155°C

Mechanical data (preloaded ball bearings)

23	Max. permissible speed	25 000 rpm
24	Axial play at axial load < 4.0 N	0 mm
	> 4.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	5.5 N
27	Max. force for press fits (static)	73 N
	(static, shaft supported)	1300 N
28	Max. radial loading, 5 mm from flange	25 N

Other specifications

29	Number of pole pairs	2
30	Number of phases	3
31	Weight of motor	300 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection sensors (Cable AWG 26)

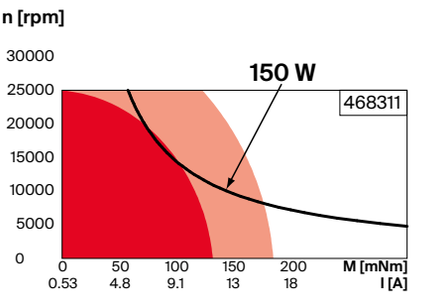
green	V_{Hall} 3...24 VDC
blue	GND
red/grey	Hall sensor 1
black/grey	Hall sensor 2
white/grey	Hall sensor 3

Wiring diagram for Hall sensors see p. 67

Option

Hollow shaft with bore diameter up to 4.1 mm

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Application

Sterilizable Devices

Orthopedic drills
Orthopedic saws
Surgical reamers

Sterilization information

Sensorless: typically 2000 autoclave cycles
Hall sensor: typically 1000 autoclave cycles

Sterilization with steam

Temperature	+134°C ± 4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

Modular system

Details on catalog page 52

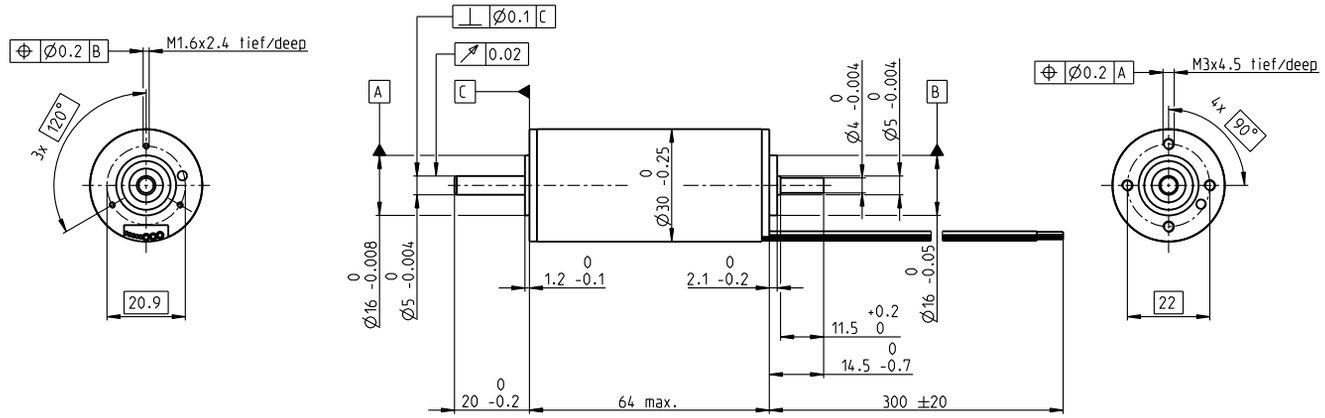
Motor Control

547_DEC Module 50/5
551_ESCON Module 50/5
551_ESCON Module 50/4 EC-S
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12

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EC-4pole 30 ∅30 mm, brushless, 200 watt

High Power



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

	305013	305014	305015
Motor data			
Values at nominal voltage			
1 Nominal voltage V	24	36	48
2 No load speed rpm	16700	16700	16500
3 No load current mA	723	482	356
4 Nominal speed rpm	16100	16100	16000
5 Nominal torque mNm	95.6	95.2	92.9
6 Nominal current (max. continuous current) A	7.61	5.06	3.68
7 Stall torque mNm	3240	3520	3430
8 Stall current A	236	171	124
9 Max. efficiency %	90	90	90
Characteristics			
10 Terminal resistance phase to phase Ω	0.102	0.21	0.386
11 Terminal inductance phase to phase mH	0.016	0.037	0.065
12 Torque constant mNm/A	13.7	20.6	27.6
13 Speed constant rpm/V	697	465	346
14 Speed/torque gradient rpm/mNm	5.17	4.75	4.83
15 Mechanical time constant ms	1.80	1.66	1.69
16 Rotor inertia gcm²	33.3	33.3	33.3

Specifications

Thermal data

17 Thermal resistance housing-ambient	7.4 K/W
18 Thermal resistance winding-housing	0.21 K/W
19 Thermal time constant winding	2.11 s
20 Thermal time constant motor	1180 s
21 Ambient temperature	-20...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	25 000 rpm
24 Axial play at axial load < 4.0 N	0 mm
> 4.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	5.5 N
27 Max. force for press fits (static)	73 N
(static, shaft supported)	1300 N
28 Max. radial load, 5 mm from flange	25 N

Other specifications

29 Number of pole pairs	2
30 Number of phases	3
31 Weight of motor	300 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

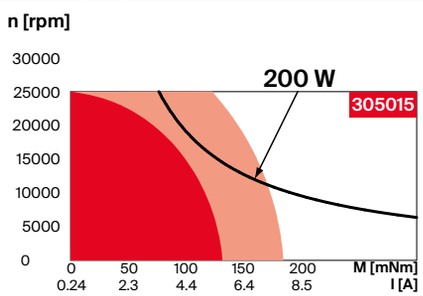
black	Motor winding 2
white	Motor winding 3
red	Motor winding 1

Connection sensors (Cable AWG 26)

black/grey	Hall sensor 2
blue	GND
green	V_{Hall} 3...24 VDC
red/grey	Hall sensor 1
white/grey	Hall sensor 3

Wiring diagram for Hall sensors see p. 67

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 52

Gear
430_GP 32 C
433_GP 32 HP
436-438_GP 42 A
439-441_GP 42 C
474–482_GP 32 S

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO

Accessories
585_Brake AB 20

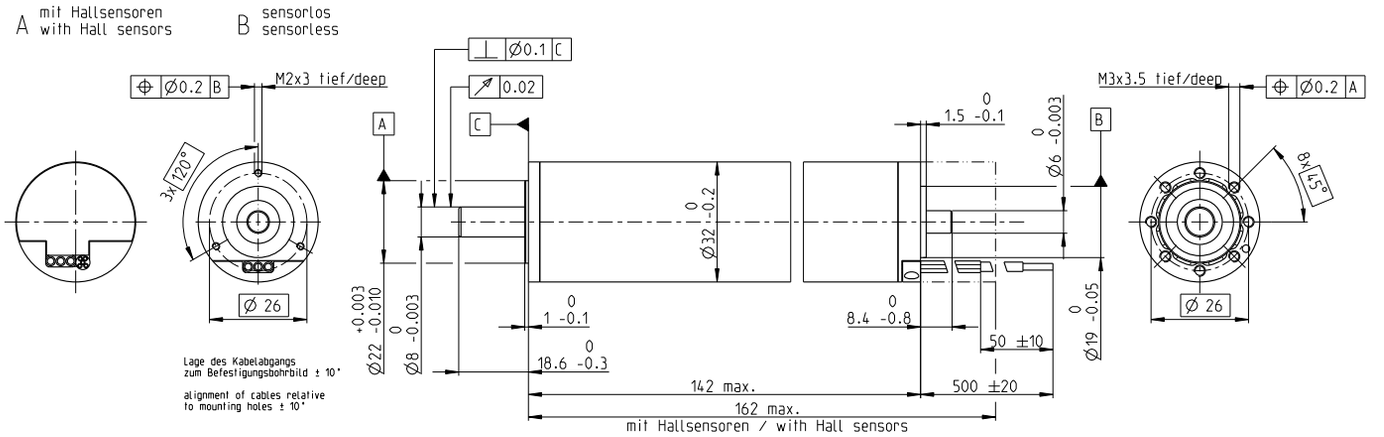
Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
551_ESCON Module 50/4 EC-S
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8 CAN
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-4pole 32 ∅32 mm, brushless, 220 watt

Heavy Duty – for applications in air

EC-4pole



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

A with Hall sensors	397798
B sensorless	393879

Motor data (provisional)					
Values at nominal voltage and ambient temperature °C		**25**	**100**	**150**	**200**
1 Nominal voltage	V	48	48	48	48
2 No load speed	rpm	6470	6650	6770	6890
3 No load current	mA	149	113	109	107
4 Nominal speed[1]	rpm	5710	5870	6080	6470
5 Nominal torque[1]	mNm	334	261	196	104
6 Nominal current (max. continuous current)	A	4.87	3.85	2.98	1.67
7 Stall torque	mNm	3350	2520	2150	1860
8 Stall current	A	47.5	36.7	31.9	28.1
9 Max. efficiency	%	89	89	89	88
Characteristics					
10 Terminal resistance phase to phase	Ω	1.01	1.31	1.51	1.71
11 Terminal inductance phase to phase	mH	0.298	0.298	0.298	0.298
12 Torque constant	mNm/A	70.5	68.7	67.4	66.2
13 Speed constant	rpm/V	135	139	142	144
14 Speed / torque gradient	rpm/mNm	1.94	2.65	3.16	3.71
15 Mechanical time constant	ms	2.6	3.55	4.24	4.98
16 Rotor inertia	gcm²	128	128	128	128

[1]Values for operation in thermal equilibrium.

Specifications

Thermal data

17	Thermal resistance housing-ambient	4 K/W
18	Thermal resistance winding-housing	0.53 K/W
19	Thermal time constant winding	18.4 s
20	Thermal time constant motor	1720 s
21	Ambient temperature*	-55...+200°C
22	Max. winding temperature	+240°C

Mechanical data (preloaded ball bearings)

23	Max. speed	12000 rpm
24	Axial play at axial load < 20 N	0 mm
	> 20 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	16 N
27	Max. force for press fits (static)	80 N
	(static, shaft supported)	3000 N
28	Max. radial load, 5 mm from flange	75 N

Other specifications

29	Number of pole pairs	2
30	Number of phases	3
31	Weight of motor	860 g

Connection A, motor cable PTFE (AWG 14)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors cable PTFE (AWG 24)

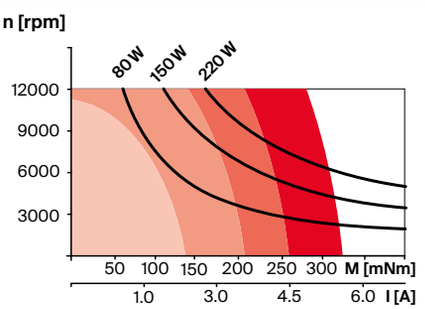
green	V_{Hall} 4.5...24 V
blue	GND
red	Hall sensor 1
black	Hall sensor 2
white	Hall sensor 3

Connection B, motor cable PTFE (AWG 14)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Wiring diagram for Hall sensors see p. 67

Operating range



TA = 25°C
TA = 100°C
TA = 150°C
TA = 200°C

Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and above listed ambient temperature, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Application

General
- extreme temperature applications
- vibration tested (according to MIL-STD810F/Jan2000 Fig. 514.5C-10)
- ultra-high vacuum applications (modifications necessary). low outgassing, can be baked out at 240°C

Aerospace
- gas turbine starter/generators for aircraft engines
- regulation of combustion engines

Oil & Gas Industry
- oil, gas and geothermal wells

Robotics
- robotic exploration vehicles

Industry
- pumps and valves for liquid metal cooling systems/turbine fuel and steam control
- valve adjustment for gas and steam power plants

Notice

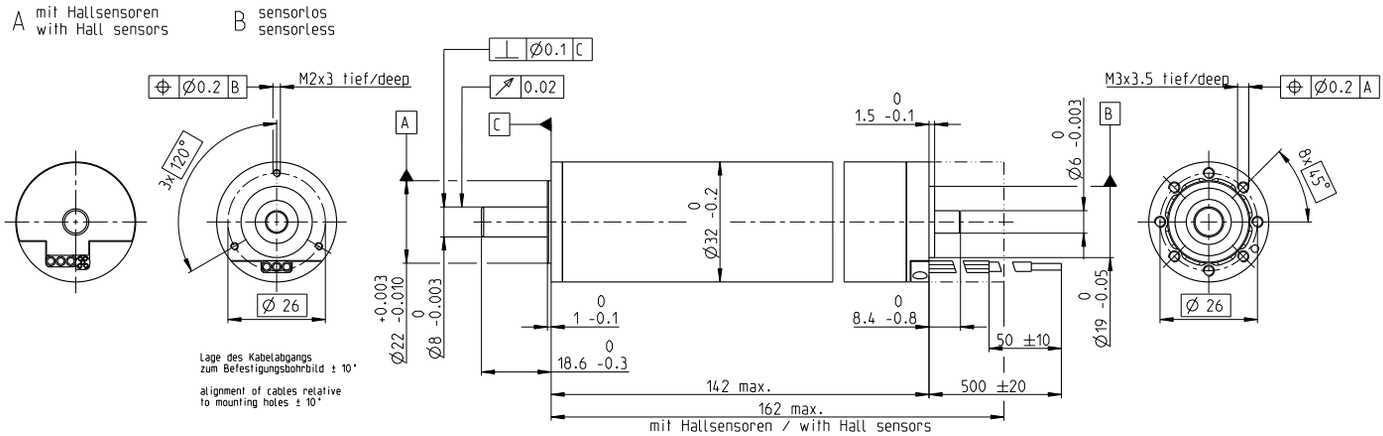
This motor contains leaded solder. It therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The motor may therefore only be used for devices that are not subject to this directive.

*The Hall sensors in this motor are rated for ambient temperatures up to 150°C. The motor with Hall sensors is fully tested at 200°C in the final inspection. Nevertheless, the Hall sensors may temporarily fail below 200°C under certain conditions.

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EC-4pole 32 ∅32 mm, brushless, 480 watt

Heavy Duty – for applications in oil



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers	
A with Hall sensors	397799
B sensorless	397800

Motor data (provisional)									
Values at nominal voltage and ambient temperature °C		**25**	**100**	**150**	**200**				
1 Nominal voltage	V	48	48	48	48				
2 No load speed	rpm	6420	6630	6750	6860				
3 No load current	mA	482	222	212	216				
4 Nominal speed[1]	rpm	4670	4420	4700	5340				
5 Nominal torque[1]	mNm	804	762	596	379				
6 Nominal current (max. continuous current)	A	11.4	10.9	8.75	5.78				
7 Stall torque	mNm	3350	2520	2150	1860				
8 Stall current	A	47.5	36.7	31.9	28.1				
9 Max. efficiency	%	82	85	85	84				
Characteristics									
10 Terminal resistance phase to phase	Ω	1.01	1.31	1.51	1.71				
11 Terminal inductance phase to phase	mH	0.298	0.298	0.298	0.298				
12 Torque constant	mNm/A	70.5	68.7	67.4	66.2				
13 Speed constant	rpm/V	135	139	142	144				
14 Speed / torque gradient	rpm/mNm	1.94	2.65	3.16	3.71				
15 Mechanical time constant	ms	2.85	3.88	4.64	5.45				
16 Rotor inertia	gcm²	140	140	140	140				

[1]Values for operation in thermal equilibrium.

Specifications

Thermal data

17	Thermal resistance housing-ambient	0.3 K/W
18	Thermal resistance winding-housing	0.53 K/W
19	Thermal time constant winding	18.4 s
20	Thermal time constant motor	129 s
21	Ambient temperature*	-55...+200°C
22	Max. winding temperature	+240°C

Mechanical data (preloaded ball bearings)

23	Max. speed		12000 rpm
24	Axial play at axial load	< 20 N	0 mm
		> 20 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		16 N
27	Max. force for press fits (static)		80 N
	(static, shaft supported)		3000 N
28	Max. radial load, 5 mm from flange		75 N

Other specifications

29	Number of pole pairs	2
30	Number of phases	3
31	Weight of motor	860 g

Connection A, motor cable PTFE (AWG 14)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors cable PTFE (AWG 24)

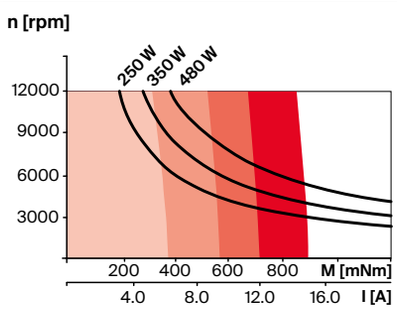
green	V_{Hall} 4.5...24 V
blue	GND
red	Hall sensor 1
black	Hall sensor 2
white	Hall sensor 3

Connection B, motor cable PTFE (AWG 14)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Wiring diagram for Hall sensors see p. 67

Operating range



Comments

TA = 25°C
TA = 100°C
TA = 150°C
TA = 200°C

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and above listed ambient temperature, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Application

General
- extreme temperature applications
- vibration tested (according to MIL-STD810F/Jan2000 Fig. 514.5C-10)
- operation in oil and high pressure (only minimal lubrication, therefore use under rated ambient conditions is not suggested)

Oil & Gas Industry
- oil, gas and geothermal wells

Modular system

Details on catalog page 52

Gear
434_GP 32 HD
442_GP 42 HD

Notice

This motor contains leaded solder. It therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The motor may therefore only be used for devices that are not subject to this directive.

Reference medium: Shell Tellus oil T32
Operation in oil of different viscosity will affect the motor data.

*The Hall sensors in this motor are rated for ambient temperatures up to 150°C. The motor with Hall sensors is fully tested at 200°C in the final inspection. Nevertheless, the Hall sensors may temporarily fail below 200°C under certain conditions.

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For your personal notes

maxon EC-i

Standard specification no. 101		90
Terminology explanations		190
EC-i 30 ∅30 mm, 20 Watt	**IE**	301
EC-i 30 ∅30 mm, 30 Watt		302
EC-i 30 ∅30 mm, 45 Watt, High Torque		303
EC-i 30 ∅30 mm, 50 Watt		304
EC-i 30 ∅30 mm, 75 Watt, High Torque		305
EC-i 40 ∅40 mm, 50 Watt		306
EC-i 40 ∅40 mm, 50 Watt, High Torque		307
EC-i 40 ∅40 mm, 70 Watt		308
EC-i 40 ∅40 mm, 70 Watt, High Torque		309
EC-i 40 ∅40 mm, 100 Watt, High Torque		310
EC-i 40 ∅40 mm, 130 Watt, High Torque		311
EC-i 52 ∅52 mm, 180 Watt, High Torque		312
EC-i 52 ∅52 mm, 200 Watt, High Torque		313
EC-i 52 ∅52 mm, 250 Watt, open housing		314
EC-i 52 ∅52 mm, 420 Watt, ventilated		315



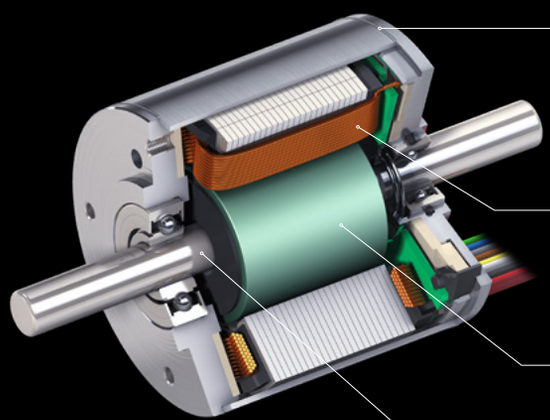
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maxon EC-i program

Powerhouses for extremely small spaces. With their optimized magnetic circuit, these brushless EC-i motors with iron windings offer a very high torque density and very low cogging torque. The multipole internal rotor has excellent dynamics. The robust design with a steel flange and housing makes this unit suitable for a wide variety of applications.

Key data

Motor ∅	30...52 mm
Motor length	26...110 mm
Power	20...420 W
Nominal torque	up to 649 mNm
Max. permissible speed	up to 15 000 rpm



The steel housing and flange ensure good heat dissipation and mechanical stability.

The stator with an iron winding is designed for high power at a low cogging torque.

The modular rotor delivers good dynamics and large torques.

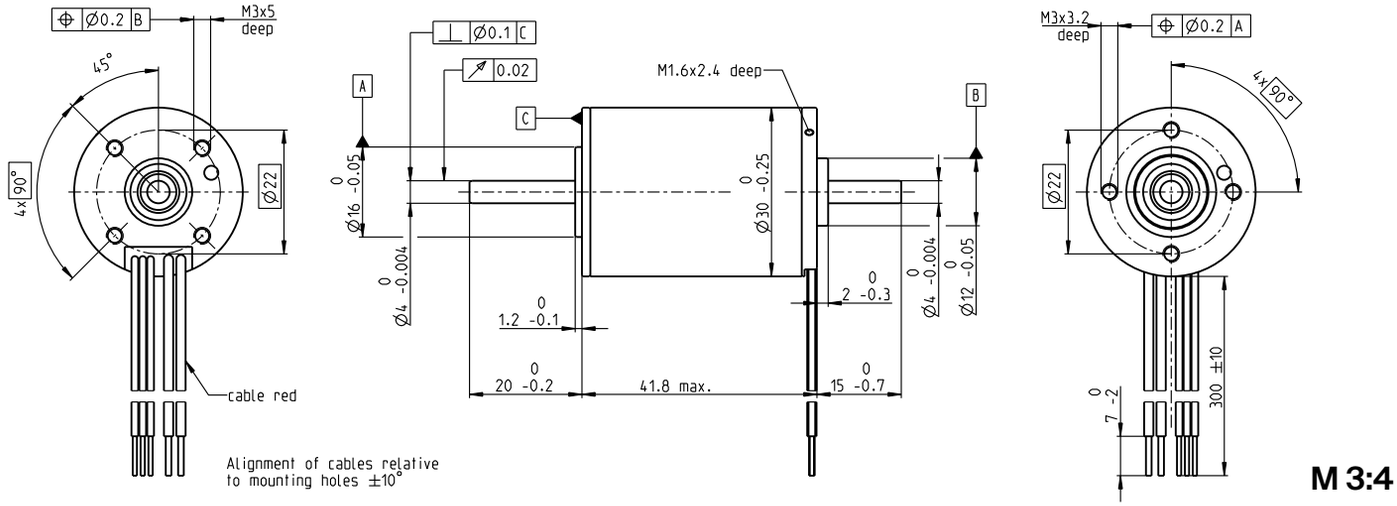
Grooveless shaft ensures smooth running and extremely high torsional rigidity.

- → Highly dynamic due to internal, multi-pole rotor
- → Mechanical time constants of less than 3 milliseconds
- → High torque density
- → Speeds up to 15 000 rpm

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EC-i 30 ∅30 mm brushless, 20 watt, with integrated electronics

4-Q-Speed Controller



M 3:4

Stock program
Standard program
Special program (on request)

			Part numbers	
			5 wire version	
			Enable	Direction
			618864	619301
Motor data (provisional)				
	Values at nominal voltage			
1	Nominal voltage	V	24	24
2	No load speed	rpm	6000	6000
3	No load current	mA	107	107
4	Nominal speed	rpm	6000	6000
5	Nominal torque	mNm	32.6	32.6
6	Nominal current (max. continuous current)	A	1.19	1.19
33	Max. torque	mNm	105	105
34	Max. current	A	6.5	6.5
9	Max. efficiency	%	75.4	75.4
	Characteristics			
35	Type of control		Speed	Speed
36	Supply voltage $+V_{CC}$	V	8...28	8...28
37	Speed set value input	V	0.42...10.1	0.42...10.1
38	Scale speed set value input	rpm/V	600	600
39	Speed range	rpm	250...6060	250...6060
40	Max. acceleration	rpm/s	6000	6000

Specifications

Thermal data

17	Thermal resistance housing-ambient	13.0 K/W
18	Thermal resistance winding-housing	5.9 K/W
19	Thermal time constant winding	34.1 s
20	Thermal time constant motor	1030 s
21	Ambient temperature	-40...+85°C
22	Max. winding temperature	+155°C
41	Max. temperature of electronics	100°C

Mechanical data (preloaded ball bearings)

16	Rotor inertia		6.69 gcm²
24	Axial play at axial load	< 9.0 N	0 mm
		> 9.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		9 N
27	Max. force for press fits (static)		48.8 N
	(static, shaft supported)		2510 N
28	Max. radial load, 10 mm from flange		30 N

Other specifications

31	Weight of motor	160 g
32	Direction of rotation	Clockwise (CW)

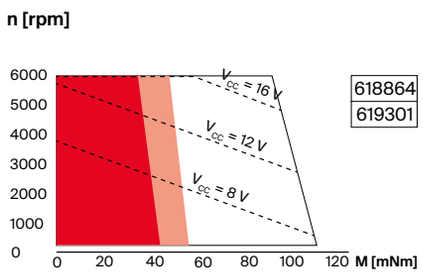
Values listed in the table are nominal.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 5 wire version (Cable AWG 20/24)

red	$+V_{CC}$ 8...28 VDC
black	GND
white	Speed set value input
green	Monitor n (6 pulses per revolution)
grey	Disable (Type Enable) or sense of direction (Type Direction)

Operating range



618864
619301

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

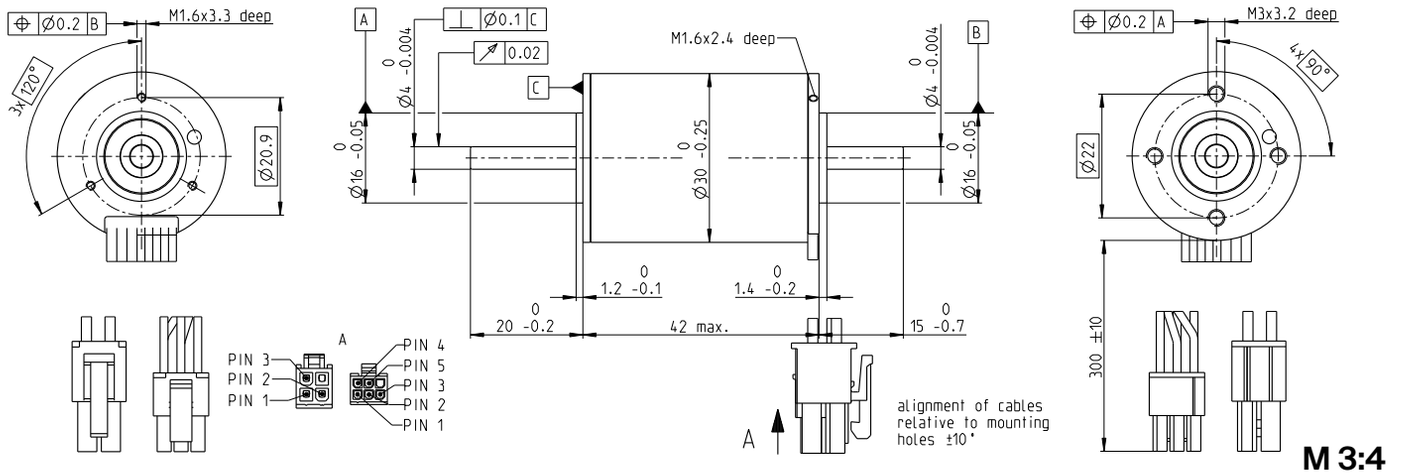
Comments

Modular system Details on catalog page 52

Gear
430_GP 32 C

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EC-i 30 ∅30 mm, brushless, 30 watt



M 3:4

Stock program
Standard program
Special program (on request)

		Part numbers			
	with Hall sensors	539472	539473	539474	539475
Motor data (provisional)					
	Values at nominal voltage				
1	Nominal voltage	V	12	24	36	48
2	No load speed	rpm	9180	9180	9180	9000
3	No load current	mA	225	112	75	54.7
4	Nominal speed	rpm	7720	7770	7760	7600
5	Nominal torque	mNm	36.9	36.8	35.4	36.9
6	Nominal current (max. continuous current)	A	3.03	1.51	0.976	0.744
7	Stall torque	mNm	292	303	291	302
8	Stall current	A	27.6	14.6	9.12	7.08
9	Max. efficiency	%	82.7	83.1	82.7	83.1
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.435	1.65	3.95	6.78
11	Terminal inductance phase to phase	mH	0.279	1.12	2.51	4.66
12	Torque constant	mNm/A	12.3	24.6	37	50.3
13	Speed constant	rpm/V	775	387	258	190
14	Speed/torque gradient	rpm/mNm	27.3	25.9	27.6	25.5
15	Mechanical time constant	ms	2.09	1.98	2.11	1.95
16	Rotor inertia	gcm²	7.3	7.3	7.3	7.3

Specifications

Thermal data

17	Thermal resistance housing-ambient		11.1 K/W
18	Thermal resistance winding-housing		3.75 K/W
19	Thermal time constant winding		30.1 s
20	Thermal time constant motor		849 s
21	Ambient temperature		-40...+100°C
22	Max. winding temperature		+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		15 000 rpm
24	Axial play at axial load	< 9.0 N	0 mm
		> 9.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		5 N
27	Max. force for press fits (static)		98 N
	(static, shaft supported)		2000 N
28	Max. radial load, 5 mm from flange		25 N

Other specifications

29	Number of pole pairs	2
30	Number of phases	3
31	Weight of motor	153 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	39-01-2040

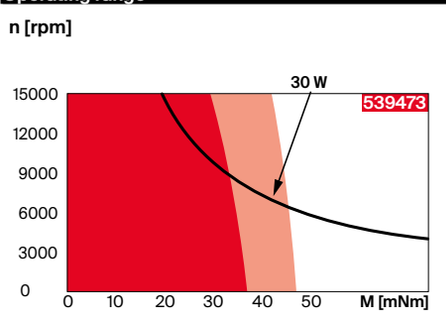
Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 52

Gear
430_GP 32 C
474-482_GP 32 S

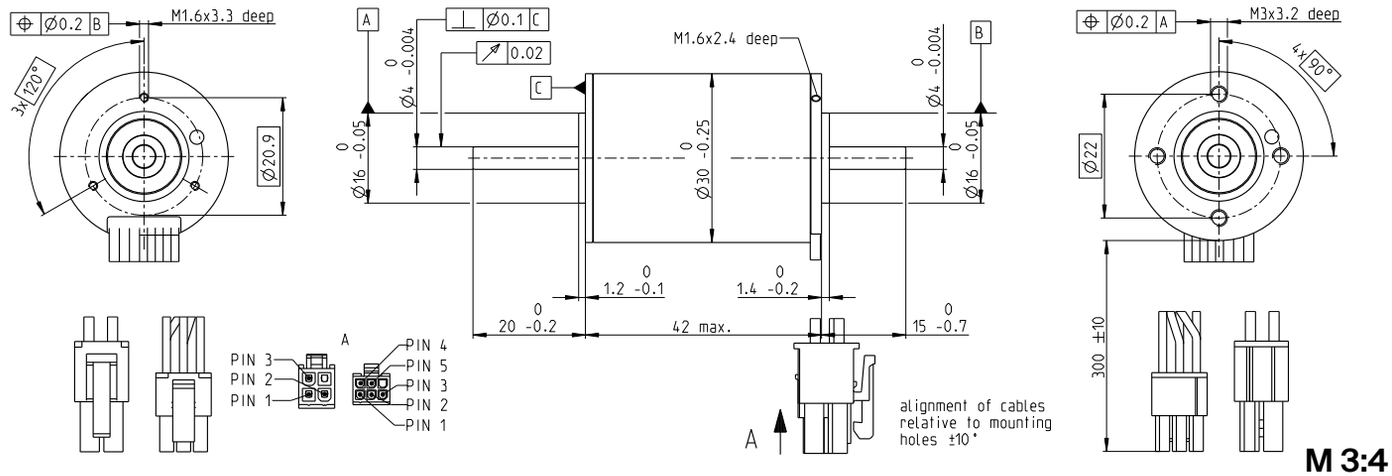
Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-i 30 ∅30 mm, brushless, 45 watt

High Torque



Stock program
Standard program
Special program (on request)

Part numbers

with Hall sensors	539480	539481	539482	539483	539484
Motor data (provisional)					
Values at nominal voltage					
1 Nominal voltage V	12	18	24	36	48
2 No load speed rpm	8240	8250	8510	8250	8510
3 No load current mA	285	190	149	95.2	74.5
4 Nominal speed rpm	6730	6780	7050	6810	7070
5 Nominal torque mNm	64.9	67.1	63.3	67.1	63.2
6 Nominal current (max. continuous current) A	4.49	3.08	2.27	1.54	1.13
7 Stall torque mNm	469	497	491	507	496
8 Stall current A	54	41.4	31	21.8	15.9
9 Max. efficiency %	85.7	86.6	86.4	87	86.5
Characteristics					
10 Terminal resistance phase to phase Ω	0.222	0.435	0.775	1.65	3.01
11 Terminal inductance phase to phase mH	0.199	0.449	0.749	1.8	3
12 Torque constant mNm/A	13.7	20.6	26.6	41.2	53.2
13 Speed constant rpm/V	696	464	359	232	180
14 Speed/torque gradient rpm/mNm	11.4	9.94	10.6	9.43	10.3
15 Mechanical time constant ms	0.956	0.83	0.888	0.787	0.862
16 Rotor inertia gcm²	8.1	8.1	8.1	8.1	8.1

Specifications

Thermal data

17	Thermal resistance housing-ambient	11.1 K/W
18	Thermal resistance winding-housing	3.75 K/W
19	Thermal time constant winding	27.8 s
20	Thermal time constant motor	866 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		10000 rpm
24	Axial play at axial load	< 9.0 N	0 mm
		> 9.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		5 N
27	Max. force for press fits (static)		98 N
	(static, shaft supported)		2000 N
28	Max. radial load, 5 mm from flange		25 N

Other specifications

29	Number of pole pairs	4
30	Number of phases	3
31	Weight of motor	156 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	39-01-2040

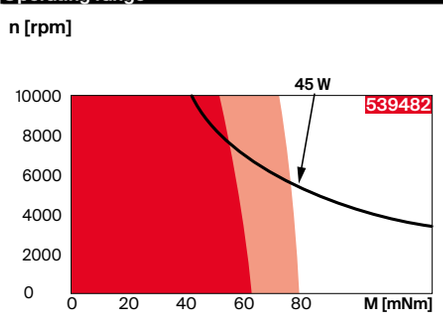
Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 52

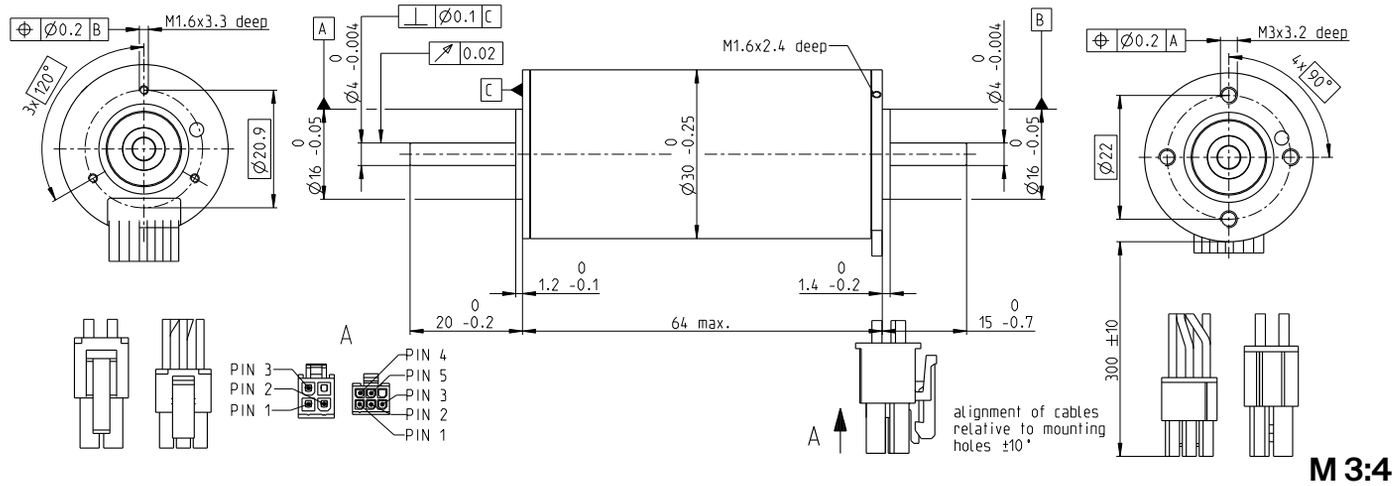
Gear
430_GP 32 C
474–482_GP 32 S

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-i 30 ∅30 mm, brushless, 50 watt



M 3:4

Stock program
Standard program
Special program (on request)

Part numbers

with Hall sensors	539476	539477	539478	539479
Motor data (provisional)				
Values at nominal voltage				
1 Nominal voltage V	12	24	36	48
2 No load speed rpm	9950	9960	10300	10200
3 No load current mA	328	164	114	84.4
4 Nominal speed rpm	8730	8830	9140	9100
5 Nominal torque mNm	55.3	55.2	53.2	58.7
6 Nominal current (max. continuous current) A	4.95	2.47	1.64	1.34
7 Stall torque mNm	576	624	626	703
8 Stall current A	58.1	32.6	22.5	20.1
9 Max. efficiency %	85.4	86.2	86.2	87.3
Characteristics				
10 Terminal resistance phase to phase Ω	0.206	0.735	1.6	2.39
11 Terminal inductance phase to phase mH	0.119	0.475	1.01	1.82
12 Torque constant mNm/A	11.4	22.8	33.2	44.6
13 Speed constant rpm/V	837	418	288	214
14 Speed/torque gradient rpm/mNm	15.1	13.5	13.9	11.5
15 Mechanical time constant ms	2.19	1.95	2	1.66
16 Rotor inertia gcm²	13.8	13.8	13.8	13.8

Specifications

Thermal data

17	Thermal resistance housing-ambient	9.01 K/W
18	Thermal resistance winding-housing	2.46 K/W
19	Thermal time constant winding	31.2 s
20	Thermal time constant motor	1080 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		15000 rpm
24	Axial play at axial load	< 9.0 N	0 mm
		> 9.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		5 N
27	Max. force for press fits (static)		98 N
	(static, shaft supported)		1300 N
28	Max. radial load, 5 mm from flange		25 N

Other specifications

29	Number of pole pairs	2
30	Number of phases	3
31	Weight of motor	240 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Article number
Molex	39-01-2040

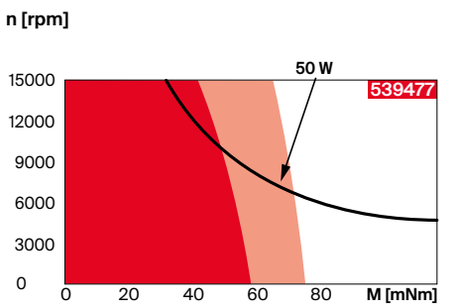
Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Article number
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system

Details on catalog page 52

Gear
430_GP 32 C
474-482_GP 32 S

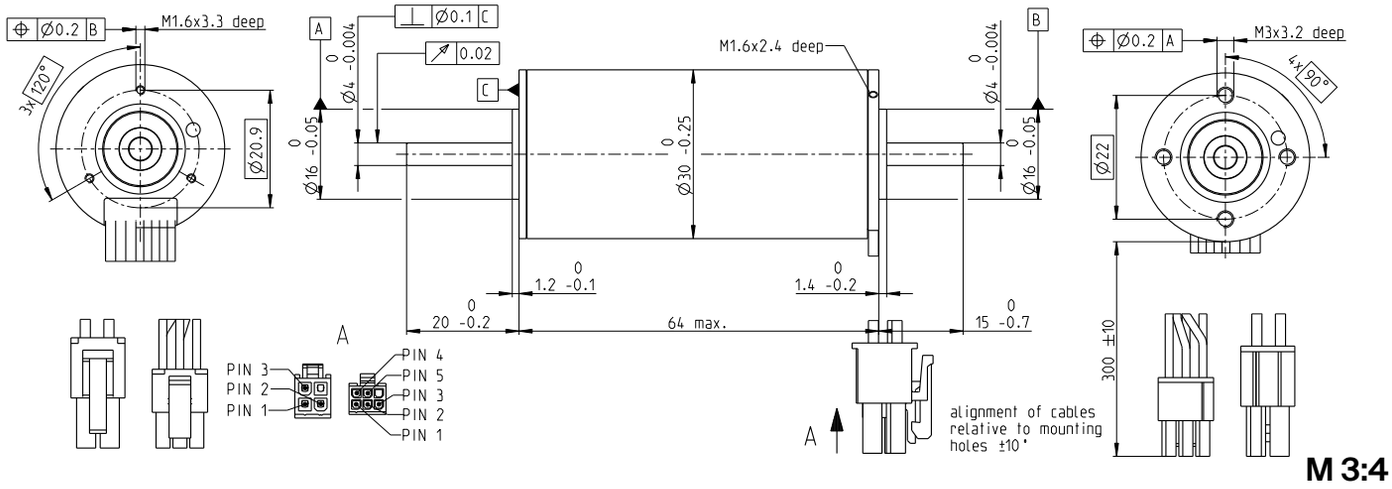
Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-i 30 ∅30 mm, brushless, 75 watt

High Torque



M 3:4

Stock program
Standard program
Special program (on request)

Part numbers

	with Hall sensors	539485	539486	539487	539488	539489
Motor data (provisional)						
	Values at nominal voltage					
1	Nominal voltage	V	12	18	24	36	48
2	No load speed	rpm	7940	7950	7950	7950	8210
3	No load current	mA	454	303	227	151	119
4	Nominal speed	rpm	6760	6840	6870	6890	7150
5	Nominal torque	mNm	108	110	107	110	104
6	Nominal current (max. continuous current)	A	7.34	4.98	3.65	2.48	1.84
7	Stall torque	mNm	895	962	968	993	986
8	Stall current	A	103	83.4	63.8	46.5	35.1
9	Max. efficiency	%	87.1	88.2	88.3	88.8	88.6
	Characteristics						
10	Terminal resistance phase to phase	Ω	0.117	0.216	0.376	0.773	1.37
11	Terminal inductance phase to phase	mH	0.0975	0.219	0.39	0.877	1.46
12	Torque constant	mNm/A	14.3	21.4	28.6	42.9	55.4
13	Speed constant	rpm/V	668	446	334	223	173
14	Speed/torque gradient	rpm/mNm	5.45	4.49	4.4	4.02	4.26
15	Mechanical time constant	ms	0.885	0.729	0.714	0.653	0.692
16	Rotor inertia	gcm²	15.5	15.5	15.5	15.5	15.5

Specifications

Thermal data

17	Thermal resistance housing-ambient	9.01 K/W
18	Thermal resistance winding-housing	2.46 K/W
19	Thermal time constant winding	31.3 s
20	Thermal time constant motor	1090 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		10000 rpm
24	Axial play at axial load	< 9.0 N	0 mm
		> 9.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		5 N
27	Max. force for press fits (static)		98 N
	(static, shaft supported)		1300 N
28	Max. radial load, 5 mm from flange		25 N

Other specifications

29	Number of pole pairs	4
30	Number of phases	3
31	Weight of motor	242 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	39-01-2040

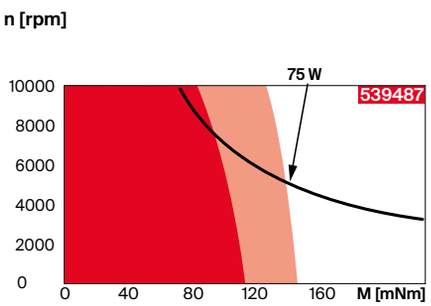
Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system

Details on catalog page 52

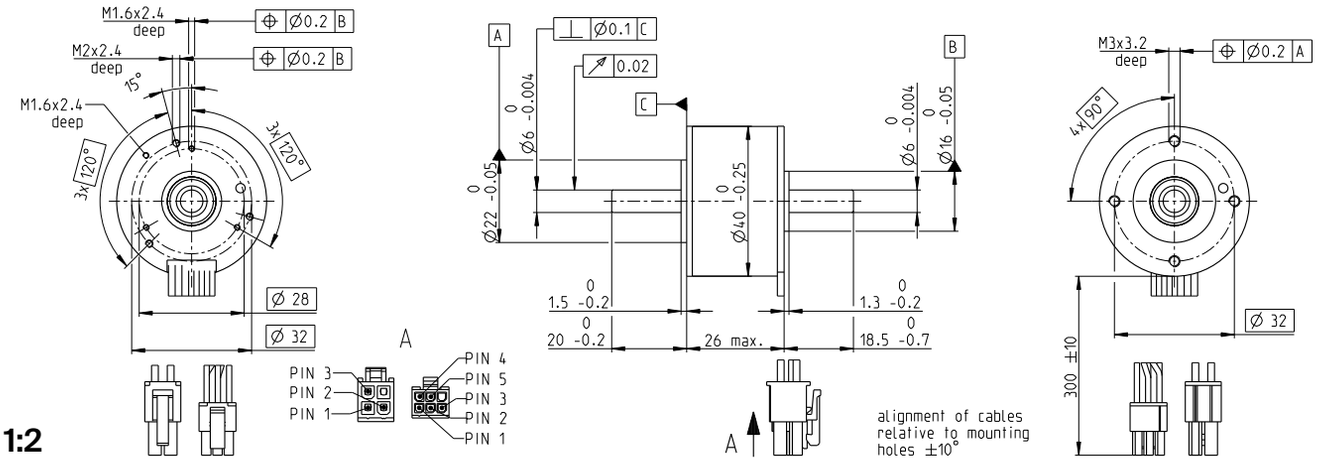
Gear
431_GP 32 C
474–482_GP 32 S

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-i 40 ∅40 mm, brushless, 50 watt



M 1:2

Stock program
Standard program
Special program (on request)

	Part numbers							
with Hall sensors	449463	449464						
Motor data								
Values at nominal voltage								
1 Nominal voltage	V	12	24					
2 No load speed	rpm	12400	13200					
3 No load current	mA	522	285					
4 Nominal speed	rpm	9640	10200					
5 Nominal torque	mNm	43.9	53.6					
6 Nominal current (max. continuous current)	A	4.58	2.83					
7 Stall torque	mNm	358	423					
8 Stall current	A	53.6	48.7					
9 Max. efficiency	%	80.9	84.8					
Characteristics								
10 Terminal resistance phase to phase	Ω	0.224	0.493					
11 Terminal inductance phase to phase	mH	0.109	0.39					
12 Torque constant	mNm/A	8.95	16.9					
13 Speed constant	rpm/V	1070	565					
14 Speed/torque gradient	rpm/mNm	26.7	16.5					
15 Mechanical time constant	ms	4.33	2.68					
16 Rotor inertia	gcm²	15.5	15.5					

Specifications

Thermal data

17 Thermal resistance housing-ambient		9.66 K/W
18 Thermal resistance winding-housing		2.57 K/W
19 Thermal time constant winding		17.7 s
20 Thermal time constant motor		821 s
21 Ambient temperature		-40...+100°C
22 Max. winding temperature		+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed		15000 rpm
24 Axial play at axial load	< 9.0 N	0 mm
	> 9.0 N	0.15 mm
25 Radial play		preloaded
26 Max. axial load (dynamic)		5 N
27 Max. force for press fits (static)		87 N
(static, shaft supported)		6500 N
28 Max. radial load, 5 mm from flange		15 N

Other specifications

29 Number of pole pairs	7
30 Number of phases	3
31 Weight of motor	170 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	39-01-2040

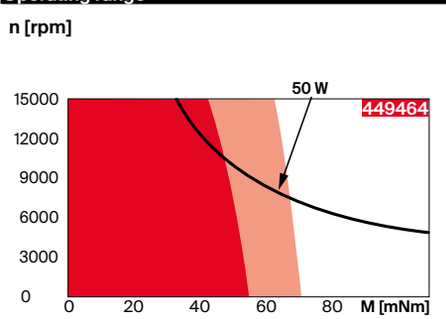
Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system

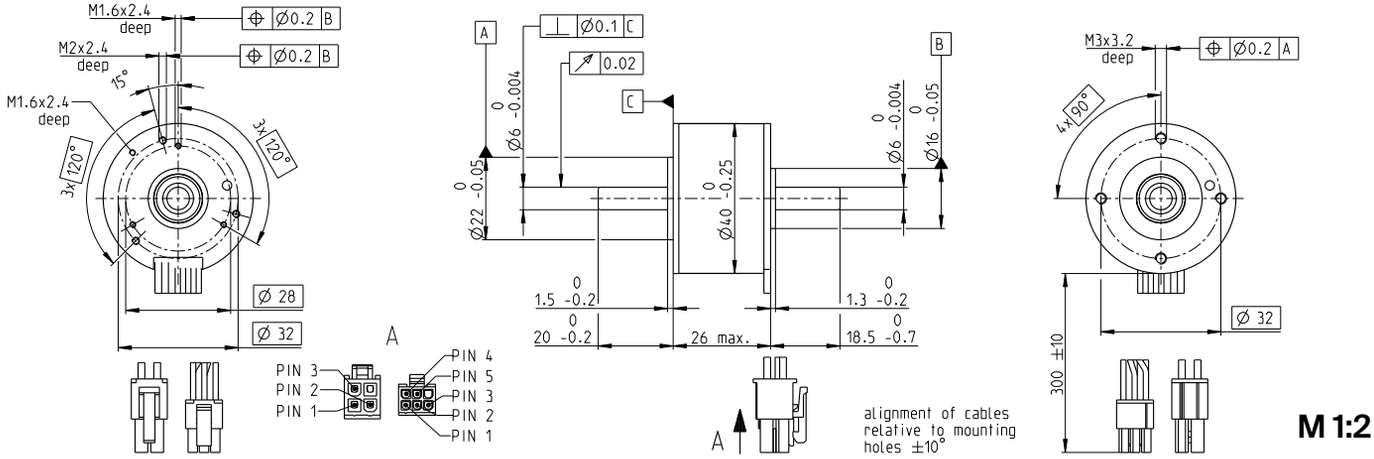
Details on catalog page 52

Gear	**Sensor**	**Motor Control**
431_GP 32 C	509_ENX 16 EASY	547_DEC Module 50/5
436-438_GP 42 A	510_ENX 16 EASY XT	551_ESCON 36/3 EC
439-441_GP 42 C	511_ENX 16 EASY Absolute	551_ESCON Module 50/4 EC-S
455_GSW 55 A	512_ENX 16 EASY Absolute XT	551_ESCON Module 50/5
474-482_GP 32 S	518_ENX 22 EMT	553_ESCON 50/5
	519_ENX 16 RIO	557_ESCON2 Micro 60/5
	526_TSX 40 MAG	563_EPOS4 Micro 24/5
	527_TSX 40 RIO	564_EPOS4 Module 50/5
		565_EPOS4 Compact 24/5 3-axes
		567_EPOS4 Compact 50/5
		569_EPOS4 50/5
		570_EPOS4 Disk 60/8
		571_EPOS4 Disk 60/12

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EC-i 40 ∅40 mm, brushless, 50 watt

High Torque



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

	with Hall sensors	496650	496651	496652	496653
Motor data					
	Values at nominal voltage				
1	Nominal voltage	V	9	18	36	48
2	No load speed	rpm	7780	7790	7350	7560
3	No load current	mA	577	289	131	103
4	Nominal speed	rpm	6390	6520	6080	6310
5	Nominal torque	mNm	65.7	65.2	78.9	73.9
6	Nominal current (max. continuous current)	A	5.95	2.95	1.62	1.19
7	Stall torque	mNm	466	497	534	526
8	Stall current	A	66.9	40.1	25.4	18.5
9	Max. efficiency	%	82.3	83.7	86	85.5
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.135	0.448	1.42	2.59
11	Terminal inductance phase to phase	mH	0.064	0.255	1.15	1.93
12	Torque constant	mNm/A	10.8	21.7	46.1	59.6
13	Speed constant	rpm/V	881	440	207	160
14	Speed/torque gradient	rpm/mNm	10.9	9.1	6.38	6.96
15	Mechanical time constant	ms	1.47	1.22	0.855	0.933
16	Rotor inertia	gcm²	12.8	12.8	12.8	12.8

Specifications

Thermal data

17	Thermal resistance housing-ambient	9.91 K/W
18	Thermal resistance winding-housing	3.77 K/W
19	Thermal time constant winding	26 s
20	Thermal time constant motor	892 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		10 000 rpm
24	Axial play at axial load	< 9.0 N	0 mm
		> 9.0 N	0.15 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		7 N
27	Max. force for press fits (static)		87 N
	(static, shaft supported)		6500 N
28	Max. radial load, 5 mm from flange		21 N

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	180 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	39-01-2040

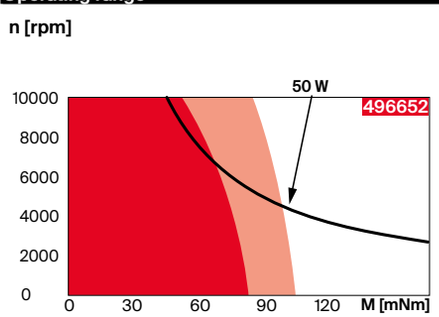
Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system

Details on catalog page 52

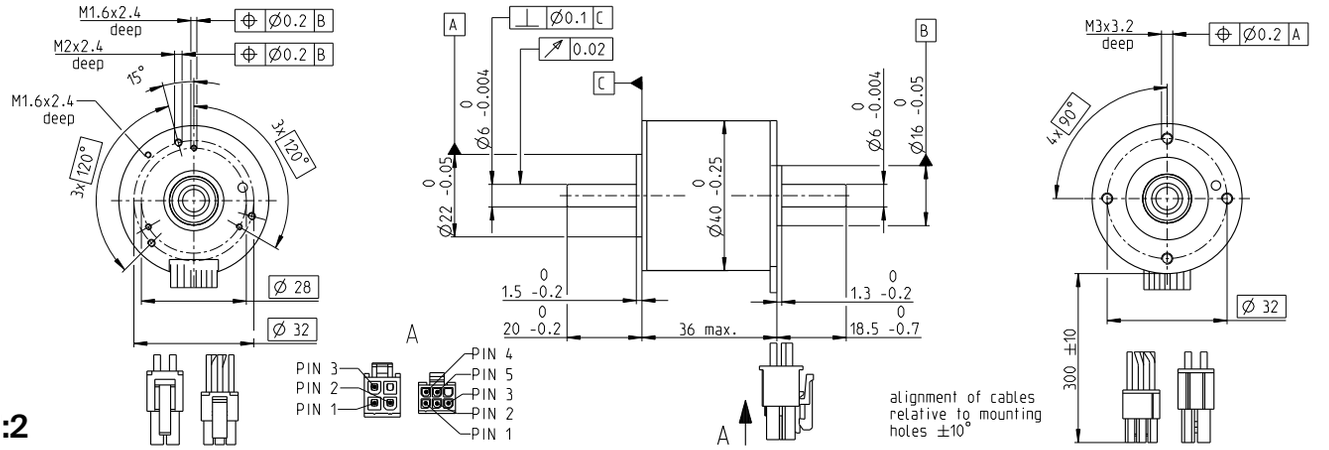
Gear
436–438_GP 42 A
439–441_GP 42 C
455_GSW 55 A

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO
526_TSX 40 MAG
527_TSX 40 RIO

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5, 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Comp. 24/5 3-axes
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-i 40 ∅40 mm, brushless, 70 watt



M 1:2

Stock program
Standard program
Special program (on request)

		Part numbers							
	with Hall sensors	449469	449470						
Motor data									
	Values at nominal voltage								
1	Nominal voltage	V	18	36					
2	No load speed	rpm	10100	10700					
3	No load current	mA	354	192					
4	Nominal speed	rpm	8220	8720					
5	Nominal torque	mNm	69.8	84.8					
6	Nominal current (max. continuous current)	A	3.98	2.47					
7	Stall torque	mNm	632	728					
8	Stall current	A	53.2	47					
9	Max. efficiency	%	84.1	87.3					
	Characteristics								
10	Terminal resistance phase to phase	Ω	0.338	0.766					
11	Terminal inductance phase to phase	mH	0.18	0.644					
12	Torque constant	mNm/A	16.7	31.5					
13	Speed constant	rpm/V	572	303					
14	Speed/torque gradient	rpm/mNm	11.6	7.36					
15	Mechanical time constant	ms	2.93	1.86					
16	Rotor inertia	gcm²	24.2	24.2					

Specifications

Thermal data

17	Thermal resistance housing-ambient	7.8 K/W
18	Thermal resistance winding-housing	2.6 K/W
19	Thermal time constant winding	28.5 s
20	Thermal time constant motor	936 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		15 000 rpm
24	Axial play at axial load	< 9.0 N	0 mm
		> 9.0 N	0.15 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		5 N
27	Max. force for press fits (static)		87 N
	(static, shaft supported)		5000 N
28	Max. radial load, 5 mm from flange		15 N

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	240 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	39-01-2040

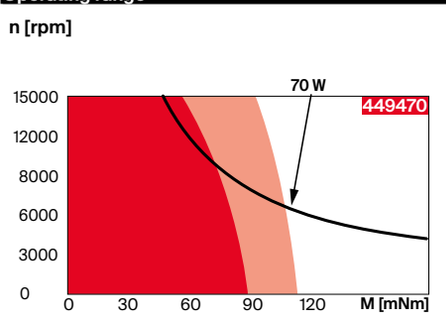
Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system

Details on catalog page 52

Gear
431_GP 32 C
436–438_GP 42 A
439–441_GP 42 C
455_GSW 55 A
474–482_GP 32 S

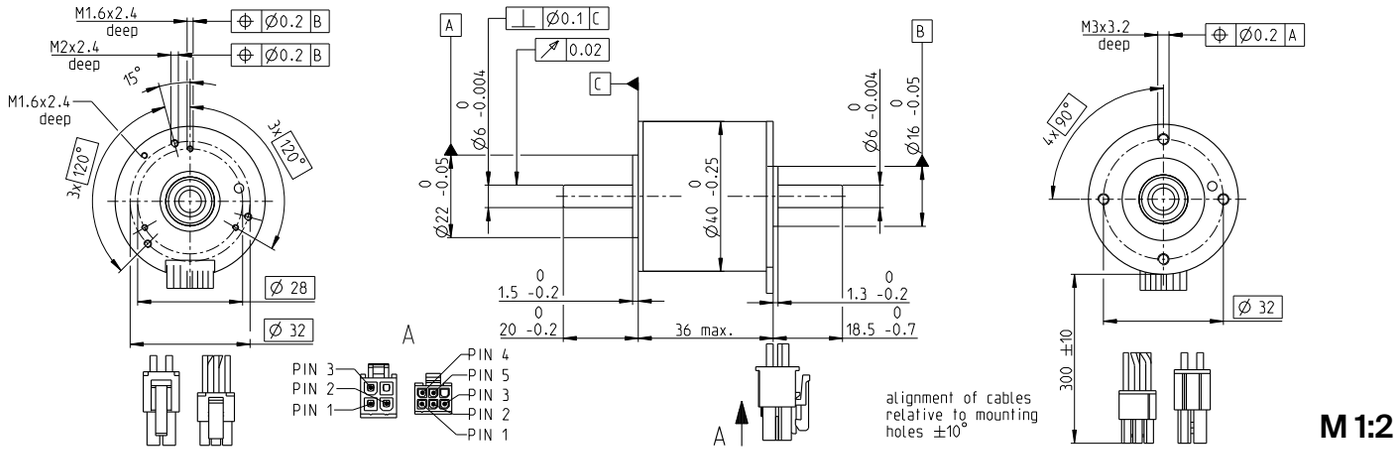
Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO
526_TSX 40 MAG
527_TSX 40 RIO

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
558_ESCON2 Module 60/12
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-i 40 ∅40 mm, brushless, 70 watt

High Torque



M 1:2

Stock program
Standard program
Special program (on request)

		Part numbers							
	with Hall sensors	496654	496655	496656					
Motor data									
	Values at nominal voltage								
1	Nominal voltage	V	18	36	48				
2	No load speed	rpm	7840	7390	4930				
3	No load current	mA	448	205	86.4				
4	Nominal speed	rpm	6890	6450	4100				
5	Nominal torque	mNm	105	130	152				
6	Nominal current (max. continuous current)	A	4.9	2.74	1.56				
7	Stall torque	mNm	932	1030	931				
8	Stall current	A	91.7	61.8	21.4				
9	Max. efficiency	%	86.4	88.6	87.5				
	Characteristics								
10	Terminal resistance phase to phase	Ω	0.196	0.582	2.24				
11	Terminal inductance phase to phase	mH	0.113	0.512	2.05				
12	Torque constant	mNm/A	21.7	46.1	92.1				
13	Speed constant	rpm/V	441	207	104				
14	Speed/torque gradient	rpm/mNm	3.99	2.62	2.52				
15	Mechanical time constant	ms	0.962	0.632	0.607				
16	Rotor inertia	gcm²	23	23	23				

Specifications

Thermal data

17	Thermal resistance housing-ambient	8.17 K/W
18	Thermal resistance winding-housing	2.27 K/W
19	Thermal time constant winding	24.9 s
20	Thermal time constant motor	1020 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		10 000 rpm
24	Axial play at axial load	< 9.0 N	0 mm
		> 9.0 N	0.15 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		7 N
27	Max. force for press fits (static)		87 N
	(static, shaft supported)		5000 N
28	Max. radial load, 5 mm from flange		26 N

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	250 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	39-01-2040

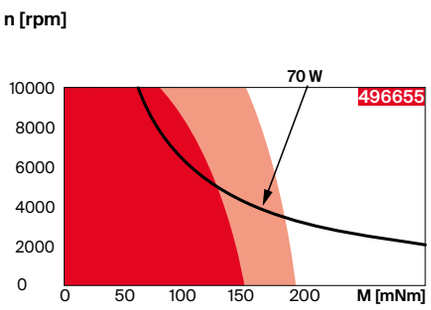
Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

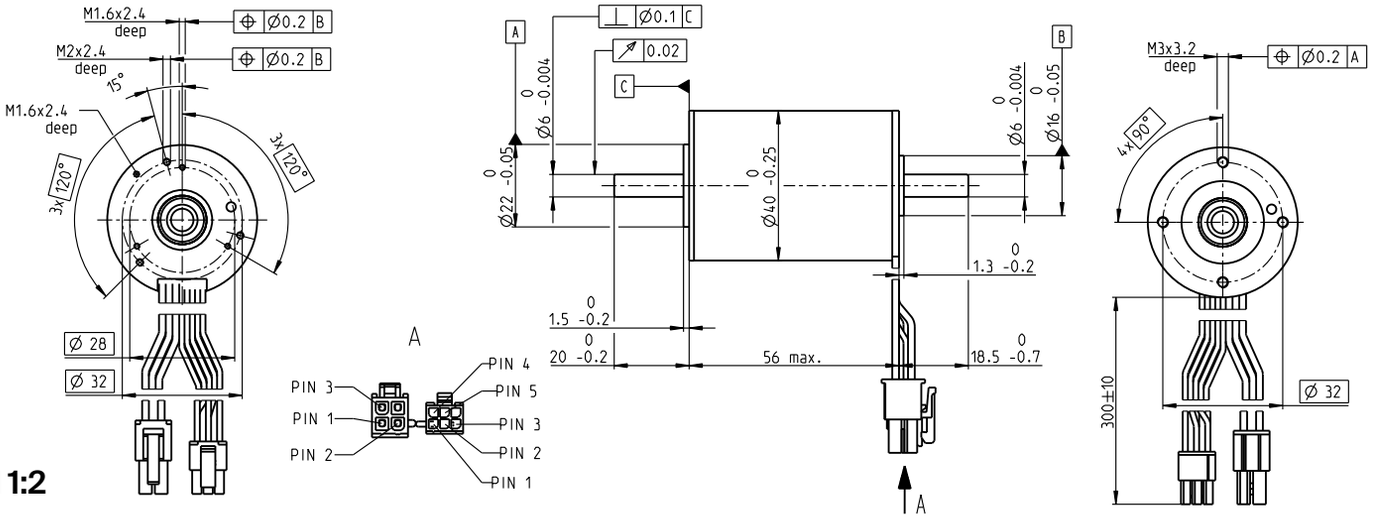
Modular system Details on catalog page 52

Gear	**Sensor**	**Motor Control**
436–438_GP 42 A	509_ENX 16 EASY	547_DEC Module 50/5
439–441_GP 42 C	510_ENX 16 EASY XT	551_ESCON 36/3 EC
455_GSW 55 A	511_ENX 16 EASY Absolute	551_ESCON Module50/4 EC-S
	512_ENX 16 EASY Absolute XT	551_ESCON Module 50/5
	518_ENX 22 EMT	553_ESCON 50/5
	519_ENX 16 RIO	563_EPOS4 Micro 24/5
	526_TSX 40 MAG	564_EPOS4 Module 50/5
	527_TSX 40 RIO	565_EPOS4 Compact 24/5 3-axes
		567_EPOS4 Compact 50/5
		569_EPOS4 50/5
		570_EPOS4 Disk 60/8
		571_EPOS4 Disk 60/12

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EC-i 40 ∅40 mm, brushless, 100 watt

High Torque



M 1:2

Stock program
Standard program
Special program (on request)

		Part numbers								
	with Hall sensors	496660	496661	488607						
Motor data										
	Values at nominal voltage									
1	Nominal voltage	V	18	36	48					
2	No load speed	rpm	4540	4550	5000					
3	No load current	mA	352	176	150					
4	Nominal speed	rpm	3920	3950	4390					
5	Nominal torque	mNm	209	210	224					
6	Nominal current (max. continuous current)	A	5.5	2.76	2.41					
7	Stall torque	mNm	1850	1930	2080					
8	Stall current	A	77.4	43.4	48.3					
9	Max. efficiency	%	86.8	87.5	89					
	Characteristics									
10	Terminal resistance phase to phase	Ω	0.233	0.829	0.994					
11	Terminal inductance phase to phase	mH	0.169	0.675	0.995					
12	Torque constant	mNm/A	37.5	74.9	91					
13	Speed constant	rpm/V	255	127	105					
14	Speed/torque gradient	rpm/mNm	1.58	1.41	1.15					
15	Mechanical time constant	ms	0.729	0.65	0.528					
16	Rotor inertia	gcm²	44	44	44					

Specifications

Thermal data

17	Thermal resistance housing-ambient	7.17 K/W
18	Thermal resistance winding-housing	1.35 K/W
19	Thermal time constant winding	25.8 s
20	Thermal time constant motor	1400 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed		8000 rpm
24	Axial play at axial load	< 9.0 N	0 mm
		> 9.0 N	0.15 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		7 N
27	Max. force for press fits (static)		87 N
	(static, shaft supported)		3000 N
28	Max. radial load, 5 mm from flange		29.9 N

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	390 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	39-01-2040

Connection sensor (Cable AWG 26)

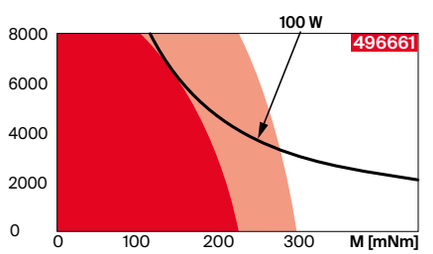
yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range

n [rpm]



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

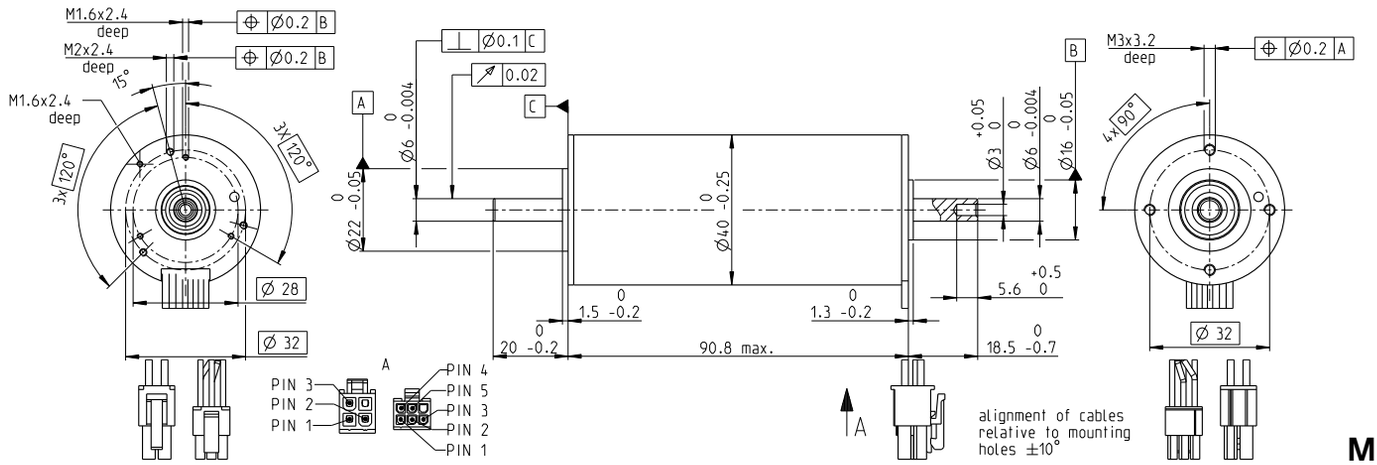
Modular system Details on catalog page 52

Gear	**Sensor**	**Motor Control**
436–438_GP 42 A	509_ENX 16 EASY	547_DEC Module 50/5
439–441_GP 42 C	510_ENX 16 EASY XT	551_ESCON 36/3 EC
455_GSW 55 A	511_ENX 16 EASY Absolute	551_ESCON Module 50/4 EC-S
	512_ENX 16 EASY Absolute XT	551_ESCON Module 50/5
	518_ENX 22 EMT	552_ESCON Module 50/8 HE
	519_ENX 16 RIO	553_ESCON 50/5
	526_TSX 40 MAG	553_ESCON 70/10
	527_TSX 40 RIO	557_ESCON2 Micro 60/5
		558_ESCON2 Module 60/12
		559_ESCON2 Compact 60/12
		564_EPOS4 Module 50/5
		565_EPOS4 Module 50/8
		567_EPOS4 Compact 50/5
		567_EPOS4 Compact 50/8
		569_EPOS4 50/5
		569_EPOS4 70/15
		570_EPOS4 Disk 60/8
		571_EPOS4 Disk 60/12

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EC-i 40 ∅40 mm, brushless, 130 watt

High Torque



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

with Hall sensors	666601	676600	666602	666603
Motor data				
Values at nominal voltage				
1 Nominal voltage V	18	24	36	48
2 No load speed rpm	4670	4730	4670	4640
3 No load current mA	496	379	248	185
4 Nominal speed rpm	3920	3990	3940	3910
5 Nominal torque mNm	278	301	330	343
6 Nominal current (max. continuous current) A	7.44	6.05	4.3	3.31
7 Stall torque mNm	2410	2650	2830	2880
8 Stall current A	92.4	86.6	69.1	55.7
9 Max. efficiency %	85.7	87	88.1	88.6
Characteristics				
10 Terminal resistance phase to phase Ω	0.195	0.277	0.521	0.862
11 Terminal inductance phase to phase mH	0.128	0.222	0.512	0.922
12 Torque constant mNm/A	36.4	47.9	72.8	97.8
13 Speed constant rpm/V	262	199	131	97.7
14 Speed/torque gradient rpm/mNm	1.4	1.15	0.938	0.862
15 Mechanical time constant ms	1.15	0.942	0.766	0.704
16 Rotor inertia gcm²	78	78	78	78

Specifications

Thermal data

17	Thermal resistance housing-ambient	5.08 K/W
18	Thermal resistance winding-housing	0.6 K/W
19	Thermal time constant winding	18.5 s
20	Thermal time constant motor	1490 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed	8000 rpm
24	Axial play at axial load < 9.0 N	0 mm
	> 9.0 N	0.15 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	7 N
27	Max. force for press fits (static)	87 N
	(static, shaft supported)	3000 N
28	Max. radial load, 5 mm from flange	29.9 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	587 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	39-01-2040

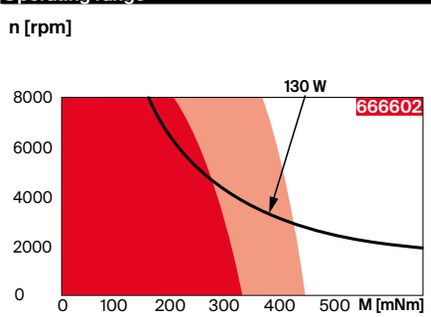
Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

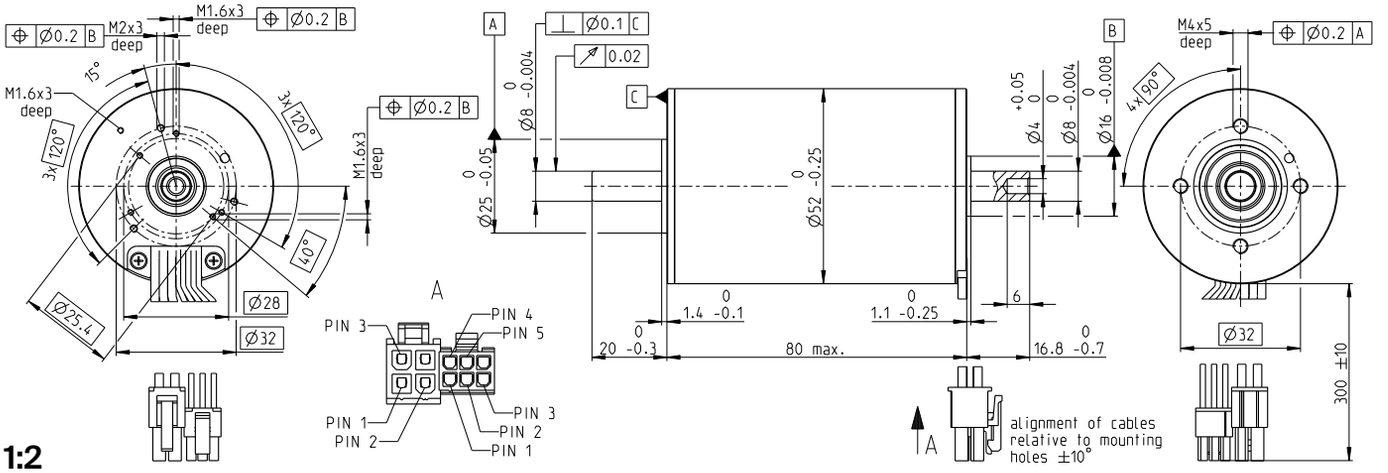
Details on catalog page 52

Gear	**Sensor**	**Motor Control**
436–438_GP 42 A	509_ENX 16 EASY	547_DEC Module 50/5
439–441_GP 42 C	510_ENX 16 EASY XT	551_ESCON Module 50/4 EC-S
455_GSW 55 A	511_ENX 16 EASY Absolute	551_ESCON Module 50/5
	512_ENX 16 EASY Absolute XT	552_ESCON Module 50/8 HE
	518_ENX 22 EMT	553_ESCON 50/5
	519_ENX 16 RIO	553_ESCON 70/10
	526_TSX 40 MAG	557_ESCON2 Micro 60/5
	527_TSX 40 RIO	558_ESCON2 Module 60/12
		559_ESCON2 Compact 60/12
		564_EPOS4 Module 50/5
		565_EPOS4 Module 50/8
		567_EPOS4 Compact 50/5
		567_EPOS4 Compact 50/8
		569_EPOS4 50/5
		569_EPOS4 70/15
		570_EPOS4 Disk 60/8
		571_EPOS4 Disk 60/12

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EC-i 52 ∅52 mm, brushless, 180 watt

High Torque



M 1:2

Stock program
Standard program
Special program (on request)

with Hall sensors	574740	574741	579164	579165
Motor data (provisional)				
Values at nominal voltage				
1 Nominal voltage V	18	24	36	48
2 No load speed rpm	4860	4720	4870	4950
3 No load current mA	1000	716	500	384
4 Nominal speed rpm	4360	4210	4370	4470
5 Nominal torque mNm	399	438	448	423
6 Nominal current (max. continuous current) A	11.5	9.03	6.33	4.59
7 Stall torque mNm	4370	4580	4930	4930
8 Stall current A	298	257	222	169
9 Max. efficiency %	88.6	89.6	90.6	90.5
Characteristics				
10 Terminal resistance phase to phase Ω	0.0604	0.0935	0.162	0.284
11 Terminal inductance phase to phase mH	0.0653	0.123	0.261	0.45
12 Torque constant mNm/A	35	48.1	70	91.9
13 Speed constant rpm/V	273	198	136	104
14 Speed/torque gradient rpm/mNm	0.471	0.386	0.316	0.321
15 Mechanical time constant ms	0.839	0.687	0.563	0.572
16 Rotor inertia gcm²	170	170	170	170

Specifications

Thermal data

17	Thermal resistance housing-ambient	4.32 K/W
18	Thermal resistance winding-housing	0.63 K/W
19	Thermal time constant winding	22.7 s
20	Thermal time constant motor	1780 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed	6000 rpm
24	Axial play at axial load < 15 N	0 mm
	> 15 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	12 N
27	Max. force for press fits (static)	150 N
	(static, shaft supported)	6000 N
28	Max. radial load, 5 mm from flange	110 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	823

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Article number
Molex	39-01-2040

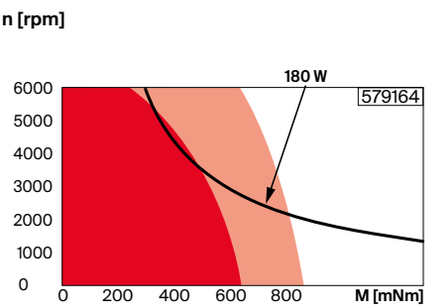
Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Article number
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 52

Gear
444_GP 52 C
455_GSW 55 A
456_GSW 62 A
458_GB 80[1]
459_GB 12[1]

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO
526_TSX 40 MAG
527_TSX 40 RIO

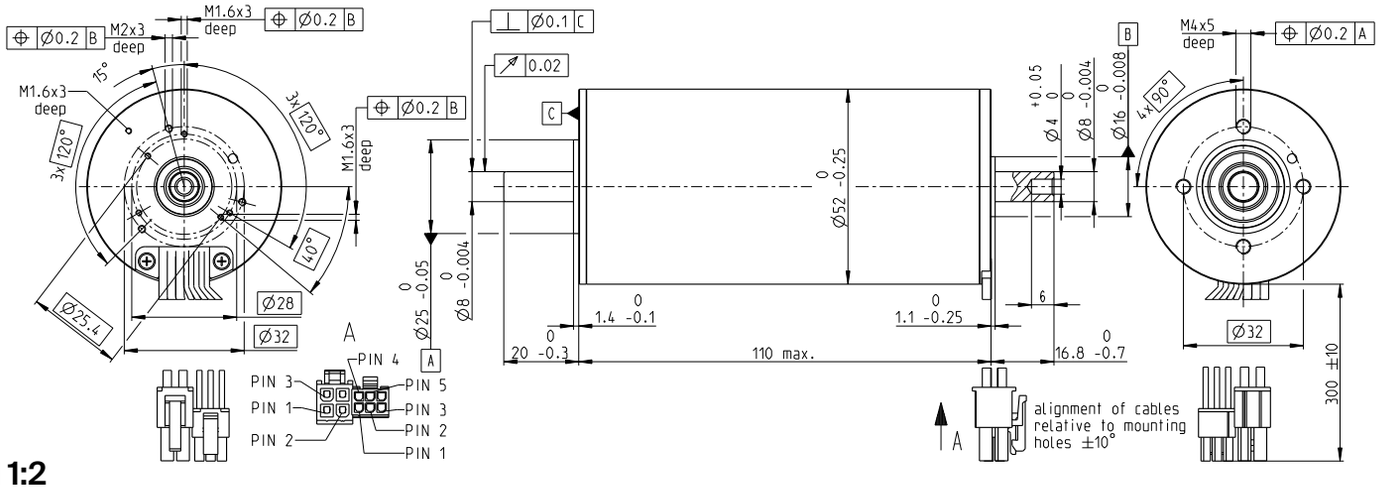
Motor Control
552_ESCON Module 50/8 HE
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/8
568_EPOS4 Compact 50/15
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

[1] on request

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EC-i 52 ∅52 mm, brushless, 200 watt

High Torque



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

	with Hall sensors	606793	596099	634043
Motor data (provisional)				
	Values at nominal voltage			
1	Nominal voltage	V	24	36	48
2	No load speed	rpm	3340	3660	3970
3	No load current	mA	657	499	419
4	Nominal speed	rpm	2970	3300	3610
5	Nominal torque	mNm	646	655	627
6	Nominal current (max. continuous current)	A	9.42	6.98	5.48
7	Stall torque	mNm	6820	7380	7830
8	Stall current	A	205	205	203
9	Max. efficiency	%	88.9	90.2	90.9
	Characteristics				
10	Terminal resistance phase to phase	Ω	0.117	0.176	0.236
11	Terminal inductance phase to phase	mH	0.149	0.28	0.424
12	Torque constant	mNm/A	68	93.1	115
13	Speed constant	rpm/V	140	103	83.3
14	Speed/torque gradient	rpm/mNm	0.241	0.194	0.172
15	Mechanical time constant	ms	0.668	0.535	0.475
16	Rotor inertia	gcm²	264	264	264

Specifications

Thermal data

17	Thermal resistance housing-ambient	4.02 K/W
18	Thermal resistance winding-housing	0.53 K/W
19	Thermal time constant winding	17.4 s
20	Thermal time constant motor	2310 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. permissible speed	5 000 rpm
24	Axial play at axial load < 15 N	0 mm
	> 15 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	12 N
27	Max. force for press fits (static)	150N
	(static, shaft supported)	6000 N
28	Max. radial load, 5 mm from flange	110 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	1150 g

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	39-01-2040

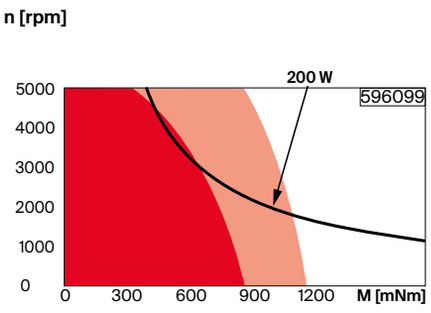
Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 52

Gear
444_GP 52 C
455_GSW 55 A
456_GSW 62 A
458_GB 80[1]
459_GB 12[1]

Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
518_ENX 22 EMT
519_ENX 16 RIO
526_TSX 40 MAG
527_TSX 40 RIO

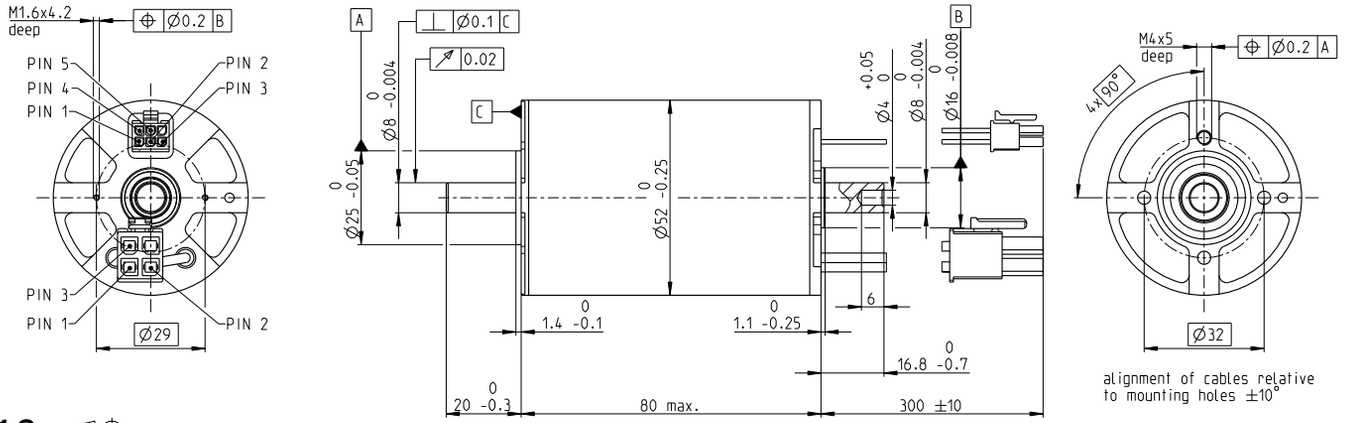
Motor Control
552_ESCON Module 50/8 HE
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
565_EPOS4 Compact 50/8
565_EPOS4 Compact 50/15
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

[1]on request

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EC-i 52 ∅52 mm, brushless, 250 watt

open housing



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

with Hall sensors	667060	667061	667062	667063
Motor data				
Values at nominal voltage				
1 Nominal voltage V	18	24	36	48
2 No load speed rpm	4450	4860	5010	5090
3 No load current mA	829	707	493	379
4 Nominal speed rpm	3770	4140	4280	4370
5 Nominal torque mNm	596	612	646	623
6 Nominal current (max. continuous current) A	14.7	12.3	8.86	6.55
7 Stall torque mNm	4290	4560	4860	4830
8 Stall current A	273	278	232	174
9 Max. efficiency %	89.1	90	90.8	90.7
Characteristics				
10 Terminal resistance phase to phase Ω	0.0658	0.0863	0.155	0.276
11 Terminal inductance phase to phase mH	0.0826	0.123	0.261	0.45
12 Torque constant mNm/A	38.2	46.7	68	89.2
13 Speed constant rpm/V	250	204	140	107
14 Speed/torque gradient rpm/mNm	0.43	0.377	0.32	0.331
15 Mechanical time constant ms	0.765	0.671	0.57	0.59
16 Rotor inertia gcm²	170	170	170	170

Specifications

Thermal data

17	Thermal resistance housing-ambient	3.5 K/W
18	Thermal resistance winding-housing	0.526 K/W
19	Thermal time constant winding	13.7 s
20	Thermal time constant motor	1310 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed	6000 rpm
24	Axial play at axial load < 9.0 N	0 mm
	> 9.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	12 N
27	Max. force for press fits (static)	150 N
	(static, shaft supported)	6000 N
28	Max. radial load, 5 mm from flange	110 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	750 g

Values listed in the table are nominal.

Connection motor (Cable AWG 14)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	171692-0104

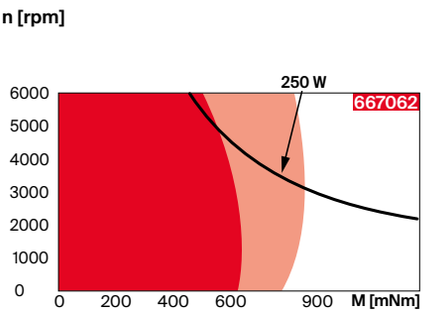
Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 52

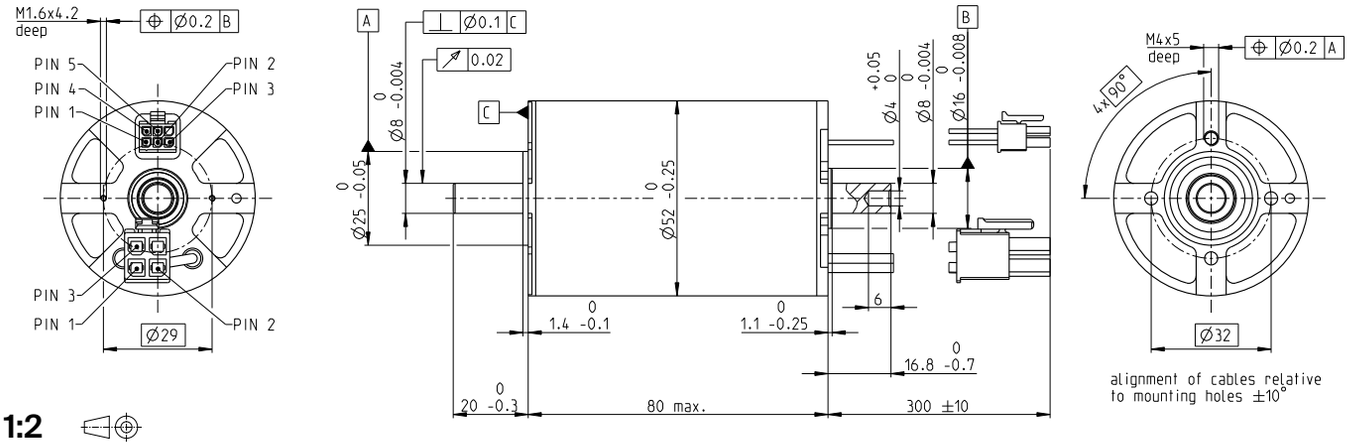
Sensor
509_ENX 16 EASY
510_ENX 16 EASY XT
511_ENX 16 EASY Absolute
512_ENX 16 EASY Absolute XT
519_ENX 16 RIO

Motor Control
552_ESCON Module 50/8 HE
553_ESCON 70/10
558_ESCON2 Module 60/30
559_ESCON2 Compact 60/30
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/8
568_EPOS4 Compact 50/15
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC-i 52 ∅52 mm, brushless, 420 watt

Ventilated



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

with Hall sensors	667064	667065	667066	633919
Motor data				
Values at nominal voltage				
1 Nominal voltage V	18	24	36	48
2 No load speed rpm	4450	4860	5010	5090
3 No load current mA	829	707	493	379
4 Nominal speed rpm	3470	3800	3910	3990
5 Nominal torque mNm	904	972	1050	1020
6 Nominal current (max. continuous current) A	21	18.3	13.3	9.94
7 Stall torque mNm	4290	4560	4860	4830
8 Stall current A	273	278	232	174
9 Max. efficiency %	89.1	90	90.8	90.7
Characteristics				
10 Terminal resistance phase to phase Ω	0.0658	0.0863	0.155	0.276
11 Terminal inductance phase to phase mH	0.0826	0.123	0.261	0.45
12 Torque constant mNm/A	38.2	46.7	68	89.2
13 Speed constant rpm/V	250	204	140	107
14 Speed/torque gradient rpm/mNm	0.43	0.377	0.32	0.331
15 Mechanical time constant ms	0.765	0.671	0.57	0.59
16 Rotor inertia gcm²	170	170	170	170

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.9 K/W
18	Thermal resistance winding-housing	0.365 K/W
19	Thermal time constant winding	8.78 s
20	Thermal time constant motor	714 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23	Max. speed	6000 rpm
24	Axial play at axial load < 9.0 N	0 mm
	> 9.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	12 N
27	Max. force for press fits (static)	150 N
	(static, shaft supported)	6000 N
28	Max. radial load, 5 mm from flange	110 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	752 g

Values listed in the table are nominal.

Connection motor (Cable AWG 14)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Article number**
Molex	171692-0104

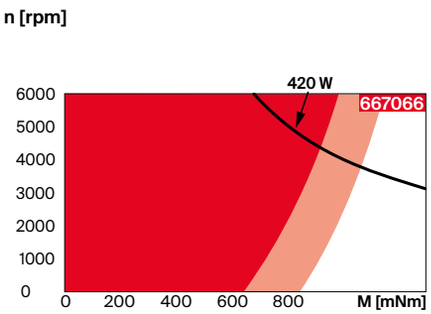
Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Article number**
Molex	430-25-0600

Wiring diagram for Hall sensors see p. 69

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system Details on catalog page 52

Sensor	**Motor Control**
509_ENX 16 EASY	553_ESCON 70/10
510_ENX 16 EASY XT	558_ESCON2 Module 60/30
511_ENX 16 EASY Absolute	559_ESCON2 Compact 60/30
512_ENX 16 EASY Absolute XT	
519_ENX 16 RIO	

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For your personal notes

maxon EC flat

Standard specification no. 101	90
Terminology explanations	190
EC 9.2 flat ∅10 mm, 0.5 Watt	319
EC 14 flat ∅13.6 mm, 1.5 Watt	320
EC 60 flat ∅60 mm, 100 Watt	321
EC 60 flat ∅60 mm, 150 Watt, open rotor	322
EC 60 flat ∅60 mm, 200 Watt, ventilated	323
EC 90 flat ∅90 mm, 160 Watt	324
EC 90 flat ∅90 mm, 220 Watt, open rotor	325
EC 90 flat ∅90 mm, 360 Watt, ventilated	326
EC 90 flat ∅90 mm, 260 Watt	327
EC 90 flat ∅90 mm, 400 Watt, open rotor	328
EC 90 flat ∅90 mm, 600 Watt, ventilated	329



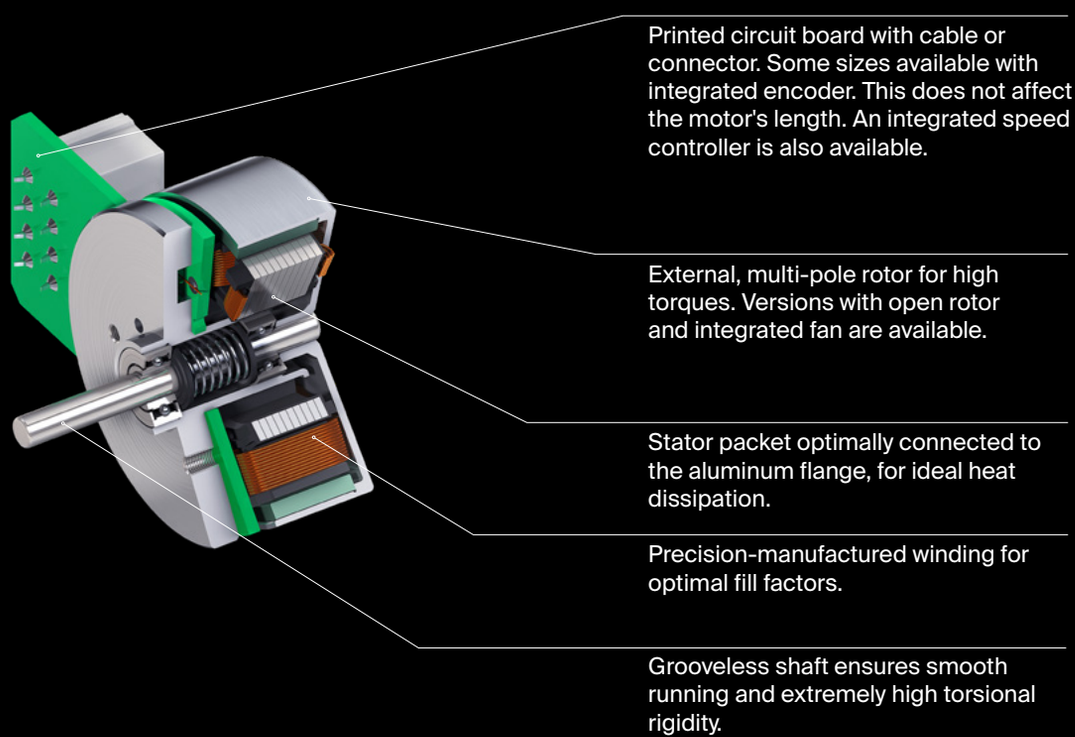
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maxon EC flat program

maxon flat motors are especially suitable for installation in confined spaces. The brushless motors are designed as internal and external rotors and can reach speeds of up to 20 000 rpm. The simple design makes it possible to automate the manufacturing – which is reflective in the price. maxon's EC flat motors are available with hall sensors, sensorless or with integrated electronics. These motors can also be combined with gearheads and encoders.

Key data

Motor ∅	9.2...90 mm
Motor length	8...39.9 mm
Power	0.5...600 W
Nominal torque	up to 1610 mNm
Max. permissible speed	up to 25 000 rpm

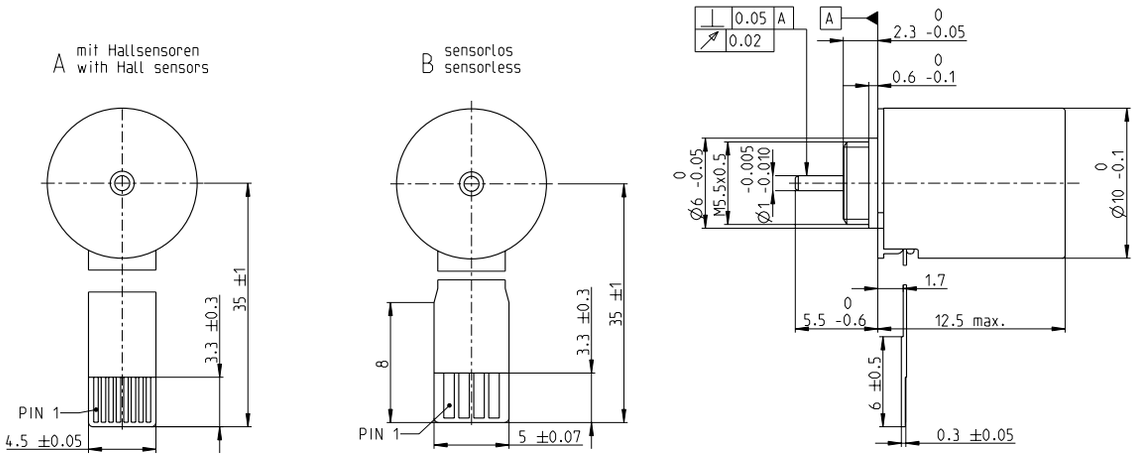


- → Attractive price/performance ratio
- → External, multi-pole rotor for high torques
- → Open design, for excellent heat dissipation at higher speeds

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EC 9.2 flat ∅10 mm, brushless, 0.5 watt



M 2:1

Stock program
Standard program
Special program (on request)

Part numbers

A with Hall sensors	624161	624162	624163
B sensorless	371119	371120	371122

Motor data (provisional)				
	Values at nominal voltage			
1	Nominal voltage	V	3	4.5	6
2	No load speed	rpm	13900	13900	15600
3	No load current	mA	51.5	34.7	31.1
4	Nominal speed	rpm	3950	3620	5240
5	Nominal torque	mNm	0.734	0.702	0.684
6	Nominal current	A	0.418	0.27	0.222
7	Stall torque[1]	mNm	1.09	1.01	1.1
8	Stall current	A	0.584	0.364	0.332
9	Max. efficiency	%	51.9	50.4	50.9
	Characteristics			
10	Terminal resistance phase to phase	Ω	5.14	12.4	18.1
11	Terminal inductance phase to phase	mH	0.127	0.281	0.4
12	Torque constant	mNm/A	1.86	2.77	3.3
13	Speed constant	rpm/V	5120	3450	2890
14	Speed/torque gradient	rpm/mNm	14100	15400	15800
15	Mechanical time constant	ms	35.1	38.2	39.3
16	Rotor inertia	gcm²	0.237	0.237	0.237

Specifications

Thermal data

17	Thermal resistance housing-ambient	49.2 K/W
18	Thermal resistance winding-housing	13.2 K/W
19	Thermal time constant winding	1.35 s
20	Thermal time constant motor	73.8 s
21	Ambient temperature	-20...+85°C
22	Max. winding temperature	+100°C

Mechanical data (preloaded ball bearings)

23	Max. speed		25 000 rpm
24	Axial play at axial load	< 0.35 N	0 mm
		> 0.35 N	0.1 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		0.15 N
27	Max. force for press fits (static)		15 N
	(static, shaft supported)		70 N
28	Max. radial load, 4 mm from flange		0.4 N

Other specifications

29	Number of pole pairs	4
30	Number of phases	3
31	Weight of motor	3 g

Values listed in the table are nominal.

Connection	with Hall sensors	sensorless
Pin 1	Motor winding 1	Motor winding 1
Pin 2	Motor winding 2	Motor winding 2
Pin 3	Motor winding 3	Motor winding 3
Pin 4	V_{Hall} 2.5...5.5 VDC	Y
Pin 5	GND	
Pin 6	Hall sensor 1	
Pin 7	Hall sensor 2	
Pin 8	Hall sensor 3	

Output signals: CMOS compatible push-pull stage.

Compatible connector:

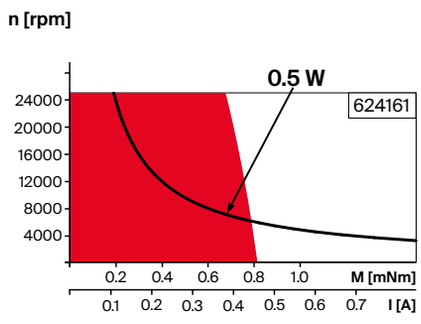
Type	Part number	Part number
Molex	52745-0897	52207-0460
FCI	SFV8R-2STBE1HLF	SFW4R-2STGE1LF

Pin for design with Hall sensors:
FPC, 8-pol, Pitch 0.5 mm, top contact style

Option: Sleeve bearings in place of ball bearings

[1]Calculation does not include saturation effect (p. 83/190)

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

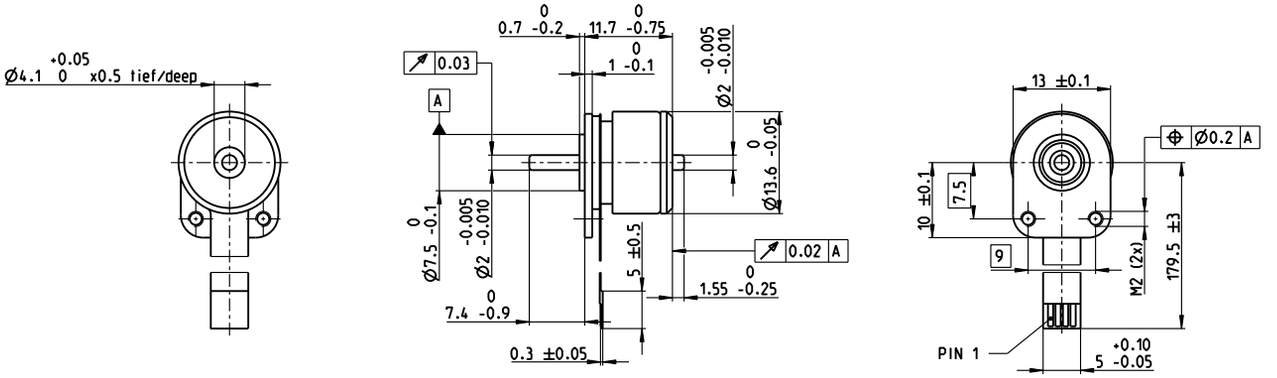
Details on catalog page 56

Gear
414_GP 10 A

Motor Control
547_DEC Module 24/2
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
557_ESCON2 Nano 24/2
564_EPOS4 Module 24/1.5
566_EPOS4 Compact 24/1.5

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EC 14 flat ∅13.6 mm, brushless, 1.5 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

		sensorless	339251	339252	236679	339253
Motor data						
	Values at nominal voltage					
1	Nominal voltage	V	6	12	18	24
2	No load speed	rpm	20000	20100	19900	20000
3	No load current	mA	156	78.1	51.7	38.9
4	Nominal speed	rpm	9600	9680	9390	9590
5	Nominal torque	mNm	1.8	1.83	1.74	1.81
6	Nominal current (max. continuous current)	A	0.794	0.402	0.256	0.199
7	Stall torque[1]	mNm	3.79	3.87	3.6	3.8
8	Stall current	A	1.5	0.764	0.474	0.374
9	Max. efficiency	%	49	49	48	49
	Characteristics					
10	Terminal resistance phase to phase	Ω	4.01	15.7	38	64.1
11	Terminal inductance phase to phase	mH	0.107	0.428	0.962	1.71
12	Torque constant	mNm/A	2.53	5.06	7.6	10.1
13	Speed constant	rpm/V	3770	1890	1260	942
14	Speed/torque gradient	rpm/mNm	5980	5860	6270	5960
15	Mechanical time constant	ms	68.9	67.5	72.3	68.6
16	Rotor inertia	gcm²	1.1	1.1	1.1	1.1

Specifications

Thermal data

17	Thermal resistance housing-ambient	11.6 K/W
18	Thermal resistance winding-housing	11.3 K/W
19	Thermal time constant winding	1.37 s
20	Thermal time constant motor	49.2 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		22000 rpm
24	Axial play at axial load	< 1.5 N	0 mm
		> 1.5 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		1.3 N
27	Max. force for press fits (static)		18 N
	(static, shaft supported)		200 N
28	Max. radial load, 5 mm from flange		3.4 N

Other specifications

29	Number of pole pairs	4
30	Number of phases	3
31	Weight of motor	8 g

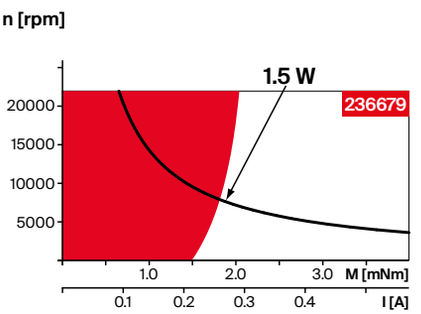
Values listed in the table are nominal.

Connection
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 ⅄ neutral point

Adapter	**Part number**
see p. 581	220310
Connector	**Part number**
TE	84953-4
Molex	52207-0433

[1]Calculation does not include saturation effect (p. 83/190)

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

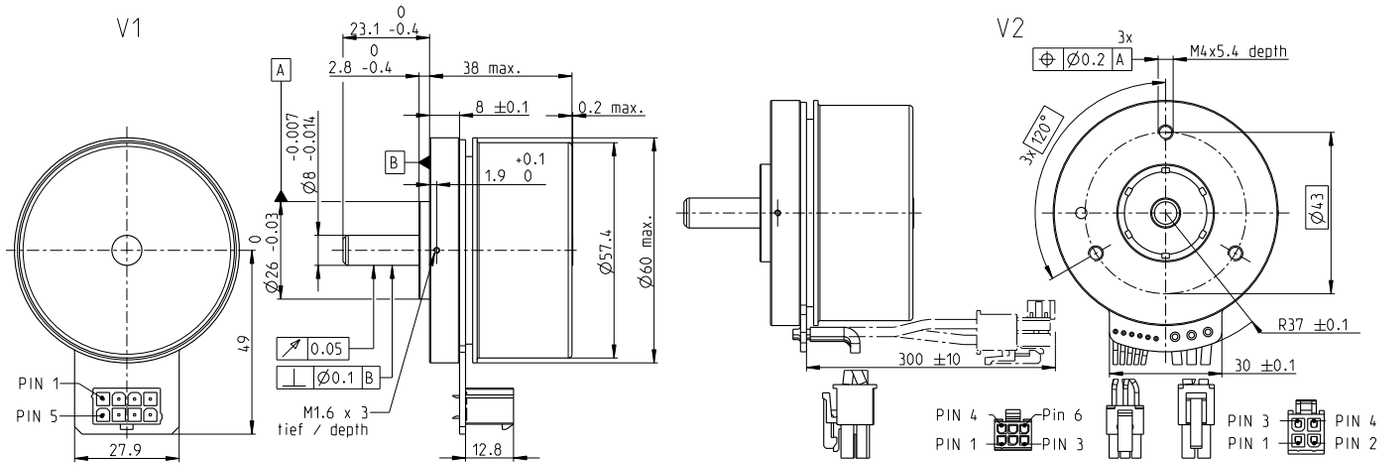
Modular system

Details on catalog page 56

Motor Control
551_ESCON Module 50/4 EC-S

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EC 60 flat ∅60 mm, brushless, 100 watt



M 1:2

Stock program
Standard program
Special program (on request)

	Part numbers								
V1 with Hall sensors	625854	625855	625856						
V2 with Hall sensors and cables	647691	645604	647692						
Motor data									
Values at nominal voltage									
1 Nominal voltage	V	12	24	48					
2 No load speed	rpm	3760	4300	4020					
3 No load current	mA	797	493	221					
4 Nominal speed	rpm	3210	3730	3460					
5 Nominal torque	mNm	263	272	301					
6 Nominal current (max. continuous current)	A	8.79	5.18	2.63					
7 Stall torque	mNm	2210	2510	2650					
8 Stall current	A	113	83.2	43.9					
9 Max. efficiency	%	84	85.2	86.3					
Characteristics									
10 Terminal resistance phase to phase	Ω	0.106	0.288	1.09					
11 Terminal inductance phase to phase	mH	0.0911	0.279	1.28					
12 Torque constant	mNm/A	30	52.5	113					
13 Speed constant	rpm/V	318	182	84.8					
14 Speed/torque gradient	rpm/mNm	1.13	0.998	0.823					
15 Mechanical time constant	ms	9.84	8.72	7.2					
16 Rotor inertia	gcm²	835	835	835					

Specifications

Thermal data

17	Thermal resistance housing-ambient	2.5 K/W
18	Thermal resistance winding-housing	3.8 K/W
19	Thermal time constant winding	41.4 s
20	Thermal time constant motor	90 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	6000 rpm
24	Axial play at axial load < 12.0 N	0 mm
	> 12.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	12 N
27	Max. force for press fits (static)	170 N
	(static, shaft supported)	8000 N
28	Max. radial load, 5 mm from flange	112 N

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	355 g

Values listed in the table are nominal.

Connection V1	**V2** (sensors, AWG 24)
Pin 1 Hall sensor1	Hall sensor 1
Pin 2 Hall sensor 2	Hall sensor 2
Pin 3 V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4 Motor winding 3	GND
Pin 5 Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6 GND	N.C.
Pin 7 Motor winding 1	
Pin 8 Motor winding 2	
	V2 (Motor, AWG 16)
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

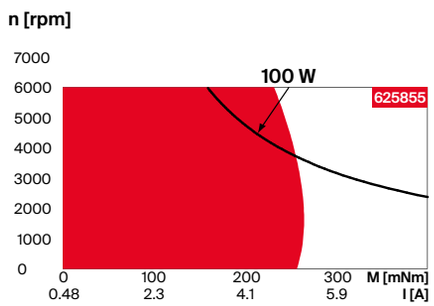
Wiring diagram for Hall sensors see p. 69

Connector	**Part number**
Molex 46015-0806	43025-0600
Molex	39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
zu EPOS4, L = 500 mm	**354045**

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 56

Gear
444_GP 52 C
458_GB 80[1]
456_GSW 62 A

Sensor
530_Encoder MILE

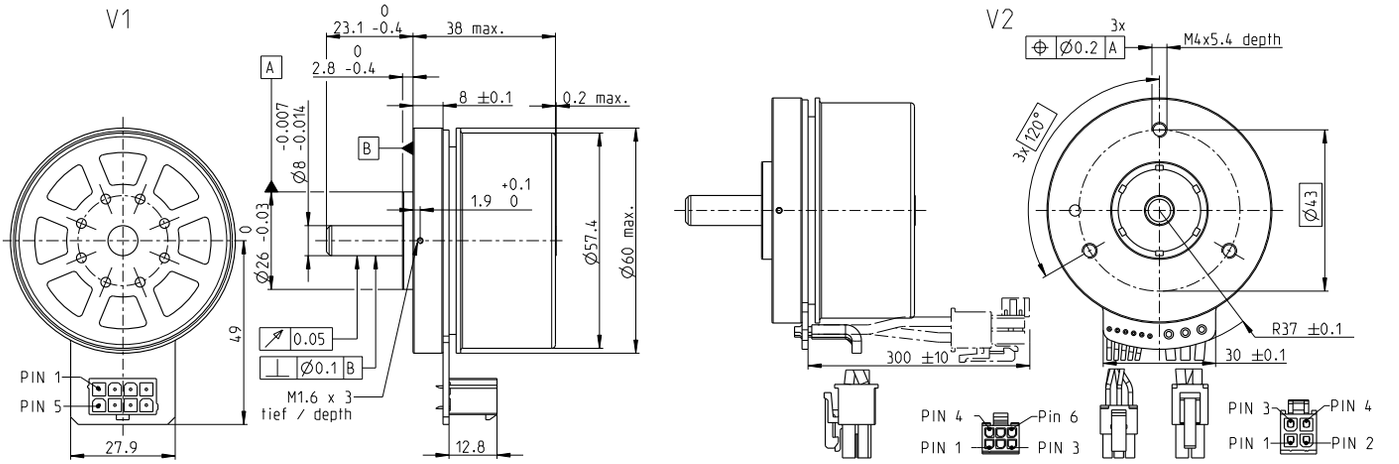
Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
568_EPOS4 Compact 50/15
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

[1]on request

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EC 60 flat ∅60 mm, brushless, 150 watt

Open Rotor



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers			
V1 with Hall sensors	625857	**625858**	625859
V2 with Hall sensors and cables	647693	647694	647695

Motor data									
Values at nominal voltage									
1 Nominal voltage	V	12	24	48					
2 No load speed	rpm	3760	4300	4020					
3 No load current	mA	815	497	224					
4 Nominal speed	rpm	2990	3480	3230					
5 Nominal torque	mNm	381	405	441					
6 Nominal current (max. continuous current)	A	12.1*	7.29	3.66					
7 Stall torque	mNm	2210	2510	2650					
8 Stall current	A	113	83.2	43.9					
9 Max. efficiency	%	83.7	85.1	86.1					
Characteristics									
10 Terminal resistance phase to phase	Ω	0.106	0.288	1.09					
11 Terminal inductance phase to phase	mH	0.0911	0.279	1.28					
12 Torque constant	mNm/A	30	52.5	113					
13 Speed constant	rpm/V	318	182	84.8					
14 Speed/torque gradient	rpm/mNm	1.13	0.998	0.823					
15 Mechanical time constant	ms	9.54	8.46	6.98					
16 Rotor inertia	gcm²	810	810	810					

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.94 K/W
18	Thermal resistance winding-housing	1.48 K/W
19	Thermal time constant winding	16.1 s
20	Thermal time constant motor	69.9 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	6000 rpm
24	Axial play at axial load < 12.0 N	0 mm
	> 12.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	12 N
27	Max. force for press fits (static)	170 N
	(static, shaft supported)	8000 N
28	Max. radial load, 5 mm from flange	112 N

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	350 g

Values listed in the table are nominal.

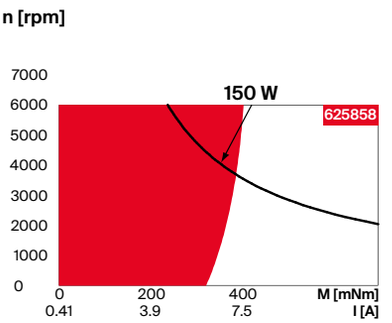
Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (Motor, AWG 16)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

Wiring diagram for Hall sensors see p. 69

Connector	**Part number**
Molex 46015-0806	43025-0600
Molex	39-01-2040

Connection cable for V1	
Universal, L = 500 mm	**339380**
to EPOS4, L = 500 mm	**354045**

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 56

Gear
444_GP 52 C
458_GB 80[1]
456_GSW 62 A

Sensor
530_Encoder MILE

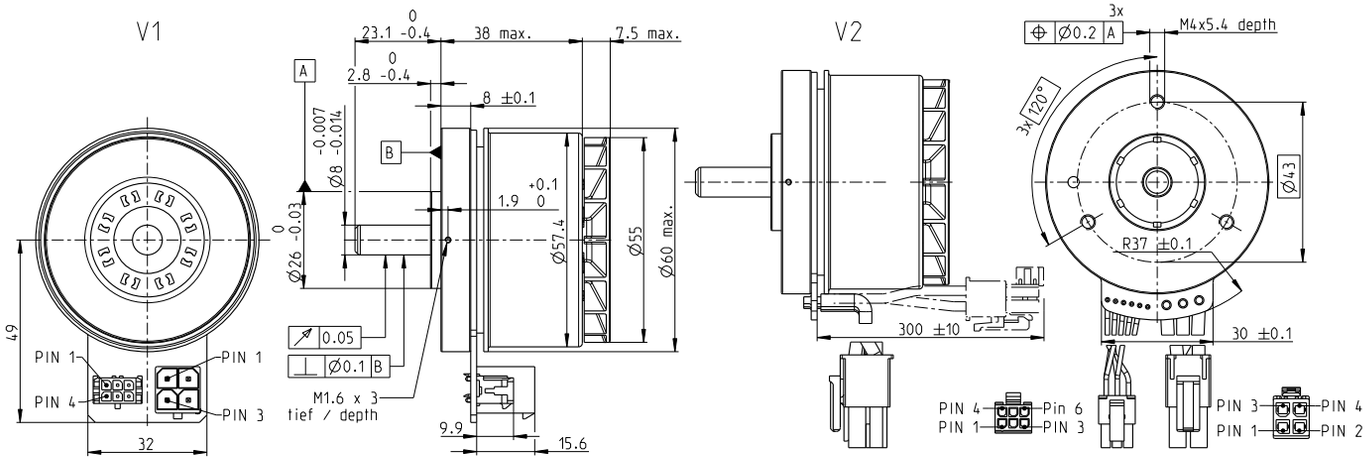
Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
568_EPOS4 Compact 50/15
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

[1]on request
*In combination with EPOS4 positioning controllers, the connector technology limits the nominal current (max. continuous current load) is limited to 11 A.

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EC 60 flat ∅60 mm, brushless, 200 watt

Ventilated



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers			
V1 with Hall sensors	625860	**614949**	625861
V2 with Hall sensors and cables	647696	642221	647697

Motor data									
	Values at nominal voltage								
1	Nominal voltage	V	12	24	48				
2	No load speed	rpm	3760	4300	4020				
3	No load current	mA	815	497	224				
4	Nominal speed	rpm	2790	3240	3020				
5	Nominal torque	mNm	496	540	581				
6	Nominal current (max. continuous current)	A	15.2*	9.34	4.63				
7	Stall torque	mNm	2210	2510	2650				
8	Stall current	A	113	83.2	43.9				
9	Max. efficiency	%	83.7	85.1	86.1				
	Characteristics								
10	Terminal resistance phase to phase	Ω	0.106	0.288	1.09				
11	Terminal inductance phase to phase	mH	0.0911	0.279	1.28				
12	Torque constant	mNm/A	30	52.5	113				
13	Speed constant	rpm/V	318	182	84.8				
14	Speed/torque gradient	rpm/mNm	1.13	0.998	0.823				
15	Mechanical time constant	ms	9.8	8.69	7.17				
16	Rotor inertia	gcm²	832	832	832				

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.22 K/W
18	Thermal resistance winding-housing	0.843 K/W
19	Thermal time constant winding	9.19 s
20	Thermal time constant motor	44 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	6000 rpm
24	Axial play at axial load < 12.0 N	0 mm
	> 12.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	12 N
27	Max. force for press fits (static)	170 N
	(static, shaft supported)	8000 N
28	Max. radial load, 5 mm from flange	112 N

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	360 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	Hall sensor 3	Hall sensor 3
Pin 4	GND	GND
Pin 5	V_{Hall} 4.5...24 VDC	V_{Hall} 4.5...24 VDC
Pin 6	N.C.	N.C.
		V2 (Motor, AWG 14)
Pin 1	Motor winding 1	Motor winding 1
Pin 2	Motor winding 2	Motor winding 2
Pin 3	Motor winding 3	Motor winding 3
Pin 4		N.C.

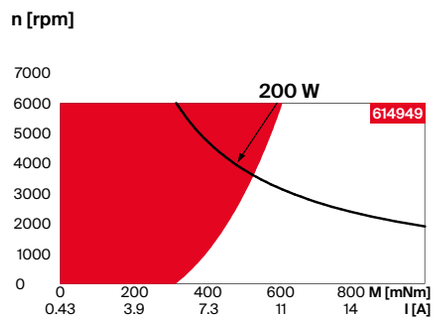
Wiring diagram for Hall sensors see p. 69

Connector	**Part number**	
Molex Micro-Fit	43045-0627	43025-0600
Molex	76829-0104	171692-0104

Connection cable for V1

for windings, L = 3 m	**520851**
for Hall sensors, L = 3 m	**275878**

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 56

Gear
444_GP 52 C
458_GB 80¹
456_GSW 62 A

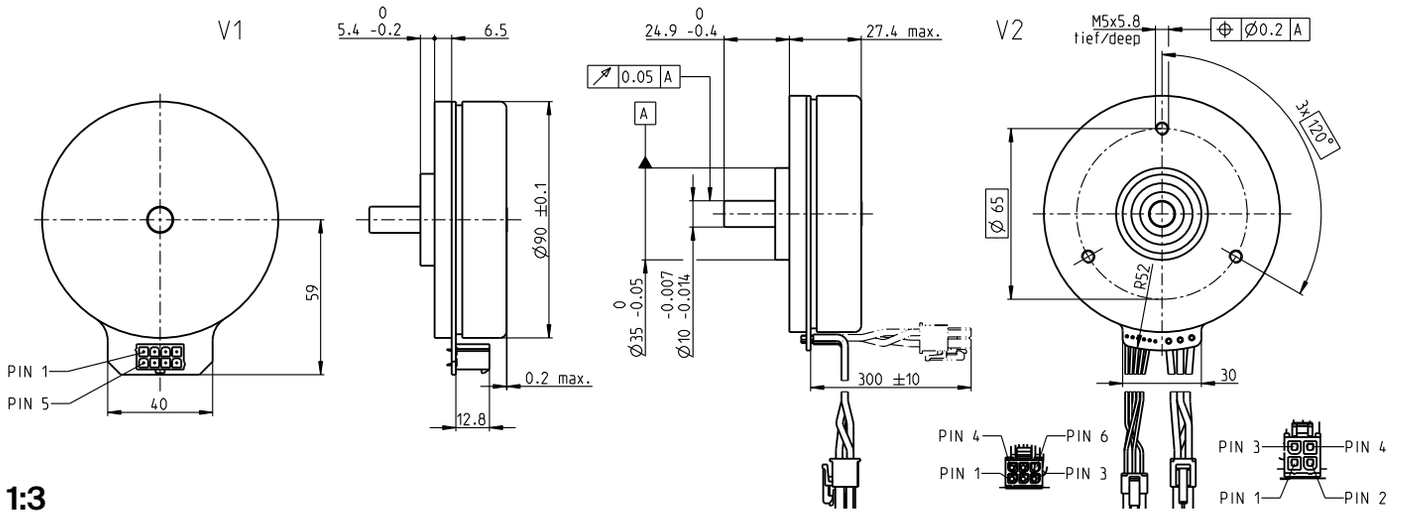
Sensor
530_Encoder MILE

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
558_ESCON2 Module 60/30
559_ESCON2 Compact 60/12
559_ESCON2 Compact 60/30

¹on request
*625860 and 647696 cannot be combined with the MILE encoder, because the current limit of the connectors of the MILE circuit board is 13 A.

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EC 90 flat ∅90 mm, brushless, 160 watt



M 1:3

Stock program
Standard program
Special program (on request)

	Part numbers			
V1 with Hall sensors	586655	**515458**	505592	**580047**
V2 with Hall sensors and cables	607321	607322	607323	607324
Motor data				
Values at nominal voltage				
1 Nominal voltage V	12	24	36	60
2 No load speed rpm	3170	3170	3070	2600
3 No load current mA	1320	658	420	197
4 Nominal speed rpm	2700	2720	2630	2200
5 Nominal torque mNm	462	462	457	464
6 Nominal current (max. continuous current) A	12.9*	6.44	4.12	2.11
7 Stall torque mNm	4930	5110	5000	4580
8 Stall current A	211	113	70	30.1
9 Max. efficiency %	84.7	85.1	84.9	84.3
Characteristics				
10 Terminal resistance phase to phase Ω	0.0569	0.213	0.514	2
11 Terminal inductance phase to phase mH	0.058	0.232	0.554	2.15
12 Torque constant mNm/A	35.6	71.2	110	217
13 Speed constant rpm/V	268	134	86.8	44.1
14 Speed/torque gradient rpm/mNm	0.429	0.401	0.406	0.406
15 Mechanical time constant ms	14.2	13.3	13.5	13.5
16 Rotor inertia gcm²	3170	3170	3170	3170

Specifications

Thermal data

17	Thermal resistance housing-ambient	2.37 K/W
18	Thermal resistance winding-housing	3.71 K/W
19	Thermal time constant winding	69.8 s
20	Thermal time constant motor	260 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static) (static, shaft supported)	440 N 8000 N
28	Max. radial load, 10 mm from flange	100 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	630 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 16)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

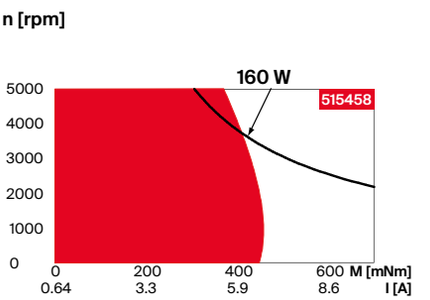
Wiring diagram for Hall sensors see p. 69

Connector		**Part number**
Molex	46015-0806	43025-0600
Molex		39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS4, L = 500 mm	**354045**

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 56

Gear
444_GP 52 C
458_GB 80¹
459_GB 12¹
460_GB 9¹
461_GB 65¹

Sensor
531_Encoder MILE

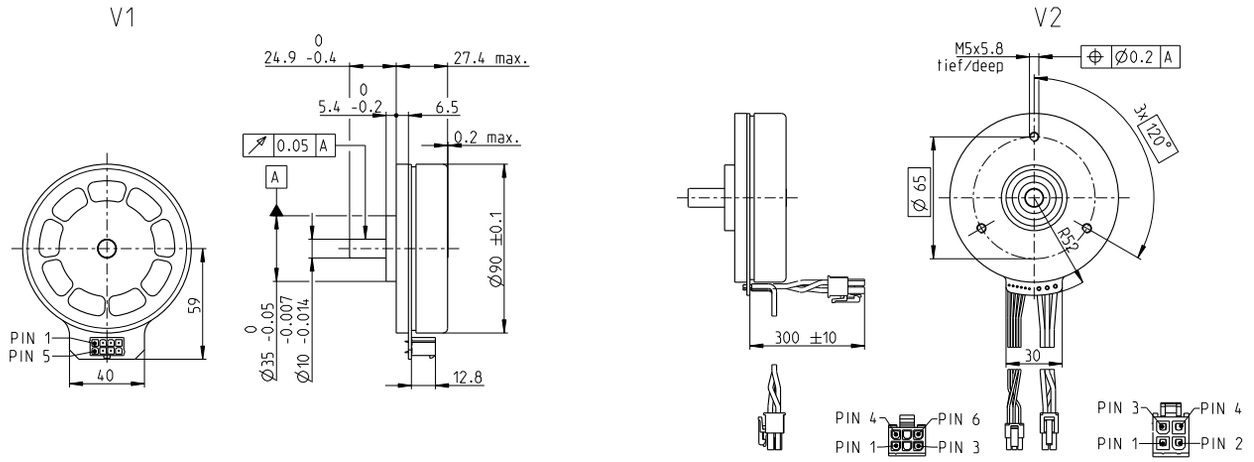
Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5, 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
558_ESCON2 Module 60/30
559_ESCON2 Compact 60/12
559_ESCON2 Compact 60/30
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
568_EPOS4 Compact 50/15
569_EPOS4 50/5
569_EPOS4 70/15
571_EPOS4 Disk 60/12

Note: The cable alignment relative to the mounting holes of the gearhead is not defined.
¹on request
*In combination with EPOS4 positioning controllers, the connector technology limits the nominal current (max. continuous current load) is limited to 11 A.

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EC 90 flat ∅90 mm, brushless, 220 watt

Open Rotor



M 1:4

Stock program
Standard program
Special program (on request)

	Part numbers								
V1 with Hall sensors	**607942**	607943	607944						
V2 with Hall sensors and cables	607946	607947	607948						
Motor data									
Values at nominal voltage									
1 Nominal voltage	V	24	36	60					
2 No load speed	rpm	3170	3070	2600					
3 No load current	mA	658	420	197					
4 Nominal speed	rpm	2490	2420	2020					
5 Nominal torque	mNm	735	721	697					
6 Nominal current (max. continuous current)	A	9.5	6.04	2.98					
7 Stall torque	mNm	5110	5000	4580					
8 Stall current	A	113	70	30.1					
9 Max. efficiency	%	85.1	84.9	84.3					
Characteristics									
10 Terminal resistance phase to phase	Ω	0.213	0.514	2					
11 Terminal inductance phase to phase	mH	0.232	0.554	2.15					
12 Torque constant	mNm/A	71.2	110	217					
13 Speed constant	rpm/V	134	86.8	44.1					
14 Speed/torque gradient	rpm/mNm	0.401	0.406	0.406					
15 Mechanical time constant	ms	12.1	12.2	12.2					
16 Rotor inertia	gcm²	2875	2875	2875					

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.87 K/W
18	Thermal resistance winding-housing	1.43 K/W
19	Thermal time constant winding	27.7 s
20	Thermal time constant motor	278 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static)	440 N
	(static, shaft supported)	8000 N
28	Max. radial load, 10 mm from flange	100 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	624 g

Values listed in the table are nominal.

Connection V1

		V2 (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

	V2 (motor, AWG 16)
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

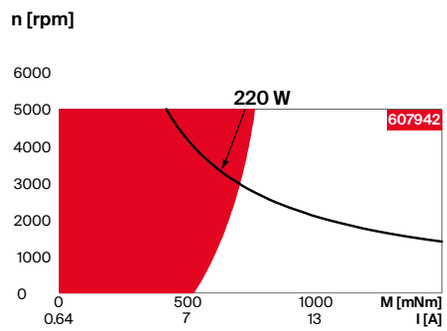
Wiring diagram for Hall sensors see p. 69

Connector	**Part number**
Molex 46015-0806	43025-0600
Molex	39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS4, L = 500 mm	**354045**

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 56

Gear
444_GP 52 C
458_GB 80¹
459_GB 12¹
460_GB 9¹
461_GB 65¹

Sensor
531_Encoder MILE

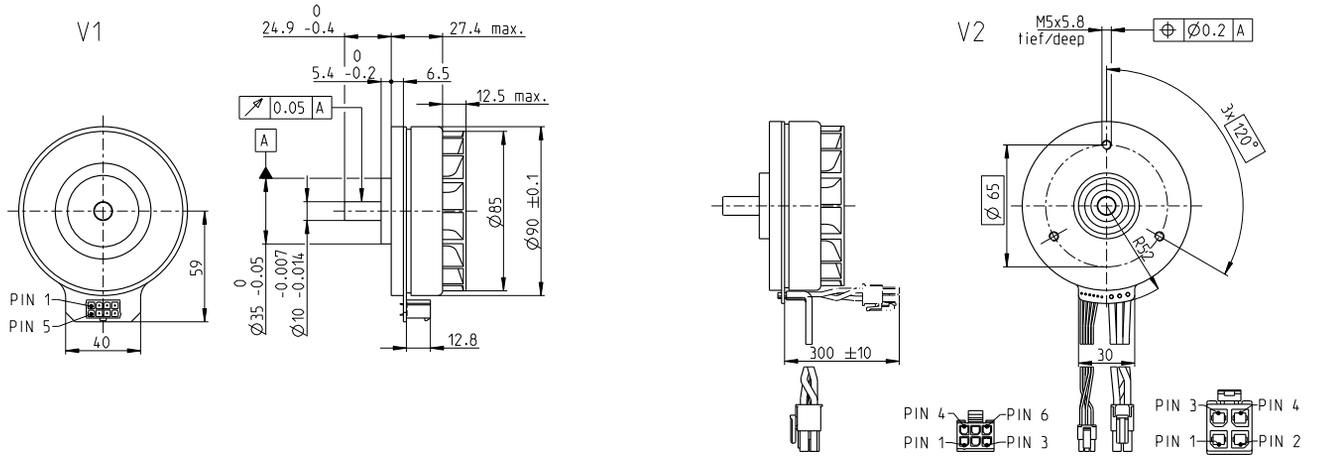
Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
558_ESCON2 Module 60/30
559_ESCON2 Compact 60/12
559_ESCON2 Compact 60/30
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
568_EPOS4 Compact 50/15
569_EPOS4 50/5
569_EPOS4 70/15
571_EPOS4 Disk 60/12

Note: The cable alignment relative to the mounting holes of the gearhead is not defined.
¹on request

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EC 90 flat ∅90 mm, brushless, 360 watt

Ventilated



M 1:4

Stock program
Standard program
Special program (on request)

Part numbers

V1 with Hall sensors		607950	607951	607952
V2 with Hall sensors and cables	607953	607954	607955	607956

Motor data						
Values at nominal voltage						
1 Nominal voltage	V	12	24	36	60	
2 No load speed	rpm	3210	3210	3120	2640	
3 No load current	mA	1390	696	444	210	
4 Nominal speed	rpm	2310	2340	2270	1890	
5 Nominal torque	mNm	958	961	941	901	
6 Nominal current (max. continuous current)	A	24.1*	12	7.66	3.75	
7 Stall torque	mNm	4860	5030	4920	4510	
8 Stall current	A	211	113	70	30.1	
9 Max. efficiency	%	84.2	84.6	84.4	83.7	
Characteristics						
10 Terminal resistance phase to phase	Ω	0.0569	0.213	0.514	2	
11 Terminal inductance phase to phase	mH	0.058	0.232	0.554	2.15	
12 Torque constant	mNm/A	35.1	70.1	108	214	
13 Speed constant	rpm/V	272	136	88.1	44.7	
14 Speed/torque gradient	rpm/mNm	0.442	0.413	0.418	0.418	
15 Mechanical time constant	ms	14.8	13.9	14	14	
16 Rotor inertia	gcm²	3210	3210	3210	3210	

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.12 K/W
18	Thermal resistance winding-housing	1.04 K/W
19	Thermal time constant winding	20 s
20	Thermal time constant motor	166 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static)	440 N
	(static, shaft supported)	8000 N
28	Max. radial load, 10 mm from flange	100 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	638 g

Values listed in the table are nominal.

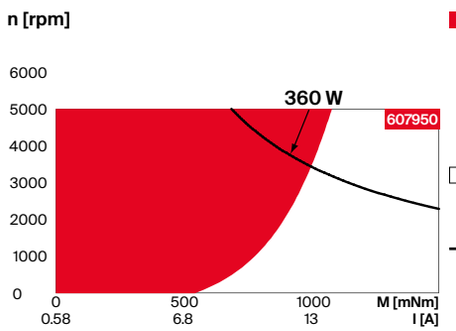
Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 14)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

Wiring diagram for Hall sensors see p. 69

Connector		**Part number**
Molex	46015-0806	43025-0600
Molex		171692-0104

Connection cable for V1
Universal, L = 500 mm **339380**

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 56

Gear
444_GP 52 C
458_GB 80[1]
459_GB 12[1]
460_GB 9[1]
461_GB 65[1]

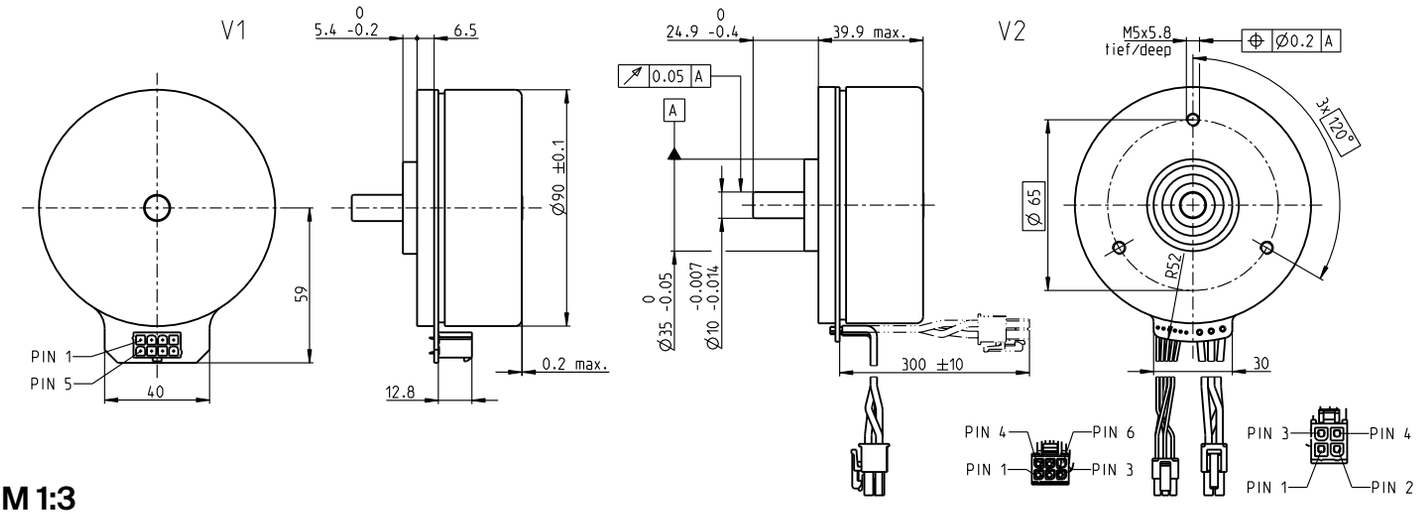
Sensor
531_Encoder MILE

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
558_ESCON2 Module 60/30
559_ESCON2 Compact 60/12
559_ESCON2 Compact 60/30

Note: The cable alignment relative to the mounting holes of the gearhead is not defined.
[1]on request
*607953 cannot be combined with the MILE encoder, because the current limit of the connectors of the MILE circuit board is 13 A.

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EC 90 flat ∅90 mm, brushless, 260 watt



M 1:3

Stock program
Standard program
Special program (on request)

	Part numbers			
V1 with Hall sensors	**500269**	500266	**500267**	500268
V2 with Hall sensors and cables	607325	607326	607327	607328
Motor data				
Values at nominal voltage				
1 Nominal voltage V	18	30	48	60
2 No load speed rpm	2110	2080	1960	1980
3 No load current mA	830	490	278	227
4 Nominal speed rpm	1790	1780	1670	1690
5 Nominal torque mNm	1020	997	972	972
6 Nominal current (max. continuous current) A	12.2*	7.11	4.09	3.31
7 Stall torque mNm	10100	10000	9490	9570
8 Stall current A	186	109	57.8	47.5
9 Max. efficiency %	87.1	87	86.6	86.7
Characteristics				
10 Terminal resistance phase to phase Ω	0.0968	0.275	0.831	1.26
11 Terminal inductance phase to phase mH	0.133	0.369	1.07	1.63
12 Torque constant mNm/A	80.7	136	231	286
13 Speed constant rpm/V	118	70.2	41.3	33.4
14 Speed/torque gradient rpm/mNm	0.142	0.142	0.148	0.148
15 Mechanical time constant ms	7.51	7.54	7.86	7.84
16 Rotor inertia gcm²	5060	5060	5060	5060

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.74 K/W
18	Thermal resistance winding-housing	1.82 K/W
19	Thermal time constant winding	57 s
20	Thermal time constant motor	258 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static) (static, shaft supported)	440 N 8000 N
28	Max. radial load, 10 mm from flange	130 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	980 g

Values listed in the table are nominal.

Connection V1

		V2 (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 16)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

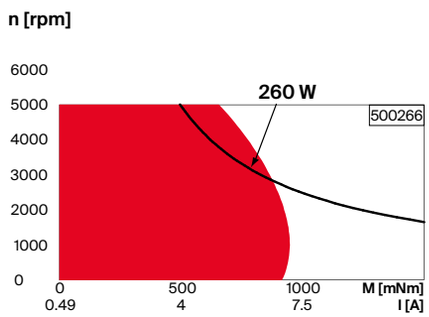
Wiring diagram for Hall sensors see p. 69

Connector	**Part number**
Molex 46015-0806	43025-0600
Molex	39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS4, L = 500 mm	**354045**

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 56

Gear
444_GP 52 C
458_GB 80¹
459_GB 12¹
460_GB 9¹
461_GB 65¹

Sensor
531_Encoder MILE

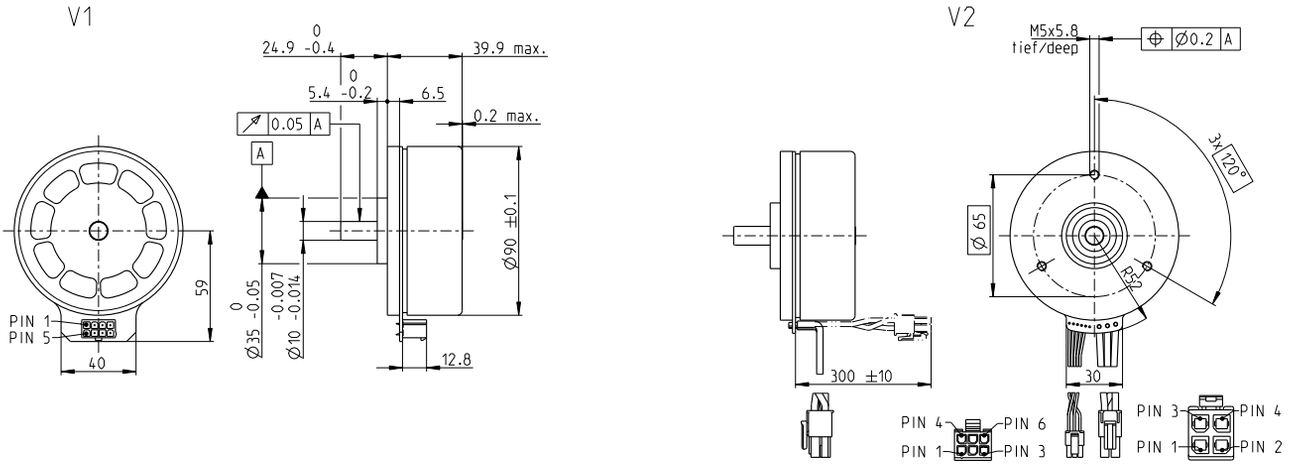
Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
558_ESCON2 Module 60/30
559_ESCON2 Compact 60/12
559_ESCON2 Compact 60/30
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
568_EPOS4 Compact 50/15
569_EPOS4 50/5, 70/15
571_EPOS4 Disk 60/12

Note: The cable alignment relative to the mounting holes of the gearhead is not defined.
¹on request
*In combination with EPOS4 positioning controllers, the connector technology limits the nominal current (max. continuous current load) is limited to 11 A.

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EC 90 flat ∅90 mm, brushless, 400 watt

Open Rotor



M 1:4

Stock program
Standard program
Special program (on request)

Part numbers

V1 with Hall sensors		607930	607931	607932
V2 with Hall sensors and cables	607933	607934	607935	607936

Motor data						
Values at nominal voltage						
1 Nominal voltage	V	18	30	48	60	
2 No load speed	rpm	2080	2080	1960	1980	
3 No load current	mA	792	475	272	221	
4 Nominal speed	rpm	1700	1700	1600	1620	
5 Nominal torque	mNm	1310	1270	1220	1230	
6 Nominal current (max. continuous current)	A	15*	8.78	5	4.05	
7 Stall torque	mNm	10200	10000	9490	9570	
8 Stall current	A	186	109	57.8	47.5	
9 Max. efficiency	%	87.3	87.1	86.6	86.7	
Characteristics						
10 Terminal resistance phase to phase	Ω	0.0968	0.275	0.831	1.26	
11 Terminal inductance phase to phase	mH	0.133	0.369	1.07	1.63	
12 Torque constant	mNm/A	81.6	136	231	286	
13 Speed constant	rpm/V	117	70.2	41.3	33.4	
14 Speed/torque gradient	rpm/mNm	0.139	0.142	0.148	0.148	
15 Mechanical time constant	ms	6.93	7.1	7.4	7.38	
16 Rotor inertia	gcm²	4765	4765	4765	4765	

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.56 K/W
18	Thermal resistance winding-housing	1.09 K/W
19	Thermal time constant winding	34.2 s
20	Thermal time constant motor	232 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static) (static, shaft supported)	440 N 8000N
28	Max. radial load, 10 mm from flange	130 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	964 g

Values listed in the table are nominal.

Connection V1

		V2 (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

	V2 (motor, AWG 14)
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

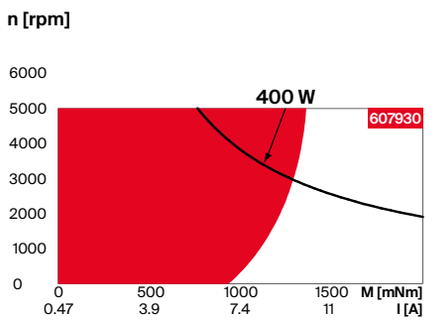
Wiring diagram for Hall sensors see p. 69

Connector		**Part number**
Molex	46015-0806	43025-0600
Molex		171692-0104

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS4, L = 500 mm	**354045**

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 56

Gear
444_GP 52 C
458_GB 80¹
459_GB 12¹
460_GB 9¹
461_GB 65¹

Sensor
531_Encoder MILE

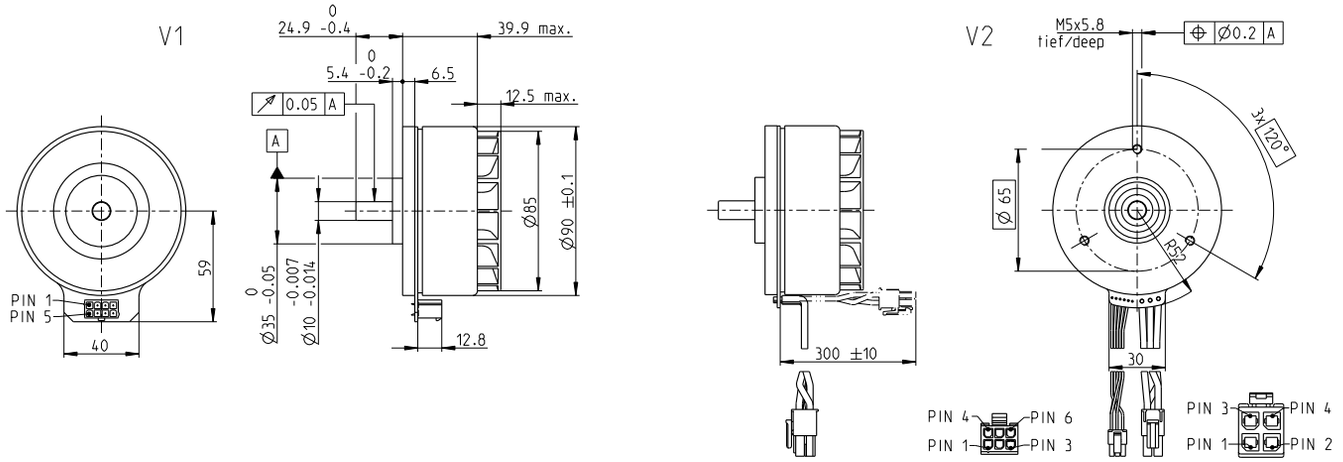
Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
558_ESCON2 Module 60/30
559_ESCON2 Compact 60/12
559_ESCON2 Compact 60/30
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
568_EPOS4 Compact 50/15
569_EPOS4 50/5
569_EPOS4 70/15
571_EPOS4 Disk 60/12

Note: The cable alignment relative to the mounting holes of the gearhead is not defined.
¹on request
*607933 cannot be combined with the MILE encoder, because the current limit of the connectors of the MILE circuit board is 13 A.

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EC 90 flat ∅90 mm, brushless, 600 watt

Ventilated



Stock program
Standard program
Special program (on request)

	Part numbers			
V1 with Hall sensors		597974	597975	597976
V2 with Hall sensors and cables	607937	607938	607939	607940
Motor data				
Values at nominal voltage				
1 Nominal voltage V	18	30	48	60
2 No load speed rpm	2080	2080	1960	1980
3 No load current mA	821	493	283	230
4 Nominal speed rpm	1620	1620	1520	1540
5 Nominal torque mNm	1620	1570	1500	1510
6 Nominal current (max. continuous current) A	18.1*	10.6	5.99	4.86
7 Stall torque mNm	10200	10000	9490	9570
8 Stall current A	186	109	57.8	47.5
9 Max. efficiency %	87	86.8	86.3	86.4
Characteristics				
10 Terminal resistance phase to phase Ω	0.0968	0.275	0.831	1.26
11 Terminal inductance phase to phase mH	0.133	0.369	1.07	1.63
12 Torque constant mNm/A	81.6	136	231	286
13 Speed constant rpm/V	117	70.2	41.3	33.4
14 Speed/torque gradient rpm/mNm	0.139	0.142	0.148	0.148
15 Mechanical time constant ms	7.41	7.6	7.92	7.9
16 Rotor inertia gcm²	5100	5100	5100	5060

Specifications

Thermal data

17	Thermal resistance housing-ambient	0.87 K/W
18	Thermal resistance winding-housing	0.89 K/W
19	Thermal time constant winding	27.9 s
20	Thermal time constant motor	255 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static)	440 N
	(static, shaft supported)	8000 N
28	Max. radial load, 10 mm from flange	130 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	988 g

Values listed in the table are nominal.

Connection V1

		V2 (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

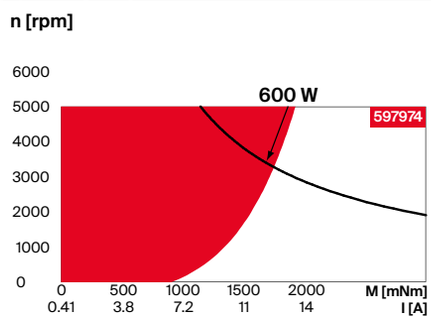
	V2 (motor, AWG 14)
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

Wiring diagram for Hall sensors see p. 69

Connector		**Part number**
Molex	46015-0806	43025-0600
Molex		171692-0104

Connection cable for V1
Universal, L = 500 mm **339380**

Operating range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) and an ambient temperature of 25 °C, the maximum permissible winding temperature will be reached during continuous operation = thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

Modular system

Details on catalog page 56

Gear
444_GP 52 C
458_GB 80[1]
459_GB 12[1]
460_GB 9[1]
461_GB 65[1]

Sensor
531_Encoder MILE

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
558_ESCON2 Module 60/30
559_ESCON2 Compact 60/12
559_ESCON2 Compact 60/30

Note: The cable alignment relative to the mounting holes of the gearhead is not defined.
[1]on request
*607937 cannot be combined with the MILE encoder, because the current limit of the connectors of the MILE circuit board is 13 A.

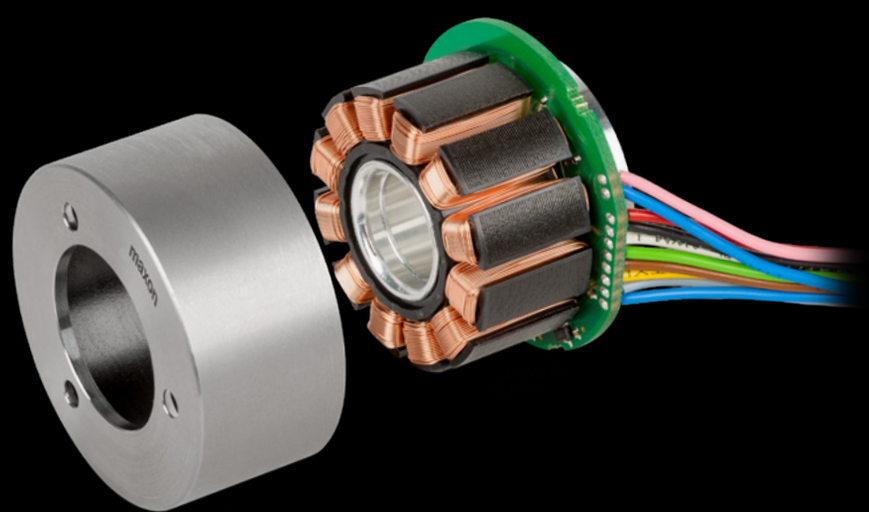
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For your personal notes

maxon EC frameless flat

Standard specification no. 101	90
Terminology explanations	190

EC frameless 45 flat ∅43.4 mm, 30 Watt	333
EC frameless 45 flat ∅43.4 mm, 50 Watt	334
EC frameless 45 flat ∅43.4 mm, 70 Watt	335
EC frameless 60 flat ∅60 mm, 100 Watt	336
EC frameless 90 flat ∅90 mm, 160 Watt	337
EC frameless 90 flat ∅90 mm, 260 Watt	338



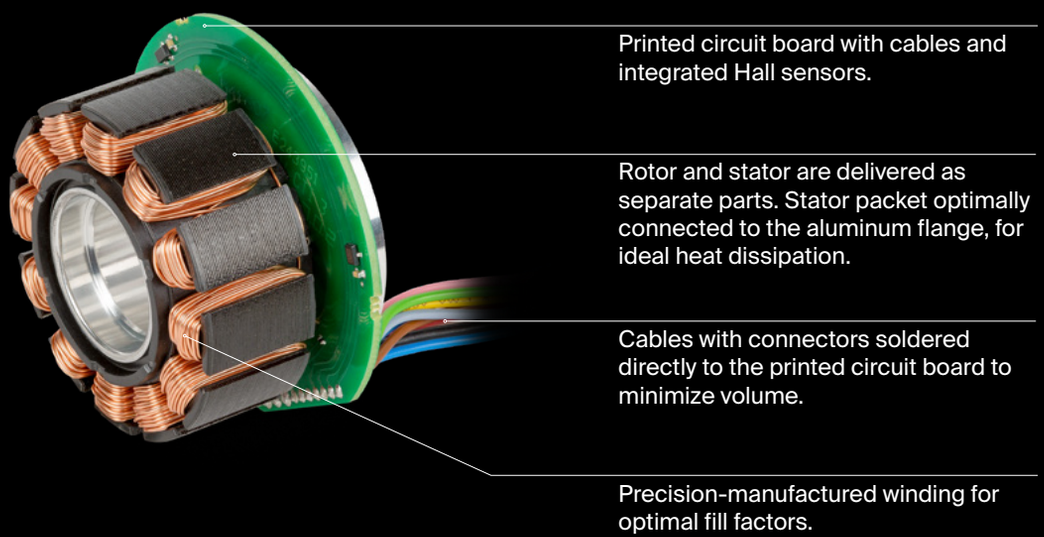
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maxon EC frameless flat program

Rotor and stator are delivered separately and connected only during the assembly of the components. Frameless motors offer maximum torque density and minimum size, high overload capability, low cogging torque, and enough space for cable glands.

Key data

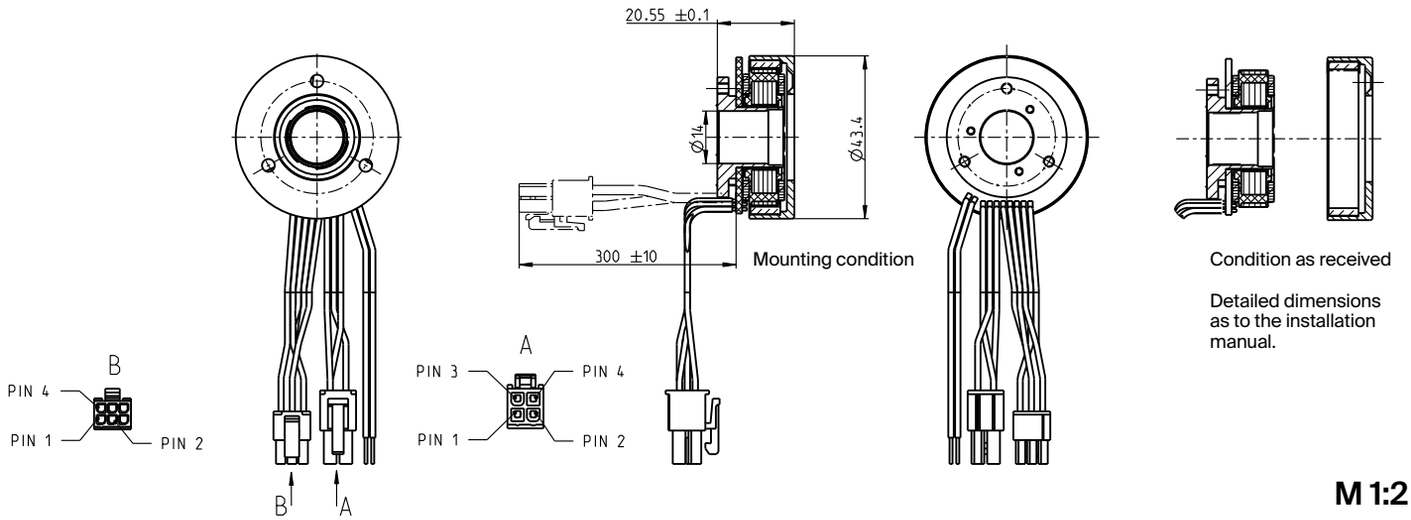
Motor ∅	43...90 mm
Motor length	20.55...42 mm
Power	30...260 W
Nominal torque	up to 1010 mNm
Max. permissible speed	up to 10 000 rpm



- → High torque density
- → Compact, with plenty of space inside
- → Low operating voltage
- → Complete control
- → Proven design

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EC frameless 45 flat ∅43.4 mm, brushless, 30 watt



M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

	with Hall sensors	548273	574536	574537	574538
Motor data					
	Values at nominal voltage				
1	Nominal voltage	V	12	18	24	36
2	No load speed	rpm	4360	4890	4360	4750
3	No load current	mA	163	129	81.4	61.6
4	Nominal speed	rpm	2910	3510	2930	3290
5	Nominal torque	mNm	54.9	57.8	54.7	66
6	Nominal current (max. continuous current)	A	2.02	1.63	1.01	0.847
7	Stall torque	mNm	247	295	251	378
8	Stall current	A	9.69	8.61	4.93	5.35
9	Max. efficiency	%	76.3	77.5	76.5	80.1
	Characteristics					
10	Terminal resistance phase to phase	Ω	1.24	2.09	4.87	6.73
11	Terminal inductance phase to phase	mH	0.56	0.697	2.24	4.29
12	Torque constant	mNm/A	25.5	34.3	51	70.6
13	Speed constant	rpm/V	374	278	187	135
14	Speed/torque gradient	rpm/mNm	18.2	17	17.9	12.9
15	Mechanical time constant	ms	28.6	30.8	28.1	20.2
16	Rotor inertia	gcm²	150	150	150	150

Specifications

Thermal data

17	Thermal resistance housing-ambient	6.73 K/W
18	Thermal resistance winding-housing	3.92 K/W
19	Thermal time constant winding	11.4 s
20	Thermal time constant motor	296 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data

23	Max. speed	10 000 rpm

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	89 g
	Weight of rotor	35 g
	Weight of stator	54 g

Values listed in the table are nominal.

Connection motor (Cable AWG 24)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1*	Pin 1
brown	Hall sensor 2*	Pin 2
grey	Hall sensor 3*	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	43025-0600

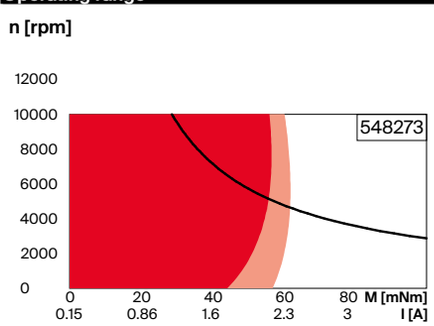
Wiring diagram for Hall sensors see p. 69
*Internal pull-up (7...13 kΩ) on pin 5

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

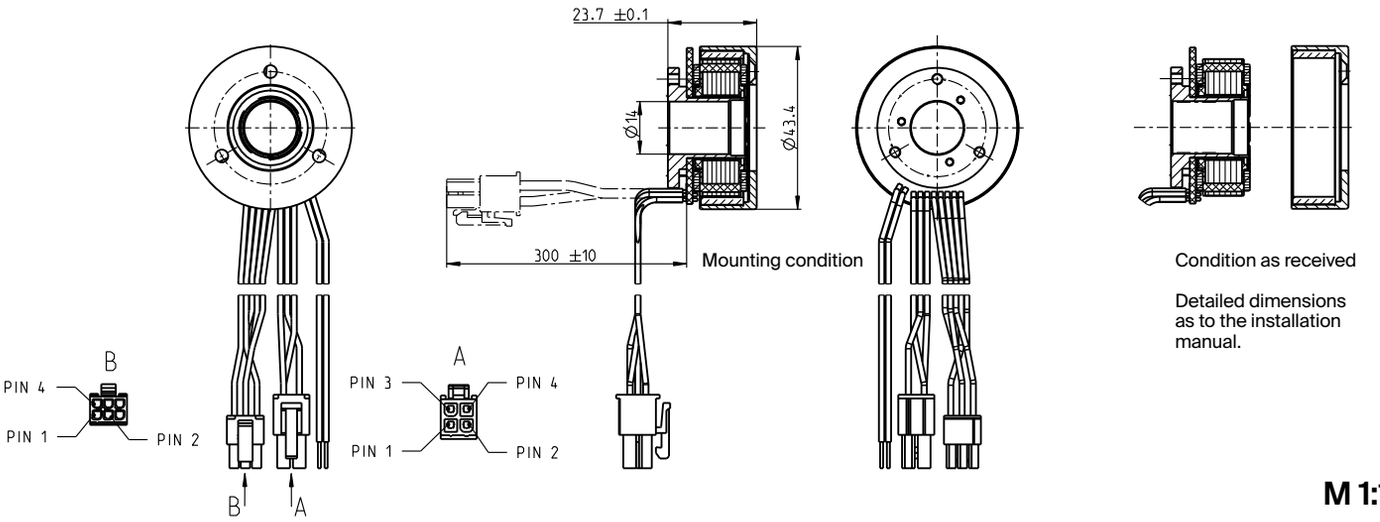
Modular system

Details on catalog page 56

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
571_EPOS4 Disk 60/12

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EC frameless 45 flat ∅43.4 mm, brushless, 50 watt



M 1:1

Stock program
Standard program
Special program (on request)

Part numbers

	with Hall sensors	543631	574402	574403	574404
Motor data					
	Values at nominal voltage				
1	Nominal voltage	V	18	24	24	36
2	No load speed	rpm	6720	6710	4730	3360
3	No load current	mA	247	185	106	42.3
4	Nominal speed	rpm	5190	5240	3480	2360
5	Nominal torque	mNm	97.1	83.4	69.6	90.5
6	Nominal current (max. continuous current)	A	3.52	2.33	1.41	0.828
7	Stall torque	mNm	975	780	402	484
8	Stall current	A	38.8	23.3	8.47	4.81
9	Max. efficiency	%	85	83.3	79.3	82.4
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.464	1.03	2.83	7.48
11	Terminal inductance phase to phase	mH	0.322	0.572	1.15	5.15
12	Torque constant	mNm/A	25.1	33.5	47.5	101
13	Speed constant	rpm/V	380	285	201	95
14	Speed/torque gradient	rpm/mNm	7.02	8.77	12	7.07
15	Mechanical time constant	ms	13.6	17	23.3	13.7
16	Rotor inertia	gcm²	185	185	185	185

Specifications

Thermal data

17	Thermal resistance housing-ambient	4.53 K/W
18	Thermal resistance winding-housing	4.75 K/W
19	Thermal time constant winding	17.7 s
20	Thermal time constant motor	227 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data

23	Max. speed	10 000 rpm

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	110 g
	Weight of rotor	41 g
	Weight of stator	69 g

Values listed in the table are nominal.

Connection motor (Cable AWG 24)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	**Part number**
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1*	Pin 1
brown	Hall sensor 2*	Pin 2
grey	Hall sensor 3*	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	**Part number**
Molex	43025-0600

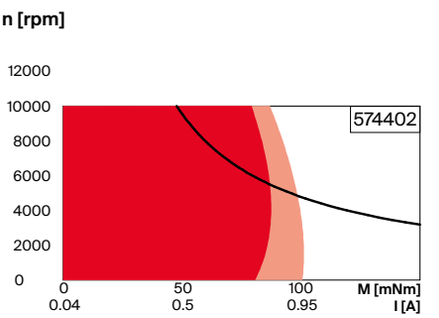
Wiring diagram for Hall sensors see p. 69
*Internal pull-up (7...13 kΩ) on pin 5

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

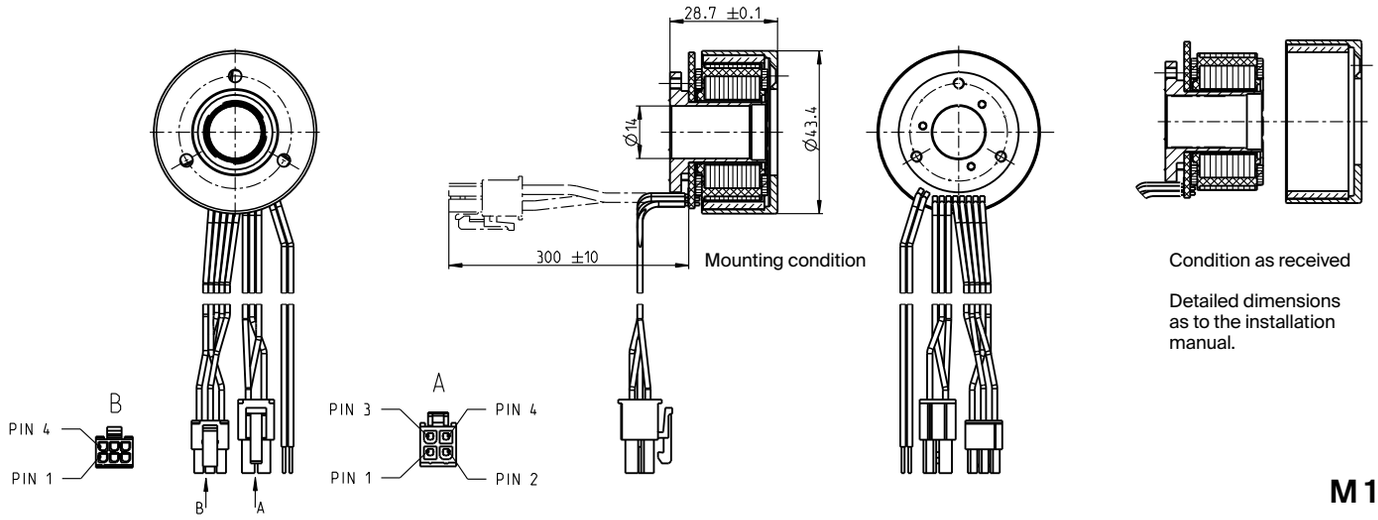
Modular system

Details on catalog page 56

Motor Control
547_DEC Module 24/2
547_DEC Module 50/5
550_ESCON Module 24/2
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Nano 24/2
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 24/1.5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
566_EPOS4 Compact 24/1.5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
571_EPOS4 Disk 60/12

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EC frameless 45 flat ∅43.4 mm, brushless, 70 watt



Stock program
Standard program
Special program (on request)

Part numbers

	with Hall sensors	548270	574035	574036	574037
Motor data					
	Values at nominal voltage				
1	Nominal voltage	V	24	30	36	48
2	No load speed	rpm	6110	6230	6330	3440
3	No load current	mA	234	194	166	48.1
4	Nominal speed	rpm	4860	4990	5080	2540
5	Nominal torque	mNm	128	112	108	134
6	Nominal current (max. continuous current)	A	3.21	2.36	1.93	0.936
7	Stall torque	mNm	1460	1170	1100	915
8	Stall current	A	39.5	25.8	20.7	6.97
9	Max. efficiency	%	85.4	83.7	83.2	84.3
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.608	1.16	1.74	6.89
11	Terminal inductance phase to phase	mH	0.463	0.691	0.966	5.85
12	Torque constant	mNm/A	36.9	45.1	53.3	131
13	Speed constant	rpm/V	259	212	179	72.7
14	Speed/torque gradient	rpm/mNm	4.26	5.44	5.85	3.82
15	Mechanical time constant	ms	10.7	13.7	14.7	9.6
16	Rotor inertia	gcm²	240	240	240	240

Specifications

Thermal data

17	Thermal resistance housing-ambient	3.56 K/W
18	Thermal resistance winding-housing	4.1 K/W
19	Thermal time constant winding	29.6 s
20	Thermal time constant motor	178 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data

23	Max. speed	10 000 rpm

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	143 g
	Weight of rotor	51 g
	Weight of stator	92 g

Values listed in the table are nominal.

Connection motor (Cable AWG 24)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1*	Pin 1
brown	Hall sensor 2*	Pin 2
grey	Hall sensor 3*	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	43025-0600

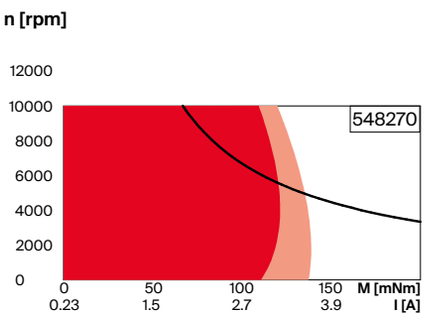
Wiring diagram for Hall sensors see p. 69
*Internal pull-up (7...13 kΩ) on pin 5

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

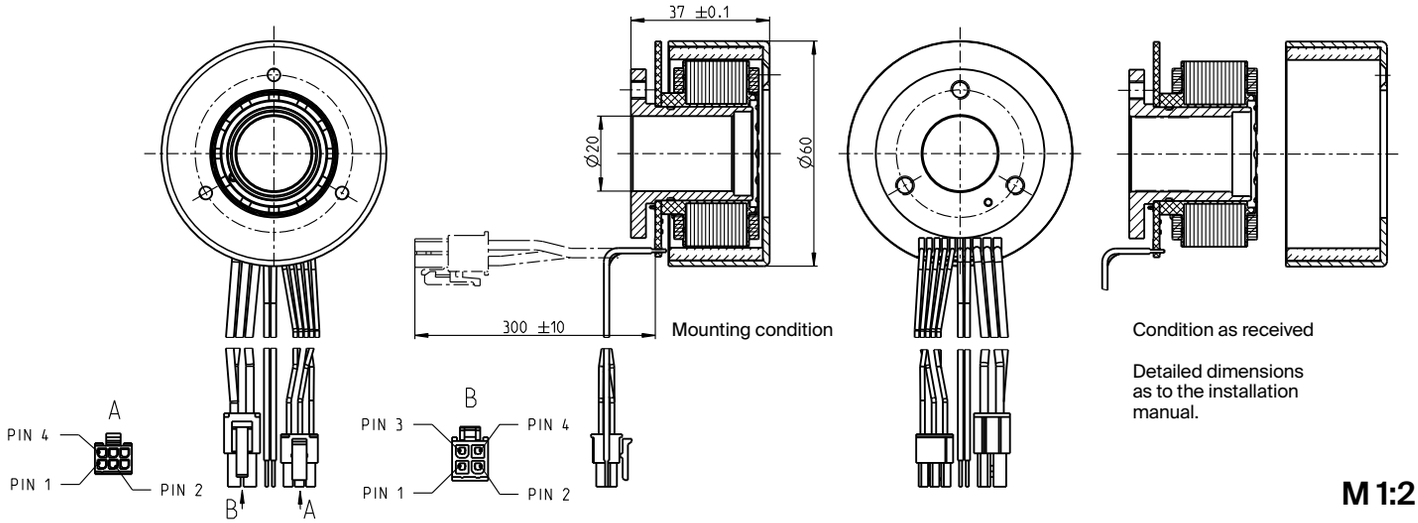
Modular system

Details on catalog page 56

Motor Control
547_DEC Module 50/5
551_ESCON 36/3 EC
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5
564_EPOS4 Module 50/5
565_EPOS4 Compact 24/5 3-axes
567_EPOS4 Compact 50/5
569_EPOS4 50/5
571_EPOS4 Disk 60/12

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EC frameless 60 flat ∅60 mm, brushless, 100 watt



Stock program
Standard program
Special program (on request)

		Part numbers		
	with Hall sensors	550153	542002	550154
Motor data				
	Values at nominal voltage			
1	Nominal voltage	V	12	24	48
2	No load speed	rpm	3710	4250	3970
3	No load current	mA	671	419	187
4	Nominal speed	rpm	3170	3740	3490
5	Nominal torque	mNm	279	289	319
6	Nominal current (max. continuous current)	A	9.25	5.47	2.78
7	Stall torque	mNm	2850	4180	5010
8	Stall current	A	93.5	78.2	43.8
9	Max. efficiency	%	84	86	88
	Characteristics				
10	Terminal resistance phase to phase	Ω	0.128	0.307	1.1
11	Terminal inductance phase to phase	mH	0.062	0.188	0.864
12	Torque constant	mNm/A	30.5	53.4	114
13	Speed constant	rpm/V	313	179	83.4
14	Speed/torque gradient	rpm/mNm	1.32	1.03	0.798
15	Mechanical time constant	ms	17.2	13.4	10.4
16	Rotor inertia	gcm²	1246	1246	1246

Specifications

Thermal data

17	Thermal resistance housing-ambient	2.5 K/W
18	Thermal resistance winding-housing	3.8 K/W
19	Thermal time constant winding	40 s
20	Thermal time constant motor	89.9 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data

23	Max. speed	6000 rpm

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	333 g
	Weight of rotor	160 g
	Weight of stator	173 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	43025-0600

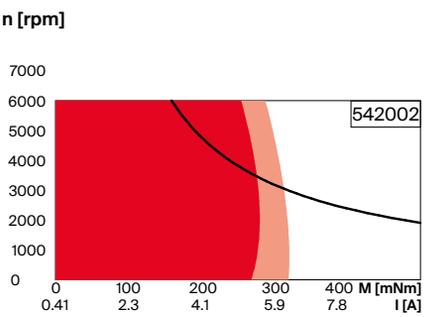
Wiring diagram for Hall sensors see p. 69

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

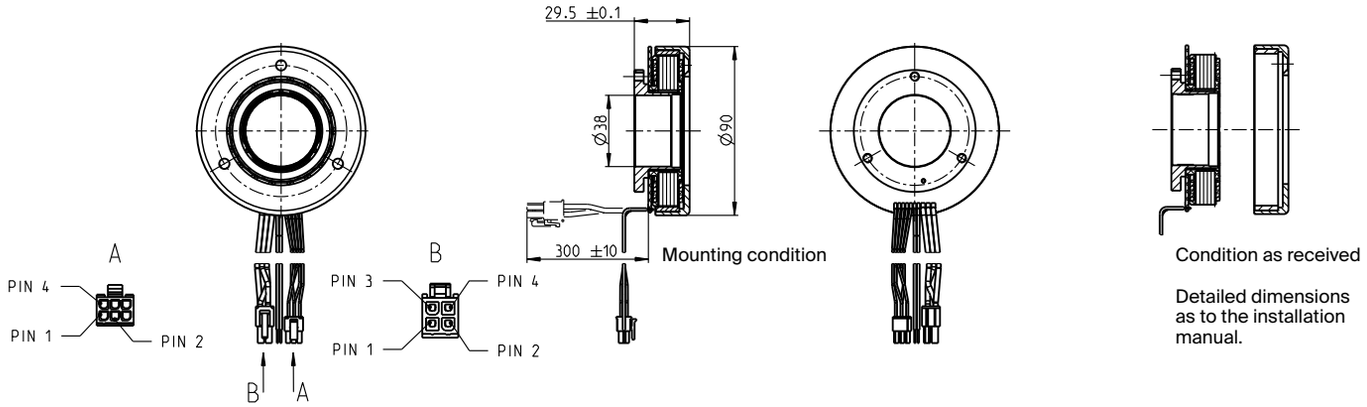
Modular system

Details on catalog page 56

Motor Control
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 (HE)
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
570_EPOS4 Disk 60/8
571_EPOS4 Disk 60/12

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EC frameless 90 flat ∅90 mm, brushless, 160 watt



M 1:4

Stock program
Standard program
Special program (on request)

			Part numbers							
		with Hall sensors	588847	543673	581301	581302				
Motor data										
	Values at nominal voltage									
1	Nominal voltage	V	12	24	36	60				
2	No load speed	rpm	3160	3170	3070	2600				
3	No load current	mA	1320	658	420	197				
4	Nominal speed	rpm	2670	2710	2630	2200				
5	Nominal torque	mNm	458	458	453	460				
6	Nominal current (max. continuous current)	A	12.8	6.39	4.09	2.1				
7	Stall torque	mNm	6260	7540	7430	6380				
8	Stall current	A	176	106	67.5	29.4				
9	Max. efficiency	%	83	85	85	84				
	Characteristics									
10	Terminal resistance phase to phase	Ω	0.0682	0.226	0.533	2.04				
11	Terminal inductance phase to phase	mH	0.058	0.232	0.554	2.15				
12	Torque constant	mNm/A	35.6	71.2	110	217				
13	Speed constant	rpm/V	268	134	86.8	44.1				
14	Speed/torque gradient	rpm/mNm	0.514	0.427	0.421	0.414				
15	Mechanical time constant	ms	17.1	14.2	14	13.8				
16	Rotor inertia	gcm²	3170	3170	3170	3170				

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.77 K/W
18	Thermal resistance winding-housing	3.71 K/W
19	Thermal time constant winding	69.6 s
20	Thermal time constant motor	263 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data

23	Max. speed	5000 rpm

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	490 g
	Weight of rotor	195 g
	Weight of stator	295 g

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	43025-0600

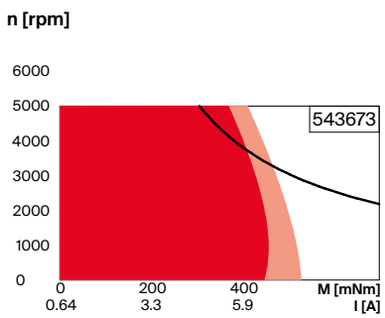
Wiring diagram for Hall sensors see p. 69

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

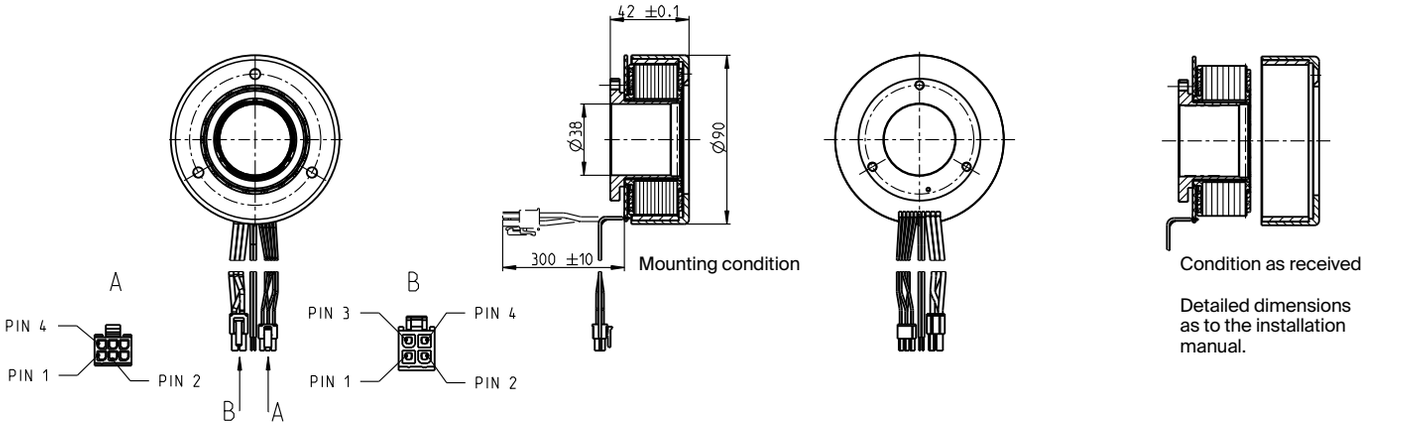
Details on catalog page 56

Motor Control

547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
569_EPOS4 50/5
569_EPOS4 70/15
571_EPOS4 Disk 60/12

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EC frameless 90 flat ∅90 mm, brushless, 260 watt



M 1:4

Stock program
Standard program
Special program (on request)

		Part numbers							
	with Hall sensors	588849	542099	581294	581295				
Motor data									
	Values at nominal voltage								
1	Nominal voltage	V	18	30	48	60			
2	No load speed	rpm	2100	2080	1960	1980			
3	No load current	mA	830	490	278	227			
4	Nominal speed	rpm	1770	1770	1660	1690			
5	Nominal torque	mNm	1010	988	964	963			
6	Nominal current (max. continuous current)	A	12.1	7.06	4.06	3.28			
7	Stall torque	mNm	13400	14100	13000	13200			
8	Stall current	A	166	103	56.2	46.3			
9	Max. efficiency	%	86	87	86	86			
	Characteristics								
10	Terminal resistance phase to phase	Ω	0.109	0.29	0.854	1.29			
11	Terminal inductance phase to phase	mH	0.133	0.369	1.07	1.63			
12	Torque constant	mNm/A	80.7	136	231	286			
13	Speed constant	rpm/V	118	70.2	41.3	33.4			
14	Speed/torque gradient	rpm/mNm	0.159	0.15	0.153	0.152			
15	Mechanical time constant	ms	8.85	8.32	8.47	8.41			
16	Rotor inertia	gcm²	5300	5300	5300	5300			

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.74 K/W
18	Thermal resistance winding-housing	1.82 K/W
19	Thermal time constant winding	60.5 s
20	Thermal time constant motor	258 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data

23	Max. speed	5000 rpm

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	814 g
	Weight of rotor	292 g
	Weight of stator	522 g

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	43025-0600

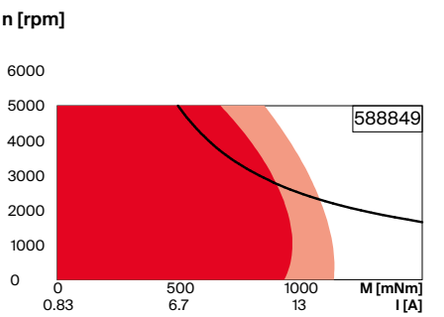
Wiring diagram for Hall sensors see p. 69

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 56

Motor Control

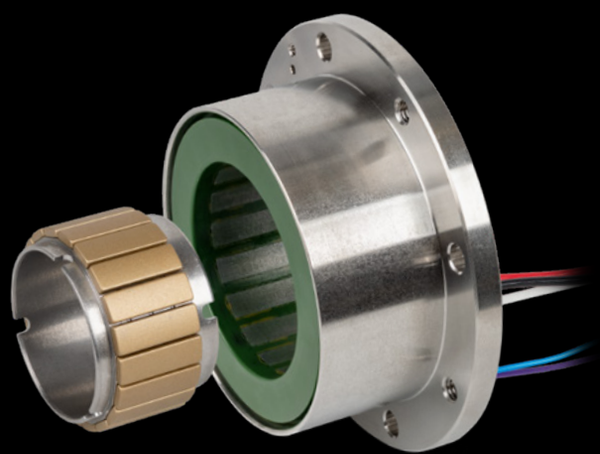
547_DEC Module 50/5
551_ESCON Module 50/4 EC-S
551_ESCON Module 50/5
552_ESCON Module 50/8 HE
553_ESCON 50/5
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
564_EPOS4 Module 50/5
565_EPOS4 Module 50/8
565_EPOS4 Module 50/15
567_EPOS4 Compact 50/5
567_EPOS4 Compact 50/8
568_EPOS4 Compact 50/15
569_EPOS4 50/5
569_EPOS4 70/15
571_EPOS4 Disk 60/12

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maxon EC frameless DT

Standard specification no. 101	90
Terminology explanations	190

EC frameless DT 38 S ∅42 mm, 110 Watt	341
EC frameless DT 38 M ∅42 mm, 240 Watt	342
EC frameless DT 50 S ∅54 mm, 220 Watt	343
EC frameless DT 50 M ∅54 mm, 210 Watt	344
EC frameless DT 65 S ∅70 mm, 290 Watt	345
EC frameless DT 65 M ∅70 mm, 375 Watt	346
EC frameless DT 85 M ∅90 mm, 570 Watt	347
EC frameless DT 85 L ∅90 mm, 680 Watt	348



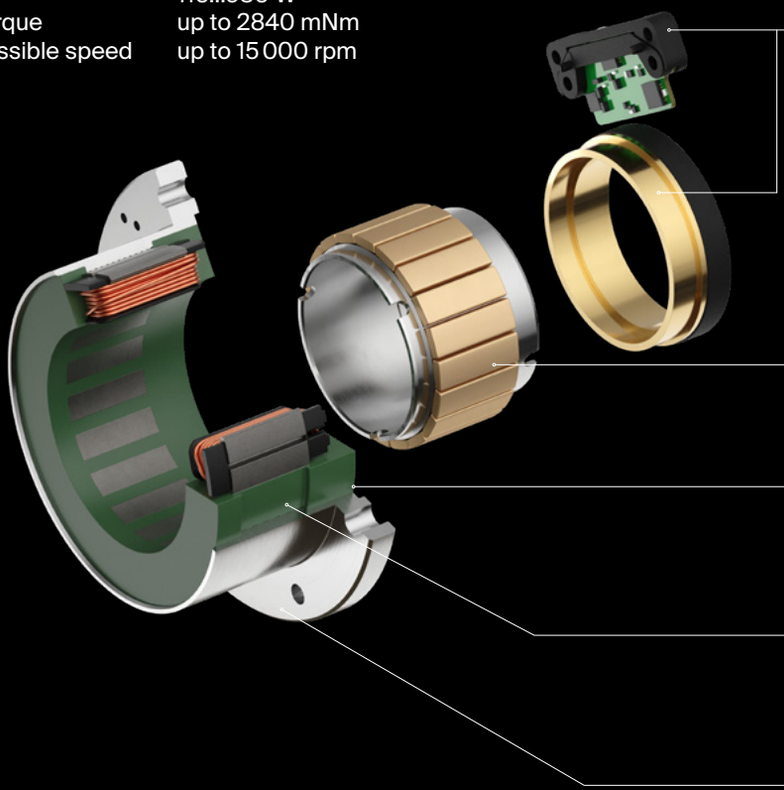
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maxon EC frameless DT program

Unleash unmatched torque density and dynamics with the EC frameless DT motor series, setting a new standard in energy efficiency and optimal heat dissipation. The compact design, and generous hollow shaft, offer unprecedented design freedom. The additional mounting flange ensures a straightforward assembly or disassembly process. For maximum compactness and reliability, maxon integrates the motor into your specific housing without any additional flange.

Key data

Motor ∅	42...90 mm
Motor length	19...43 mm
Power	110...680 W
Nominal torque	up to 2840 mNm
Max. permissible speed	up to 15 000 rpm



Optional: Integrated encoder with commutation signal for a high degree of positioning accuracy. Rotors and stators are delivered in pairs.

Rotor optimized for minimum rotor inertia with maximum hollow shaft.

NTC sensors directly at the winding head guarantee optimal temperature monitoring.

Potted stator with heat-conducting sealing compound in the mounting flange for optimized heat transfer.

Mounting flange for very easy integration into the customer application.

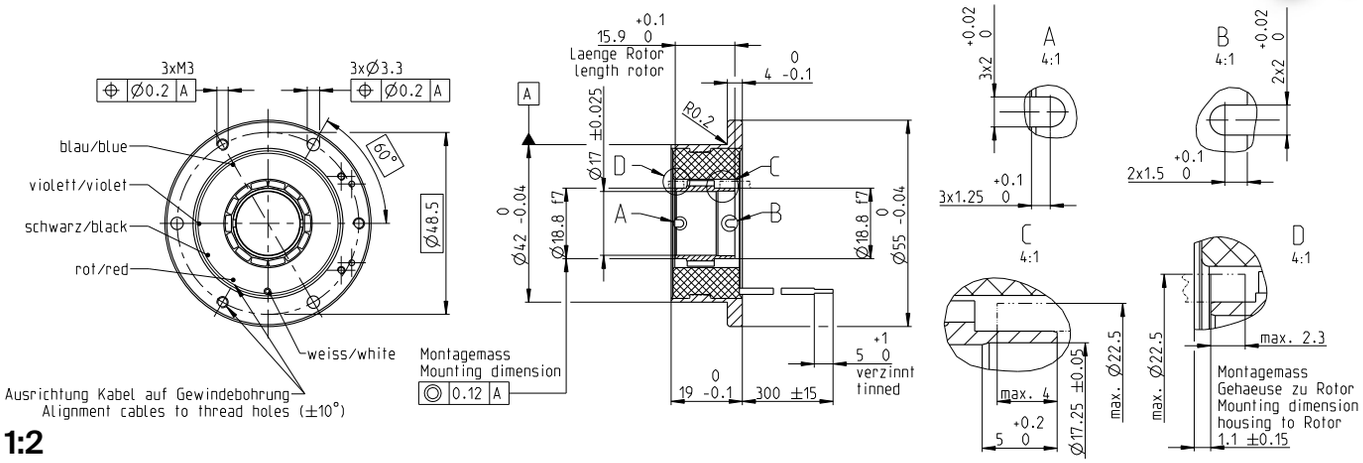
- → Top torque density
- → Short length, with large hollow shaft
- → Excellent heat dissipation
- → Outstanding energy efficiency
- → Low cogging torque

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EC frameless DT 38 S ∅42 mm, brushless, 110 watt

Dynamic Torque





M 1:2

Stock program
Standard program
Special program (on request)

			Part numbers
		sensorless	814370
Motor data			
	Values at nominal voltage		
1	Nominal voltage	V	24
2	No load speed	rpm	12400
3	No load current	mA	261
4	Nominal speed	rpm	10100
5	Nominal torque	mNm	96.8
6	Nominal current (max. continuous current)	A	4.8
	Continuous torque with heat sink	mNm	130
7	Stall torque	mNm	641
8	Stall current	A	89.9
9	Max. efficiency	%	89.5
	Characteristics		
10	Terminal resistance phase to phase	Ω	0.267
11	Terminal inductance phase to phase	mH	0.182
12	Torque constant	mNm/A	18.2
13	Speed constant	rpm/V	524
14	Speed/torque gradient	rpm/mNm	7.7
15	Mechanical time constant	ms	0.98
16	Rotor inertia	gcm²	12.2

Specifications

Thermal data

17	Thermal resistance housing-ambient	7.28 K/W
18	Thermal resistance winding-housing	0.6 K/W
19	Thermal time constant winding	4.5 s
20	Thermal time constant motor	451 s
21	Ambient temperature	-40...+100 °C
22	Max. winding temperature	+155 °C

Mechanical data

23	Max. speed	15000 rpm

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	125 g
	(with mounting flange made of stainless steel)	
	Weight for integration	64 g
	(without mounting flange)	

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

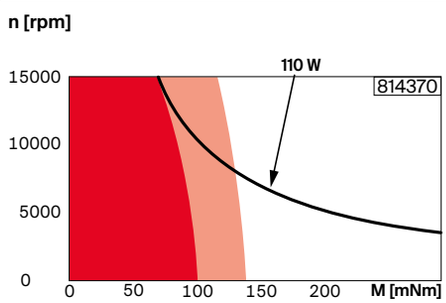
Connection NTC (Cable AWG 24)

purple	NTC
blue	NTC

Resistance 25 °C: 5 kΩ ±1%, beta (25–85 °C): 3490 K

Comment
For Torque control data, refer to "Installation Manual" available on maxon online shop.

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system

Details on catalog page 56

Sensor
522_TSX 38 MAG with commutation signals

Motor Control
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 50/5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8 CAN
570_EPOS4 Disk 60/8 EtherCAT

Variants

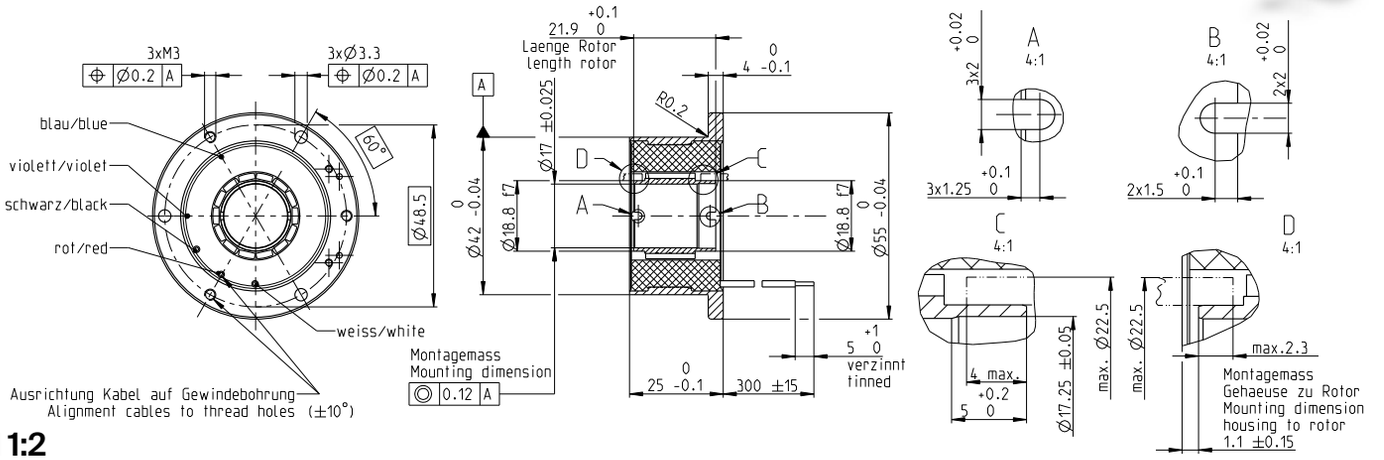
maxon integration into customer housing on request
Other coil designs on request

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EC frameless DT 38 M ∅42 mm, brushless, 240 watt

Dynamic Torque





M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

		sensorless
		800948
Motor data		
	Values at nominal voltage	
1	Nominal voltage	V 24
2	No load speed	rpm 6290
3	No load current	mA 147
4	Nominal speed	rpm 5110
5	Nominal torque	mNm 186
6	Nominal current (max. continuous current)	A 4.7
	Continuous torque with heat sink	mNm 222
7	Stall torque	mNm 1150
8	Stall current	A 63.8
9	Max. efficiency	% 90.6
	Characteristics	
10	Terminal resistance phase to phase	Ω 0.376
11	Terminal inductance phase to phase	mH 0.312
12	Torque constant	mNm/A 36.2
13	Speed constant	rpm/V 264
14	Speed/torque gradient	rpm/mNm 2.740
15	Mechanical time constant	ms 0.583
16	Rotor inertia	gcm² 20.3

Specifications

Thermal data

17	Thermal resistance housing-ambient	6.87 K/W
18	Thermal resistance winding-housing	0.33 K/W
19	Thermal time constant winding	3.38 s
20	Thermal time constant motor	574 s
21	Ambient temperature	-40...+100 °C
22	Max. winding temperature	+155 °C

Mechanical data

23	Max. speed	15 000 rpm

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor (with mounting flange made of stainless steel)	169 g
	Weight for integration (without mounting flange)	97 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

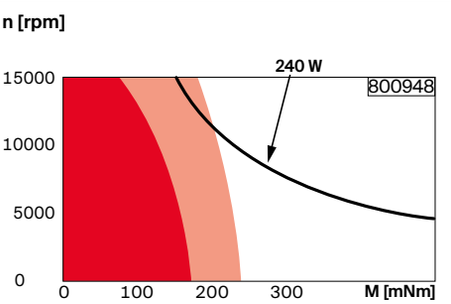
Connection NTC (Cable AWG 24)

purple	NTC
blue	NTC

Resistance 25 °C: 5 kΩ ±1%, beta (25–85 °C): 3490 K

Comment
For Torque control data, refer to "Installation Manual" available on maxon online shop.

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 56

Sensor
522_TSX 38 MAG with commutation signals

Motor Control
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 50/5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8 CAN
570_EPOS4 Disk 60/8 EtherCAT

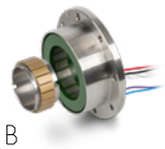
Variants

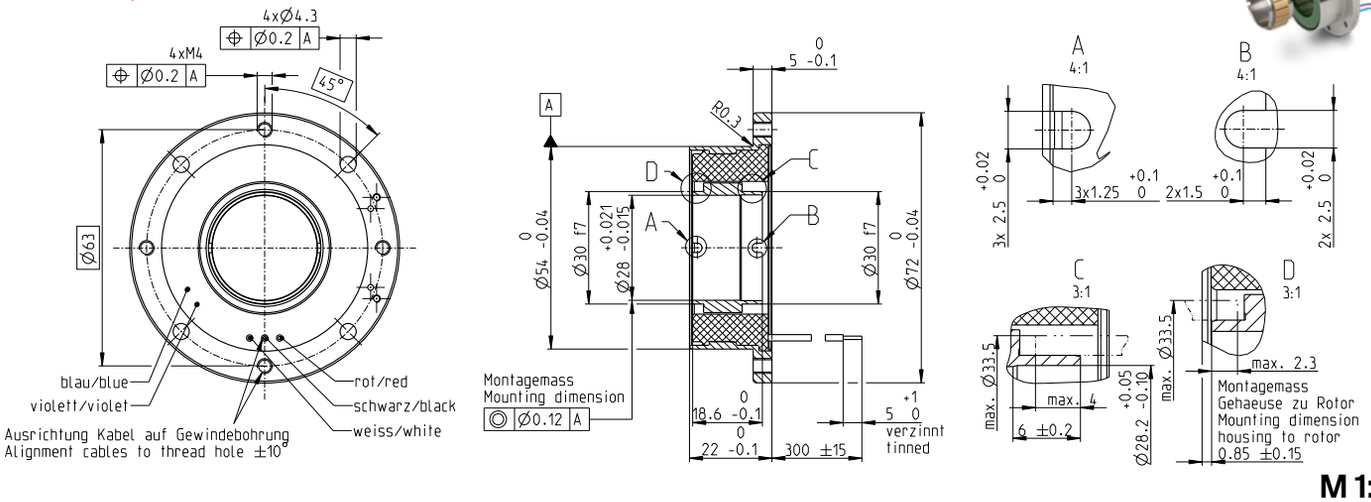
maxon integration into customer housing on request
Other coil designs on request

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EC frameless DT 50 S ∅54 mm, brushless, 220 watt

Dynamic Torque





M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

		sensorless
		734439
Motor data		
	Values at nominal voltage	
1	Nominal voltage V	48
2	No load speed rpm	6650
3	No load current mA	150
4	Nominal speed rpm	5630
5	Nominal torque mNm	322
6	Nominal current (max. continuous current) A	4.35
	Continuous torque with heat sink mNm	379
7	Stall torque mNm	1890
8	Stall current A	81.2
9	Max. efficiency %	91.6
	Characteristics	
10	Terminal resistance phase to phase Ω	0.591
11	Terminal inductance phase to phase mH	0.384
12	Torque constant mNm/A	68.5
13	Speed constant rpm/V	139
14	Speed/torque gradient rpm/mNm	1.2
15	Mechanical time constant ms	0.881
16	Rotor inertia gcm²	70

Specifications

Thermal data

17	Thermal resistance housing-ambient	4.02 K/W
18	Thermal resistance winding-housing	1.4 K/W
19	Thermal time constant winding	15.9 s
20	Thermal time constant motor	453 s
21	Ambient temperature	-40...+100 °C
22	Max. winding temperature	+155 °C

Mechanical data

23	Max. speed	7000 rpm

Other specifications

29	Number of pole pairs	10
30	Number of phases	3
31	Weight of motor (with mounting flange made of stainless steel)	218 g
	Weight for integration (without mounting flange)	116 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

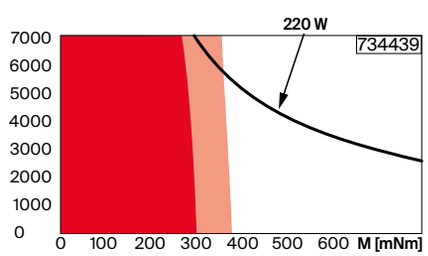
Connection NTC (Cable AWG 24)

purple	NTC
blue	NTC

Resistance 25 °C: 5 kΩ ±1%, beta (25–85 °C): 3490 K

Comment
For Torque control data, refer to "Installation Manual" available on maxon online shop.

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system

Details on catalog page 56

Sensor
523_TSX 50 MAG with commutation signals

Motor Control
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 50/5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8 CAN
570_EPOS4 Disk 60/8 EtherCAT

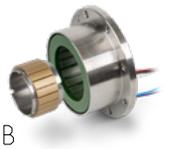
Variants

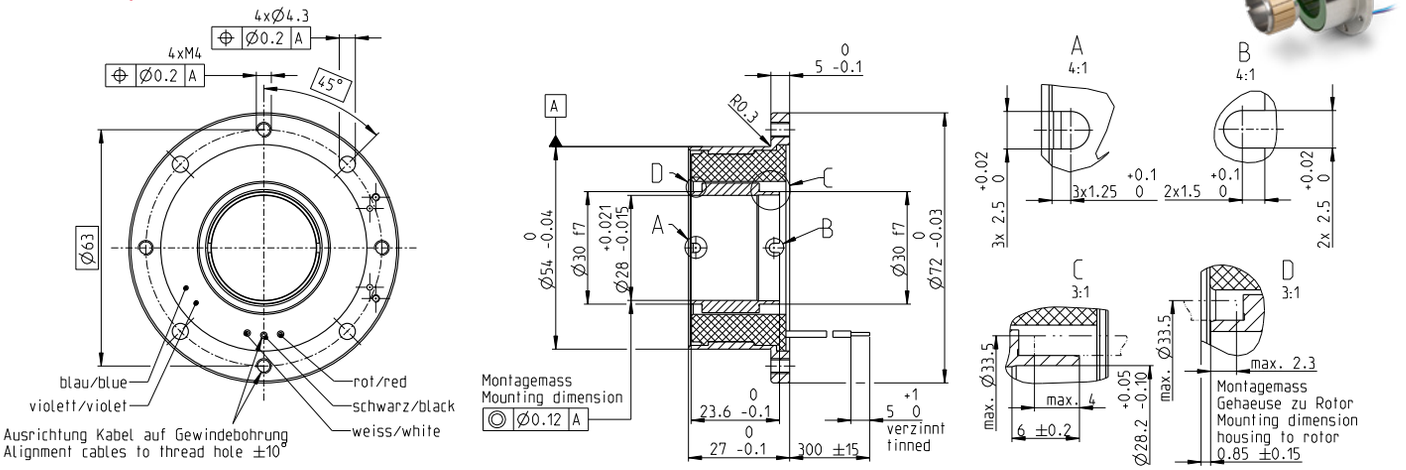
maxon integration into customer housing on request
Other coil designs on request

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EC frameless DT 50 M ∅54 mm, brushless, 210 watt

Dynamic Torque





M 1:2

Stock program
Standard program
Special program (on request)

Part numbers

		sensorless
		758031
Motor data		
	Values at nominal voltage	
1	Nominal voltage	V 48
2	No load speed	rpm 4330
3	No load current	mA 109
4	Nominal speed	rpm 3700
5	Nominal torque	mNm 430
6	Nominal current (max. continuous current)	A 3.84
	Continuous torque with heat sink	mNm 552
7	Stall torque	mNm 2750
8	Stall current	A 63
9	Max. efficiency	% 91.8
	Characteristics	
10	Terminal resistance phase to phase	Ω 0.762
11	Terminal inductance phase to phase	mH 0.571
12	Torque constant	mNm/A 105
13	Speed constant	rpm/V 90.7
14	Speed/torque gradient	rpm/mNm 0.656
15	Mechanical time constant	ms 0.68
16	Rotor inertia	gcm² 98.8

Specifications

Thermal data

17	Thermal resistance housing-ambient	5.02 K/W
18	Thermal resistance winding-housing	0.412 K/W
19	Thermal time constant winding	7.11 s
20	Thermal time constant motor	678 s
21	Ambient temperature	-40...+100 °C
22	Max. winding temperature	+155 °C

Mechanical data

23	Max. speed	5000 rpm

Other specifications

29	Number of pole pairs	10
30	Number of phases	3
31	Weight of motor (with mounting flange made of stainless steel)	270 g
	Weight for integration (without mounting flange)	156 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

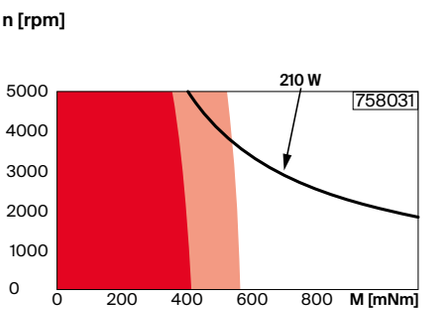
Connection NTC (Cable AWG 24)

purple	NTC
blue	NTC

Resistance 25 °C: 5 kΩ ±1%, beta (25–85 °C): 3490 K

Comment
For Torque control data, refer to "Installation Manual" available on maxon online shop.

Operating range Comments



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system Details on catalog page 56

Sensor
523_TSX 50 MAG with commutation signals

Motor Control
551_ESCON Module 50/5
553_ESCON 50/5
557_ESCON2 Micro 60/5
563_EPOS4 Micro 24/5 CAN
563_EPOS4 Micro 24/5 EtherCAT
564_EPOS4 Module 50/5
567_EPOS4 Compact 50/5
569_EPOS4 50/5
570_EPOS4 Disk 60/8 CAN
570_EPOS4 Disk 60/8 EtherCAT

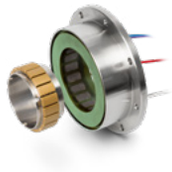
Variants

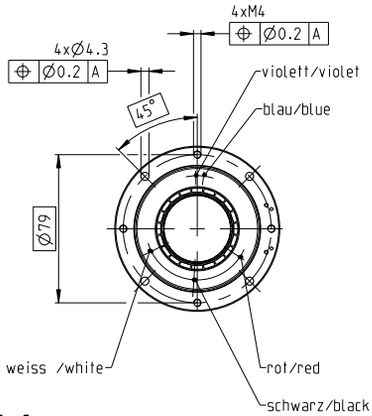
maxon integration into customer housing on request
Other coil designs on request

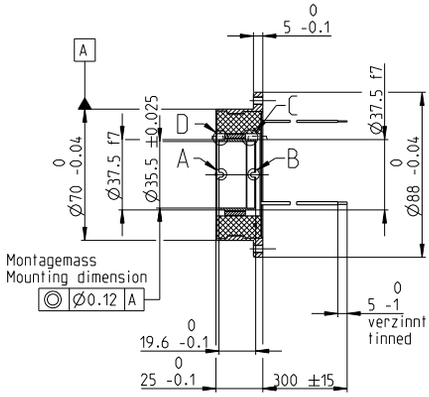
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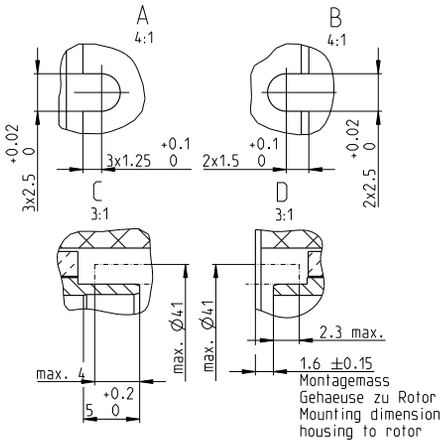
EC frameless DT 65 S ∅70 mm, brushless, 290 watt

Dynamic Torque









M 1:4

Stock program
Standard program
Special program (on request)

Part numbers

		sensorless
	Motor data	
	Values at nominal voltage	
1	Nominal voltage V	48
2	No load speed rpm	4570
3	No load current mA	204
4	Nominal speed rpm	3840
5	Nominal torque mNm	688
6	Nominal current (max. continuous current) A	6.26
	Continuous torque with heat sink mNm	907
7	Stall torque mNm	4080
8	Stall current A	145
9	Max. efficiency %	92.6
	Characteristics	
10	Terminal resistance phase to phase Ω	0.332
11	Terminal inductance phase to phase mH	0.458
12	Torque constant mNm/A	99.7
13	Speed constant rpm/V	95.8
14	Speed/torque gradient rpm/mNm	0.319
15	Mechanical time constant ms	0.569
16	Rotor inertia gcm^2	170

Specifications

Thermal data

17	Thermal resistance housing-ambient	3.65 K/W
18	Thermal resistance winding-housing	0.379 K/W
19	Thermal time constant winding	12.1 s
20	Thermal time constant motor	1330 s
21	Ambient temperature	-40...+100 °C
22	Max. winding temperature	+155 °C

Mechanical data

23	Max. speed	5000 rpm

Other specifications

29	Number of pole pairs	10
30	Number of phases	3
31	Weight of motor	377 g
	(with mounting flange made of stainless steel)	
	Weight for integration	219 g
	(without mounting flange)	

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

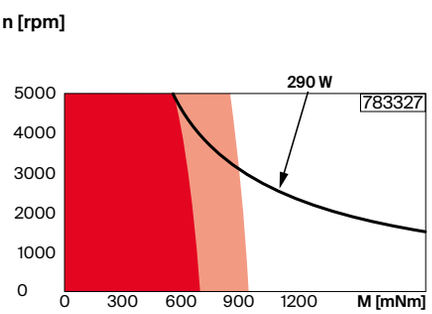
Connection NTC (Cable AWG 24)

purple	NTC
blue	NTC

Resistance 25 °C: 5 kΩ ±1%, beta (25–85 °C): 3490 K

Comment
For Torque control data, refer to "Installation Manual" available on maxon online shop.

Operating range Comments



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system Details on catalog page 56

Sensor
524_TSX 65 MAG with commutation signals

Motor Control
552_ESCON Module 50/8
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
565_EPOS4 Module 50/8
568_EPOS4 Compact 50/8
569_EPOS4 70/15
570_EPOS4 Disk 60/8 CAN
570_EPOS4 Disk 60/8 EtherCAT

Variants

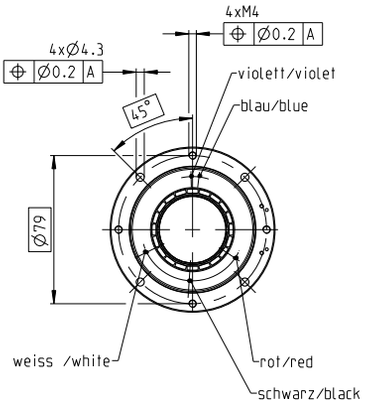
maxon integration into customer housing on request
Other coil designs on request

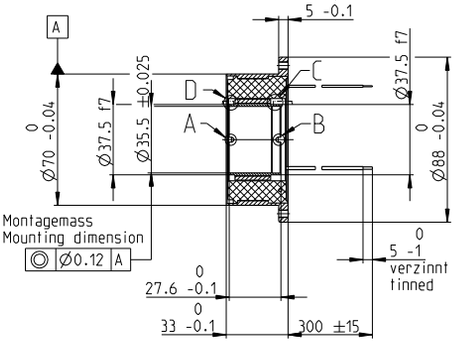
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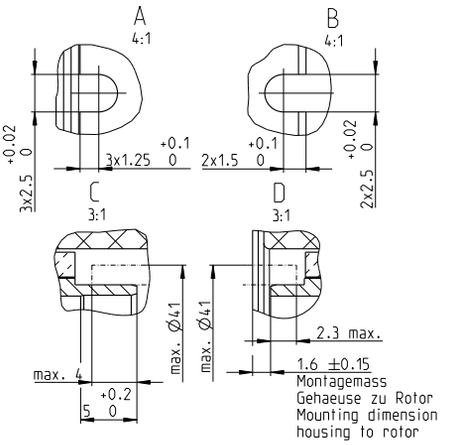
EC frameless DT 65 M ∅70 mm, brushless, 375 watt

Dynamic Torque









M 1:4

Stock program
Standard program
Special program (on request)

Part numbers

		sensorless	783332
Motor data			
	Values at nominal voltage		
1	Nominal voltage	V	48
2	No load speed	rpm	2590
3	No load current	mA	150
4	Nominal speed	rpm	2170
5	Nominal torque	mNm	1130
6	Nominal current (max. continuous current)	A	5.87
	Continuous torque with heat sink	mNm	1395
7	Stall torque	mNm	5660
8	Stall current	A	103
9	Max. efficiency	%	92.4
	Characteristics		
10	Terminal resistance phase to phase	Ω	0.466
11	Terminal inductance phase to phase	mH	0.779
12	Torque constant	mNm/A	176
13	Speed constant	rpm/V	54.2
14	Speed/torque gradient	rpm/mNm	0.143
15	Mechanical time constant	ms	0.41
16	Rotor inertia	gcm²	275

Specifications

Thermal data

17	Thermal resistance housing-ambient	3.42 K/W
18	Thermal resistance winding-housing	0.207 K/W
19	Thermal time constant winding	9.1 s
20	Thermal time constant motor	1250 s
21	Ambient temperature	-40...+100 °C
22	Max. winding temperature	+155 °C

Mechanical data

23	Max. speed	5000 rpm

Other specifications

29	Number of pole pairs	10
30	Number of phases	3
31	Weight of motor (with mounting flange made of stainless steel)	524 g
	Weight for integration (without mounting flange)	332 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

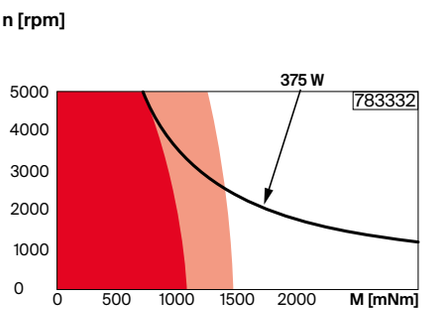
Connection NTC (Cable AWG 24)

purple	NTC
blue	NTC

Resistance 25 °C: 5 kΩ ±1%, beta (25–85 °C): 3490 K

Comment
For Torque control data, refer to "Installation Manual" available on maxon online shop.

Operating range



Comments

Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system

Details on catalog page 56

Sensor
524_TSX 65 MAG with commutation signals

Motor Control
552_ESCON Module 50/8
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/12
559_ESCON2 Compact 60/12
565_EPOS4 Module 50/8
568_EPOS4 Compact 50/8
569_EPOS4 70/15
570_EPOS4 Disk 60/8 CAN
570_EPOS4 Disk 60/8 EtherCAT

Variants

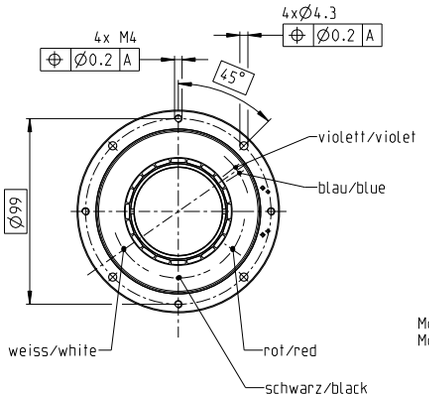
maxon integration into customer housing on request
Other coil designs on request

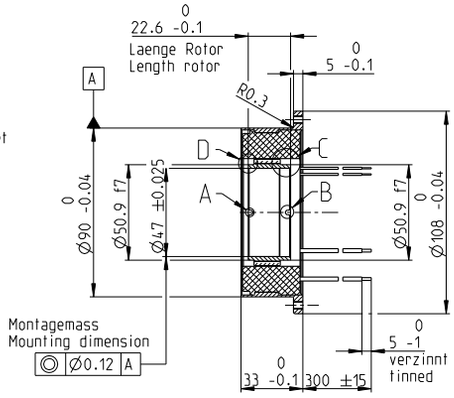
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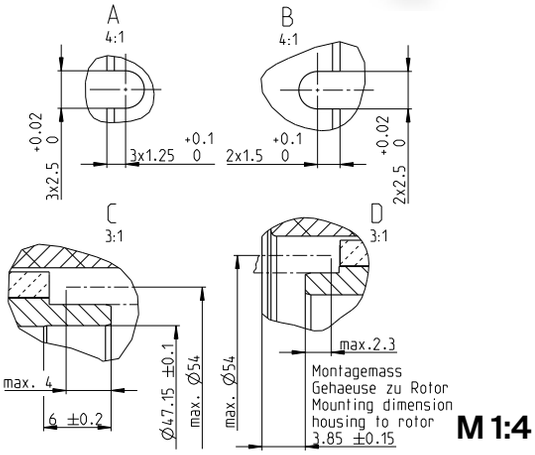
EC frameless DT 85 M ∅90 mm, brushless, 570 watt

Dynamic Torque









M 1:4

Stock program
Standard program
Special program (on request)

Part numbers

		sensorless
	Motor data	740953
	Values at nominal voltage	
1	Nominal voltage	V 48
2	No load speed	rpm 3410
3	No load current	mA 283
4	Nominal speed	rpm 2850
5	Nominal torque	mNm 1710
6	Nominal current (max. continuous current)	A 11.4
	Continuous torque with heat sink	mNm 2106
7	Stall torque	mNm 11500
8	Stall current	A 306
9	Max. efficiency	% 93.9
	Characteristics	
10	Terminal resistance phase to phase	Ω 0.16
11	Terminal inductance phase to phase	mH 0.367
12	Torque constant	mNm/A 134
13	Speed constant	rpm/V 71.4
14	Speed/torque gradient	rpm/mNm 0.084
15	Mechanical time constant	ms 0.57
16	Rotor inertia	gcm^2 650

Specifications

Thermal data

17	Thermal resistance housing-ambient	2.35 K/W
18	Thermal resistance winding-housing	0.3 K/W
19	Thermal time constant winding	21 s
20	Thermal time constant motor	810 s
21	Ambient temperature	-40...+100 °C
22	Max. winding temperature	+155 °C

Mechanical data

23	Max. speed	4000 rpm

Other specifications

29	Number of pole pairs	10
30	Number of phases	3
31	Weight of motor (with mounting flange made of stainless steel)	741 g
	Weight for integration (without mounting flange)	517 g

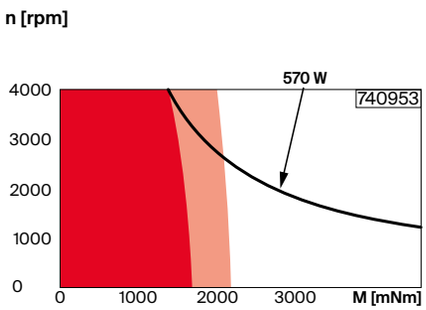
Values listed in the table are nominal.

Connection motor (Cable AWG 16)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection NTC (Cable AWG 24)
purple NTC
blue NTC
Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K

Comment
For Torque control data, refer to "Installation Manual" available on maxon online shop.

Operating range Comments



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Modular system Details on catalog page 56

Sensor
525_TSX 85 MAG with commutation signals

Motor Control
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/30
559_ESCON2 Compact 60/12
559_ESCON2 Compact 60/30
565_EPOS4 Module 50/15
569_EPOS4 Compact 50/15
569_EPOS4 70/15
570_EPOS4 Disk 60/8 CAN
570_EPOS4 Disk 60/8 EtherCAT
571_EPOS4 Disk 60/12 CAN
571_EPOS4 Disk 60/12 EtherCAT

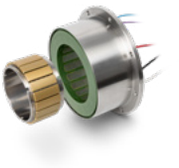
Variants

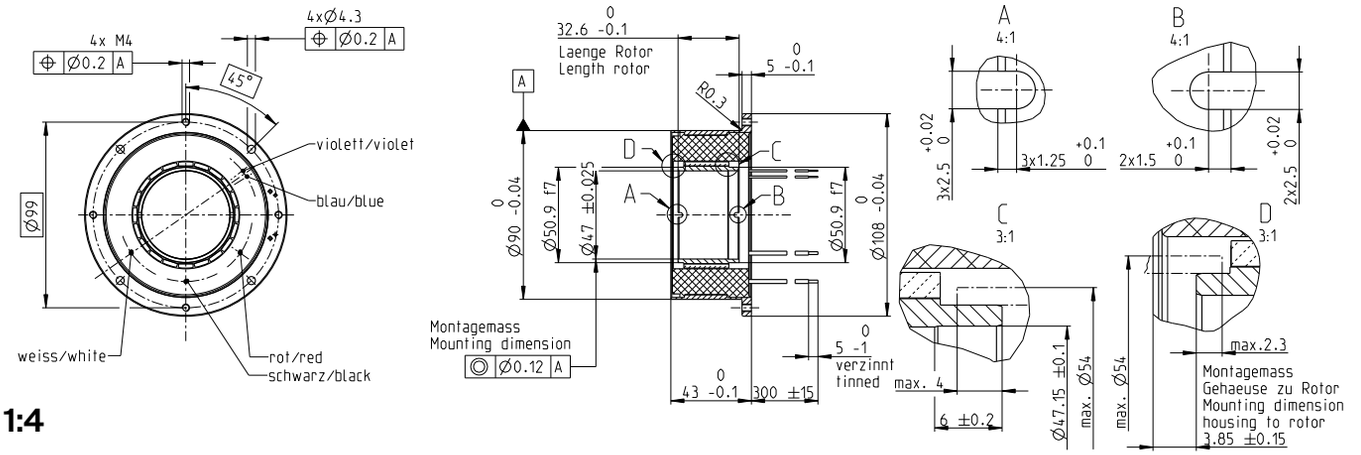
maxon integration into customer housing on request
Other coil designs on request

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EC frameless DT 85 L ∅90 mm, brushless, 680 watt

Dynamic Torque





M 1:4

Stock program
Standard program
Special program (on request)

			Part numbers
		sensorless	759875
Motor data			
	Values at nominal voltage		
1	Nominal voltage	V	48
2	No load speed	rpm	1920
3	No load current	mA	204
4	Nominal speed	rpm	1580
5	Nominal torque	mNm	2840
6	Nominal current (max. continuous current)	A	10.8
	Continuous torque with heat sink	mNm	3423
7	Stall torque	mNm	18600
8	Stall current	A	220
9	Max. efficiency	%	93.9
	Characteristics		
10	Terminal resistance phase to phase	Ω	0.218
11	Terminal inductance phase to phase	mH	0.586
12	Torque constant	mNm/A	238
13	Speed constant	rpm/V	40.2
14	Speed/torque gradient	rpm/mNm	0.037
15	Mechanical time constant	ms	0.398
16	Rotor inertia	gcm²	1030

Specifications

	Thermal data	
17	Thermal resistance housing-ambient	2.20 K/W
18	Thermal resistance winding-housing	0.205 K/W
19	Thermal time constant winding	20 s
20	Thermal time constant motor	760 s
21	Ambient temperature	-40...+100 °C
22	Max. winding temperature	+155 °C
	Mechanical data	
23	Max. speed	3000 rpm
	Other specifications	
29	Number of pole pairs	10
30	Number of phases	3
31	Weight of motor (with mounting flange made of stainless steel)	1040 g
	Weight for integration (without mounting flange)	765 g

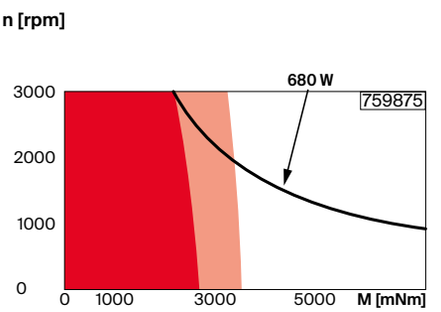
Values listed in the table are nominal.

Connection motor (Cable AWG 16)
red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection NTC (Cable AWG 24)
purple NTC
blue NTC
Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K

Comment
For Torque control data, refer to "Installation Manual" available on maxon online shop.

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Intermittent operation

Assigned power rating

Comments

Modular system

Details on catalog page 56

Sensor
525_TSX 85 MAG with commutation signals

Motor Control
553_ESCON 70/10
557_ESCON2 Micro 60/5
558_ESCON2 Module 60/30
559_ESCON2 Compact 60/12
559_ESCON2 Compact 60/30
565_EPOS4 Module 50/15
569_EPOS4 Compact 50/15
569_EPOS4 70/15
570_EPOS4 Disk 60/8 CAN
570_EPOS4 Disk 60/8 EtherCAT
571_EPOS4 Disk 60/12 CAN
571_EPOS4 Disk 60/12 EtherCAT

Variants

maxon integration into customer housing on request
Other coil designs on request

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Compact drives with integrated positioning/speed controller

Terminology explanations	350
IDX	353–358
ECX FLAT	361–366

Explanation of maxon IDX drives terminology

Dimensional drawings
Presentation of the views according to the projection method E (ISO). 
All dimensions in [mm].

Drive data
The values were determined for sinusoidal commutation and a drive without additional attachments, such as a brake or gearhead. Additional attachments may change the performance data of the system.

1 **Nominal power supply voltage** U_N [Volt]
is the supply voltage at which the nominal values of the drive are achieved. The nominal values (lines 2 – 7) are based on this voltage. The supply voltage may vary within the range of the nominal operating voltage (line 12).

2 **Nominal speed** n_N [rpm]
is the speed for which the drive is rated. For torques up to the nominal torque, the integrated motor controller is capable of regulating to this speed.

3 **Nominal torque at 25°C (max. continuous torque)** [mNm]
and
4 **Nominal torque at 40°C (max. continuous torque)** [mNm]
is the torque generated during operation with the nominal supply voltage and nominal supply current at 25°C/40°C. It is at the limit of the drive's continuous operation range. To prevent the winding from heating up too much, higher torques are only possible for brief periods. The integrated motor controller monitors the winding with a temperature sensor.

5 **Nominal supply current at 25°C** [A]
and
6 **Nominal supply current at 40°C** [A]
is the supply current required to reach the nominal torque with the nominal supply voltage at 25°C/40°C.

7 **Maximum speed with nominal supply voltage** [rpm]
is the maximum speed the drive can achieve at the nominal supply voltage.

8 **Maximum permissible drive speed** n_{max} [rpm]
is the maximum speed the drive can achieve. The maximum speed can only be achieved if a sufficiently high supply voltage is available. Higher speeds are not permitted.

9 **Maximum torque (short-term)** M_{max} [mNm]
is the torque that the drive can output for short periods of time. The duration depends on the installation and is monitored by the integrated motor controller using temperature sensors.

10 **Maximum supply current (short term)** I_{max} [A]
is the maximum current. The supply current is not proportional to the torque, but instead depends on the supply voltage and the operating point.

11 **Rotor moment of inertia** J_R [gcm²]
is the mass moment of inertia of the rotor, based on the axis of rotation.

12 **Nominal supply voltage** $+V_{CC}$ [V]
shows the permitted range for the supply voltage relative to GND. If the actual voltage is lower than the nominal supply voltage, then the nominal torque and speed cannot be guaranteed. If a brake is attached, then the supply voltage of the brake is considered to be the lower limit (see feature chart).

13 **Mechanical time constant** τ_m [ms]
is the time required for the rotor to accelerate from standstill to 63% of its no load speed.

14 **Thermal resistance housing-ambient** R_{th2} [K/W]
and
15 **Thermal resistance winding-housing** R_{th1} [K/W]
Characteristic values of thermal contact resistance without additional heat sinking. Lines 14 and 15 combined define the maximum heating at a given power loss (load). Thermal resistance R_{th2} on motors with metal flanges can decrease by up to 80% if the motor is coupled directly to a good heat-conducting (e.g. metallic) mounting rather than a plastic panel.

16 **Thermal time constant of winding** τ_w [s]
and
17 **Thermal time constant of drive** τ_s [s]
These are the typical response times for temperature changes of the winding and drive. It is noticeable that the drive has a much slower thermal response than the winding. The values have been calculated from the product of the thermal capacity and the given heat resistances. The integrated motor controller monitors the temperatures with temperature sensors.

18 **Ambient temperature** [°C]
Operating temperature range. It results from the thermal resistance of the materials and components used, and the viscosity of the bearing lubrication.

19 **Axial play** [mm]
On motors that are not preloaded, these are the tolerance limits for the bearing play. A preload cancels out the axial play up to the specified axial force. When load is applied in the direction of the preload force (away from the flange), the axial play is always zero. The length tolerance of the shaft includes the maximum axial play.

20 **Radial play** [mm]
Radial play is the bearing's radial movement. A spring is utilized to preload the motor's bearings, eliminating radial play up to a given axial load.

21/22 **Max. axial load** [N]
Dynamic: axial loading permissible in operation. If different values apply for traction and thrust, the smaller value is given.
Static: maximum axial force that does not cause permanent damage when applied to the front of the shaft at standstill.

23 **Max. radial load** [N]
The value is given for a typical distance from the front flange. As the distance increases, this value decreases.

24 **Weight of motor** [g]

25 **Typical noise level** [dBA]
is the statistical average of the noise level measured in accordance with the maxon standard (10 cm distance radially to the drive, no-load operation at the given speed.) The drive lies freely on a plastic foam mat in the noise chamber). The acoustic noise level depends on a number of factors, such as component tolerances, and it is greatly influenced by the overall system in which the drive is installed. When the drive is installed in an unfavorable constellation, the noise level may be significantly higher than the noise level of the drive alone. The acoustic noise level is measured and determined during product qualification.

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maxon IDX

Drive with positioning/speed controller

Terminology explanations	350
IDX 56 S ☐56 mm, 180 Watt	353
IDX 56 M ☐56 mm, 230 Watt	354
IDX 56 L ☐56 mm, 280 Watt	355
IDX 70 S ☐70 mm, 550 Watt	356
IDX 70 M ☐70 mm, 650 Watt	357
IDX 70 L ☐70 mm, 750 Watt	358



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maxon IDX program

Drive with positioning/speed controller

A maintenance-free positioning drive with proven components. The compact brushless EC-i motor combined with an EPOS4 positioning controller makes for a highly-dynamic, powerful drive package with field-oriented control (FOC), a high level of efficiency, and maintenance-free components in high-quality industrial housing.

Key data

Drive ☐	56...70 mm
Drive length	120...211 mm
Power	180...750 W
Rated torque	up to 3167 mNm
Drive speed	up to 6000 rpm



Encoder
Integrated single-turn or multi-turn absolute encoder

Electronics
Integrated electronics with positioning/speed controller

Commands
EtherCAT, CANopen, I/O

Housing
High-quality industrial housing with connectors and IP65 protection class

Holding brake
Optional

Motor
Length: S, M, L
Winding: 24 V, 48 V, 60 V
Flange: A-Flange, C-Flange

Gear
Stages: 1–3
Versions: Standard, Noise reduced, Ultra performance

Accessories
Compatible cables

- → High continuous torque
- → Outstanding energy efficiency
- → Maximum power density
- → Unmatched precision in dynamic motion
- → IP65-protected design
- → Easily configured online

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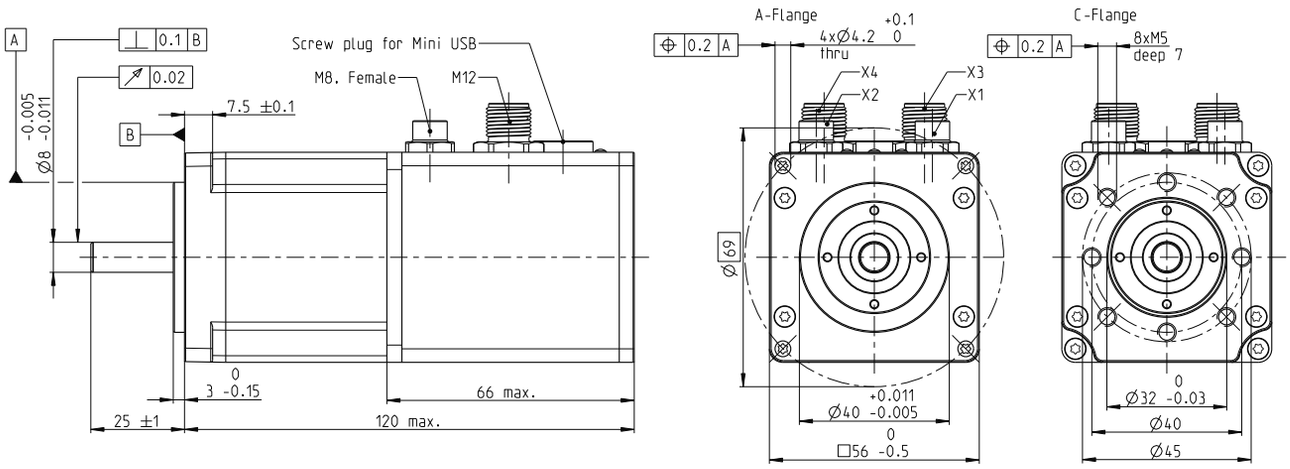
IDX 56 S ☐56 mm, with integrated electronics

IP65 drive with positioning/Speed Controller

Key data: 180/212 W, 450 mNm, 6000 rpm

EtherCAT
CANopen
I/O





M 1:2

	Drive data (provisional)			
1_	Nominal power supply voltage	V	24	48
2_	Nominal speed	rpm	4400	4500
3_	Nominal torque at 25°C	mNm	393	450
4_	Nominal torque at 40°C	mNm	349	399
5_	Nominal supply current at 25°C	A	9.0	5.3
6_	Nominal supply current at 40°C	A	8.0	4.7
7_	Maximum speed at nominal voltage	rpm	6000	6000
8_	Maximum permissible drive speed	rpm	6000	6000
9_	Maximum torque (short-time)	mNm	775	1546
10_	Maximum supply current (short-time)	A	24	24
11_	Rotor inertia of the drive	gcm²	107	107
12_	Nominal supply voltage + V_{CC}	V	12..48	12..48
13_	Mechanical time constant	ms	0.82	0.783

	Thermal data		
14_	Thermal resistance housing-ambient	K/W	2.04
15_	Thermal resistance winding-housing	K/W	1.94
16_	Thermal time constant winding	s	38.2
17_	Thermal time constant drive	s	585
18_	Ambient temperature	°C	-30...+85

	Mechanical data		
19_	Axial play	mm	0.14
	Preload	N	16
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	12
22_	Max. force for press fits (static)	N	150
23_	Max. radial load [mm from flange]	N	110 [12.5]

	Other specifications		
24_	Weight of the drive	g	574
25_	Typical noise level [rpm]	dBA	55 [4000]
	Protection class without shaft		IP65

Sensor

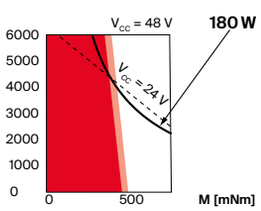
ENC single-turn absolute encoder:	
Resolution, bits	12
EMT multi-turn absolute encoder:	
Additional length, mm	+20
Resolution, bits	14
Multi-turn: max. no. of turns	65536

Supply	M12, male, 5 poles, L-coded
I/O's	M12, male, 12 poles, A-coded
CANopen Input	M8, male, 5 poles, B-coded
CANopen Output	M8, female, 5 poles, B-coded
EtherCAT Input	M8, female, 4 poles, A-coded
EtherCAT Output	M8, female, 4 poles, A-coded

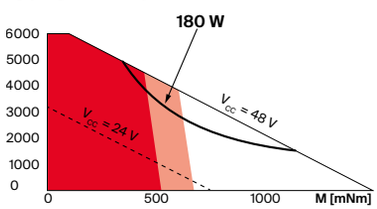
Compatible cables available online in the configurator

Operating range

n [rpm] 24-V-system



n [rpm] 48-V-system



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- ☐ Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
406_GPX 52 A/UP	1–3
407_GPX 52 LN	1–3
456_GSW 62	
458_GB 80	1
459_GB 12	1

Sensor
integrated ENC
integrated EMT

Motor Control
integrated

Accessories
592_Brake AB 42 S

Configuration

Flange front: A-flange / C-flange
Interface with positioning / speed controller: CANopen / EtherCAT
Interface with speed controller: I/O
Shaft: standard/short

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IDX 56 M ☐56 mm, with integrated electronics

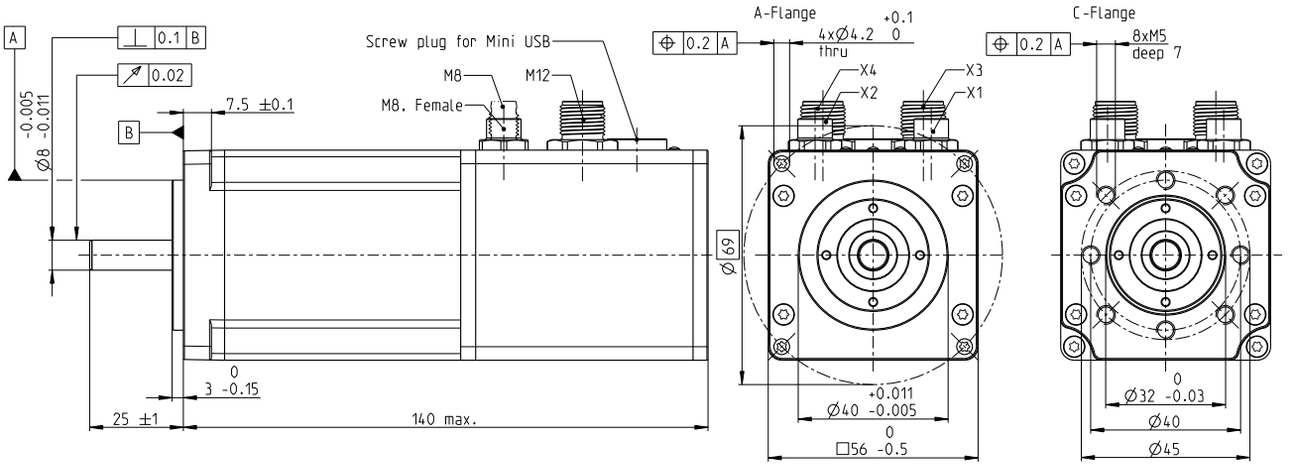
IP65 drive with positioning/Speed Controller

Key data: 230/256 W, 516 mNm, 6000 rpm

EtherCAT
CANopen
I/O



IDX



M 1:2

	Drive data (provisional)			
1_	Nominal power supply voltage	V	24	48
2_	Nominal speed	rpm	4477	4500
3_	Nominal torque at 25°C	mNm	433	516
4_	Nominal torque at 40°C	mNm	376	458
5_	Nominal supply current at 25°C	A	10.0	5.8
6_	Nominal supply current at 40°C	A	8.7	5.2
7_	Maximum speed at nominal voltage	rpm	5227	6000
8_	Maximum permissible drive speed	rpm	6000	6000
9_	Maximum torque (short-time)	mNm	948	1498
10_	Maximum supply current (short-time)	A	24	24
11_	Rotor inertia of the drive	gcm²	170	170
12_	Nominal supply voltage + V_{CC}	V	12..48	12..48
13_	Mechanical time constant	ms	0.654	0.693

	Thermal data		
14_	Thermal resistance housing-ambient	K/W	2.47
15_	Thermal resistance winding-housing	K/W	1.16
16_	Thermal time constant winding	s	18.9
17_	Thermal time constant drive	s	1320
18_	Ambient temperature	°C	-30...+85

	Mechanical data		
19_	Axial play	mm	0.14
	Preload	N	16
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	12
22_	Max. force for press fits (static)	N	150
23_	Max. radial load [mm from flange]	N	110 [12.5]

	Other specifications		
24_	Weight of the drive	g	1070
25_	Typical noise level [rpm]	dBA	54 [4000]
	Protection class without shaft		IP65

Sensor

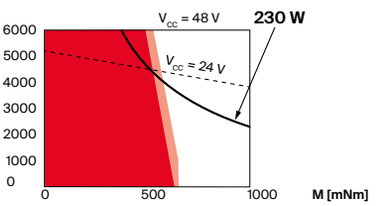
ENC single-turn absolute encoder:	
Resolution, bits	12
EMT multi-turn absolute encoder:	
Additional length, mm	+20
Resolution, bits	14
Multi-turn: max. no. of turns	65536

Supply	M12, male, 5 poles, L-coded
I/O's	M12, male, 12 poles, A-coded
CANopen Input	M8, male, 5 poles, B-coded
CANopen Output	M8, female, 5 poles, B-coded
EtherCAT Input	M8, female, 4 poles, A-coded
EtherCAT Output	M8, female, 4 poles, A-coded

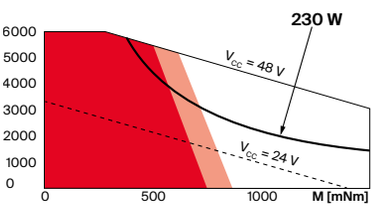
Compatible cables available online in the configurator

Operating range

n [rpm] 24-V-system



n [rpm] 48-V-system



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
406_GPX 52 A/UP	1–3
407_GPX 52 LN	1–3
456_GSW 62	
458_GB 80	1
459_GB 12	1

Sensor
integrated ENC
integrated EMT

Motor Control
integrated

Accessories
592_Brake AB 42 S

Configuration

Flange front: A-flange / C-flange
Interface with positioning / speed controller: CANopen / EtherCAT
Interface with speed controller: I/O
Shaft: standard/short

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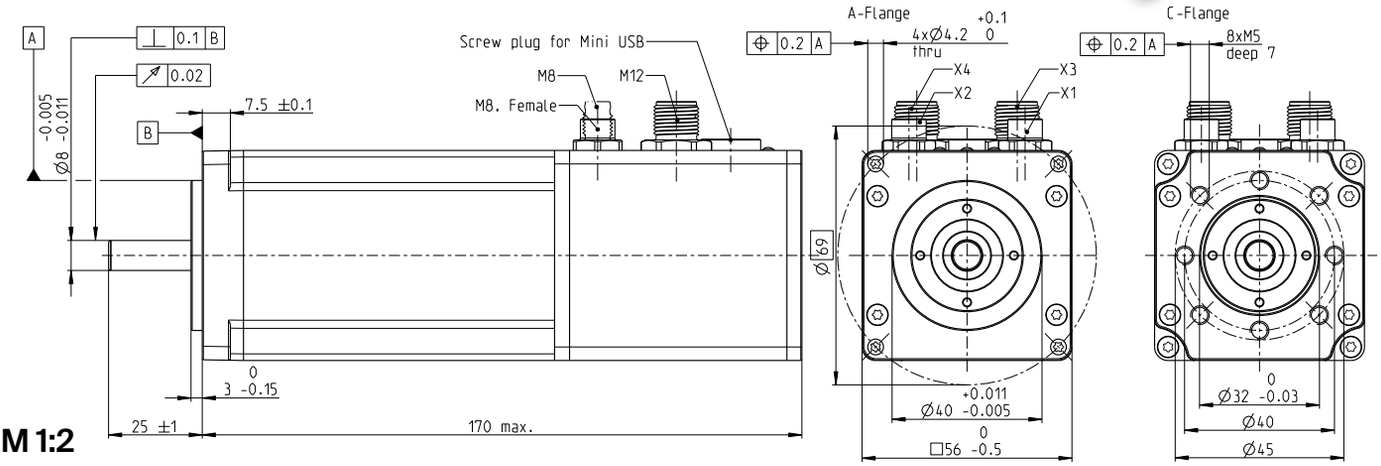
IDX 56 L ☐56 mm, with integrated electronics

IP65 drive with positioning/Speed Controller

Key data: 280/316 W, 795 mNm, 6000 rpm

EtherCAT
CANopen
I/O





M 1:2

Drive data (provisional)				
1_	Nominal power supply voltage	V	24	48
2_	Nominal speed	rpm	2724	3500
3_	Nominal torque at 25°C	mNm	795	779
4_	Nominal torque at 40°C	mNm	690	690
5_	Nominal supply current at 25°C	A	11.4	6.7
6_	Nominal supply current at 40°C	A	9.9	6.0
7_	Maximum speed at nominal voltage	rpm	3110	4925
8_	Maximum permissible drive speed	rpm	6000	5000
9_	Maximum torque (short-time)	mNm	1589	2006
10_	Maximum supply current (short-time)	A	24	24
11_	Rotor inertia of the drive	gcm²	265	265
12_	Nominal supply voltage + V_{CC}	V	12..48	12..48
13_	Mechanical time constant	ms	0.57	0.55

Thermal data			
14_	Thermal resistance housing-ambient	K/W	2.01
15_	Thermal resistance winding-housing	K/W	0.76
16_	Thermal time constant winding	s	20.1
17_	Thermal time constant drive	s	1450
18_	Ambient temperature	°C	-30...+85

Mechanical data			
19_	Axial play	mm	0.14
	Preload	N	16
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	12
22_	Max. force for press fits (static)	N	150
23_	Max. radial load [mm from flange]	N	110 [12.5]

Other specifications			
24_	Weight of the drive	g	1445
25_	Typical noise level [rpm]	dBA	58 [4000]
	Protection class without shaft		IP65

Sensor

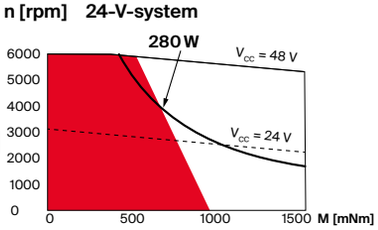
ENC single-turn absolute encoder:	
Resolution, bits	12
EMT multi-turn absolute encoder:	
Additional length, mm	+20
Resolution, bits	14
Multi-turn: max. no. of turns	65 536

Supply	M12, male, 5 poles, L-coded
I/O's	M12, male, 12 poles, A-coded
CANopen Input	M8, male, 5 poles, B-coded
CANopen Output	M8, female, 5 poles, B-coded
EtherCAT Input	M8, female, 4 poles, A-coded
EtherCAT Output	M8, female, 4 poles, A-coded

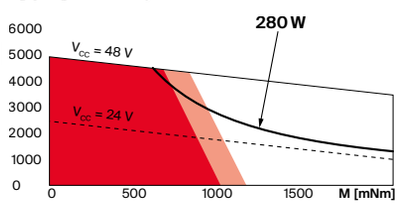
Compatible cables available online in the configurator

Operating range

n [rpm] 24-V-system



n [rpm] 48-V-system



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- ☐ Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]
406_GPX 52 A/UP	1–3
407_GPX 52 LN	1–3
456_GSW 62	
458_GB 80	1
459_GB 12	1

Sensor
integrated ENC
integrated EMT

Motor Control
integrated

Accessories
592_Brake AB 42 S

Configuration

Flange front: A-flange / C-flange
Interface with positioning / speed controller: CANopen / EtherCAT
Interface with speed controller: I/O
Shaft: standard/short

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IDX 70 S ☐70 mm, with integrated electronics

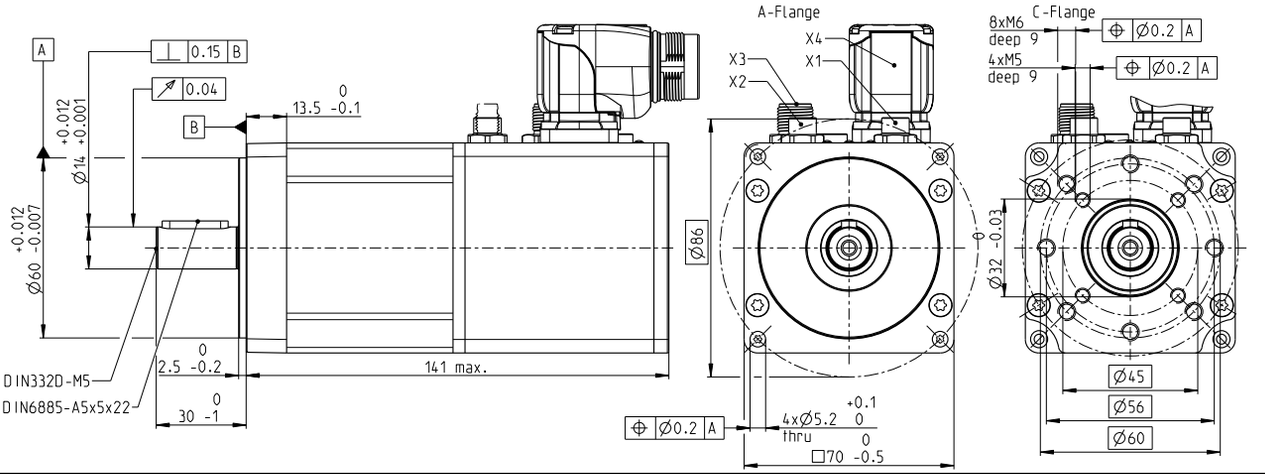
IP65 Drive with positioning/Speed Controller

Key data: 550/641 W, 1530 mNm, 6000 rpm

EtherCAT
CANopen
I/O



IDX



M 1:3

	Drive data (provisional)				
1_	Nominal power supply voltage	V	24	48	60
2_	Nominal speed	rpm	3870	3800	4000
3_	Nominal torque at 25°C	mNm	1069	1339	1530
4_	Nominal torque at 40°C	mNm	928	1163	1329
5_	Nominal supply current at 25°C	A	19.7	12.1	11.6
6_	Nominal supply current at 40°C	A	17.1	10.5	10.1
7_	Maximum speed at nominal voltage	rpm	4100	4100	4280
8_	Maximum permissible drive speed	rpm	6000	5125	4280
9_	Maximum torque (short-time)	mNm	2208	4416	5290
10_	Maximum supply current (short-time)	A	46	46	46
11_	Rotor inertia of the drive	gcm²	568	568	568
12_	Nominal supply voltage + V_{CC}	V	12...60	12...60	12...60
13_	Mechanical time constant	ms	0.598	0.543	0.569

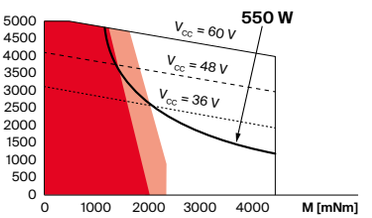
	Thermal data		
14_	Thermal resistance housing-ambient	K/W	1.76
15_	Thermal resistance winding-housing	K/W	1.07
16_	Thermal time constant winding	s	9.83
17_	Thermal time constant drive	s	1260
18_	Ambient temperature	°C	-30...+85

	Mechanical data		
19_	Axial play	mm	0.22
	Preload	N	28
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	22
22_	Max. force for press fits (static)	N	270
23_	Max. radial load [mm from flange]	N	300 [15]

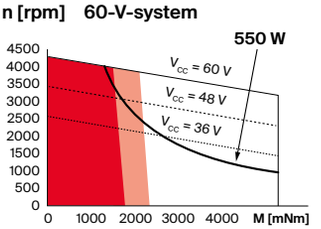
	Other specifications		
24_	Weight of the drive	g	1800
25_	Typical noise level [rpm]	dBA	55 [3000]

Operating range

n [rpm] 48-V-system



n [rpm] 60-V-system



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
☐ Short term operation

Sensor

ENC single-turn absolute encoder:	
Resolution, bits	12
EMT multi-turn absolute encoder:	
Additional length, mm	+39
Resolution, bits	14
Multi-turn: max. no. of turns	65536

Supply	M23, male, 6 poles, N-coded
I/O's	M12, male, 12 poles, A-coded
CANopen Input	M8, male, 5 poles, B-coded
CANopen Output	M8, female, 5 poles, B-coded
EtherCAT Input	M8, female, 4 poles, A-coded
EtherCAT Output	M8, female, 4 poles, A-coded

Compatible cables available online in the configurator.

Modular system Details on catalog page 44

Gear	Stages [opt.]
408_GPX 70 A/UP	1–2
409_GPX 70 LN	1–2
459_GB 12	1
460_GB 9	1
461_GB 65	2

Sensor
integrated ENC
integrated EMT

Accessories
593_Brake AB 60 S

Motor Control
integrated

Configuration

Flange front: A-flange / C-flange
Interface with positioning / speed controller: CANopen / EtherCAT
Interface with speed controller: I/O
Angle power connector: 0° / 90°
Shaft: standard with feather key/small diameter without feather key

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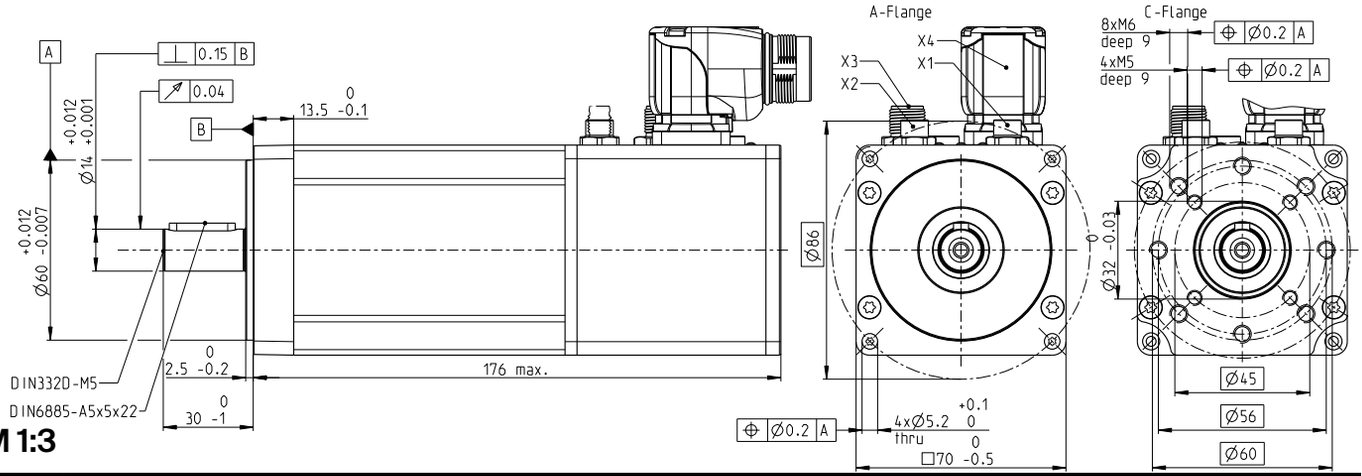
IDX 70 M ☐70 mm, with integrated electronics

IP65 Drive with positioning/Speed Controller

Key data: 650/773 W, 2441 mNm, 4000 rpm

EtherCAT
CANopen
I/O





M 1:3

Drive data (provisional)				
1_	Nominal power supply voltage	V	48	60
2_	Nominal speed	rpm	3038	3022
3_	Nominal torque at 25°C	mNm	2096	2441
4_	Nominal torque at 40°C	mNm	1820	2120
5_	Nominal supply current at 25°C	A	15.3	14.0
6_	Nominal supply current at 40°C	A	13.3	12.2
7_	Maximum speed at nominal voltage	rpm	3150	3195
8_	Maximum permissible drive speed	rpm	4000	3195
9_	Maximum torque (short-time)	mNm	5750	7084
10_	Maximum supply current (short-time)	A	46	46
11_	Rotor inertia of the drive	gcm²	1050	1050
12_	Nominal supply voltage + V_{CC}	V	12...60	12...60
13_	Mechanical time constant	ms	0.487	0.437

Thermal data			
14_	Thermal resistance housing-ambient	K/W	1.41
15_	Thermal resistance winding-housing	K/W	0.642
16_	Thermal time constant winding	s	9.83
17_	Thermal time constant drive	s	1260
18_	Ambient temperature	°C	-30...+85

Mechanical data			
19_	Axial play	mm	0.22
	Preload	N	28
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	22
22_	Max. force for press fits (static)	N	270
23_	Max. radial load [mm from flange]	N	300 [15]

Other specifications			
24_	Weight of the drive	g	2500
25_	Typical noise level [rpm]	dBA	60 [3000]
	Protection class without shaft		IP65

Sensor

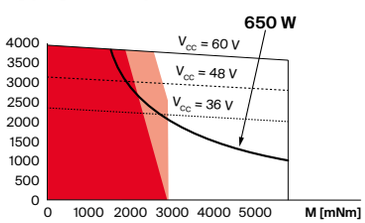
ENC single-turn absolute encoder:	
Resolution, bits	12
EMT multi-turn absolute encoder:	
Additional length, mm	+39
Resolution, bits	14
Multi-turn: max. no. of turns	65 536

Supply	M23, male, 6 poles, N-coded
I/O's	M12, male, 12 poles, A-coded
CANopen Input	M8, male, 5 poles, B-coded
CANopen Output	M8, female, 5 poles, B-coded
EtherCAT Input	M8, female, 4 poles, A-coded
EtherCAT Output	M8, female, 4 poles, A-coded

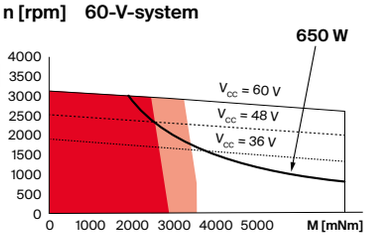
Compatible cables available online in the configurator.

Operating range

n [rpm] 48-V-system



n [rpm] 60-V-system



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
408_GPX 70 A/UP	1–2	integrated ENC	integrated
409_GPX 70 LN	1–2	integrated EMT	
459_GB 12	1		
460_GB 9	1	Accessories	
461_GB 65	2	593_Brake AB 60 S	

Configuration

Flange front: A-flange / C-flange
Interface with positioning / speed controller: CANopen / EtherCAT
Interface with speed controller: I/O
Angle power connector: 0° / 90°
Shaft: standard with feather key/small diameter without feather key

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IDX 70 L ☐70 mm, with integrated electronics

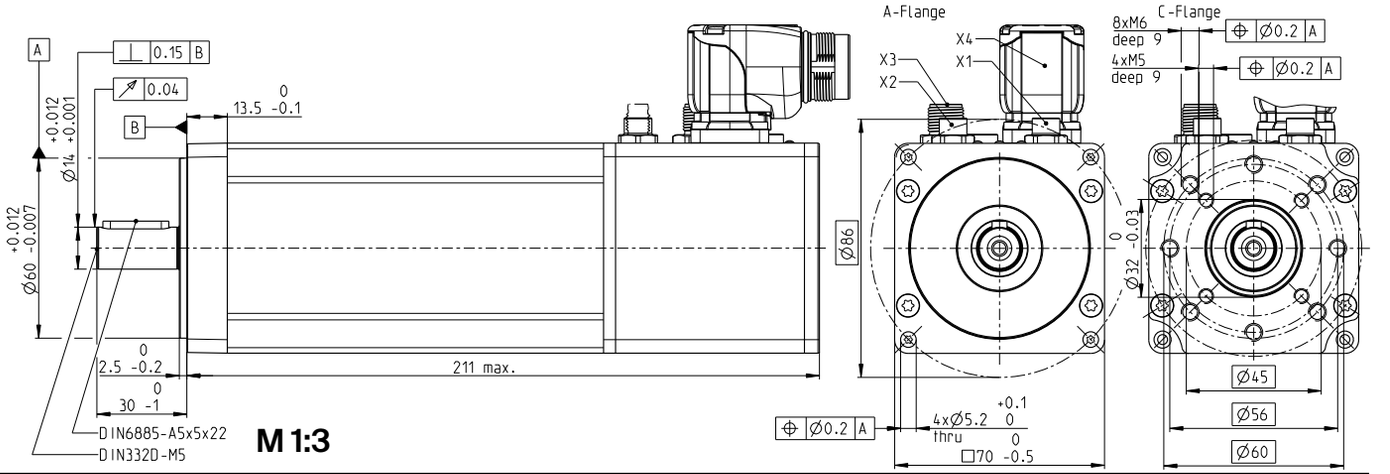
IP65 Drive with positioning/Speed Controller

Key data: 750/831 W, 3167 mNm, 3200 rpm

EtherCAT
CANopen
I/O



IDX



Drive data (provisional)				
1_ Nominal power supply voltage	V	48	60
2_ Nominal speed	rpm	2424	2505
3_ Nominal torque at 25°C	mNm	2890	3167
4_ Nominal torque at 40°C	mNm	2510	2750
5_ Nominal supply current at 25°C	A	16.7	15.1
6_ Nominal supply current at 40°C	A	14.5	13.1
7_ Maximum speed at nominal voltage	rpm	2490	2630
8_ Maximum permissible drive speed	rpm	3200	2630
9_ Maximum torque (short-time)	mNm	7268	8602
10_ Maximum supply current (short-time)	A	46	46
11_ Rotor inertia of the drive	gcm²	1534	1534
12_ Nominal supply voltage + V_{CC}	V	12...60	12...60
13_ Mechanical time constant	ms	0.408	0.449

Thermal data		
14_ Thermal resistance housing-ambient	K/W	0.364
15_ Thermal resistance winding-housing	K/W	1.143
16_ Thermal time constant winding	s	9.84
17_ Thermal time constant drive	s	1620
18_ Ambient temperature	°C	-30...+85

Mechanical data		
19_ Axial play	mm	0.22
Preload	N	28
Direction of force		Pull
20_ Radial play		preloaded
21_ Max. axial load (dynamic)	N	22
22_ Max. force for press fits (static)	N	270
23_ Max. radial load [mm from flange]	N	300 [15]

Other specifications		
24_ Weight of the drive	g	3200
25_ Typical noise level [rpm]	dBA	65 [3000]
Protection class without shaft		IP65

Sensor

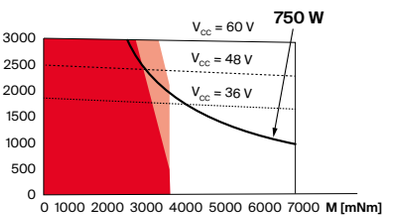
ENC single-turn absolute encoder:	
Resolution, bits	12
EMT multi-turn absolute encoder:	
Additional length, mm	+39
Resolution, bits	14
Multi-turn: max. no. of turns	65 536

Supply	M23, male, 6 poles, N-coded
I/O's	M12, male, 12 poles, A-coded
CANopen Input	M8, male, 5 poles, B-coded
CANopen Output	M8, female, 5 poles, B-coded
EtherCAT Input	M8, female, 4 poles, A-coded
EtherCAT Output	M8, female, 4 poles, A-coded

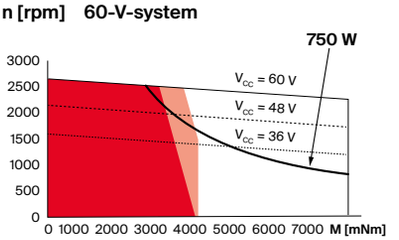
Compatible cables available online in the configurator.

Operating range

n [rpm] 48-V-system



n [rpm] 60-V-system



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- ☐ Short term operation

Modular system Details on catalog page 44

Sensor
integrated ENC
integrated EMT

Motor Control
integrated

Accessories
593_Brake AB 60 S

Configuration

Flange front: A-flange / C-flange
Interface with positioning / speed controller: CANopen / EtherCAT
Interface with speed controller: I/O
Angle power connector: 0° / 90°
Shaft: standard with feather key/small diameter without feather key

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maxon ECX FLAT

Drive with speed controller

Terminology explanations		350
ECX FLAT 22 S ∅22 mm, 16.7 Watt, High Torque	NEW	361
ECX FLAT 22 L ∅22 mm, 29 Watt, High Torque	NEW	362
ECX FLAT 32 S ∅32 mm, 50 Watt, High Torque		363
ECX FLAT 32 L ∅32 mm, 80 Watt, High Torque		364
ECX FLAT 42 S ∅42 mm, 90 Watt, High Torque	NEW	365
ECX FLAT 42 M ∅42 mm, 120 Watt, High Torque	NEW	366



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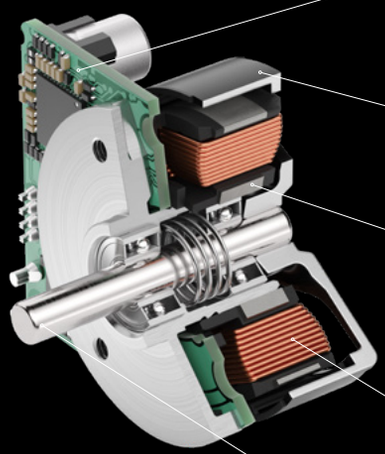
maxon ECX FLAT program

Drive with speed controller

The compact brushless ECX FLAT motors with integrated 4-Q speed controller are based on the tried-and-tested high torque motors and are optimized for high torques and confined spaces. The control commands are given via four digital and analog input and outputs with a wide range of functionalities. The ECX FLAT program is fully configurable. Select your mechanical and electrical interface online and configure the functionality of the drive electronics.

Key data

Motor ∅	32 mm
Motor length	17.5...20 mm
Power	50...80 W
Nominal torque	up to 74 mNm
Max. permissible speed	up to 14 000 rpm



Integrated 4-Q speed controller with easy online configuration. Command functions via four digital and analog inputs and outputs.

External, multipole rotor for high torques.

Stator packet optimally connected to the flange, for ideal heat dissipation.

Precision-manufactured winding for optimal fill factors.

Grooveless shaft ensures smooth running and extremely high torsional rigidity.

- → High continuous torque
- → High power density
- → Integrated 4-Q speed controller
- → Easily configured online

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ECX FLAT 22 S ∅22 mm, brushless, with integrated electronics

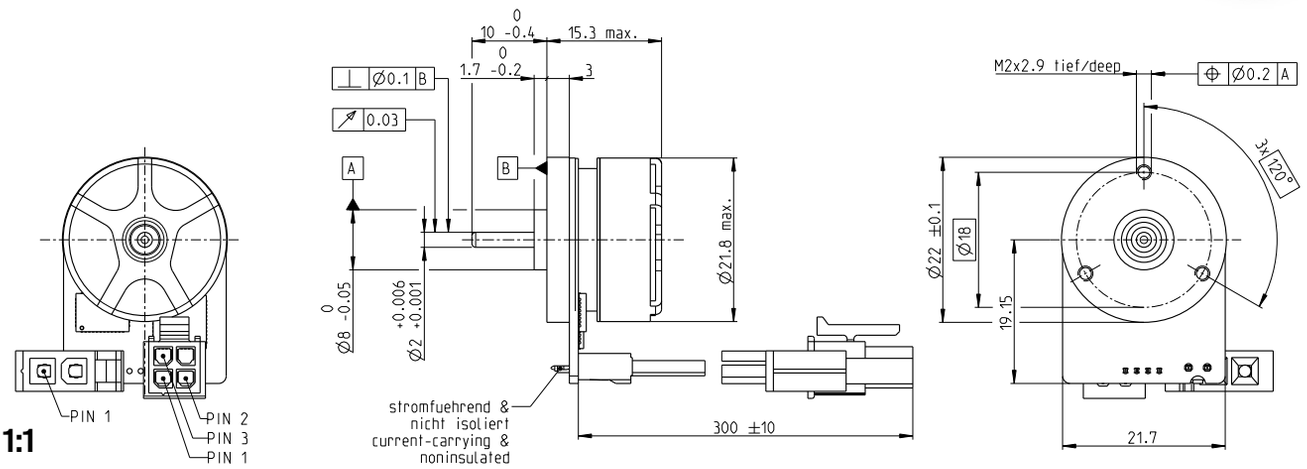
High Torque, 4-Q-Speed Controller

Key data: 16.7 W, 13.3 mNm, 14 000 rpm

NEW



I/O⇔



M 1:1

	Drive data		
1_	Nominal power supply voltage	V	24
2_	Nominal speed	rpm	12 000
3_	Nominal torque at 25 °C	mNm	13.3
5_	Nominal supply current at 25 °C	A	1.25
7_	Maximum speed at nominal voltage	rpm	14 000
8_	Maximum permissible drive speed	rpm	14 000
9_	Maximum torque (short-time)	mNm	30.8
10_	Maximum supply current (short-time)	A	2.134
11_	Rotor inertia of the drive	gcm²	4.84
12_	Nominal supply voltage + V_{CC}	V	8...28
13_	Mechanical time constant	ms	6.82
	Speed constant	rpm/V	682
37_	Speed set value input	V	0...10
38_	Scale speed set value input	rpm/V	1200
	Min. permissible drive speed	rpm	300
40_	Max. acceleration	rpm/s	20 000

	Thermal data		
14_	Thermal resistance housing-ambient	K/W	8.48
15_	Thermal resistance winding-housing	K/W	14
16_	Thermal time constant winding	s	11.9
17_	Thermal time constant drive	s	20.3
18_	Ambient temperature	°C	-25...+85

	Mechanical data		
19_	Axial play at axial load	< 4 N	0 mm
		> 4 N	0.14 mm
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	1.8
22_	Max. force for press fits (static)	N	26
	(shaft supported)	N	200
23_	Max. radial load [mm from flange]	N	3.5 [5]

	Other specifications		
24_	Weight of the drive	g	27

Drive data in the table is nominal data.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection, Supply (Cable AWG 22)

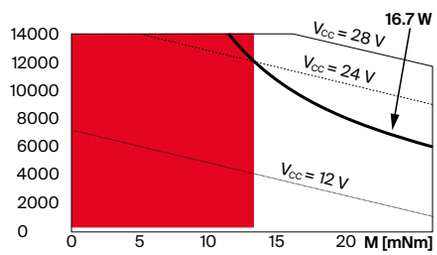
red	Pin 1	+V_{CC} 8...28 VDC
black	Pin 2	GND
Connector	**Article number**	
Molex	39-01-2020	

Connection, I/O's (Cable AWG 28)

white	Pin 1	I/O 1
green	Pin 2	I/O 2
grey	Pin 3	I/O 3
brown	Pin 4	I/O 4
Connector	**Article number**	
Molex	43025-0400	

Operating range

n [rpm] 24-V-system



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
390_GPX 22 A/C	1–4	integrated	integrated
391_GPX 22 LN/LZ	1–4		
392_GPX 22 HP	2–4		
394_GPX 22 UP	1–4		
396_GPX 26 A/C	3		
397_GPX 26 LN/LZ	3		
398_GPX 26 HP	4		

Configuration

Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder
Motor controller: I/O functionality/system parameters

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ECX FLAT 22 L ∅22 mm, brushless, with integrated electronics

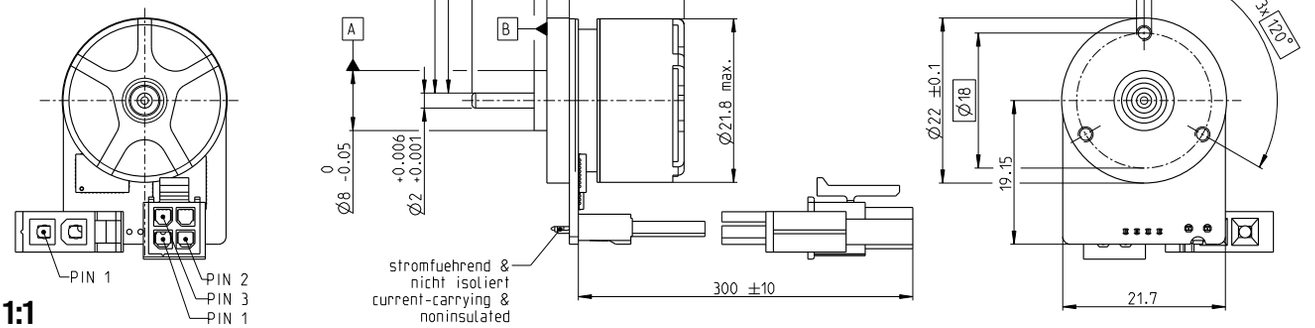
High Torque, 4-Q-Speed Controller

Key data: 29 W, 25 mNm, 14000 rpm

NEW



I/O⇔



M 1:1

	Drive data		
1_	Nominal power supply voltage	V	24
2_	Nominal speed	rpm	11000
3_	Nominal torque at 25°C	mNm	25
5_	Nominal supply current at 25°C	A	2.2
7_	Maximum speed at nominal voltage	rpm	14000
8_	Maximum permissible drive speed	rpm	14000
9_	Maximum torque (short-time)	mNm	57.6
10_	Maximum supply current (short-time)	A	3.88
11_	Rotor inertia of the drive	gcm²	6.82
12_	Nominal supply voltage + V_{CC}	V	8...28
13_	Mechanical time constant	ms	4.67
	Speed constant	rpm/V	661
37_	Speed set value input	V	0...10
38_	Scale speed set value input	rpm/V	1100
	Min. permissible drive speed	rpm	300
40_	Max. acceleration	rpm/s	20000

	Thermal data		
14_	Thermal resistance housing-ambient	K/W	5.9
15_	Thermal resistance winding-housing	K/W	5.84
16_	Thermal time constant winding	s	6.09
17_	Thermal time constant drive	s	14.1
18_	Ambient temperature	°C	-25...+85

	Mechanical data		
19_	Axial play at axial load	< 4 N	0 mm
		> 4 N	0.14 mm
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	1.8
22_	Max. force for press fits (static)	N	26
	(shaft supported)	N	200
23_	Max. radial load [mm from flange]	N	3.5 [5]

	Other specifications		
24_	Weight of the drive	g	33.5

Drive data in the table is nominal data.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection, Supply (Cable AWG 22)

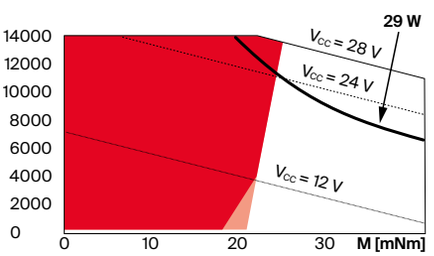
red	Pin 1	+V_{CC} 8...28 VDC
black	Pin 2	GND
Connector	**Article number**	
Molex	39-01-2020	

Connection, I/O's (Cable AWG 28)

white	Pin 1	I/O 1
green	Pin 2	I/O 2
grey	Pin 3	I/O 3
brown	Pin 4	I/O 4
Connector	**Article number**	
Molex	43025-0400	

Operating range

n [rpm] 24-V-system



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
390_GPX 22 A/C	1–4	integrated	integrated
391_GPX 22 LN/LZ	1–4		
392_GPX 22 HP	2–4		
394_GPX 22 UP	1–4		
396_GPX 26 A/C	3		
397_GPX 26 LN/LZ	3		
398_GPX 26 HP	4		

Configuration

Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder
Motor controller: I/O functionality/system parameters

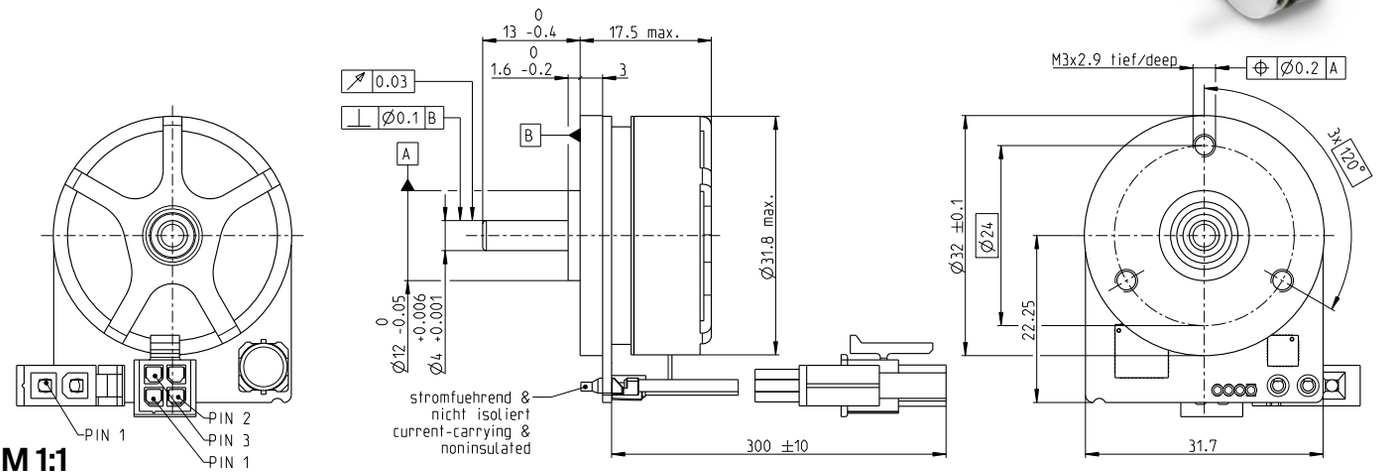
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ECX FLAT 32 S ∅32 mm, brushless, with integrated electronics

High Torque, 4-Q-Speed Controller

Key data: 50 W, 47.8 mNm, 14 000 rpm





M 1:1

	Drive data		
1_	Nominal power supply voltage	V	24
2_	Nominal speed	rpm	10 000
3_	Nominal torque at 25 °C	mNm	47.8
5_	Nominal supply current at 25 °C	A	3.04
7_	Maximum speed at nominal voltage	rpm	12 491
8_	Maximum permissible drive speed	rpm	14 000
9_	Maximum torque (short-time)	mNm	91.4
10_	Maximum supply current (short-time)	A	5.28
11_	Rotor inertia of the drive	gcm²	24.4
12_	Nominal supply voltage + V_{CC}	V	8...28
13_	Mechanical time constant	ms	4.79
	Speed constant	rpm/V	569
37_	Speed set value input	V	0...10
38_	Scale speed set value input	rpm/V	1000
	Min. permissible drive speed	rpm	200
40_	Max. acceleration	rpm/s	20 000

	Thermal data		
14_	Thermal resistance housing-ambient	K/W	4.38
15_	Thermal resistance winding-housing	K/W	6.44
16_	Thermal time constant winding	s	20.7
17_	Thermal time constant drive	s	130
18_	Ambient temperature	°C	-25...+85

	Mechanical data		
19_	Axial play at axial load	< 4 N	0 mm
		> 4 N	0.14 mm
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	4
22_	Max. force for press fits (static)	N	45
	(shaft supported)	N	1000
23_	Max. radial load [mm from flange]	N	12 [5]

	Other specifications		
24_	Weight of the drive	g	59.5

Drive data in the table is nominal data.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection, Supply (Cable AWG 20)

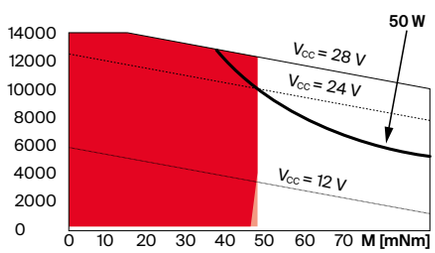
red	Pin 1 +V_{CC} 8...28 VDC
black	Pin 2 GND
Connector	**Article number**
Molex	39-01-2020

Connection, I/O's (Cable AWG 28)

white	Pin 1 I/O 1
green	Pin 2 I/O 2
grey	Pin 3 I/O 3
brown	Pin 4 I/O 4
Connector	**Article number**
Molex	43025-0400

Operating range

n [rpm] 24-V-system



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
399_GPX 32 A/C	1–3	integrated	integrated
400_GPX 32 LN/LZ	1–3		
401_GPX 32 HP	2–4		
402_GPX 32 UP	1–4		
403_GPX 37 A	3		
404_GPX 37 LN/LZ	3		

Configuration

Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder
Motor controller: I/O functionality/system parameters

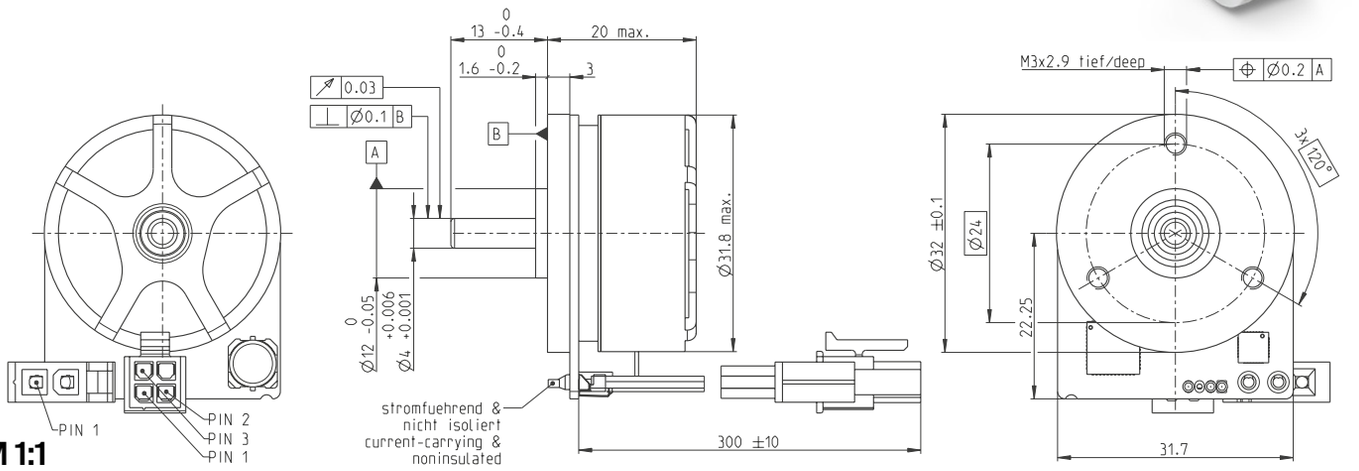
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ECX FLAT 32 L ∅32 mm, brushless, with integrated electronics

High Torque, 4-Q-Speed Controller

Key data: 80 W, 73.9 mNm, 14 000 rpm





M 1:1

	Drive data		
1_	Nominal power supply voltage	V	24
2_	Nominal speed	rpm	10 000
3_	Nominal torque at 25 °C	mNm	73.9
5_	Nominal supply current at 25 °C	A	4.9
7_	Maximum speed at nominal voltage	rpm	13 318
8_	Maximum permissible drive speed	rpm	14 000
9_	Maximum torque (short-time)	mNm	119
10_	Maximum supply current (short-time)	A	7.2
11_	Rotor inertia of the drive	gcm²	30.7
12_	Nominal supply voltage + V_{CC}	V	8...28
13_	Mechanical time constant	ms	3.69
	Speed constant	rpm/V	592
37_	Speed set value input	V	0...10
38_	Scale speed set value input	rpm/V	1000
	Min. permissible drive speed	rpm	200
40_	Max. acceleration	rpm/s	20 000

	Thermal data		
14_	Thermal resistance housing-ambient	K/W	3.01
15_	Thermal resistance winding-housing	K/W	3.73
16_	Thermal time constant winding	s	12.3
17_	Thermal time constant drive	s	107
18_	Ambient temperature	°C	-25...+85

	Mechanical data		
19_	Axial play at axial load	< 4 N	0 mm
		> 4 N	0.14 mm
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	4
22_	Max. force for press fits (static)	N	45
	(shaft supported)	N	1000
23_	Max. radial load [mm from flange]	N	12 [5]

	Other specifications		
24_	Weight of the drive	g	71.2

Drive data in the table is nominal data.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

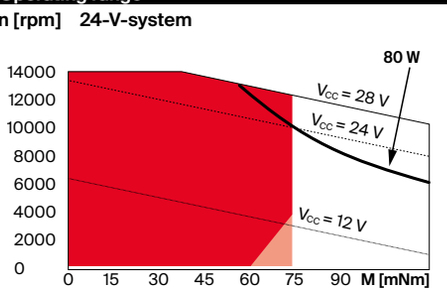
Connection, Supply (Cable AWG 20)

red	Pin 1 +V_{CC} 8...28 VDC
black	Pin 2 GND
Connector	**Article number**
Molex	39-01-2020

Connection, I/O's (Cable AWG 28)

white	Pin 1 I/O 1
green	Pin 2 I/O 2
grey	Pin 3 I/O 3
brown	Pin 4 I/O 4
Connector	**Article number**
Molex	43025-0400

Operating range



Continuous operation
Continuous operation with reduced thermal resistance R_{th2} 50%
Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
399_GPX 32 A/C	1–3	integrated	integrated
400_GPX 32 LN/LZ	1–3		
401_GPX 32 HP	2–4		
402_GPX 32 UP	1–4		
403_GPX 37 A	3		
404_GPX 37 LN/LZ	3		

Configuration

Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder
Motor controller: I/O functionality/system parameters

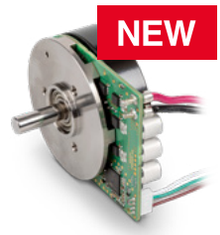
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ECX FLAT 42 S ∅42 mm, brushless, with integrated electronics

High Torque, 4-Q-Speed Controller

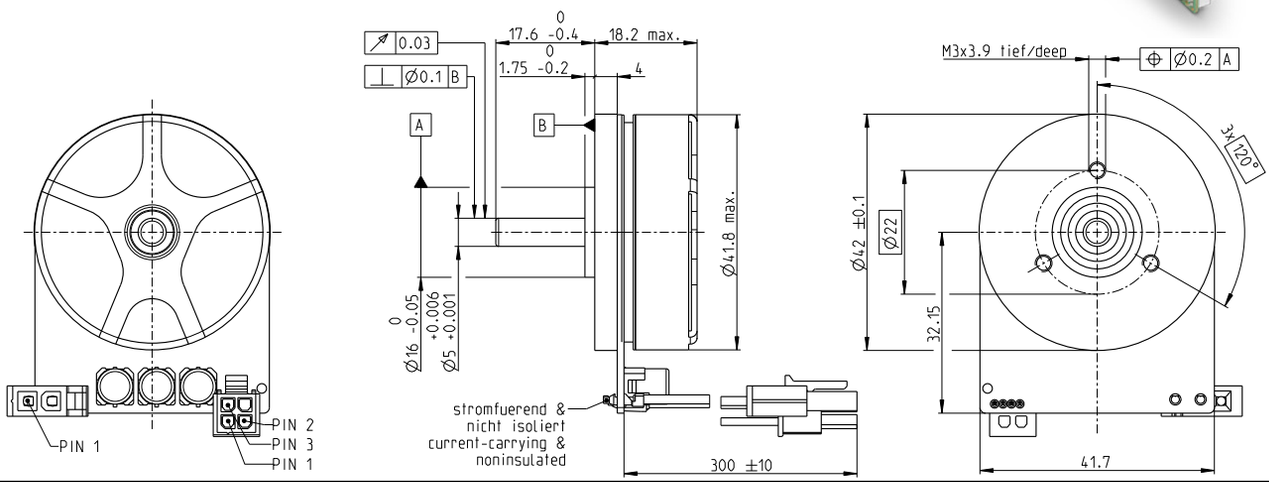
Key data: 90 W, 127 mNm, 8000 rpm

NEW



I/O⇔

ECX FLAT



M 3:4

	Drive data		
1_	Nominal power supply voltage	V	24
2_	Nominal speed	rpm	6700
3_	Nominal torque at 25°C	mNm	127
5_	Nominal supply current at 25°C	A	5.66
7_	Maximum speed at nominal voltage	rpm	8000
8_	Maximum permissible drive speed	rpm	8000
9_	Maximum torque (short-time)	mNm	321.1
10_	Maximum supply current (short-time)	A	12.61
11_	Rotor inertia of the drive	gcm²	65.3
12_	Nominal supply voltage + V_{CC}	V	8...28
13_	Mechanical time constant	ms	3.97
	Speed constant	rpm/V	386
37_	Speed set value input	V	0...10
38_	Scale speed set value input	rpm/V	1000
	Min. permissible drive speed	rpm	200
40_	Max. acceleration	rpm/s	8000

	Thermal data		
14_	Thermal resistance housing-ambient	K/W	2.12
15_	Thermal resistance winding-housing	K/W	3.53
16_	Thermal time constant winding	s	15.2
17_	Thermal time constant drive	s	118
18_	Ambient temperature	°C	-25...+85

	Mechanical data		
19_	Axial play at axial load	< 6 N	0 mm
		> 6 N	0.14 mm
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	6
22_	Max. force for press fits (static)	N	86
	(shaft supported)	N	1300
23_	Max. radial load [mm from flange]	N	35 [5]

	Other specifications		
24_	Weight of the drive	g	105

Drive data in the table is nominal data.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection, Supply (Cable AWG 18)

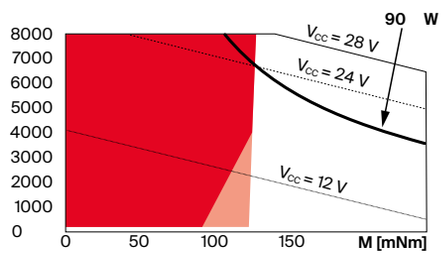
red	Pin 1	+V_{CC} 8...28 VDC
black	Pin 2	GND
Connector	**Article number**	
Molex	39-01-2020	

Connection, I/O's (Cable AWG 28)

white	Pin 1	I/O 1
green	Pin 2	I/O 2
grey	Pin 3	I/O 3
brown	Pin 4	I/O 4
Connector	**Article number**	
Molex	43025-0400	

Operating range

n [rpm] 24-V-system



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
405_GPX 42 C/UP 455_GSW 55 A	1–4	integrated	integrated

Configuration

Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder
Motor controller: I/O functionality/system parameters

Compact drive

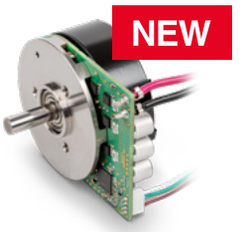
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ECX FLAT 42 M ∅42 mm, brushless, with integrated electronics

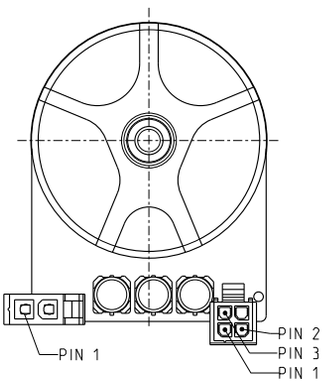
High Torque, 4-Q-Speed Controller

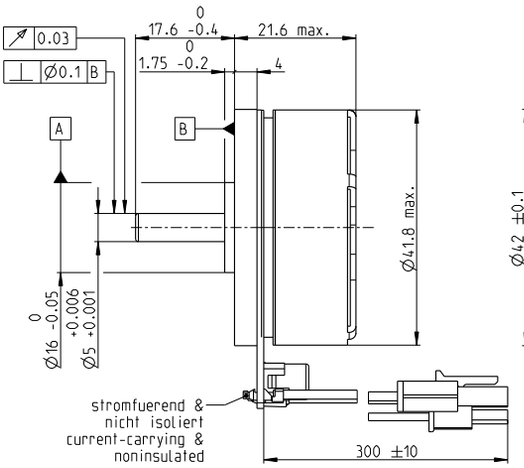
Key data: 120 W, 190 mNm, 8000 rpm

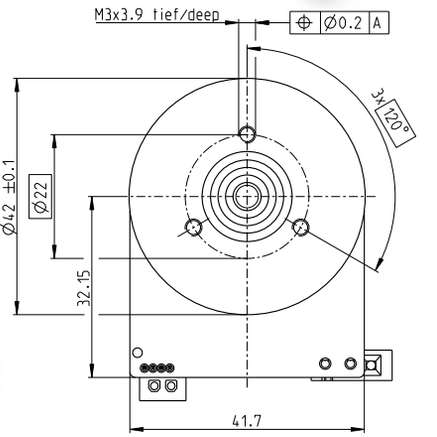
NEW



I/O⇔







M 3:4

	Drive data		
1_	Nominal power supply voltage	V	24
2_	Nominal speed	rpm	6100
3_	Nominal torque at 25°C	mNm	190
5_	Nominal supply current at 25°C	A	7.1
7_	Maximum speed at nominal voltage	rpm	7776
8_	Maximum permissible drive speed	rpm	8000
9_	Maximum torque (short-time)	mNm	536
10_	Maximum supply current (short-time)	A	17.46
11_	Rotor inertia of the drive	gcm²	86.2
12_	Nominal supply voltage + V_{CC}	V	8...28
13_	Mechanical time constant	ms	2.57
	Speed constant	rpm/V	339
37_	Speed set value input	V	0...10
38_	Scale speed set value input	rpm/V	1000
	Min. permissible drive speed	rpm	200
40_	Max. acceleration	rpm/s	8000

	Thermal data		
14_	Thermal resistance housing-ambient	K/W	1.66
15_	Thermal resistance winding-housing	K/W	3.01
16_	Thermal time constant winding	s	20.1
17_	Thermal time constant drive	s	92.2
18_	Ambient temperature	°C	-25...+85

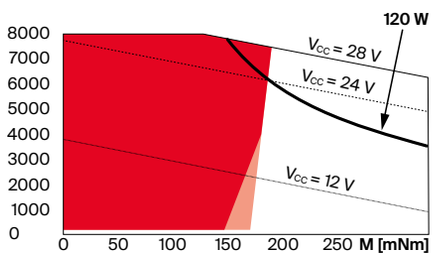
	Mechanical data		
19_	Axial play at axial load	< 6 N	0 mm
		> 6 N	0.14 mm
	Direction of force		Pull
20_	Radial play		preloaded
21_	Max. axial load (dynamic)	N	6
22_	Max. force for press fits (static)	N	86
	(shaft supported)	N	1300
23_	Max. radial load [mm from flange]	N	40 [5]

	Other specifications		
24_	Weight of the drive	g	128

Drive data in the table is nominal data.

Operating range

n [rpm] 24-V-system



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular system Details on catalog page 44

Gear	Stages [opt.]	Sensor	Motor Control
405_GPX 42 C/UP 455_GSW 55 A	1–4	integrated	integrated

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection, Supply (Cable AWG 18)

red	Pin 1	+V_{CC} 8...28 VDC
black	Pin 2	GND
Connector	**Article number**	
Molex	39-01-2020	

Connection, I/O's (Cable AWG 28)

white	Pin 1	I/O 1
green	Pin 2	I/O 2
grey	Pin 3	I/O 3
brown	Pin 4	I/O 4
Connector	**Article number**	
Molex	43025-0400	

Configuration
Shaft, front: length/shaft shoulder/faces
Shaft, rear: length/shaft shoulder
Motor controller: I/O functionality/system parameters

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Precision gearhead

Standard specification no. 102		91
Terminology explanations		
GPX, GP, GS, GB and screw drive		370–482
GSW		455–456
Planetary gearhead (GPX), can be configured online		370–409
Planetary gearhead (GP)		412–446
Spur gearhead (GS)		448–452
Strain wave gearhead (GSW)	NEW	455–456
Parvalux right angle gear (GB)		458–461

Explanations of maxon terminology gear and screw drive

Dimensional drawings
Presentation of the views according to the projection method E (ISO). All dimensions in [mm].

Mounting in plastic
Screwed connections on motors with plastic flanges require special attention.

M_A Max. tightening torque [Ncm]
A torque screwdriver may be adjusted to this value.

L Active thread depth [mm]
The relation of the thread depth to the thread diameter must be at least 2:1. The screw-in depth must be less than the usable length of the thread!

Gearhead data
Values are based on an ambient temperature of around 25 °C (known as cold data).

Key data (GPX)
Maximum values identified as key data represent the maximum for all stages/reductions.

Technical data

Max. continuous/intermittent* input speed
It is based on service life considerations. If this value is greatly exceeded, the service life can be shortened, the gear heats up more and more noise is generated.

Temperature range
The temperature range may be extended for some gears to –40 °C and +100 °C, but in extremely low temperatures, much greater power consumption must be expected. Special lubrication can be supplied on request, even for other temperature ranges.

Radial play
The radial play test value depends heavily on the mounting, measuring point and adjoining force. For this reason, the clearance of the measuring point to the flange is always given. Measurement is always carried out under a test force that is smaller than the maximum radial load.

Max. permissible radial load
Is stated in a specific distance from the gear flange. If it is not specified in stages, radial load is based on a reference speed of 1000 rpm on the gear drive shaft.

Axial play
The value for the axial play of a gear is determined between the two axial end positions of the output shaft. This measurement is determined by the type of bearings and may be zero for preloaded ball bearings and low axial forces. Minimum play is required for any kind of friction bearings otherwise they will jam.

Max. axial load (dynamic)
Corresponds to the permissible axial load of the drive shaft without damaging the gear. Below the given load, axial play can be kept.

Max. permissible pressing force
Corresponds to the force with which, for example, a coupling element may be mounted to the gear drive shaft.

1 Reduction ratio
The reduction indicates the ratio by which the speed of the gear output shaft is smaller than the motor speed.

2 Absolute reduction ratio
Provides the reduction as an exact ratio of two natural numbers.

3 Max. motor shaft diameter [mm]
The max. motor shaft diameter is based on the motor pinion's internal diameter.

4 Number of stages
States the number of gear stages engaged in series.

5 Max. continuous torque [Nm]
The continuous torque provides the maximum load permanently applied to the output shaft. If it is exceeded, the service life is significantly shortened.

6 Intermittent* torque [Nm]
The short-time torque is the maximum torque that may be output on the output shaft for a short period of time without damaging it.

7 Efficiency [%]
The specified efficiency is a maximum value that is valid for maximum continuous torque. The efficiency is greatly reduced with very small loads (see diagram). The efficiency is stage-dependent, but is unaffected by the motor speed.

8 Weight [g]

9 Average backlash no load [°]
Gear backlash is the turning angle of the gear output shaft which, when the input shaft is blocked, the gear output shaft covers when it is turned from one end position to the opposite position. The end positions depend on the torque applied to the output shaft. It should be noted that if the gear output shaft is blocked, based on the reversed reduction ratio, the motor shaft will turn through a much greater angle from stop to stop.

10 Mass inertia [gcm²]
The gear moment of inertia is given at the motor shaft. It is required in order to calculate the additional torque needed for acceleration of the gear components in the case of highly dynamic drives. Variations may arise depending on how lubrication is distributed.

11 Gear length L1 [mm]
L1 describes the gear length down to the motor's axial mount area (reference C in motors).

12 Direction of rotation
The Direction of rotation of our planetary gears is always the same as that of the motor shaft. With spur gears, it depends on the number of stages. With even numbers (i.e. 2, 4, 6, 8), the Direction of rotation is the same, but the opposite if the numbers are odd.

13 Max. transmittable power (continuous) [W]
This value gives the maximum constant output available on the output shaft. If it is exceeded, the service life is considerably shortened.

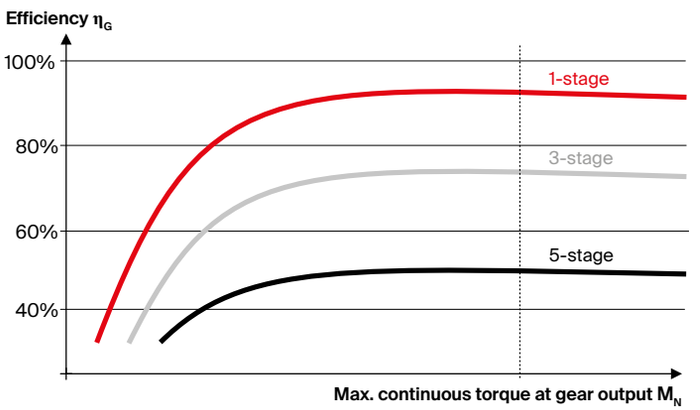
14 Max. transmittable power (intermittent*) [W]
This value gives the maximum intermittent output available on the output shaft. This range may be used intermittently and repeatedly.

15 Max. overload torque
The maximal permitted torque that can be applied for a short period of time (a few seconds) without destroying the gear. It can be considered as break free torque, for example, to overcome static friction of a mechanically jammed drive.

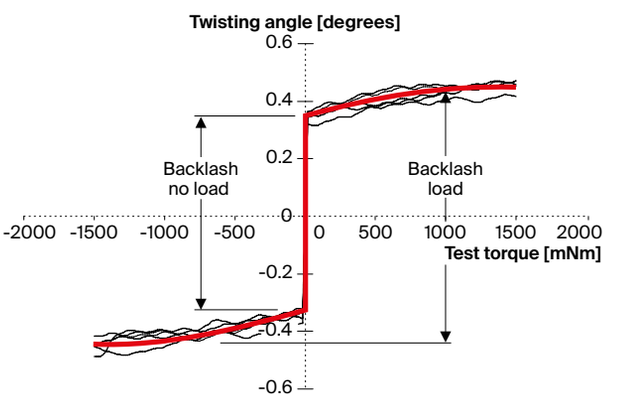
***intermittent**
Short-term operation is defined as follows:
- during 1 second
- during max. 10 % of the operating cycle

If these values are exceeded, a reduced service life must be expected.

Gearhead efficiency as a function of torque (schematic)



Gear play measurement



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maxon planetary gearhead

(can be configured online)

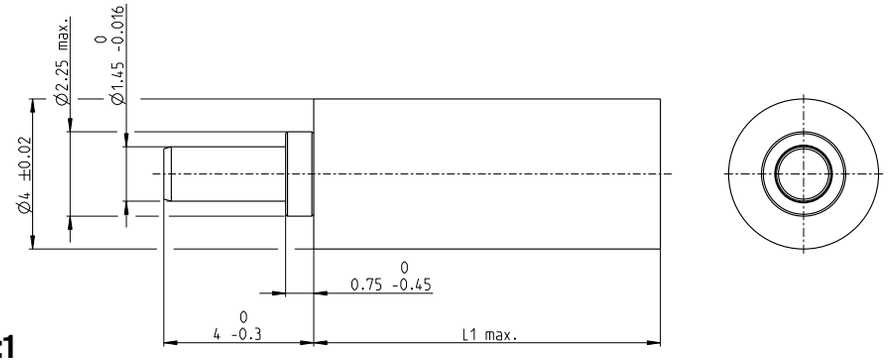
Standard specification no. 102	91
Terminology explanations	368
GPX 4 C ∅4 mm, 0.002–0.015 Nm	370
GPX 6 A ∅6 mm, 0.002–0.03 Nm	371
GPX 8 A ∅8 mm, 0.01–0.1 Nm	372
GPX 10 A ∅10 mm, 0.01–0.15 Nm	373
GPX 12 A/C ∅12 mm, 0.08–0.23 Nm	374
GPX 12 LN/LZ ∅12 mm, 0.06–0.17 Nm	375
GPX 12 HP ∅12 mm, 0.25–0.35 Nm	376
GPX 13 SPEED ∅13 mm, 0.025–0.15 Nm, sterilizable	377
GPX 14 A/C ∅14 mm, 0.16–0.4 Nm	378
GPX 14 LN/LZ ∅14 mm, 0.13–0.3 Nm	379
GPX 14 HP ∅14 mm, 0.3–0.5 Nm	380
GPX 16 A/C ∅16 mm, 0.2–0.6 Nm	381
GPX 16 LN/LZ ∅16 mm, 0.16–0.45 Nm	382
GPX 16 HP ∅16 mm, 0.55–0.9 Nm	383
GPX 16 HP ∅16 mm, 0.4–0.8 Nm, sterilizable	384
GPX 16 SPEED ∅16 mm, 0.045–0.11 Nm, sterilizable	385
GPX 19 A/C ∅19 mm, 0.35–1.05 Nm	386
GPX 19 LN/LZ ∅19 mm, 0.28–0.8 Nm	387
GPX 19 HP ∅19 mm, 0.9–2.0 Nm	388
GPX 19 SPEED ∅19 mm, 0.08–0.2 Nm, sterilizable	389
GPX 22 A/C ∅22 mm, 0.5–2.0 Nm	390
GPX 22 LN/LZ ∅22 mm, 0.4–1.5 Nm	391
GPX 22 HP ∅22 mm, 2.4–3.7 Nm	392
GPX 22 HP ∅22 mm, 0.8–3.3 Nm, sterilizable	393
GPX 22 UP ∅22 mm, 1.0–5.2 Nm	394
GPX 22 SPEED ∅22 mm, 0.11–0.27 Nm, sterilizable	395
GPX 26 A/C ∅26 mm, 0.75–5.0 Nm	396
GPX 26 LN/LZ ∅26 mm, 0.6–4.5 Nm	397
GPX 26 HP ∅26 mm, 3.0–6.3 Nm	398
GPX 32 A/C ∅32 mm, 1.25–6.6 Nm	399
GPX 32 LN/LZ ∅32 mm, 1.0–5.0 Nm	400
GPX 32 HP ∅32 mm, 4.0–9.0 Nm	401
GPX 32 UP ∅32 mm, 2.2–12.6 Nm	402
GPX 37 A ∅37 mm, 2.3–9.3 Nm	403
GPX 37 LN/LZ ∅37 mm, 1.85–9.3 Nm	404
GPX 42 C/UP ∅42 mm, 3.0–35.0 Nm	405
GPX 52 A/UP ∅52 mm, 5.0–45.0 Nm	406
GPX 52 LN ∅52 mm, 4.0–24.0 Nm	407
GPX 70 A/UP ∅70 mm, 10.0–70.0 Nm	408
GPX 70 LN ∅70 mm, 8.0–27.0 Nm	409



maxon GPX gearheads make an impression with the highest power transmission in a very short compact design. The modular construction and the scaled stages form the basis for a custom made drive solution. High torque, high speed, low noise, low backlash; maxon GPX gearheads fulfill practically all requirements. maxon GPX gearheads can be configured online and are ready for delivery within 11 working days.

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GPX 4 ∅4 mm, planetary gearhead





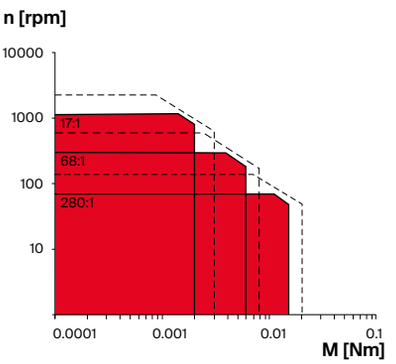
M 5:1

Key data		C Ceramic version
Max. transmittable power	W	0.17
Max. continuous torque	Nm	0.015
Max. continuous input speed	rpm	20 000
Ambient temperature	°C	-15...+80
Bearing at output		Sleeve bearing

Operating range (output shaft) — C Ceramic version

Continuous operation

Intermittent operation



Specifications		C Ceramic version		
Number of stages		2	3	4
Max. transmittable power (continuous)	W	0.17	0.12	0.08
Max. transmittable power (intermittent)	W	0.21	0.15	0.10
Max. continuous torque	Nm	0.002	0.006	0.015
Max. intermittent torque	Nm	0.003	0.008	0.020
Max. continuous input speed	rpm	20 000	20 000	20 000
Max. intermittent input speed	rpm	40 000	40 000	40 000
Max. efficiency	%	76	70	65
Average backlash no load	°	3.0	3.3	3.5
Max. axial load (dynamic)	N	5	5	5
Max. radial load, 4 mm from flange	N	3	4	4
Gearhead length L1[1]	mm	9.3	11.0	12.7
Weight	g	0.4	0.5	0.6

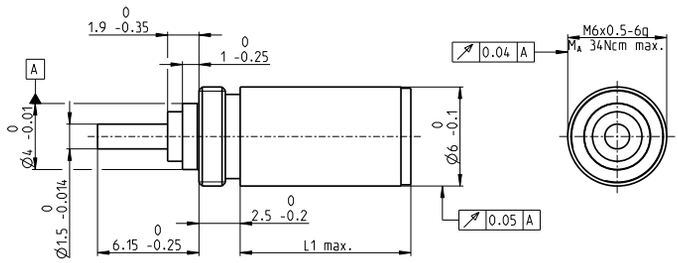
Configuration		C Ceramic version		
Number of stages		2	3	4
Reduction Absolute reduction: (see online)	X:1	17	68	280
Version		Ceramic version		
Flange		Standard flange		
Shaft		with/without flat face		

Modular system		Page
EC motor	№ of stages [opt.]	
ECX SPEED 4 M	2–4	193
ECX SPEED 4 L	2–4	194

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 6 ∅6 mm, planetary gearhead





GPX

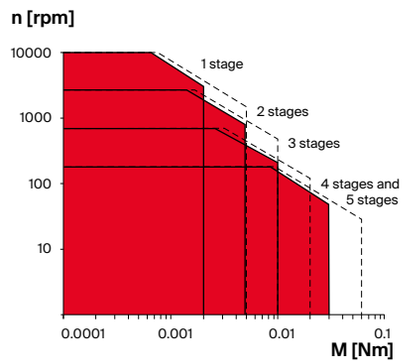
M 1:2

Key data		A Standard version
Max. transmittable power	W	0.6
Max. continuous torque	Nm	0.03
Max. continuous input speed	rpm	40 000
Ambient temperature	°C	-40...+100
Bearing at output		Ball bearing

Operating range (output shaft) — A Standard version

Continuous operation

Intermittent operation



Specifications		A Standard version				
Number of stages		1	2	3	4	5
Max. transmittable power (continuous)	W	0.63	0.39	0.20	0.15	0.04
Max. transmittable power (intermittent)	W	0.79	0.49	0.25	0.18	0.05
Max. continuous torque	Nm	0.002	0.005	0.01	0.03	0.03
Max. intermittent torque	Nm	0.005	0.01	0.02	0.06	0.06
Max. continuous input speed	rpm	40 000	40 000	40 000	40 000	40 000
Max. intermittent input speed	rpm	40 000	40 000	40 000	40 000	40 000
Max. efficiency	%	88	77	68	60	52
Average backlash no load	°	1.8	2.0	2.2	2.5	2.8
Max. axial load (dynamic)	N	5	5	5	5	5
Max. radial load, 5 mm from flange	N	5	6	7	8	8
Gearhead length L1[1]	mm	5.3	7.8	10.4	13.0	15.6
Weight	g	1.7	2.1	2.5	2.9	3.3

Configuration		A Standard version				
Number of stages		1	2	3	4	5
Reduction Absolute reduction: (see online)	X:1	3.9	15	57	221	854
Version		Standard				
Flange		Standard flange/flange with centering diameter				
Shaft		Length/flat face				

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 6 M	1–5	97

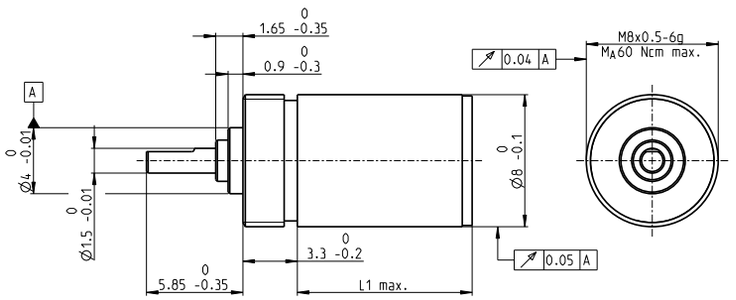
		Page
EC motor	№ of stages [opt.]	
ECX SPEED 6 M	1–5	195–196
ECX PRIME 6 M	1–5	235

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

Gearhead

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GPX 8 ∅8 mm, planetary gearhead

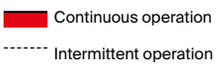


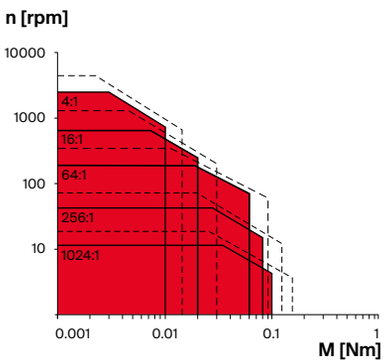


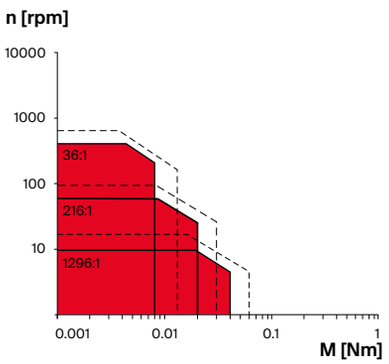
M 1:2

Key data		A Standard version
Max. transmittable power	W	0.84
Max. continuous torque	Nm	0.1
Max. continuous input speed	rpm	12000
Ambient temperature	°C	-15...+80
Bearing at output		Ball bearing

Operating range (output shaft) — **A Standard version**







Specifications		A Standard version							
Number of stages		1	2	2	3	3	4	4	5
Max. transmittable power (continuous)	W	0.840	0.520	0.140	0.390	0.060	0.130	0.040	0.040
Max. transmittable power (intermittent)	W	1.05	0.650	0.180	0.490	0.080	0.160	0.060	0.050
Max. continuous torque	Nm	0.010	0.020	0.008	0.060	0.020	0.080	0.040	0.100
Max. intermittent torque	Nm	0.015	0.030	0.012	0.090	0.030	0.120	0.060	0.150
Max. continuous input speed	rpm	12000	12000	12000	12000	12000	12000	12000	12000
Max. intermittent input speed	rpm	20000	20000	20000	20000	20000	20000	20000	20000
Max. efficiency	%	90	81	76	73	66	65	57	59
Average backlash no load	°	1.8	2.0	2.4	2.2	2.6	2.5	2.8	2.8
Max. axial load (dynamic)	N	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max. radial load, 5 mm from flange	N	5	6	6	7	7	8	8	8
Gearhead length L1[1]	mm	5.5	8.1	8.3	10.7	11.1	13.3	13.9	15.9
Weight	g	2.6	3.2	3.2	3.8	3.8	4.4	4.4	5.0

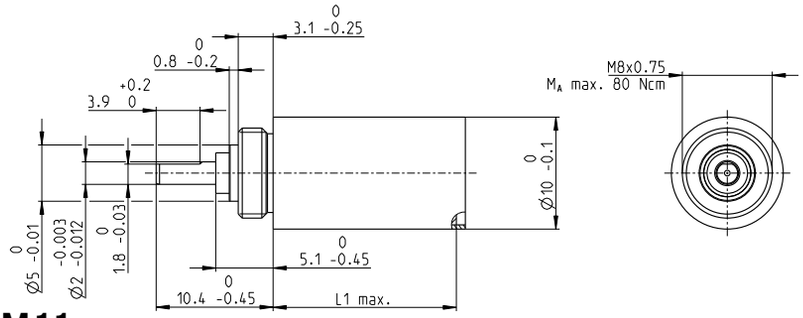
Configuration		A Standard version							
Number of stages		1	2	2	3	3	4	4	5
Reduction Absolute reduction: (see online)	X:1	4	16	36	64	216	256	1296	1024
Version		Standard							
Flange		Standard flange/flange with centering diameter							
Shaft		Length/flat face							

Modular system		Page			Page
DC motor	№ of stages [opt.]		**EC motor**	№ of stages [opt.]	
DCX 8 M	1–5	98	ECX SPEED 8 M	1–5	197–198

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 10 ∅10 mm, planetary gearhead

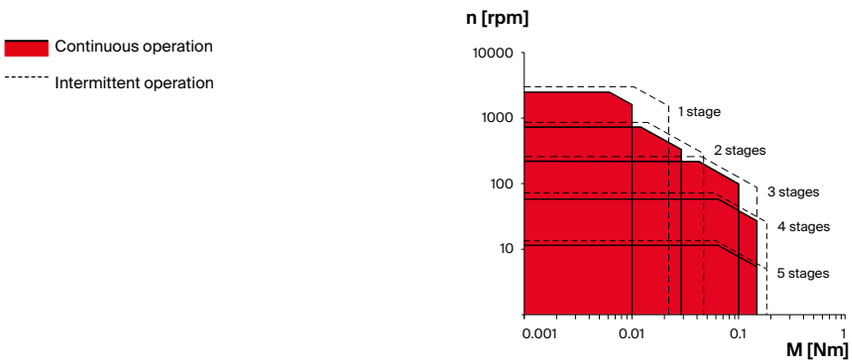


M 1:1



Key data		A Standard version
Max. transmittable power	W	1.6
Max. continuous torque	Nm	0.15
Max. continuous input speed	rpm	12 000
Ambient temperature	°C	-40...+80
Bearing at output		Ball bearing

Operating range (output shaft) — A Standard version



Specifications		A Standard version				
Number of stages		1	2	3	4	5
Max. transmittable power (continuous)	W	1.6	1.2	1.0	0.40	0.10
Max. transmittable power (intermittent)	W	2.0	1.5	1.3	0.50	0.13
Max. continuous torque	Nm	0.01	0.03	0.10	0.15	0.15
Max. intermittent torque	Nm	0.02	0.05	0.15	0.20	0.20
Max. continuous input speed	rpm	12 000	12 000	12 000	12 000	12 000
Max. intermittent input speed	rpm	15 000	15 000	15 000	15 000	15 000
Max. efficiency	%	90	81	73	65	59
Average backlash no load	°	1.5	1.8	2.0	2.2	2.5
Max. axial load (dynamic)	N	5	5	5	5	5
Max. radial load, 5 mm from flange	N	5	10	15	20	25
Gearhead length L1[1]	mm	9.9	13.4	16.6	19.8	23.0
Weight	g	6.7	7.2	7.7	8.2	8.7

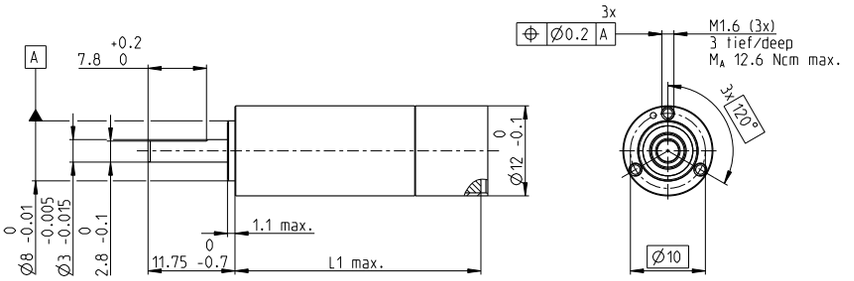
Configuration		A Standard version				
Number of stages		1	2	3	4	5
Reduction	X:1	4	16	64	256	1024
Absolute reduction: (see online)						
Version		Standard				
Flange		Standard flange				
Shaft		Length/flat face				

Modular system		Page			Page
DC motor	№ of stages [opt.]		**EC motor**	№ of stages [opt.]	
DCX 10 S	1–5	99	ECX SPEED 10 M	1–5	199
DCX 10 L	1–5	100	ECX SPEED 10 L	1–5	200

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 12 ∅12 mm, planetary gearhead





M 1:1

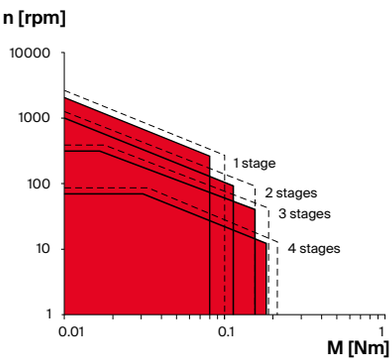
Key data		A Standard version	C Ceramic version
Max. transmittable power	W	2	2.4
Max. continuous torque	Nm	0.17	0.23
Max. continuous input speed	rpm	16 000	16 000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

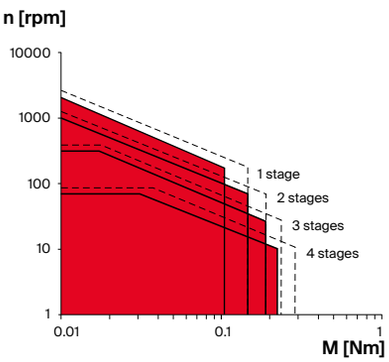
Continuous operation

Intermittent operation

A Standard version



C Ceramic version



Specifications		A Standard version				C Ceramic version			
Number of stages		1	2	3	4	1	2	3	4
Max. transmittable continuous power	W	2.0	1.0	0.50	0.25	2.4	1.2	0.60	0.30
Max. transmittable intermittent power	W	2.5	1.25	0.65	0.30	3.0	1.50	0.80	0.40
Max. continuous torque	Nm	0.08	0.11	0.14	0.17	0.11	0.15	0.19	0.23
Max. intermittent torque	Nm	0.10	0.14	0.18	0.21	0.15	0.19	0.24	0.29
Max. continuous input speed	rpm	16 000	16 000	16 000	16 000	16 000	16 000	16 000	16 000
Max. intermittent input speed	rpm	20 000	20 000	20 000	20 000	20 000	20 000	20 000	20 000
Max. efficiency	%	90	80	75	65	90	80	75	65
Average backlash no load	°	1.2	1.5	1.8	2.1	1.2	1.5	1.8	2.1
Max. axial load (dynamic)	N	20	20	20	20	20	20	20	20
Max. radial load, 5 mm from flange	N	30	35	50	50	30	35	50	50
Gearhead length L1[1]	mm	15.5	20.4	25.2	30.1	15.5	20.4	25.2	30.1
Weight	g	11	14	17	19	11	14	17	19

Configuration		A Standard version				C Ceramic version			
Number of stages		1	2	3	4	1	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/reduced backlash/high power							
Flange		Standard flange/configurable flange							
Shaft		Length/flat face							

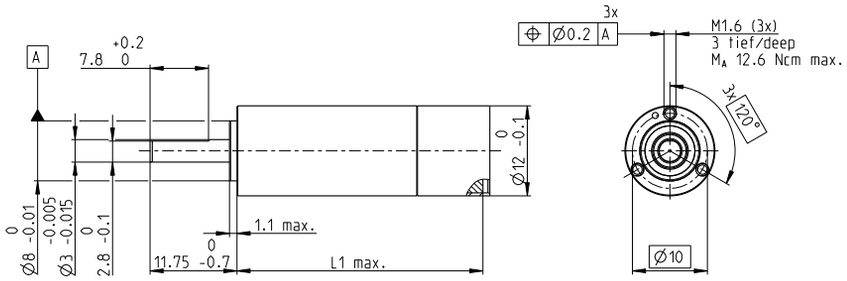
Modular system		Page
DC motor	№ of stages [opt.]	
DCX 12 S	1–4	101
DCX 12 L	1–4	102

Modular system		Page
EC motor	№ of stages [opt.]	
ECX SPEED 10 M	1–5	199
ECX SPEED 10 L	1–4	200

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 12 ∅12 mm, planetary gearhead

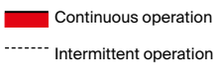




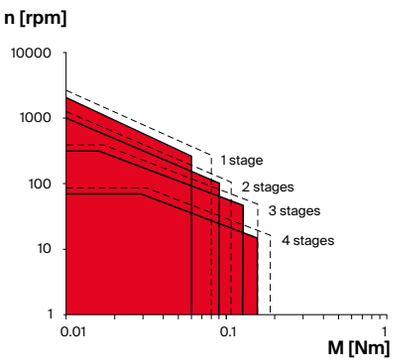
M 1:1

Key data		LN Noise reduced	LZ Backlash reduced
Max. transmittable power	W	1.6	1
Max. continuous torque	Nm	0.14	0.2
Max. continuous input speed	rpm	16000	16000
Ambient temperature	°C	-40...+85	-40...+100
Bearing at output		Ball bearing	Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration	

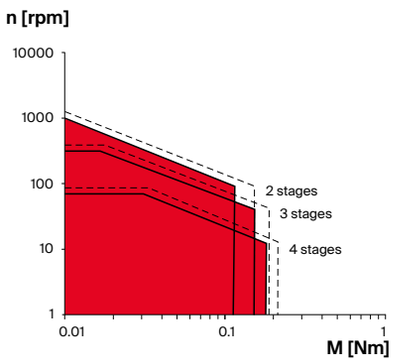
Operating range (output shaft)



LN Noise reduced



LZ Backlash reduced



Specifications		LN Noise reduced				LZ Backlash reduced		
Number of stages		1	2	3	4	2	3	4
Max. transmittable continuous power	W	1.6	0.8	0.40	0.20	1.0	0.50	0.25
Max. transmittable intermittent power	W	2.0	1.00	0.50	0.25	1.25	0.65	0.30
Max. continuous torque	Nm	0.06	0.09	0.11	0.14	0.11	0.14	0.17
Max. intermittent torque	Nm	0.08	0.11	0.14	0.18	0.14	0.18	0.21
Max. continuous input speed	rpm	16000	16000	16000	16000	16000	16000	16000
Max. intermittent input speed	rpm	20000	20000	20000	20000	20000	20000	20000
Max. efficiency	%	90	80	75	65	80	75	65
Average backlash no load	°	1.2	1.5	1.8	2.1	1.35	1.6	1.8
Max. axial load (dynamic)	N	20	20	20	20	20	20	20
Max. radial load, 5 mm from flange	N	30	35	50	50	35	50	50
Gearhead length L1[1]	mm	15.5	20.4	25.2	30.1	20.4	25.2	30.1
Weight	g	11	14	17	19	14	17	19

Configuration		LN Noise reduced				LZ Backlash reduced		
Number of stages		1	2	3	4	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power						
Flange		Standard flange/configurable flange						
Shaft		Length/flat face						

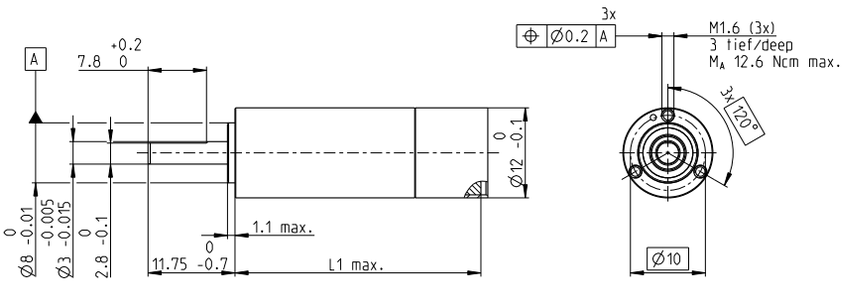
Modular system		Page
DC motor	№ of stages [opt.]	
DCX 12 S	1–4	101
DCX 12 L	1–4	102

Modular system		Page
EC motor	№ of stages [opt.]	
ECX SPEED 10 M	1–5	199
ECX SPEED 10 L	1–4	200

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 12 ∅12 mm, planetary gearhead

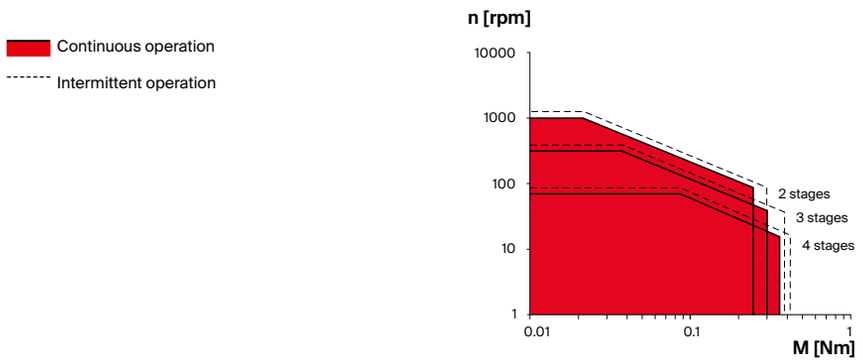




M 1:1

Key data		HP High Power
Max. transmittable power	W	2.2
Max. continuous torque	Nm	0.35
Max. continuous input speed	rpm	16 000
Ambient temperature	°C	-40...+100
Bearing at output		Ball bearing

Operating range (output shaft) — HP High Power



Specifications		HP High Power		
Number of stages		2	3	4
Max. transmittable power (continuous)	W	2.2	1.10	0.60
Max. transmittable power (intermittent)	W	2.80	1.40	0.80
Max. continuous torque	Nm	0.25	0.30	0.35
Max. intermittent torque	Nm	0.30	0.38	0.41
Max. continuous input speed	rpm	16 000	16 000	16 000
Max. intermittent input speed	rpm	20 000	20 000	20 000
Max. efficiency	%	75	65	55
Average backlash no load	°	1.5	1.8	2.1
Max. axial load (dynamic)	N	20	20	20
Max. radial load, 5 mm from flange	N	45	60	60
Gearhead length L1[1]	mm	23.4	28.1	33.1
Weight	g	16	19	21

Configuration		HP High Power		
Number of stages		2	3	4
Reduction Absolute reduction: (see online)	X:1	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power		
Flange		Standard flange		
Shaft		Length/flat face		

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 12 S	2–4	101
DCX 12 L	2–4	102

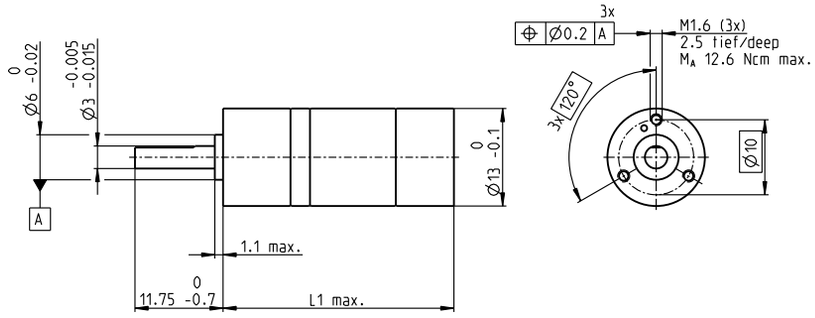
Modular system		Page
EC motor	№ of stages [opt.]	
ECX SPEED 10 M	1–5	199
ECX SPEED 10 L	1–4	200

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 13 SPEED ∅13 mm, planetary gearhead

Sterilizable





M 1:1

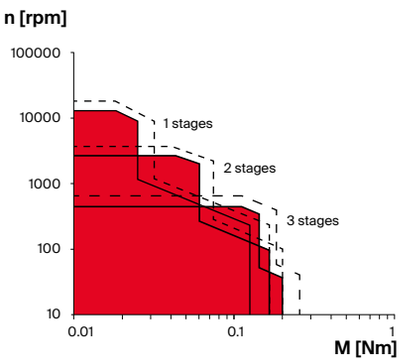
Key data		Without shaft seal*	With shaft seal*
Max. transmittable power	W	22 (3.2)	22 (3.2)
Max. continuous torque	Nm	0.15	0.15
Max. continuous input speed	rpm	60 000	60 000
Ambient temperature	°C	-10...+135	-10...+135
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

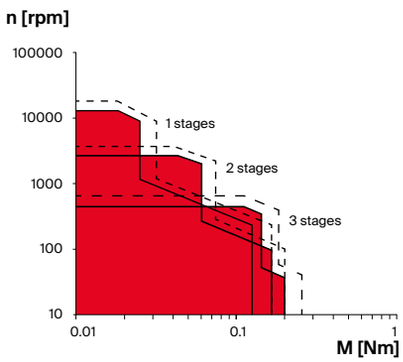
Continuous operation

Intermittent operation

Without shaft seal



With shaft seal



Sterilization information

Without shaft seal: typically 1000 autoclave cycles
With shaft seal: typically 2000 autoclave cycles

Sterilization with steam	
Temperature	134 °C ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

135°C

Specifications		Without shaft seal*			With shaft seal*		
Number of stages		1	2	3	1	2	3
Max. transmittable continuous power	W	22 (3.2)	11 (1.6)	6 (0.8)	22 (3.2)	11 (1.6)	6 (0.8)
Max. transmittable intermittent power	W	27 (4)	13 (2)	7 (1)	27 (4)	13 (2)	7 (1)
Max. continuous torque	Nm	0.025 (0.13)	0.06 (0.16)	0.15 (0.2)	0.025 (0.13)	0.06 (0.16)	0.15 (0.2)
Max. intermittent torque	Nm	0.030 (0.16)	0.075 (0.2)	0.19 (0.25)	0.030 (0.16)	0.075 (0.2)	0.19 (0.25)
Max. continuous input speed	rpm	60 000	60 000	60 000	60 000	60 000	60 000
Max. intermittent input speed	rpm	75 000	75 000	75 000	75 000	75 000	75 000
Max. efficiency	%	85	80	70	85	80	70
Average backlash no load	°	1.2	1.4	1.6	1.2	1.4	1.6
Max. axial load (dynamic)	N	20	20	20	20	20	20
Max. radial load, 5 mm from flange	N	10	15	25	10	15	25
Gearhead length L1[1]	mm	30.8	36.6	42.4	30.8	36.6	42.4
Weight	g	21	26	30	21	26	30

Configuration		Without shaft seal			With shaft seal		
Number of stages		1	2	3	1	2	3
Reduction	X:1	5	25	125	5	25	125
Absolute reduction: (see online)							
Version		Without shaft seal/With shaft seal					
Flange		Standard flange/configurable flange					
Shaft		Length/flat face					

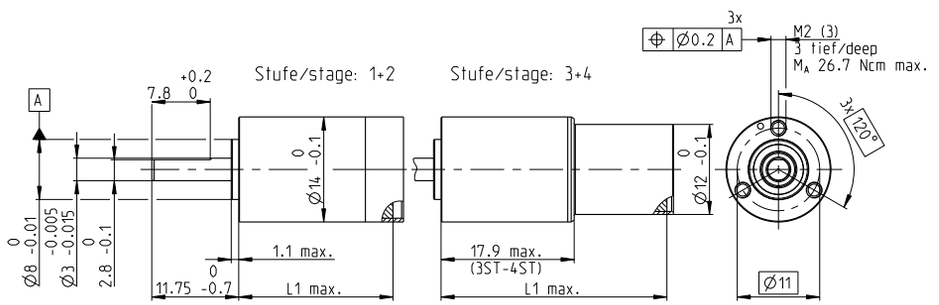
Modular system		Page
EC motor	№ of stages [opt.]	
ECX SPEED 13 M	1–3	201–204
ECX SPEED 13 L	1–3	205–208

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

*Values in parentheses apply in case of reduced speed (according to diagram).

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GPX 14 ∅14 mm, planetary gearhead





M 1:1

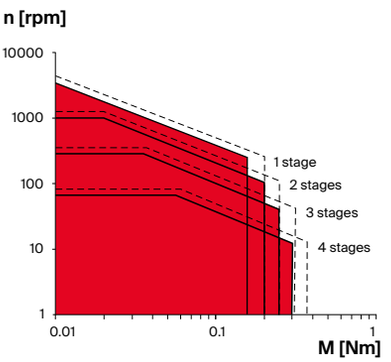
Key data		A Standard version	C Ceramic version
Max. transmittable power	W	4	4.8
Max. continuous torque	Nm	0.3	0.4
Max. continuous input speed	rpm	16 000	16 000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

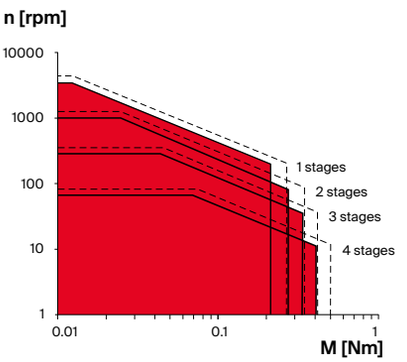
Continuous operation

Intermittent operation

A Standard version



C Ceramic version



Specifications		A Standard version				C Ceramic version			
Number of stages		1	2	3	4	1	2	3	4
Max. transmittable continuous power	W	4.0	2.0	1.0	0.4	4.8	2.4	1.2	0.5
Max. transmittable intermittent power	W	5.0	2.5	1.25	0.5	6.0	3.0	1.50	0.6
Max. continuous torque	Nm	0.16	0.20	0.25	0.30	0.21	0.27	0.33	0.40
Max. intermittent torque	Nm	0.20	0.25	0.31	0.38	0.26	0.34	0.41	0.50
Max. continuous input speed	rpm	14 000	16 000	16 000	16 000	14 000	16 000	16 000	16 000
Max. intermittent input speed	rpm	17 500	20 000	20 000	20 000	17 500	20 000	20 000	20 000
Max. efficiency	%	90	80	75	65	90	80	75	65
Average backlash no load	°	1.1	1.3	1.45	1.7	1.1	1.3	1.45	1.7
Max. axial load (dynamic)	N	20	20	20	20	20	20	20	20
Max. radial load, 5 mm from flange	N	30	45	60	60	30	45	60	60
Gearhead length L1[1]	mm	15.7	20.8	25.5	30.3	15.7	20.8	25.5	30.3
Weight	g	14	19	21	23	14	19	21	23

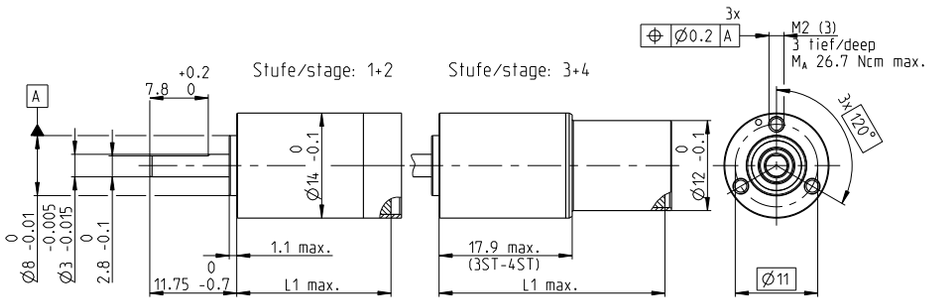
Configuration		A Standard version				C Ceramic version			
Number of stages		1	2	3	4	1	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	3.9, 5.3, 6.6	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power							
Flange		Standard flange/configurable flange							
Shaft		Length/flat face							

Modular system		Page			Page
DC motor	№ of stages [opt.]		**EC motor**	№ of stages [opt.]	
DCX 12 S	3–4	101	ECX SPEED 13 M	1–2 [3–4]	201–202
DCX 12 L	3–4	102	ECX SPEED 13 L	1–2 [3–4]	205–206
DCX 14 L	1–2 [3–4]	103–104			

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 14 ∅14 mm, planetary gearhead





GPX

M 1:1

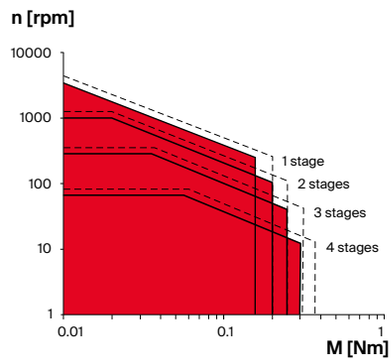
Key data		LN Noise reduced	LZ Backlash reduced
Max. transmittable power	W	3.2	3
Max. continuous torque	Nm	0.24	0.3
Max. continuous input speed	rpm	16000	16000
Ambient temperature	°C	-40...+85	-40...+100
Bearing at output		Ball bearing	Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration	

Operating range (output shaft)

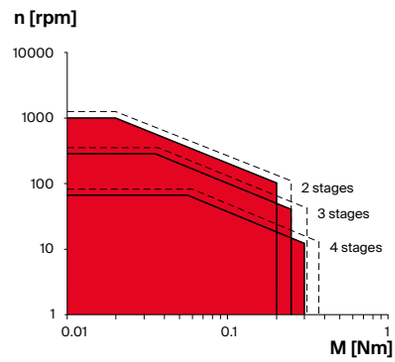
Continuous operation

Intermittent operation

LN Noise reduced



LZ Backlash reduced



Specifications		LN Noise reduced				LZ Backlash reduced		
Number of stages		1	2	3	4	2	3	4
Max. transmittable continuous power	W	3.2	1.6	0.8	0.3	2.0	1.0	0.4
Max. transmittable intermittent power	W	4.0	2.0	1.0	0.4	2.5	1.25	0.5
Max. continuous torque	Nm	0.13	0.16	0.20	0.24	0.20	0.25	0.30
Max. intermittent torque	Nm	0.16	0.20	0.25	0.30	0.25	0.31	0.38
Max. continuous input speed	rpm	14000	16000	16000	16000	16000	16000	16000
Max. intermittent input speed	rpm	17500	20000	20000	20000	20000	20000	20000
Max. efficiency	%	90	80	75	65	80	75	65
Average backlash no load	°	1.1	1.3	1.45	1.7	0.95	1.05	1.2
Max. axial load (dynamic)	N	20	20	20	20	20	20	20
Max. radial load, 5 mm from flange	N	30	45	60	60	45	60	60
Gearhead length L1[1]	mm	15.7	20.8	25.5	30.3	20.8	25.5	30.3
Weight	g	14	19	21	23	19	21	23

Configuration		LN Noise reduced				LZ Backlash reduced		
Number of stages		1	2	3	4	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power						
Flange		Standard flange/configurable flange						
Shaft		Length/flat face						

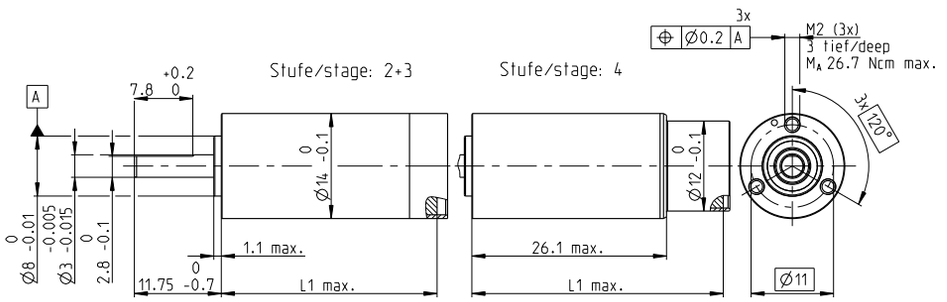
Modular system		Page			Page
DC motor	№ of stages [opt.]		**EC motor**	№ of stages [opt.]	
DCX 12 S	3–4	101	ECX SPEED 13 M	1–2 [3–4]	201–202
DCX 12 L	3–4	102	ECX SPEED 13 L	1–2 [3–4]	205–206
DCX 14 L	1–2 [3–4]	103–104			

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

Gearhead

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GPX 14 ∅14 mm, planetary gearhead

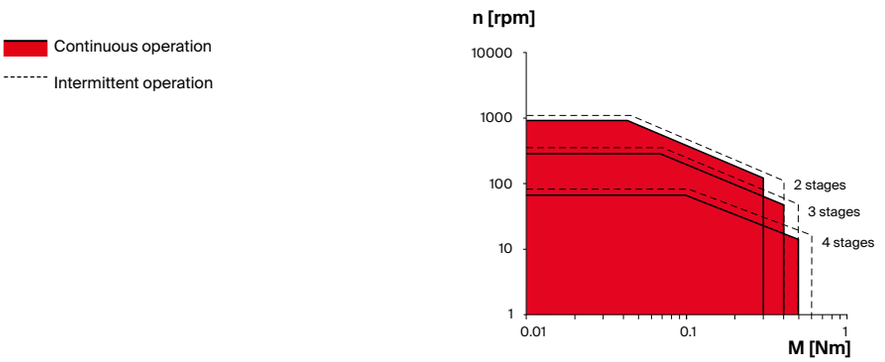




M 1:1

Key data		HP High Power
Max. transmittable power	W	4.0
Max. continuous torque	Nm	0.50
Max. continuous input speed	rpm	16000
Ambient temperature	°C	-40...+100
Bearing at output		Ball bearing

Operating range (output shaft) — HP High Power



Specifications		HP High Power		
Number of stages		2	3	4
Max. transmittable power (continuous)	W	4.0	2.0	0.7
Max. transmittable power (intermittent)	W	5.0	2.5	1.0
Max. continuous torque	Nm	0.30	0.40	0.50
Max. intermittent torque	Nm	0.40	0.50	0.60
Max. continuous input speed	rpm	14000	16000	16000
Max. intermittent input speed	rpm	17500	20000	20000
Max. efficiency	%	75	65	55
Average backlash no load	°	1.3	1.45	1.7
Max. axial load (dynamic)	N	20	20	20
Max. radial load, 5 mm from flange	N	45	70	70
Gearhead length L1[1]	mm	23.9	29.0	33.7
Weight	g	21	25	27

Configuration		HP High Power		
Number of stages		2	3	4
Reduction Absolute reduction: (see online)	X:1	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power		
Flange		Standard flange		
Shaft		Length/flat face		

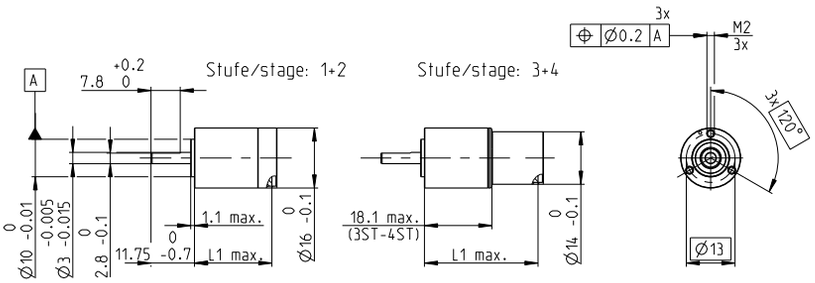
Modular system		Page
DC motor	№ of stages [opt.]	
DCX 12 S	4	101
DCX 12 L	4	102
DCX 14 L	2–3 [4]	103–104

		Page
EC motor	№ of stages [opt.]	
ECX SPEED 13 M	2–3 [4]	201–202
ECX SPEED 13 L	2–3 [4]	205–206

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 16 ∅16 mm, planetary gearhead





M 1:2

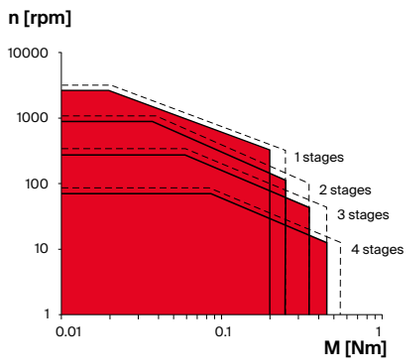
Key data		A Standard version	C Ceramic version
Max. transmittable power	W	6.5	7.8
Max. continuous torque	Nm	0.45	0.6
Max. continuous input speed	rpm	16 000	16 000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

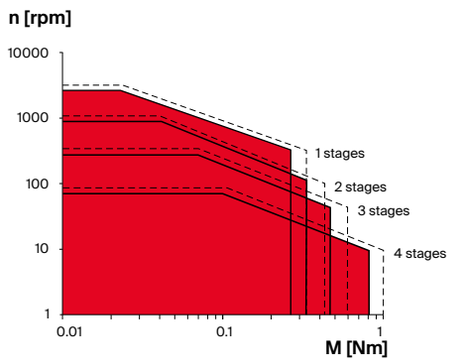
Continuous operation

Intermittent operation

A Standard version



C Ceramic version



Specifications		A Standard version				C Ceramic version			
Number of stages		1	2	3	4	1	2	3	4
Max. transmittable continuous power	W	6.5	3.2	1.6	0.60	7.8	3.8	1.9	0.7
Max. transmittable intermittent power	W	8.0	4.0	2.0	0.75	10.0	5.0	2.5	1.0
Max. continuous torque	Nm	0.20	0.25	0.35	0.45	0.27	0.33	0.47	0.60
Max. intermittent torque	Nm	0.25	0.35	0.45	0.55	0.33	0.42	0.58	0.75
Max. continuous input speed	rpm	12 000	14 000	16 000	16 000	12 000	14 000	16 000	16 000
Max. intermittent input speed	rpm	15 000	17 500	20 000	20 000	15 000	17 500	20 000	20 000
Max. efficiency	%	90	80	75	65	90	80	75	65
Average backlash no load	°	1.0	1.2	1.3	1.4	1.0	1.2	1.3	1.4
Max. axial load (dynamic)	N	20	20	20	20	20	20	20	20
Max. radial load, 5 mm from flange	N	30	45	70	70	30	45	70	70
Gearhead length L1[1]	mm	15.8	20.7	25.7	30.6	15.8	20.7	25.7	30.6
Weight	g	20	25	27	31	20	25	27	31

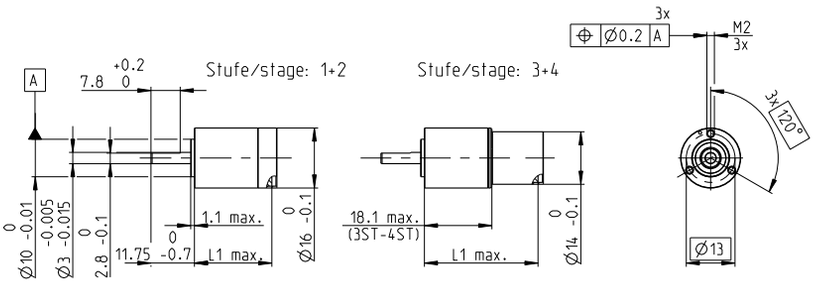
Configuration		A Standard version				C Ceramic version			
Number of stages		1	2	3	4	1	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/reduced backlash/high power							
Flange		Standard flange/configurable flange							
Shaft		Length/flat face							

Modular system			Page
DC motor	№ of stages [opt.]		
DCX 14 L	3–4		103–104
DCX 16 S	1–2 [3–4]		105–106
DCX 16 L	1–2 [3–4]		107–108
DC-max 16 S*	1–2 [3–4]		121–122
EC motor	№ of stages [opt.]		Page
ECX SPEED 13 M	3–4		201–202
ECX SPEED 13 L	3–4		205–206
ECX SPEED 16 M	1–2 [3–4]		209–210
ECX SPEED 16 L	1–2 [3–4]		213–214
ECX PRIME 16 M*	1–2		236
ECX PRIME 16 L*	1–2		237

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 16 ∅16 mm, planetary gearhead





M 1:1

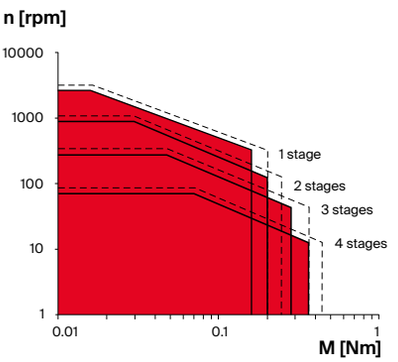
Key data		LN Noise reduced	LZ Backlash reduced
Max. transmittable power	W	5.2	3.2
Max. continuous torque	Nm	0.36	0.5
Max. continuous input speed	rpm	16 000	16 000
Ambient temperature	°C	-40...+85	-40...+100
Bearing at output		Ball bearing	Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration	

Operating range (output shaft)

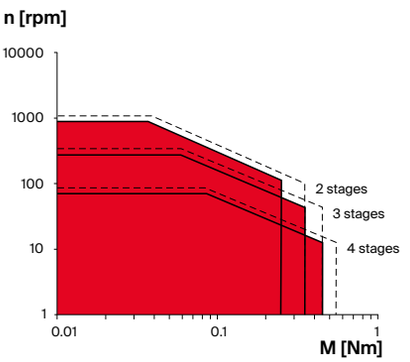
Continuous operation

Intermittent operation

LN Noise reduced



LZ Backlash reduced



Specifications		LN Noise reduced				LZ Backlash reduced		
Number of stages		1	2	3	4	2	3	4
Max. transmittable continuous power	W	5.2	2.6	1.3	0.5	3.2	1.6	0.6
Max. transmittable intermittent power	W	6.5	3.3	1.6	0.6	4.0	2.0	0.8
Max. continuous torque	Nm	0.16	0.20	0.28	0.36	0.25	0.35	0.45
Max. intermittent torque	Nm	0.20	0.25	0.35	0.45	0.35	0.45	0.55
Max. continuous input speed	rpm	12 000	14 000	16 000	16 000	14 000	16 000	16 000
Max. intermittent input speed	rpm	15 000	17 500	20 000	20 000	17 500	20 000	20 000
Max. efficiency	%	90	80	75	65	80	75	65
Average backlash no load	°	1.0	1.2	1.3	1.4	0.8	0.9	1.0
Max. axial load (dynamic)	N	20	20	20	20	20	20	20
Max. radial load, 5 mm from flange	N	30	45	70	70	45	70	70
Gearhead length L1[1]	mm	15.8	20.7	25.7	30.6	20.7	25.7	30.6
Weight	g	20	25	27	30.6	25	27	30.6

Configuration		LN Noise reduced				LZ Backlash reduced		
Number of stages		1	2	3	4	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power						
Flange		Standard flange/configurable flange						
Shaft		Length/flat face						

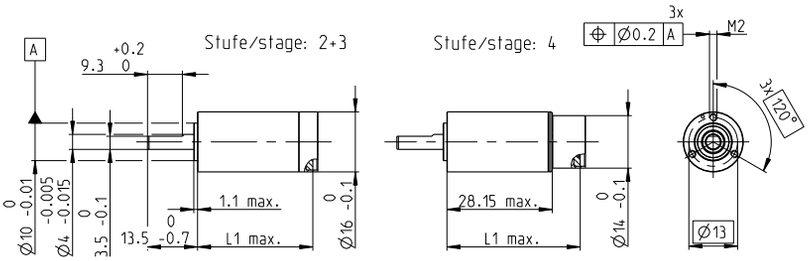
Modular system		Page
DC motor	№ of stages [opt.]	
DCX 14 L	3–4	103–104
DCX 16 S	1–2 [3–4]	105–106
DCX 16 L	1–2 [3–4]	107–108
DC-max 16 S*	1–2 [3–4]	121–122

		Page
EC motor		
ECX SPEED 13 M	3–4	201–202
ECX SPEED 13 L	3–4	205–206
ECX SPEED 16 M	1–2 [3–4]	209–210
ECX SPEED 16 L	1–2 [3–4]	213–214
ECX PRIME 16 M*	1–2	236
ECX PRIME 16 L*	1–2	237

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 16 ∅16 mm, planetary gearhead



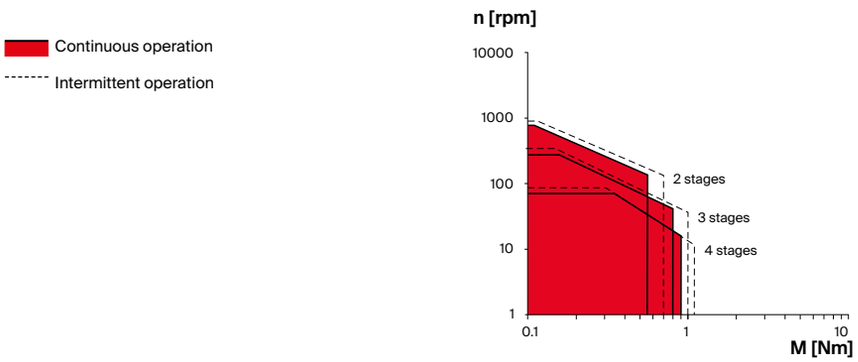


GPX

M 1:2

Key data		HP High Power
Max. transmittable power	W	8
Max. continuous torque	Nm	0.9
Max. continuous input speed	rpm	16 000
Ambient temperature	°C	-40...+100
Bearing at output		Ball bearing

Operating range (output shaft) — HP High Power



Specifications		HP High Power		
Number of stages		2	3	4
Max. transmittable power (continuous)	W	8.0	4.0	1.5
Max. transmittable power (intermittent)	W	10.0	4.4	1.5
Max. continuous torque	Nm	0.55	0.80	0.90
Max. intermittent torque	Nm	0.70	1.00	1.10
Max. continuous input speed	rpm	12 000	14 000	16 000
Max. intermittent input speed	rpm	15 000	17 500	20 000
Max. efficiency	%	75	65	55
Average backlash no load	°	1.2	1.3	1.4
Max. axial load (dynamic)	N	30	30	30
Max. radial load, 5 mm from flange	N	80	90	90
Gearhead length L1[1]	mm	25.9	30.9	35.7
Weight	g	31	35	39

Configuration		HP High Power		
Number of stages		2	3	4
Reduction Absolute reduction: (see online)	X:1	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power		
Flange		Standard flange		
Shaft		Length/flat face/cross hole		

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 14 L	4	103–104
DCX 16 S	2–3 [4]	105–106
DCX 16 L	2–3 [4]	107–108

		Page
EC motor	№ of stages [opt.]	
ECX SPEED 13 M	4	201–202
ECX SPEED 13 L	4	205–206
ECX SPEED 16 M	2–3 [4]	209–210
ECX SPEED 16 L	2–3 [4]	213–214
ECX PRIME 16 M*	2–3	236
ECX PRIME 16 L*	2–3	237

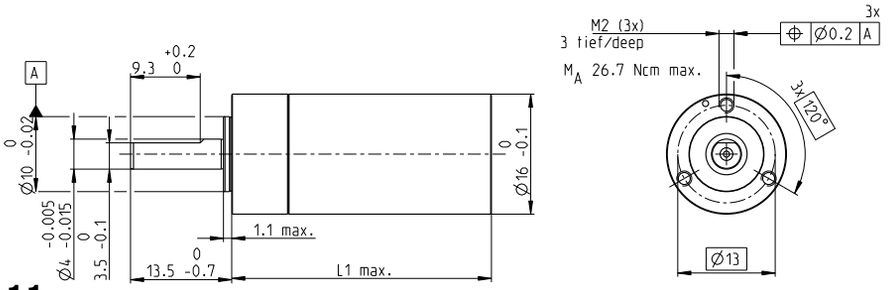
*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

Gearhead

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GPX 16 HP ∅16 mm, planetary gearhead

Sterilizable

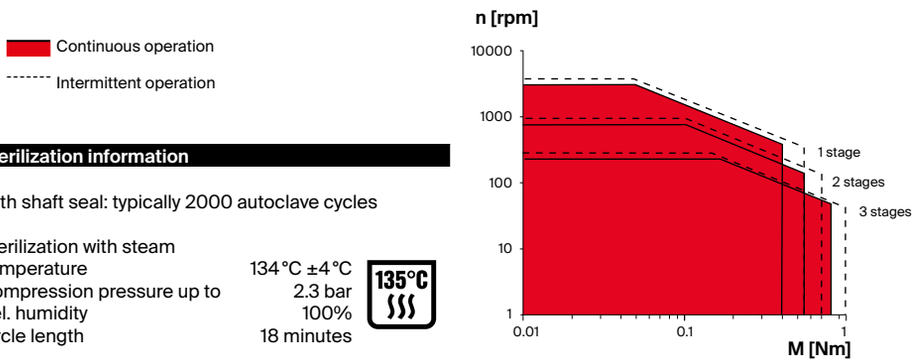




M 1:1

Key data		With shaft seal
Max. transmittable power	W	16.0
Max. continuous torque	Nm	0.8
Max. continuous input speed	rpm	14000
Ambient temperature	°C	-10...+135
Bearing at output		Ball bearing

Operating range (output shaft) — **With shaft seal**



Sterilization information

With shaft seal: typically 2000 autoclave cycles

Sterilization with steam	
Temperature	134 °C ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

135°C

Specifications		With shaft seal		
Number of stages		1	2	3
Max. transmittable continuous power	W	16.0	8.0	4.0
Max. transmittable intermittent power	W	20.0	10.0	4.4
Max. continuous torque	Nm	0.40	0.55	0.80
Max. intermittent torque	Nm	0.55	0.70	1.0
Max. continuous input speed	rpm	12000	12000	14000
Max. intermittent input speed	rpm	15000	15000	17500
Max. efficiency	%	85	75	65
Average backlash no load	°	1.0	1.2	1.3
Max. axial load (dynamic)	N	30	30	30
Max. radial load, 5 mm from flange	N	25	35	35
Gearhead length L1[1]	mm	27.8	34.7	39.7
Weight	g	36	43	48

Configuration		With shaft seal		
Number of stages		1	2	3
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231
Version		Shaft seal		
Flange		Standard flange		
Shaft		Length/flat face/cross hole		

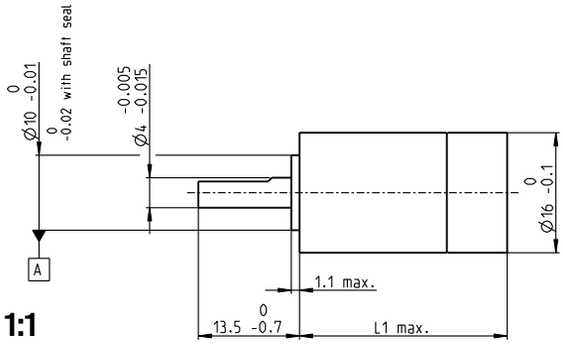
Modular system			Page
EC motor	№ of stages [opt.]		
ECX SPEED 16 M		1–3	211–212
ECX SPEED 16 L		1–3	215–216
ECX PRIME 16 L STEC*		1–3	238

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 16 SPEED ∅16 mm, planetary gearhead

Sterilizable



M 1:1



GPX

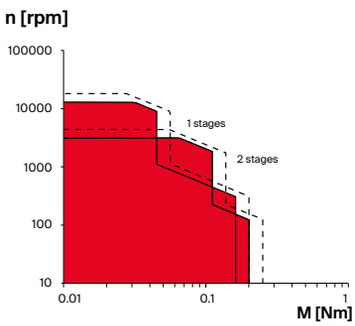
Key data		Without shaft seal*	With shaft seal*
Max. transmittable power	W	42 (5.2)	42 (5.2)
Max. continuous torque	Nm	0.11 (0.2)	0.11 (0.2)
Max. continuous input speed	rpm	50 000	50 000
Ambient temperature	°C	-10...+135	-10...+135
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

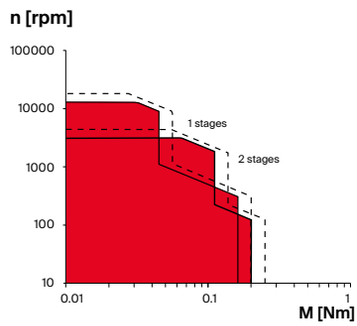
Continuous operation

Intermittent operation

Without shaft seal



With shaft seal



Sterilization information

Without shaft seal: typically 1000 autoclave cycles
With shaft seal: typically 2000 autoclave cycles

Sterilization with steam	
Temperature	134 °C ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

135°C

Specifications		Without shaft seal*		With shaft seal*	
Number of stages		1	2	1	2
Max. transmittable continuous power	W	42 (5.2)	21 (2.6)	42 (5.2)	21 (2.6)
Max. transmittable intermittent power	W	52 (6.5)	25 (3.3)	52 (6.5)	25 (3.3)
Max. continuous torque	Nm	0.045 (0.16)	0.11 (0.20)	0.045 (0.16)	0.11 (0.20)
Max. intermittent torque	Nm	0.055 (0.20)	0.140 (0.25)	0.055 (0.20)	0.140 (0.25)
Max. continuous input speed	rpm	50 000	50 000	50 000	50 000
Max. intermittent input speed	rpm	70 000	70 000	70 000	70 000
Max. efficiency	%	85	80	85	80
Average backlash no load	°	1.4	1.6	1.4	1.6
Max. axial load (dynamic)	N	30.0	30.0	30.0	30.0
Max. radial load, 5 mm from flange	N	25.0	35.0	15.0	20.0
Gearhead length L1[1]	mm	27.7	35.1	35.3	42.7
Weight	g	27	35	37	45

Configuration		Without shaft seal		With shaft seal	
Number of stages		1	2	1	2
Reduction	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44
Absolute reduction: (see online)					
Version		Without shaft seal/With shaft seal			
Flange		Standard flange			
Shaft		Length/flat face/cross hole			

Modular system		Page
EC motor	№ of stages [opt.]	
ECX SPEED 16 M	1–2	211–212
ECX SPEED 16 L	1–2	215–216

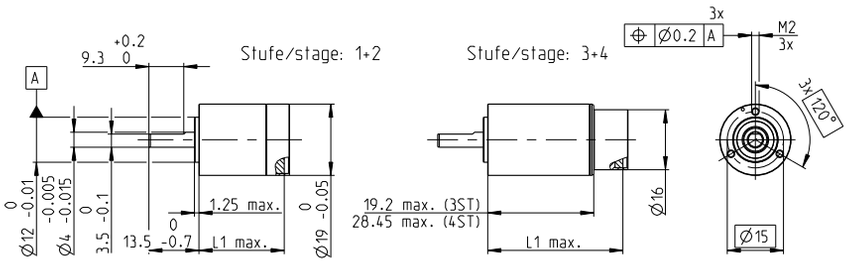
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

*Values in parentheses apply in case of reduced speed (according to diagram).

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Gearhead

GPX 19 ∅19 mm, planetary gearhead



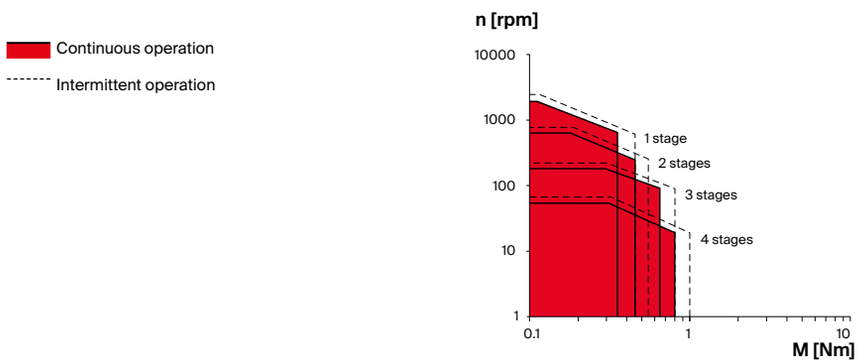


M 1:2

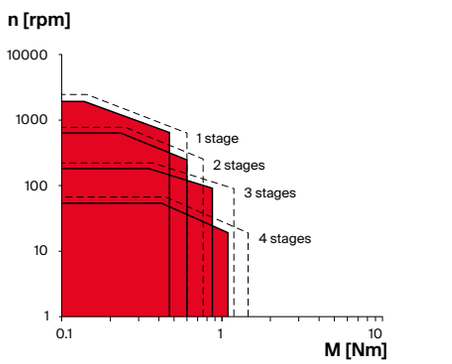
Key data		A Standard version	C Ceramic version
Max. transmittable power	W	13	15.5
Max. continuous torque	Nm	0.8	1.1
Max. continuous input speed	rpm	14 000	14 000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

A Standard version



C Ceramic version



Specifications		A Standard version				C Ceramic version			
Number of stages		1	2	3	4	1	2	3	4
Max. transmittable continuous power	W	13.0	6.5	3.2	0.9	15.5	7.8	3.9	1.0
Max. transmittable intermittent power	W	16.2	8.1	4.1	1.1	19.4	9.7	4.9	1.3
Max. continuous torque	Nm	0.35	0.45	0.65	0.80	0.47	0.60	0.86	1.05
Max. intermittent torque	Nm	0.45	0.55	0.80	1.00	0.60	0.75	1.10	1.30
Max. continuous input speed	rpm	10 000	12 000	14 000	14 000	10 000	12 000	14 000	14 000
Max. intermittent input speed	rpm	12 500	15 000	17 500	17 500	12 500	15 000	17 500	17 500
Max. efficiency	%	90	80	75	65	90	80	75	65
Average backlash no load	°	0.9	1.15	1.25	1.35	0.9	1.15	1.25	1.35
Max. axial load (dynamic)	N	40	40	40	40	40	40	40	40
Max. radial load, 5 mm from flange	N	50	80	90	90	50	80	90	90
Gearhead length L1[1]	mm	16.7	22.9	27.0	36.2	16.7	22.9	27.0	36.2
Weight	g	30	40	43	55	30	40	43	55

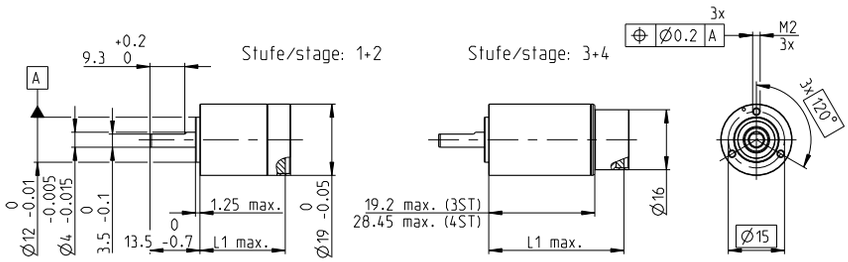
Configuration		A Standard version				C Ceramic version			
Number of stages		1	2	3	4	1	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	3.9, 5.3, 6.6	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power							
Flange		Standard flange/configurable flange							
Shaft		Length/flat face/cross hole							

Modular system					
DC motor	№ of stages [opt.]	Page	**EC motor**	№ of stages [opt.]	Page
DCX 16 S	3–4	105–106	ECX SPEED 16 M	3–4	209–210
DCX 16 L	3–4	107–108	ECX SPEED 16 L	3–4	213–214
DCX 19 S	1–2 [3–4]	109–110	ECX SPEED 19 M	1–2 [3–4]	217–218
DC-max 16 S	3–4	121–122	ECX SPEED 19 L	1–2 [3–4]	221–222
			ECX PRIME 16 M	3–4	236
			ECX PRIME 16 L	3–4	237

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 19 ∅19 mm, planetary gearhead





M 1:2

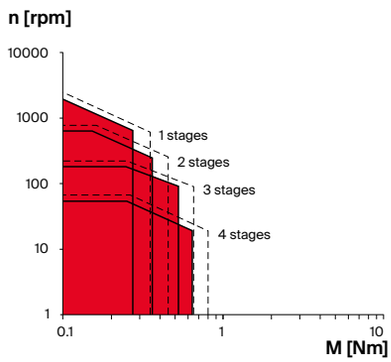
Key data		LN Noise reduced	LZ Backlash reduced
Max. transmittable power	W	10.4	6.5
Max. continuous torque	Nm	0.64	0.8
Max. continuous input speed	rpm	14000	14000
Ambient temperature	°C	-40...+85	-40...+100
Bearing at output		Ball bearing	Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration	

Operating range (output shaft)

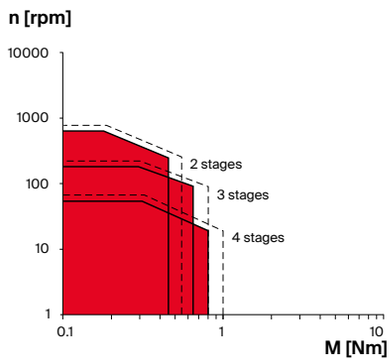
Continuous operation

Intermittent operation

LN Noise reduced



LZ Backlash reduced



Specifications		LN Noise reduced				LZ Backlash reduced		
Number of stages		1	2	3	4	2	3	4
Max. transmittable continuous power	W	10.4	5.2	2.6	0.7	6.5	3.2	0.9
Max. transmittable intermittent power	W	13.0	6.5	3.2	0.9	8.1	4.1	1.1
Max. continuous torque	Nm	0.28	0.36	0.52	0.64	0.45	0.65	0.80
Max. intermittent torque	Nm	0.35	0.45	0.65	0.80	0.55	0.80	1.00
Max. continuous input speed	rpm	10000	12000	14000	14000	12000	14000	14000
Max. intermittent input speed	rpm	12500	15000	17500	17500	15000	17500	17500
Max. efficiency	%	90	80	75	65	80	75	65
Average backlash no load	°	0.9	1.15	1.25	1.35	0.8	1.0	1.15
Max. axial load (dynamic)	N	40	40	40	40	40	40	40
Max. radial load, 5 mm from flange	N	50	80	90	90	80	90	90
Gearhead length L1[1]	mm	16.7	22.9	27.0	36.2	22.9	27.0	36.2
Weight	g	30	40	43	55	40	43	55

Configuration		LN Noise reduced				LZ Backlash reduced		
Number of stages		1	2	3	4	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power						
Flange		Standard flange/configurable flange						
Shaft		Length/flat face/cross hole						

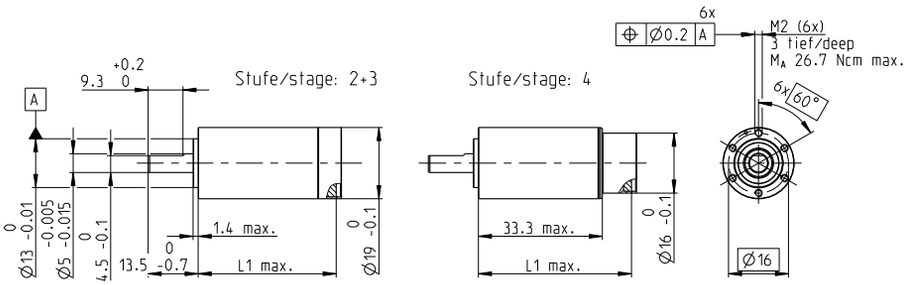
Modular system		Page
DC motor	№ of stages [opt.]	
DCX 16 S	3–4	105–106
DCX 16 L	3–4	107–108
DCX 19 S	1–2 [3–4]	109–110
DC-max 16 S	3–4	121–122

		Page
EC motor	№ of stages [opt.]	
ECX SPEED 16 M	3–4	209–210
ECX SPEED 16 L	3–4	213–214
ECX SPEED 19 M	1–2 [3–4]	217–218
ECX SPEED 19 L	1–2 [3–4]	221–222
ECX PRIME 16 M	3–4	236
ECX PRIME 16 L	3–4	237

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 19 ∅19 mm, planetary gearhead

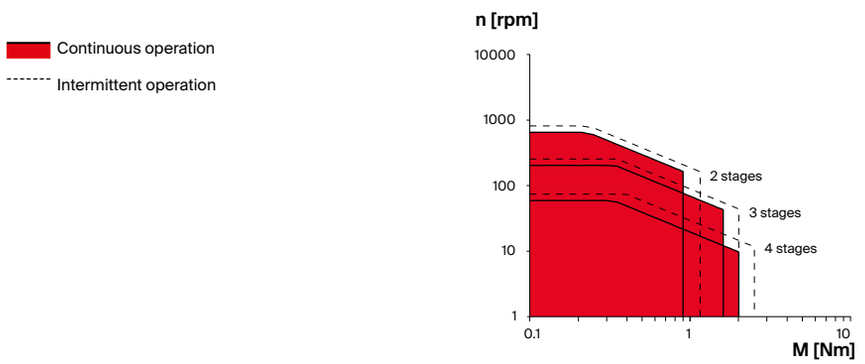




M 1:2

Key data		HP High Power
Max. transmittable power	W	15
Max. continuous torque	Nm	2
Max. continuous input speed	rpm	14 000
Ambient temperature	°C	-40...+100
Bearing at output		Ball bearing

Operating range (output shaft) — **HP High Power**



Specifications		HP High Power		
Number of stages		2	3	4
Max. transmittable power (continuous)	W	15.0	7.0	2.0
Max. transmittable power (intermittent)	W	19.0	9.0	3.0
Max. continuous torque	Nm	0.90	1.60	2.00
Max. intermittent torque	Nm	1.15	2.00	2.50
Max. continuous input speed	rpm	10 000	12 000	14 000
Max. intermittent input speed	rpm	12 500	15 000	17 500
Max. efficiency	%	75	65	55
Average backlash no load	°	1.15	1.25	1.35
Max. axial load (dynamic)	N	40	40	40
Max. radial load, 5 mm from flange	N	100	120	120
Gearhead length L1[1]	mm	30.8	37.0	41.0
Weight	g	51	61	63

Configuration		HP High Power		
Number of stages		2	3	4
Reduction Absolute reduction: (see online)	X:1	16, 21, 26, 28, 35	62, 83, 103, 111, 138,150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power		
Flange		Standard flange		
Shaft		Length/flat face/cross hole		

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 16 S	4	105–106
DCX 16 L	4	107–108
DCX 19 S	2–3 [4]	109–110

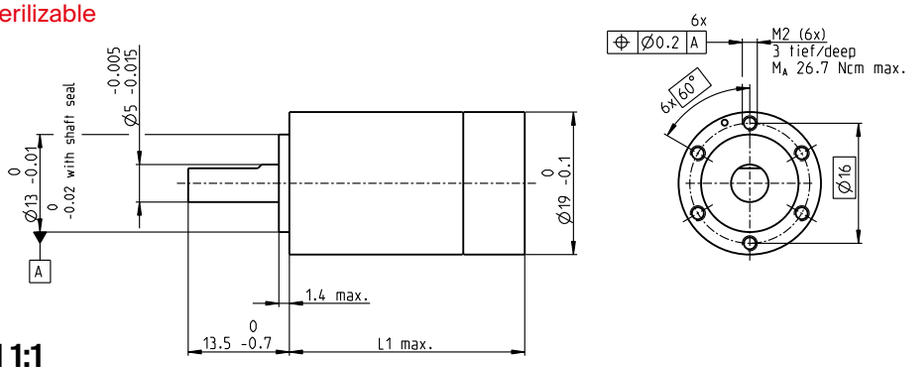
		Page
EC motor	№ of stages [opt.]	
ECX SPEED 16 M	4	209–210
ECX SPEED 16 L	4	213–214
ECX SPEED 19 M	2–3 [4]	217–218
ECX SPEED 19 L	2–3 [4]	221–222
ECX PRIME 16 M	4	236
ECX PRIME 16 L	4	237

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 19 SPEED ∅19 mm, planetary gearhead

Sterilizable





M 1:1

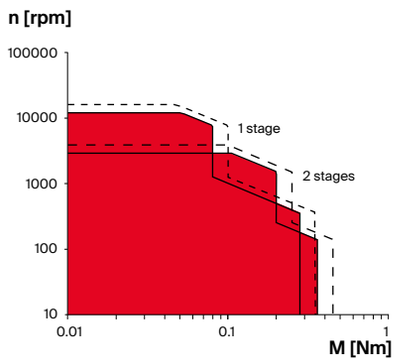
Key data		Without shaft seal*	With shaft seal*
Max. transmittable power	W	62 (10.4)	62 (10.4)
Max. continuous torque	Nm	0.2 (0.36)	0.2 (0.36)
Max. continuous input speed	rpm	45 000	45 000
Ambient temperature	°C	-10...+135	-10...+135
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

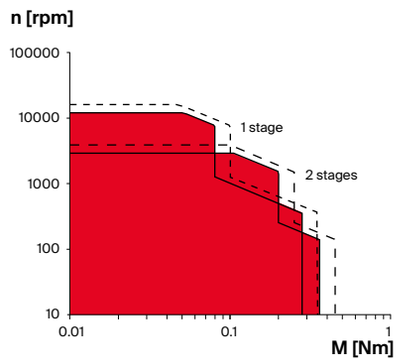
Continuous operation

Intermittent operation

Without shaft seal



With shaft seal



Sterilization information

Without shaft seal: typically 1000 autoclave cycles
With shaft seal: typically 2000 autoclave cycles

Sterilization with steam	
Temperature	134 °C ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

135°C

Specifications		Without shaft seal*		With shaft seal*	
Number of stages		1	2	1	2
Max. transmittable continuous power	W	62 (10.4)	31 (5.2)	62 (10.4)	31 (5.2)
Max. transmittable intermittent power	W	77 (13)	38 (6.5)	77 (13)	38 (6.5)
Max. continuous torque	Nm	0.08 (0.28)	0.2 (0.36)	0.08 (0.28)	0.2 (0.36)
Max. intermittent torque	Nm	0.1 (0.35)	0.25 (0.45)	0.1 (0.35)	0.25 (0.45)
Max. continuous input speed	rpm	45 000	45 000	45 000	45 000
Max. intermittent input speed	rpm	60 000	60 000	60 000	60 000
Max. efficiency	%	85	80	85	80
Average backlash no load	°	1.4	1.6	1.4	1.6
Max. axial load (dynamic)	N	40.0	40.0	40.0	40.0
Max. radial load, 5 mm from flange	N	50.0	85.0	35.0	55.0
Gearhead length L1[1]	mm	31.4	40.3	39.20	48.10
Weight	g	41	54	56	69

Configuration		Without shaft seal		With shaft seal	
Number of stages		1	2	1	2
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44
Version		Without shaft seal/with shaft seal			
Flange		Standard flange			
Shaft		Length/flat face/cross hole			

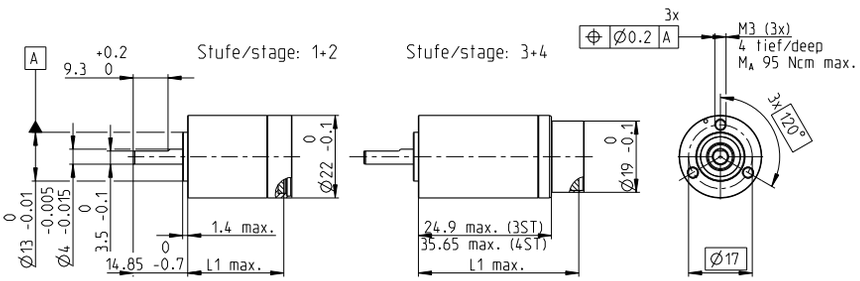
Modular system		Page
EC motor	№ of stages [opt.]	
ECX SPEED 16 M	[3]	209–212
ECX SPEED 16 L	[3]	213–216
ECX SPEED 19 M	1–2	217–220
ECX SPEED 19 L	1–2	221–224

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

*Values in parentheses apply in case of reduced speed (according to diagram).

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GPX 22 ∅22 mm, planetary gearhead





M 1:2

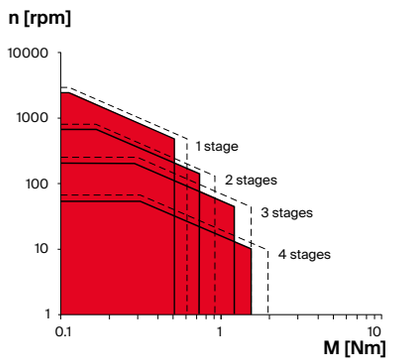
Key data		A Standard version	C Ceramic version
Max. transmittable power	W	24	30
Max. continuous torque	Nm	1.5	2
Max. continuous input speed	rpm	12000	12000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

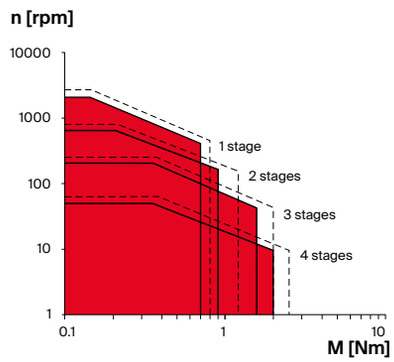
Continuous operation

Intermittent operation

A Standard version



C Ceramic version



Specifications		A Standard version				C Ceramic version			
Number of stages		1	2	3	4	1	2	3	4
Max. transmittable power (continuous)	W	24.0	12.0	6.0	1.6	30.0	15.0	7.0	2.0
Max. transmittable power (intermittent)	W	30.0	15.0	7.5	2.0	38.0	19.0	9.0	2.5
Max. continuous torque	Nm	0.50	0.70	1.20	1.50	0.70	0.90	1.60	2.00
Max. intermittent torque	Nm	0.60	0.90	1.50	1.90	0.80	1.20	2.00	2.50
Max. continuous input speed	rpm	8000	10000	12000	12000	8000	10000	12000	12000
Max. intermittent input speed	rpm	10000	12500	15000	15000	10000	12500	15000	15000
Max. efficiency	%	90	81	74	66	90	81	74	66
Average backlash no load	°	0.85	1.05	1.2	1.35	0.85	1.05	1.2	1.35
Max. axial load (dynamic)	N	40	40	40	40	40	40	40	40
Max. radial load, 10 mm from flange	N	65	100	120	120	65	100	120	120
Gearhead length L1[1]	mm	19.9	26.4	32.2	43.0	19.9	26.4	32.2	43.0
Weight	g	45	58	67	89	45	58	67	89

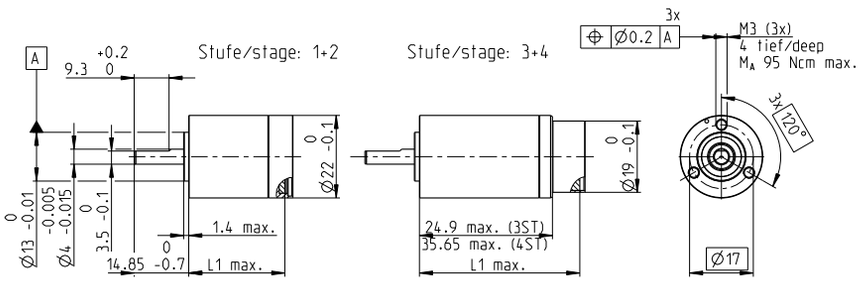
Configuration		A Standard version				C Ceramic version			
Number of stages		1	2	3	4	1	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance							
Flange		Standard flange/configurable flange							
Shaft		Length/flat face/cross hole							

Modular system			Page
DC motor		№ of stages [opt.]	
DCX 19 S		3–4	109–110
DCX 22 S		1–2 [3–4]	111–112
DCX 22 L		1–2 [3–4]	113–114
DC-max 22 S*		1–2 [3–4]	123–124
EC motor		№ of stages [opt.]	Page
ECX SPEED 19 M		3–4	217–218
ECX SPEED 19 L		3–4	221–222
ECX SPEED 22 M		1–2 [3–4]	225–226
ECX SPEED 22 L		1–2 [3–4]	229–230
ECX PRIME 22 L*		1–2	239
ECX TORQUE 22 M		1–2	243
ECX TORQUE 22 L		1–2	244
ECX TORQUE 22 XL		1–2	245
ECX FLAT 22 S*		1–2 [3–4]	257–258
ECX FLAT 22 L*		1–2 [3–4]	259
Compact drive			Page
ECX FLAT 22 S*		1–2 [3–4]	361
ECX FLAT 22 L*		1–2 [3–4]	362

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 22 ∅22 mm, planetary gearhead





M 1:2

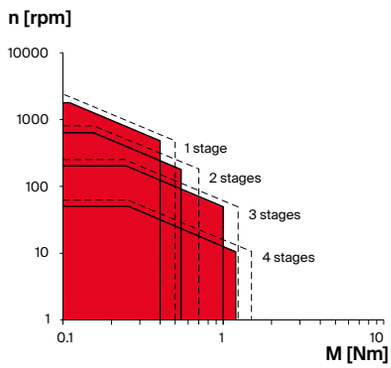
Key data		LN Noise reduced	LZ Backlash reduced
Max. transmittable power	W	20	12
Max. continuous torque	Nm	1.2	1.5
Max. continuous input speed	rpm	12000	12000
Ambient temperature	°C	-40...+85	-40...+100
Bearing at output		Ball bearing	Ball bearing
Typical noise level	dBA	-5 compared to standard configuration	

Operating range (output shaft)

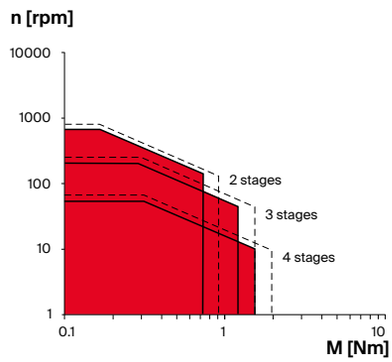
Continuous operation

Intermittent operation

LN Noise reduced



LZ Backlash reduced



Specifications		LN Noise reduced				LZ Backlash reduced		
Number of stages		1	2	3	4	2	3	4
Max. transmittable power (continuous)	W	20.0	10.0	5.0	1.3	12.0	6.0	1.6
Max. transmittable power (intermittent)	W	25.0	13.0	6.3	1.6	15.0	7.5	2.0
Max. continuous torque	Nm	0.40	0.55	1.00	1.20	0.70	1.20	1.50
Max. intermittent torque	Nm	0.50	0.70	1.25	1.50	0.90	1.50	1.90
Max. continuous input speed	rpm	8000	10000	12000	12000	10000	12000	12000
Max. intermittent input speed	rpm	10000	12500	15000	15000	12500	15000	15000
Max. efficiency	%	90	81	74	66	81	74	66
Average backlash no load	°	0.85	1.05	1.20	1.35	0.85	1.05	1.2
Max. axial load (dynamic)	N	40	40	40	40	40	40	40
Max. radial load, 10 mm from flange	N	65	100	120	120	100	120	120
Gearhead length L1[1]	mm	19.9	26.4	32.2	43.0	26.4	32.2	43.0
Weight	g	45	58	67	89	58	67	89

Configuration		LN Noise reduced				LZ Backlash reduced		
Number of stages		1	2	3	4	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance						
Flange		Standard flange/configurable flange						
Shaft		Length/flat face/cross hole						

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 19 S	3–4	109–110
DCX 22 S	1–2 [3–4]	111–112
DCX 22 L	1–2 [3–4]	113–114
DC-max 22 S*	1–2 [3–4]	123–124

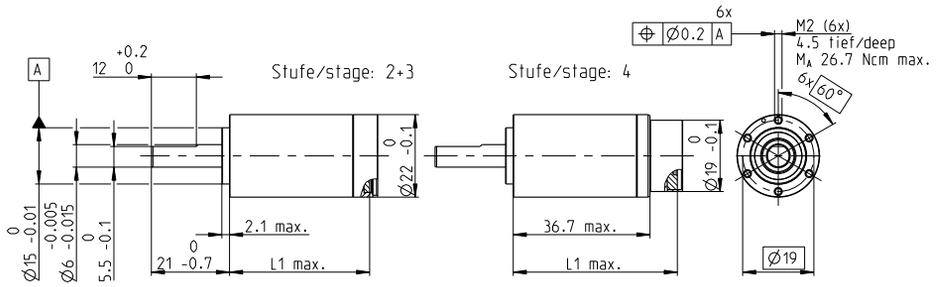
		Page
EC motor	№ of stages [opt.]	
ECX SPEED 19 M	3–4	217–218
ECX SPEED 19 L	3–4	221–222
ECX SPEED 22 M	1–2 [3–4]	225–226
ECX SPEED 22 L	1–2 [3–4]	229–230
ECX PRIME 22 L*	1–2	239
ECX TORQUE 22 M	1–2	243
ECX TORQUE 22 L	1–2	244
ECX TORQUE 22 XL	1–2	245
ECX FLAT 22 S*	1–2 [3–4]	257–258
ECX FLAT 22 L*	1–2 [3–4]	259

		Page
Compact drive		
ECX FLAT 22 S*	1–2 [3–4]	361
ECX FLAT 22 L*	1–2 [3–4]	362

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 22 ∅22 mm, planetary gearhead

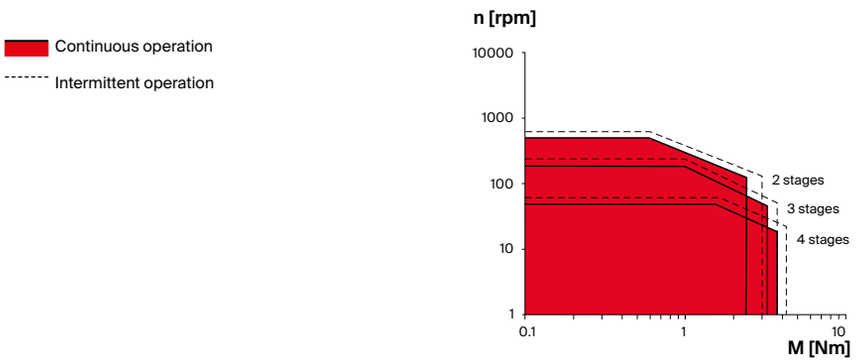




M 1:2

Key data		HP High Power
Max. transmittable power	W	30
Max. continuous torque	Nm	3.7
Max. continuous input speed	rpm	12000
Ambient temperature	°C	-40...+100
Bearing at output		Ball bearing

Operating range (output shaft) — HP High Power



Specifications		HP High Power		
Number of stages		2	3	4
Max. transmittable power (continuous)	W	30.0	15.0	8.0
Max. transmittable power (intermittent)	W	40.0	20.0	10.0
Max. continuous torque	Nm	2.40	3.30	3.70
Max. intermittent torque	Nm	3.00	3.80	4.20
Max. continuous input speed	rpm	8000	10000	12000
Max. intermittent input speed	rpm	10000	12500	15000
Max. efficiency	%	75	65	55
Average backlash no load	°	1.05	1.2	1.35
Max. axial load (dynamic)	N	80	80	80
Max. radial load, 10 mm from flange	N	145	150	150
Gearhead length L1[1]	mm	31.7	38.2	44.0
Weight	g	73	86	95

Configuration		HP High Power		
Number of stages		2	3	4
Reduction Absolute reduction: (see online)	X:1	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance		
Flange		Standard flange		
Shaft		Length/flat face/cross hole		

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 19 S	4	109–110
DCX 22 S	2–3 [4]	111–112
DCX 22 L	2–3 [4]	113–114

		Page
EC motor	№ of stages [opt.]	
ECX SPEED 19 M	4	217–218
ECX SPEED 19 L	4	221–222
ECX SPEED 22 M	2–3 [4]	225–226
ECX SPEED 22 L	2–3 [4]	229–230
ECX PRIME 22 L*	2–3	239
ECX TORQUE 22 M	2–3	243
ECX TORQUE 22 L	2–3	244
ECX TORQUE 22 XL	2–3	245
ECX FLAT 22 S*	2–3 [4]	257–258
ECX FLAT 22 L*	2–3 [4]	259

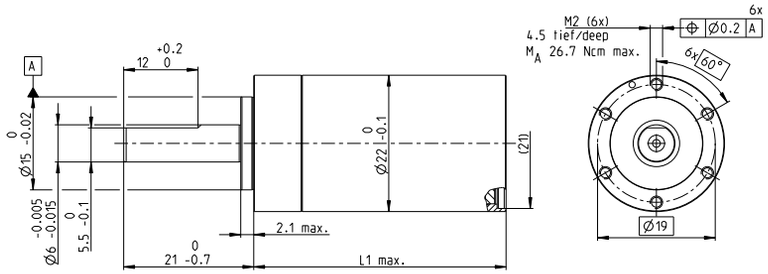
		Page
Compact drive		
ECX FLAT 22 S*	2–3 [4]	361
ECX FLAT 22 L*	2–3 [4]	362

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 22 HP ∅22 mm, planetary gearhead

Sterilizable

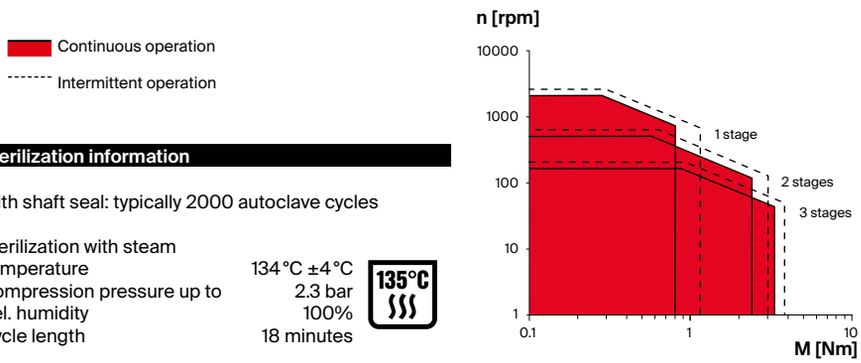




M 1:2

Key data		With shaft seal
Max. transmittable power	W	60
Max. continuous torque	Nm	3.3
Max. continuous input speed	rpm	10000
Ambient temperature	°C	-10...+135
Bearing at output		Ball bearing

Operating range (output shaft) — **With shaft seal**



Sterilization information

With shaft seal: typically 2000 autoclave cycles

Sterilization with steam	
Temperature	134 °C ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

Specifications		With shaft seal		
Number of stages		1	2	3
Max. transmittable continuous power	W	60	30	15
Max. transmittable intermittent power	W	80	40	20
Max. continuous torque	Nm	0.8	2.4	3.3
Max. intermittent torque	Nm	1.15	3.0	3.8
Max. continuous input speed	rpm	8000	8000	10000
Max. intermittent input speed	rpm	10000	10000	12500
Max. efficiency	%	85	75	65
Average backlash no load	°	0.85	1.05	1.2
Max. axial load (dynamic)	N	80	80	80
Max. radial load, 10 mm from flange	N	45	75	100
Gearhead length L1[1]	mm	29.3	39.4	45.9
Weight	g	79	94	107

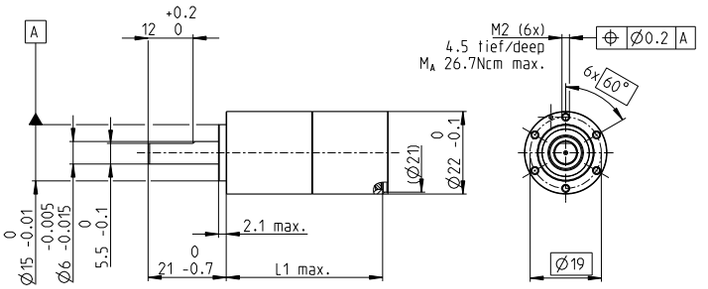
Configuration		With shaft seal		
Number of stages		1	2	3
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231
Version		Shaft seal		
Flange		Standard flange		
Shaft		Length/flat face/cross hole		

Modular system		Page
EC motor	№ of stages [opt.]	
ECX SPEED 22 M	1–3	227–228
ECX SPEED 22 L	1–3	231–232
ECX PRIME 22 L STEC*	1–3	239

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 22 ∅22 mm, planetary gearhead

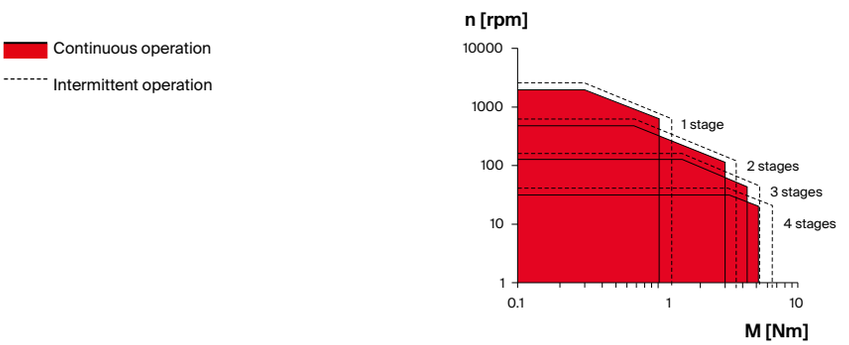




M 1:2

Key data		UP Ultra performance
Max. transmittable power	W	66
Max. continuous torque	Nm	5.2
Max. continuous input speed	rpm	8000
Ambient temperature	°C	-20...+100
Bearing at output		Ball bearing

Operating range (output shaft) — UP Ultra performance



Specifications		UP Ultra performance			
Number of stages		1	2	3	4
Max. transmittable continuous power	W	66.0	36.0	20.0	11.0
Max. transmittable intermittent power	W	82.5	45.0	25.0	14.0
Max. continuous torque	Nm	1.00	2.90	4.30	5.20
Max. intermittent torque	Nm	1.25	3.60	5.30	6.50
Max. continuous input speed	rpm	8000	8000	8000	8000
Max. intermittent input speed	rpm	10000	10000	10000	10000
Max. efficiency	%	96	93	90	87
Average backlash no load	°	0.6	0.7	0.8	0.8
Max. axial load (dynamic)	N	80	80	80	80
Max. radial load, 10 mm from flange	N	100	145	150	150
Gearhead length L1[1]	mm	22.0	32.0	42.0	52.0
Weight	g	49	69	87	106

Configuration		UP Ultra performance			
Number of stages		1	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance			
Flange		Standard flange			
Shaft		Length/flat face/cross hole			

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 22 S	1–4	111–112
DCX 22 L	1–4	113–114

		Page
EC motor	№ of stages [opt.]	
ECX SPEED 22 M	1–4	225–226
ECX SPEED 22 L	1–4	229–230
ECX PRIME 22 L	1–4	239
ECX TORQUE 22 M	1–4	243
ECX TORQUE 22 L	1–4	244
ECX TORQUE 22 XL	1–4	245
ECX FLAT 22 S	1–4	257–258
ECX FLAT 22 L	1–4	259

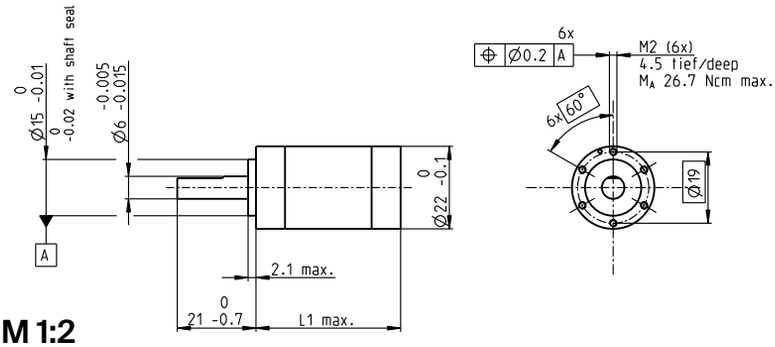
		Page
Compact drive		
ECX FLAT 22 S*	1–4	361
ECX FLAT 22 L*	1–4	362

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 22 SPEED ∅22 mm, planetary gearhead

Sterilizable



M 1:2

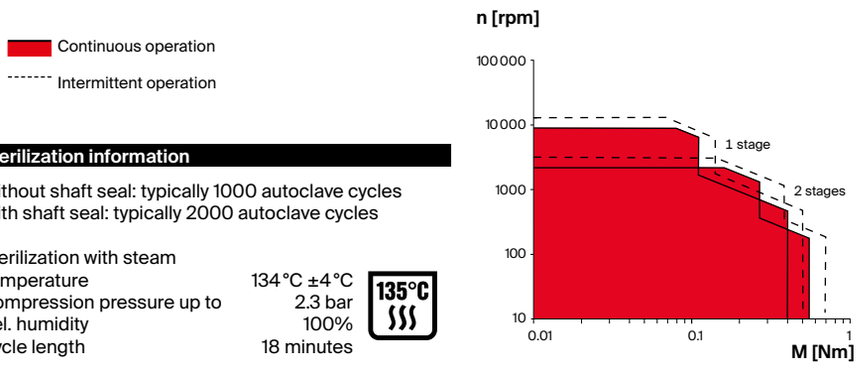


GPX

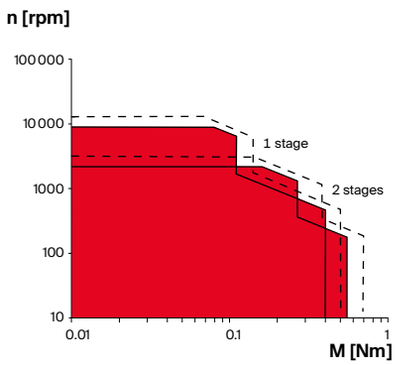
Key data		Without shaft seal	With shaft seal
Max. transmittable power	W	74 (20)	74 (20)
Max. continuous torque	Nm	0.27 (0.55))	0.27 (0.55
Max. continuous input speed	rpm	35 000	35 000
Ambient temperature	°C	-10...+135	-10...+135
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

Without shaft seal



With shaft seal



Sterilization information

Without shaft seal: typically 1000 autoclave cycles
With shaft seal: typically 2000 autoclave cycles

Sterilization with steam	
Temperature	134 °C ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

135°C SSS

Specifications		Without shaft seal*		With shaft seal*	
Number of stages		1	2	1	2
Max. transmittable continuous power	W	74 (20)	37 (10)	74 (20)	37 (10)
Max. transmittable intermittent power	W	92 (25)	46 (13)	92 (25)	46 (13)
Max. continuous torque	Nm	0.11 (0.4)	0.27 (0.55)	0.11 (0.4)	0.27 (0.55)
Max. intermittent torque	Nm	0.14 (0.5)	0.38 (0.7)	0.14 (0.5)	0.38 (0.7)
Max. continuous input speed	rpm	35 000	35 000	35 000	35 000
Max. intermittent input speed	rpm	50 000	50 000	50 000	50 000
Max. efficiency	%	85	80	85	80
Average backlash no load	°	1.4	1.6	1.4	1.6
Max. axial load (dynamic)	N	80.0	80.0	80.0	80.0
Max. radial load, 10 mm from flange	N	45.0	75.0	30.0	50.0
Gearhead length L1[1]	mm	30.8	40.9	38.6	48.6
Weight	g	65	86	85	106

Configuration		Without shaft seal		With shaft seal	
Number of stages		1	2	1	2
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44
Version		Without shaft seal/With shaft seal			
Flange		Standard flange			
Shaft		Length/flat face/cross hole			

Modular system		Page
EC motor	№ of stages [opt.]	
ECX SPEED 19 M	[3]	217–220
ECX SPEED 19 L	[3]	221–224
ECX SPEED 22 M	1–2	225–226
ECX SPEED 22 L	1–2	229–230

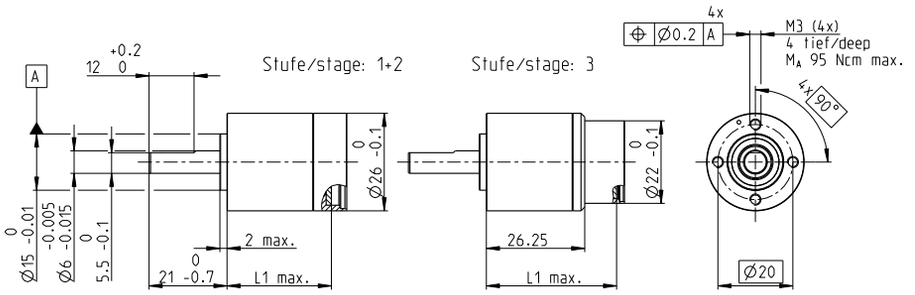
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

*Values in parentheses apply in case of reduced speed (according to diagram).

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Gearhead

GPX 26 ∅26 mm, planetary gearhead





M 1:2

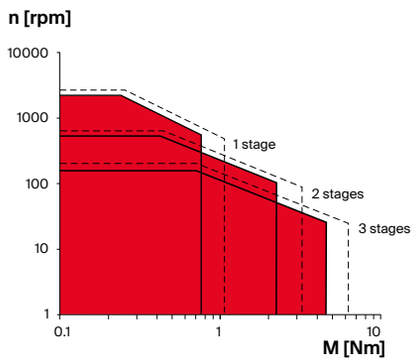
Key data		A Standard version	C Ceramic version
Max. transmittable power	W	48	55
Max. continuous torque	Nm	2.25	3.0
Max. continuous input speed	rpm	8000	8000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

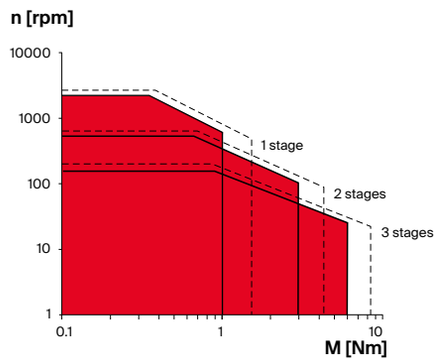
Continuous operation

Intermittent operation

A Standard version



C Ceramic version



Specifications		A Standard version			C Ceramic version		
Number of stages		1	2	3	1	2	3
Max. transmittable continuous power	W	48	24	12.0	55	30	15.0
Max. transmittable intermittent power	W	60	30	15.0	70	35	18.0
Max. continuous torque	Nm	0.75	2.25	4.50	1.00	2.60	5.00
Max. intermittent torque	Nm	1.10	3.20	6.20	1.50	3.40	6.30
Max. continuous input speed	rpm	7000	8000	10000	7000	8000	10000
Max. intermittent input speed	rpm	8750	10000	12500	8750	10000	12500
Max. efficiency	%	90	78	75	90	78	75
Average backlash no load	°	0.75	0.95	1.1	0.75	0.95	1.1
Max. axial load (dynamic)	N	80	80	80	80	80	80
Max. radial load, 10 mm from flange	N	95	145	150	95	145	150
Gearhead length L1[1]	mm	21.3	30.2	35.5	21.3	30.2	35.5
Weight	g	75	95	105	75	95	105

Configuration		A Standard version			C Ceramic version		
Number of stages		1	2	3	1	2	3
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231
Version		Standard/ceramic version/noise reduced/reduced backlash					
Flange		Standard flange/configurable flange					
Shaft		Length/flat face/cross hole					

Modular system			Page
DC motor	№ of stages [opt.]		
DCX 22 S	3		111–112
DCX 22 L	3		113–114
DCX 26 L	1–2 [3]		115–116
DC-max 22 S*	3		123–124
DC-max 26 S*	1–2 [3]		125–126

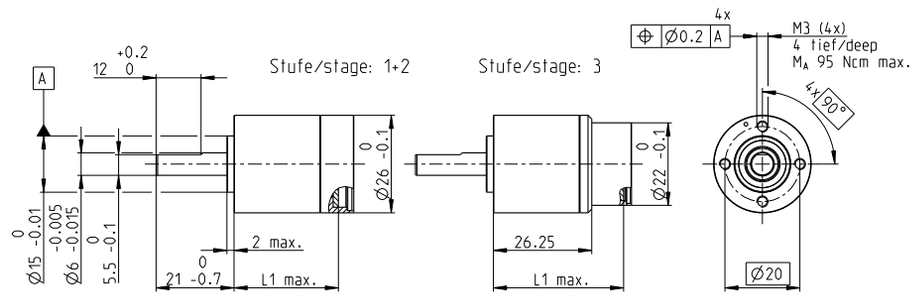
		Page
EC motor	№ of stages [opt.]	
ECX SPEED 22 M	3	225–226
ECX SPEED 22 L	3	229–230
ECX PRIME 22 L	3	239
ECX TORQUE 22 M	3	243
ECX TORQUE 22 L	3	244
ECX TORQUE 22 XL	3	245
ECX FLAT 22 S	3	257–258
ECX FLAT 22 L	3	259

		Page
Compact drive	№ of stages [opt.]	
ECX FLAT 22 S	3	361
ECX FLAT 22 L	3	362

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 26 ∅26 mm, planetary gearhead

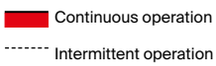




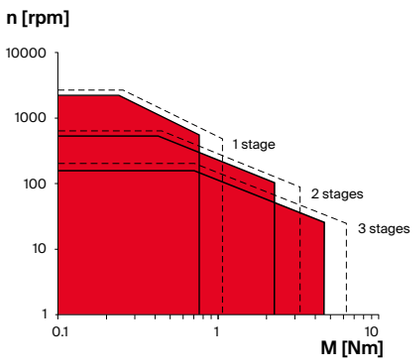
M 1:2

Key data		LN Noise reduced	LZ Backlash reduced
Max. transmittable power	W	38	24
Max. continuous torque	Nm	1.8	2.3
Max. continuous input speed	rpm	8000	8000
Ambient temperature	°C	-40...+85	-40...+100
Bearing at output		Ball bearing	Ball bearing
Typical noise level	dBA	-5 compared to standard configuration	

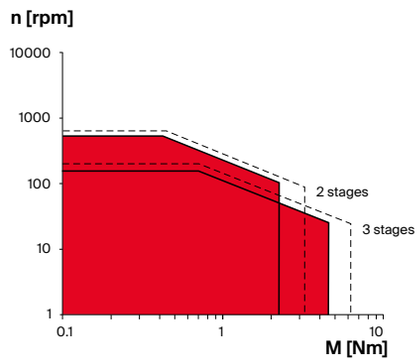
Operating range (output shaft)



LN Noise reduced



LZ Backlash reduced



Specifications		LN Noise reduced			LZ Backlash reduced	
Number of stages		1	2	3	2	3
Max. transmittable continuous power	W	38	19	10.0	24	12.0
Max. transmittable intermittent power	W	48	24	12.0	30	15.0
Max. continuous torque	Nm	0.60	1.80	3.60	2.25	4.50
Max. intermittent torque	Nm	0.75	2.25	4.50	3.20	6.20
Max. continuous input speed	rpm	7000	8000	10000	8000	10000
Max. intermittent input speed	rpm	8750	10000	12500	10000	12500
Max. efficiency	%	90	78	75	78	75
Average backlash no load	°	0.75	0.95	1.1	0.85	0.9
Max. axial load (dynamic)	N	80	80	80	80	80
Max. radial load, 10 mm from flange	N	95	145	150	145	150
Gearhead length L1[1]	mm	21.3	30.2	35.5	30.2	35.5
Weight	g	75	95	105	95	105

Configuration		LN Noise reduced			LZ Backlash reduced	
Number of stages		1	2	3	2	3
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231
Version		Standard/ceramic version/noise reduced/backlash reduced/high power				
Flange		Standard flange/configurable flange				
Shaft		Length/flat face/cross hole				

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 22 S	3	111–112
DCX 22 L	3	113–114
DCX 26 L	1–2 [3]	115–116
DC-max 22 S*	3	123–124
DC-max 26 S*	1–2 [3]	125–126

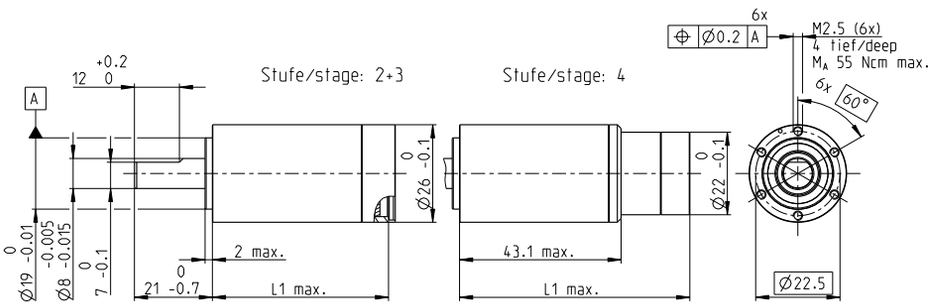
		Page
EC motor	№ of stages [opt.]	
ECX SPEED 22 M	3	225–226
ECX SPEED 22 L	3	229–230
ECX PRIME 22 L	3	239
ECX TORQUE 22 M	3	243
ECX TORQUE 22 L	3	244
ECX TORQUE 22 XL	3	245
ECX FLAT 22 S	3	257–258
ECX FLAT 22 L	3	259

		Page
Compact drive	№ of stages [opt.]	
ECX FLAT 22 S	3	361
ECX FLAT 22 L	3	362

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 26 ∅26 mm, planetary gearhead

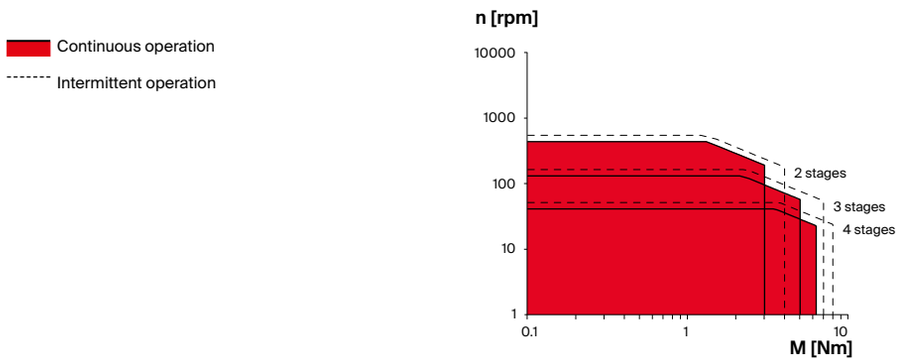




M 1:2

Key data		HP High Power
Max. transmittable power	W	60
Max. continuous torque	Nm	6.3
Max. continuous input speed	rpm	10000
Ambient temperature	°C	-40...+100
Bearing at output		Ball bearing

Operating range (output shaft) — HP High Power



Specifications		HP High Power		
Number of stages		2	3	4
Max. transmittable power (continuous)	W	60	30	15
Max. transmittable power (intermittent)	W	75	40	20
Max. continuous torque	Nm	3.0	5.0	6.3
Max. intermittent torque	Nm	4.0	7.0	8.0
Max. continuous input speed	rpm	7000	8000	10000
Max. intermittent input speed	rpm	8750	10000	12500
Max. efficiency	%	75	65	55
Average backlash no load	°	0.95	1.1	1.3
Max. axial load (dynamic)	N	110	110	110
Max. radial load, 10 mm from flange	N	180	180	180
Gearhead length L1[1]	mm	38.2	47.1	52.4
Weight	g	122	144	153

Configuration		HP High Power		
Number of stages		2	3	4
Reduction Absolute reduction: (see online)	X:1	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power		
Flange		Standard flange		
Shaft		Length/flat face/cross hole		

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 22 S	4	111–112
DCX 22 L	4	113–114
DCX 26 L	2–3 [4]	115–116

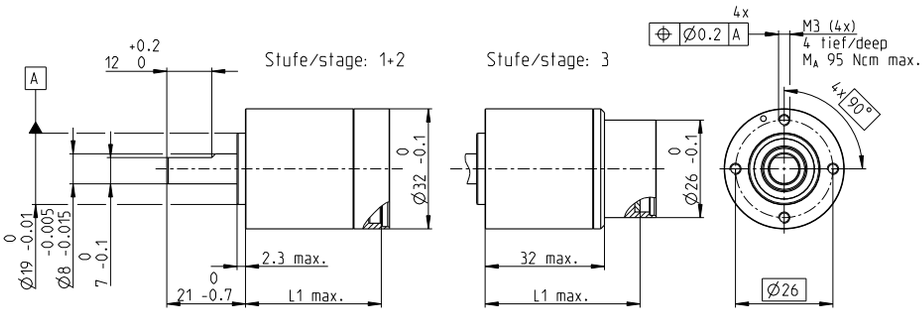
		Page
EC motor	№ of stages [opt.]	
ECX SPEED 22 M	4	225–226
ECX SPEED 22 L	4	229–230
ECX PRIME 22 L	4	239
ECX TORQUE 22 M	4	243
ECX TORQUE 22 L	4	244
ECX TORQUE 22 XL	4	245
ECX FLAT 22 S	4	257–258
ECX FLAT 22 L	4	259

		Page
Compact drive	№ of stages [opt.]	
ECX FLAT 22 S	4	361
ECX FLAT 22 L	4	362

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 32 ∅32 mm, planetary gearhead





M 1:2

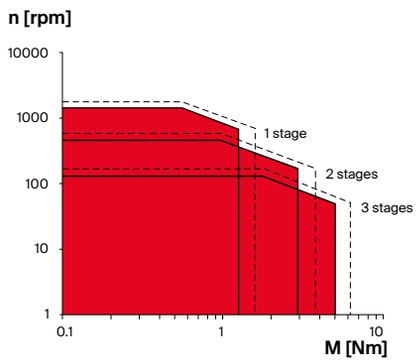
Key data		A Standard version	C Ceramic version
Max. transmittable power	W	100	120
Max. continuous torque	Nm	5	6.6
Max. continuous input speed	rpm	8000	8000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

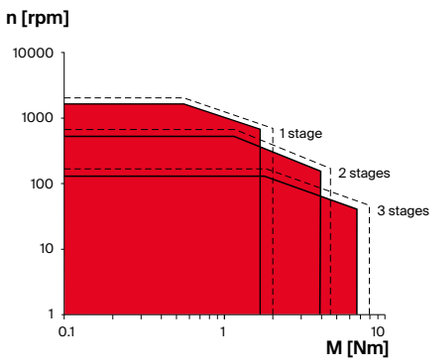
Continuous operation

Intermittent operation

A Standard version



C Ceramic version



Specifications		A Standard version			C Ceramic version		
Number of stages		1	2	3	1	2	3
Max. transmittable continuous power	W	100	50	25	120	60	30
Max. transmittable intermittent power	W	125	62	31	150	75	37
Max. continuous torque	Nm	1.25	2.90	5.00	1.60	3.80	6.60
Max. intermittent torque	Nm	1.60	3.60	6.25	2.00	4.50	8.00
Max. continuous input speed	rpm	6000	7000	8000	6000	7000	8000
Max. intermittent input speed	rpm	7500	8750	10000	7500	8750	10000
Max. efficiency	%	90	78	75	90	78	75
Average backlash no load	°	0.55	0.7	0.9	0.55	0.7	0.9
Max. axial load (dynamic)	N	110	110	110	110	110	110
Max. radial load, 10 mm from flange	N	160	180	180	160	180	180
Gearhead length L1[1]	mm	26.7	36.3	43.9	26.7	36.3	43.9
Weight	g	140	185	230	140	185	230

Configuration		A Standard version			C Ceramic version		
Number of stages		1	2	3	1	2	3
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231
Version		Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance					
Flange		Standard flange/configurable flange					
Shaft		Length/diameter/flat face/cross hole					

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 26 L	3	115–116
DCX 32 L	1–2 [3]	117
DC-max 26 S*	3	125–126

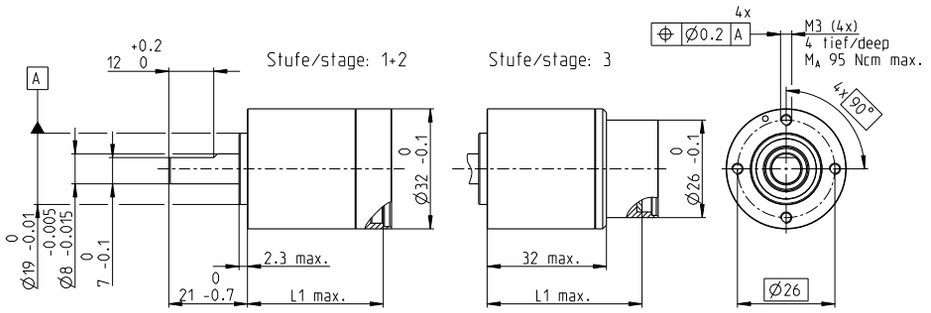
		Page
EC motor	№ of stages [opt.]	
ECX FLAT 32 S*	1–2 [3]	260–261
ECX FLAT 32 L*	1–2 [3]	262

		Page
Compact drive	№ of stages [opt.]	
ECX FLAT 32 S IE*	1–2 [3]	363
ECX FLAT 32 L IE*	1–2 [3]	364

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 32 ∅32 mm, planetary gearhead





M 1:2

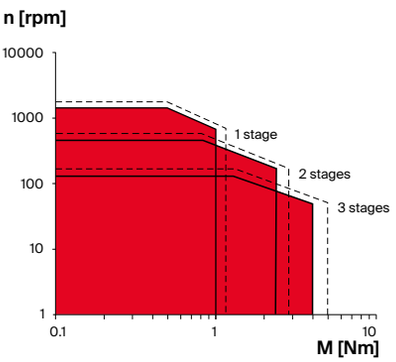
Key data		LN Noise reduced	LZ Backlash reduced
Max. transmittable power	W	80	50
Max. continuous torque	Nm	4	5
Max. continuous input speed	rpm	8000	8000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing
Typical noise level	dBA	-5 compared to standard configuration	

Operating range (output shaft)

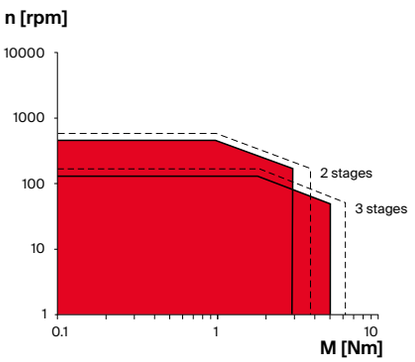
Continuous operation

Intermittent operation

LN Noise reduced



LZ Backlash reduced



Specifications		LN Noise reduced			LZ Backlash reduced	
Number of stages		1	2	3	2	3
Max. transmittable continuous power	W	80	40	20	50	25
Max. transmittable intermittent power	W	100	50	25	62	31
Max. continuous torque	Nm	1.00	2.30	4.00	2.90	5.00
Max. intermittent torque	Nm	1.30	2.90	5.00	3.60	6.25
Max. continuous input speed	rpm	6000	7000	8000	7000	8000
Max. intermittent input speed	rpm	7500	8750	10000	8750	10000
Max. efficiency	%	90	78	75	78	75
Average backlash no load	°	0.55	0.7	0.9	0.55	0.75
Max. axial load (dynamic)	N	110	110	110	110	110
Max. radial load, 10 mm from flange	N	160	180	180	180	180
Gearhead length L1[1]	mm	26.7	36.3	43.9	36.3	43.9
Weight	g	140	185	230	185	230

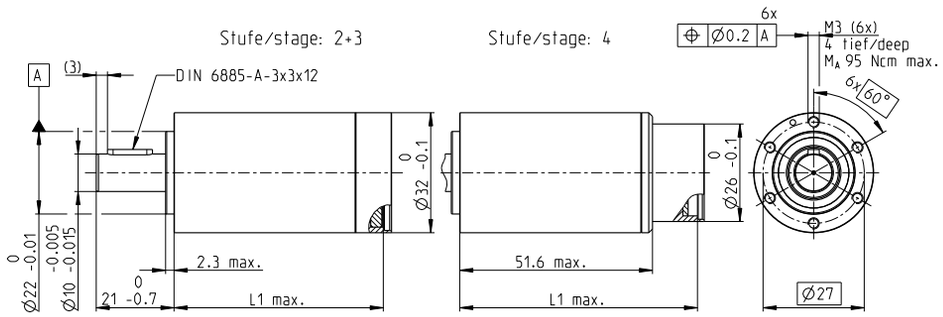
Configuration		LN Noise reduced			LZ Backlash reduced	
Number of stages		1	2	3	2	3
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231
Version		Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance				
Flange		Standard flange/configurable flange				
Shaft		Length/diameter/flat face/cross hole				

Modular system		Page			Page			Page
DC motor	№ of stages [opt.]		**EC motor**	№ of stages [opt.]		**Compact drive**	№ of stages [opt.]	
DCX 26 L	3	115–116	ECX FLAT 32 S*	1–2 [3]	260–261	ECX FLAT 32 S IE*	1–2 [3]	363
DCX 32 L	1–2 [3]	117	ECX FLAT 32 L*	1–2 [3]	262	ECX FLAT 32 L IE*	1–2 [3]	364
DC-max 26 S*	3	125–126						

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 32 ∅32 mm, planetary gearhead

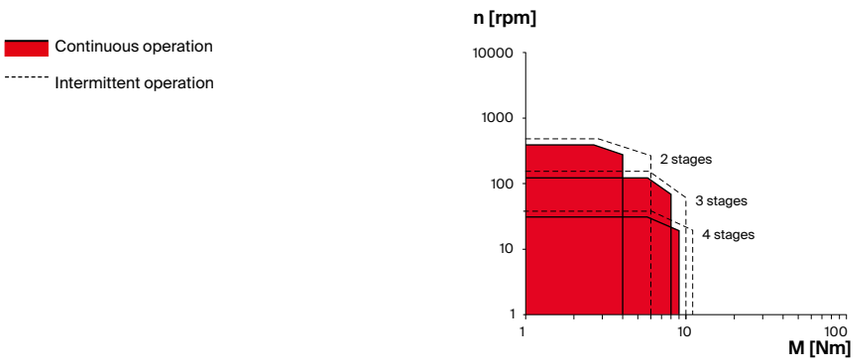




M 1:2

Key data		HP High Power
Max. transmittable power	W	110
Max. continuous torque	Nm	9
Max. continuous input speed	rpm	8000
Ambient temperature	°C	-40...+100
Bearing at output		Ball bearing

Operating range (output shaft) — HP High Power



Specifications		HP High Power		
Number of stages		2	3	4
Max. transmittable power (continuous)	W	110	55	18
Max. transmittable power (intermittent)	W	140	70	25
Max. continuous torque	Nm	4.00	8.00	9.00
Max. intermittent torque	Nm	6.00	10.00	12.00
Max. continuous input speed	rpm	6000	7000	8000
Max. intermittent input speed	rpm	7500	8750	10000
Max. efficiency	%	76	65	55
Average backlash no load	°	0.7	0.9	1.1
Max. axial load (dynamic)	N	110	110	110
Max. radial load, 10 mm from flange	N	200	250	250
Gearhead length L1[1]	mm	46.3	55.9	63.5
Weight	g	200	220	250

Configuration		HP High Power		
Number of stages		2	3	4
Reduction Absolute reduction: (see online)	X:1	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance		
Flange		Standard flange		
Shaft		Length/flat face/feather key		

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 26 L	4	115–116
DCX 32 L	2–3 [4]	117

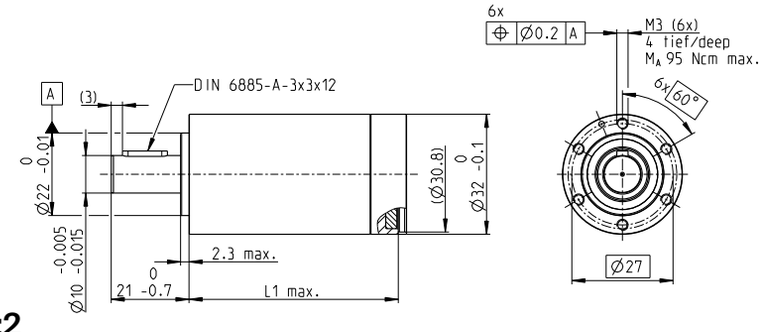
		Page
EC motor	№ of stages [opt.]	
ECX FLAT 32 S*	2–3 [4]	260–261
ECX FLAT 32 L*	2–3 [4]	262

		Page
Compact drive	№ of stages [opt.]	
ECX FLAT 32 S*	2–3 [4]	363
ECX FLAT 32 L*	2–3 [4]	364

*Limited selection of reduction ratios (see online).
[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 32 ∅32 mm, planetary gearhead





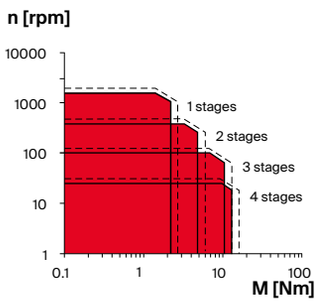
M 1:2

Key data		UP Ultra performance
Max. transmittable power	W	242
Max. continuous torque	Nm	12.6
Max. continuous input speed	rpm	6000
Ambient temperature	°C	-40 ... +100
Bearing at output		Ball bearing

Operating range (output shaft) — UP Ultra performance

Continuous operation

Intermittent operation



Specifications		UP Ultra performance			
Number of stages		1	2	3	4
Max. transmittable continuous power	W	242	130	70	25
Max. transmittable intermittent power	W	300	160	85	30
Max. continuous torque	Nm	2.20	4.80	10.40	12.60
Max. intermittent torque	Nm	2.70	6.00	13.00	16.00
Max. continuous input speed	rpm	6000	6000	6000	6000
Max. intermittent input speed	rpm	7500	7500	7500	7500
Max. efficiency	%	96	93	90	87
Average backlash no load	°	0.4	0.7	0.8	0.8
Max. axial load (dynamic)	N	110	110	110	110
Max. radial load, 10 mm from flange	N	150	200	250	250
Gearhead length L1[1]	mm	32.0	47.0	62.0	77.0
Weight	g	167	231	287	350

Configuration		UP Ultra performance			
Number of stages		1	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance			
Flange		Standard flange			
Shaft		Length/flat face/feather key			

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 32 L	1–4	117

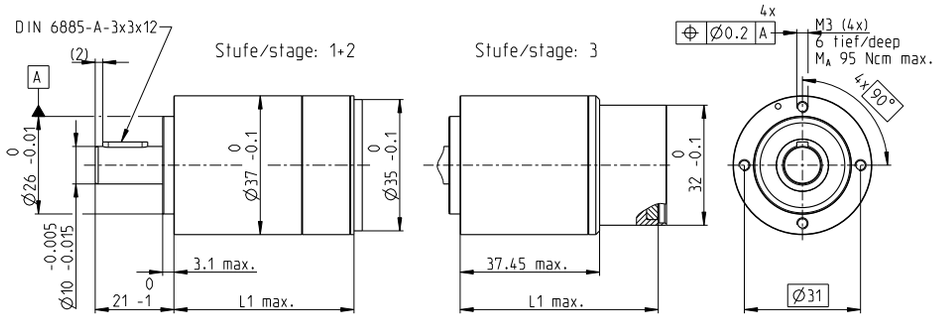
		Page
EC motor	№ of stages [opt.]	
ECX FLAT 32 S	1–4	260–261
ECX FLAT 32 L	1–4	262

		Page
Compact drive	№ of stages [opt.]	
ECX FLAT 32 S	1–4	363
ECX FLAT 32 L	1–4	364

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 37 ∅37 mm, planetary gearhead

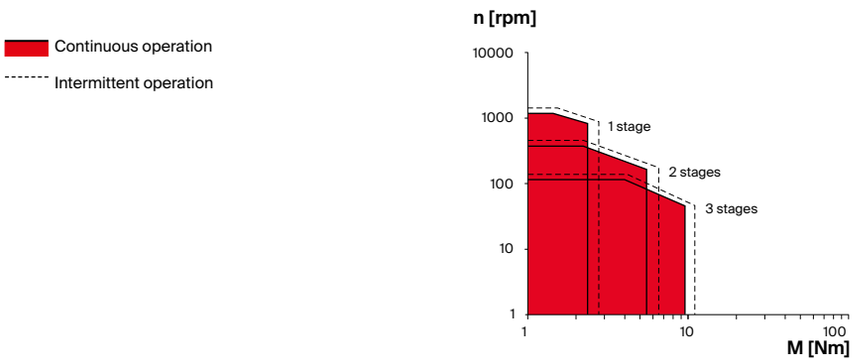




M 1:2

Key data		A Standard version
Max. transmittable power	W	185
Max. continuous torque	Nm	9.3
Max. continuous input speed	rpm	7000
Ambient temperature	°C	-40...+100
Bearing at output		Ball bearing

Operating range (output shaft) — **A Standard version**



Specifications		A Standard version		
Number of stages		1	2	3
Max. transmittable continuous power	W	185	90	45
Max. transmittable intermittent power	W	230	115	60
Max. continuous torque	Nm	2.30	5.40	9.30
Max. intermittent torque	Nm	2.90	6.80	11.60
Max. continuous input speed	rpm	5000	6000	7000
Max. intermittent input speed	rpm	6250	7500	8750
Max. efficiency	%	90	80	75
Average backlash no load	°	0.5	0.6	0.7
Max. axial load (dynamic)	N	240	240	240
Max. radial load, 10 mm from flange	N	200	250	250
Gearhead length L1[1]	mm	35.4	48.3	52.9
Weight	g	230	310	410

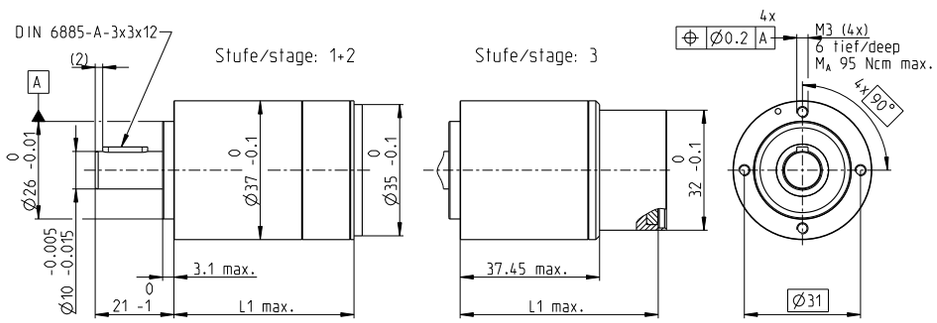
Configuration		A Standard version		
Number of stages		1	2	3
Reduction Absolute reduction: (see online)	X:1	3.9	16, 26	62, 83, 103, 111, 138, 150, 172, 186, 231
Version		Standard/noise reduced/reduced backlash		
Flange		Standard flange/configurable flange		
Shaft		Length/flat face/feather key		

Modular system		Page			Page			Page
DC motor	№ of stages [opt.]		**EC motor**	№ of stages [opt.]		**ECX drive**	№ of stages [opt.]	
DCX 32 L	3	117	ECX FLAT 32 S	3	260-261	ECX FLAT 32 S IE	3	363
DCX 35 L	1–2	118	ECX FLAT 32 L	3	262	ECX FLAT 32 L IE	3	364

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 37 ∅37 mm, planetary gearhead





M 1:2

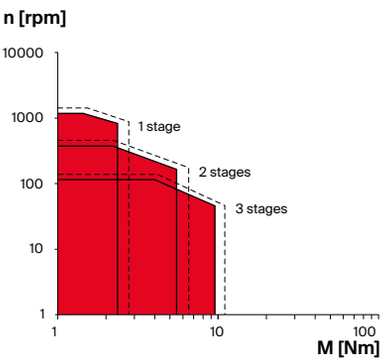
Key data		LN Noise reduced	LZ Backlash reduced
Max. transmittable power	W	150	90
Max. continuous torque	Nm	7.4	9.3
Max. continuous input speed	rpm	7000	7000
Ambient temperature	°C	-40...+85	-40...+100
Bearing at output		Ball bearing	Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration	

Operating range (output shaft)

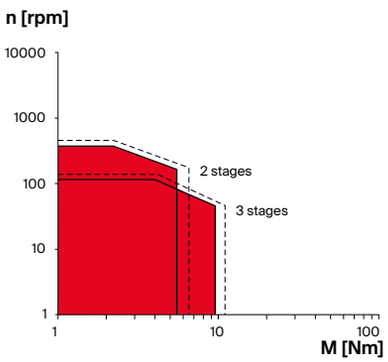
Continuous operation

Intermittent operation

LN Noise reduced



LZ Backlash reduced



Specifications		LN Noise reduced			LZ Backlash reduced	
Number of stages		1	2	3	2	3
Max. transmittable continuous power	W	150	75	37	90	45
Max. transmittable intermittent power	W	185	90	45	115	60
Max. continuous torque	Nm	1.85	4.30	7.40	5.40	9.30
Max. intermittent torque	Nm	2.30	5.40	9.20	6.80	11.60
Max. continuous input speed	rpm	5000	6000	7000	6000	7000
Max. intermittent input speed	rpm	6250	7500	8750	7500	8750
Max. efficiency	%	90	80	75	80	75
Average backlash no load	°	0.5	0.6	0.7	0.4	0.5
Max. axial load (dynamic)	N	240	240	240	240	240
Max. radial load, 10 mm from flange	N	200	250	250	250	250
Gearhead length L1[1]	mm	35.4	48.3	52.9	48.3	52.9
Weight	g	230	310	410	310	410

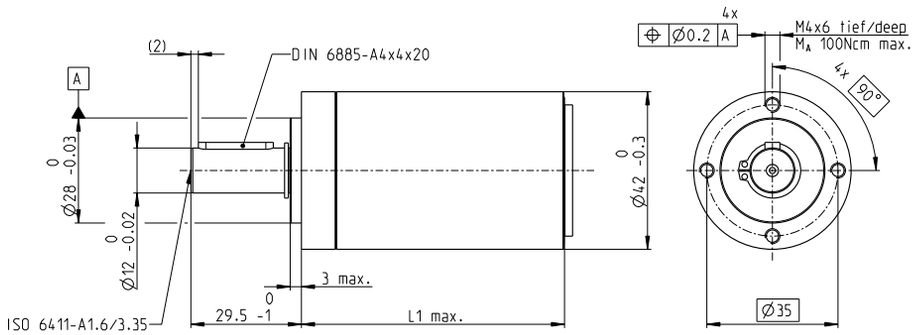
Configuration		LN Noise reduced			LZ Backlash reduced	
Number of stages		1	2	3	2	3
Reduction Absolute reduction: (see online)	X:1	3.9	16, 26	62, 83, 103, 111, 138, 150, 172, 186, 231	16, 26	62, 83, 103, 111, 138, 150, 172, 186, 231
Version		Standard/noise reduced/backlash reduced				
Flange		Standard flange/configurable flange				
Shaft		Length/flat face/feather key				

Modular system		Page			Page			Page
DC motor	№ of stages [opt.]		**EC motor**	№ of stages [opt.]		**ECX drive**	№ of stages [opt.]	
DCX 32 L	3	117	ECX FLAT 32 S	3	260-261	ECX FLAT 32 S IE	3	363
DCX 35 L	1-2	118	ECX FLAT 32 L	3	262	ECX FLAT 32 L IE	3	364

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 42 ∅42 mm, planetary gearhead





M 1:2

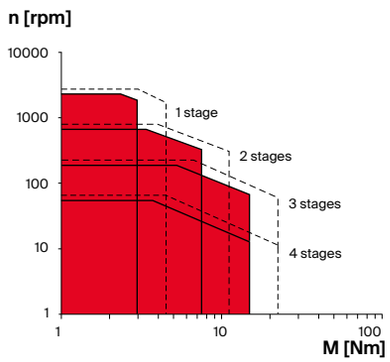
Key data		C Ceramic version	UP Ultra performance
Max. transmittable power	W	580	650
Max. continuous torque	Nm	15.0	35.0
Max. continuous input speed	rpm	8000	6000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

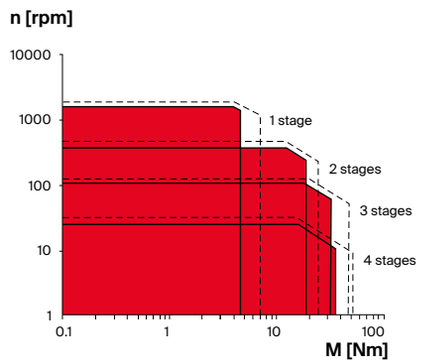
Continuous operation

Intermittent operation

C Ceramic version



UP Ultra performance



Specifications		C Ceramic version				UP Ultra performance			
Number of stages		1	2	3	4	1	2	3	4
Max. transmittable power (continuous)	W	580	240	100	20	650	460	200	40
Max. transmittable power (intermittent)	W	725	300	125	25	820	580	250	50
Max. continuous torque	Nm	3.0	7.5	15.0	15.0	4.5	18.0	32.0	35.0
Max. intermittent torque	Nm	4.5	11.3	22.5	22.5	7.0	24.0	46.0	50.0
Max. continuous input speed	rpm	8000	8000	8000	8000	6000	6000	6000	6000
Max. intermittent input speed	rpm	10000	10000	10000	10000	7500	7500	7500	7500
Max. efficiency	%	90	81	72	64	96	93	90	87
Average backlash no load	°	0.6	0.8	1.0	1.0	0.3	0.4	0.5	0.6
Max. axial load (dynamic)	N	150	150	150	150	200	200	200	200
Max. radial load, 12 mm from flange	N	120	240	360	360	350	525	750	750
Gearhead length L1[1]	mm	37.4	51.9	66.4	80.9	48.0	67.0	86.0	104.5
Weight	g	260	360	460	560	400	540	660	790

Configuration		C Ceramic version				UP Ultra performance			
Number of stages		1	2	3	4	1	2	3	4
Reduction Absolute reduction: (see online)	X:1	3.5, 4.3	12, 15, 19, 21, 26	43, 53, 66, 74, 81, 113, 126, 156	150, 186, 230, 257, 285, 319, 353, 394, 441, 488, 546, 676, 756, 936	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Version		Ceramic version/ultra performance							
Flange		Standard flange							
Shaft		Length/flat face/feather key							

Modular system		Page
DC motor	№ of stages [opt.]	
DCX 35 L	1–4	118

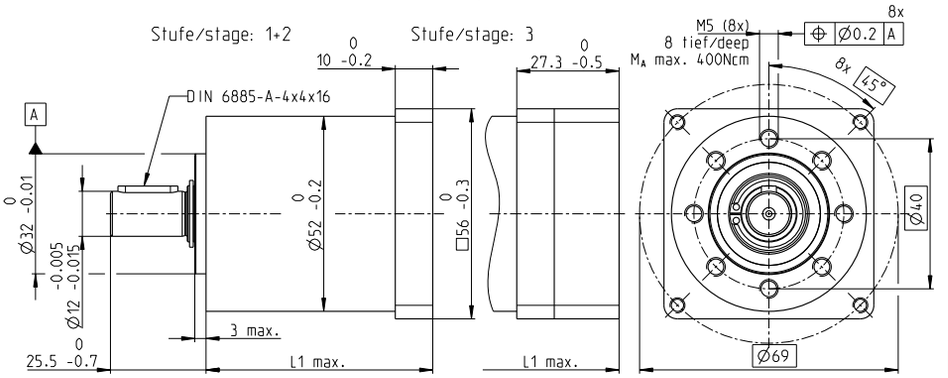
		Page
EC motor	№ of stages [opt.]	
ECX FLAT 42 S	1–4	263–264
ECX FLAT 42 M	1–4	265

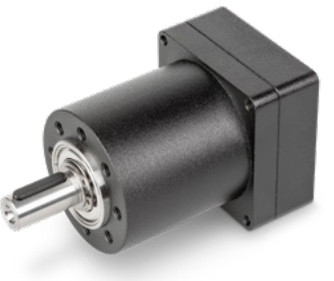
		Page
Compact drive		
ECX FLAT 42 S	1–4	365
ECX FLAT 42 M	1–4	366

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 52 ∅52 mm, planetary gearhead





M 1:2

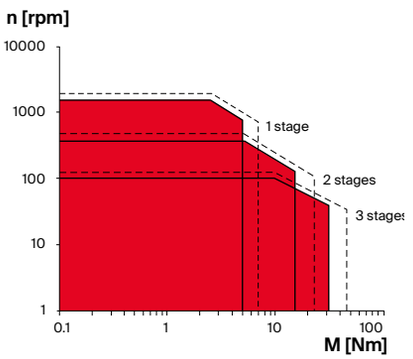
Key data		A Standard version	UP Ultra performance
Max. transmittable power	W	400	600
Max. continuous torque	Nm	30.0	45.0
Max. continuous input speed	rpm	6000	6000
Ambient temperature	°C	-40...+100	-40...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

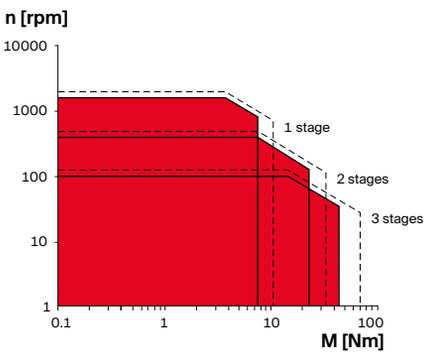
Continuous operation

Intermittent operation

A Standard version



UP Ultra performance



Specifications		A Standard version			UP Ultra performance		
Number of stages		1	2	3	1	2	3
Max. transmittable power (continuous)	W	400	200	100	600	300	150
Max. transmittable power (intermittent)	W	500	250	125	750	375	188
Max. continuous torque	Nm	5.0	15.0	30.0	7.5	22.5	45.0
Max. intermittent torque	Nm	7.0	23.0	45.0	10.5	34.5	67.5
Max. continuous input speed	rpm	6000	6000	6000	6000	6000	6000
Max. intermittent input speed	rpm	7500	7500	7500	7500	7500	7500
Max. efficiency	%	95	92	89	95	92	89
Average backlash no load	°	0.5	0.6	0.8	0.3	0.4	0.5
Max. axial load (dynamic)	N	200	200	200	200	200	200
Max. permissible radial load, 10 mm from flange	N	420	630	900	420	630	900
Gearhead length L1[1]	mm	44	61	78	44	61	78
Weight	g	545	713	930	552	719	926

Configuration	A Standard version			UP Ultra performance		
Number of stages	1	2	3	1	2	3
Reduction	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 172	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 172
Version	Standard/noise reduced/ultra performance					
Flange	Standard flange					
Shaft	Length/diameter/feather key					

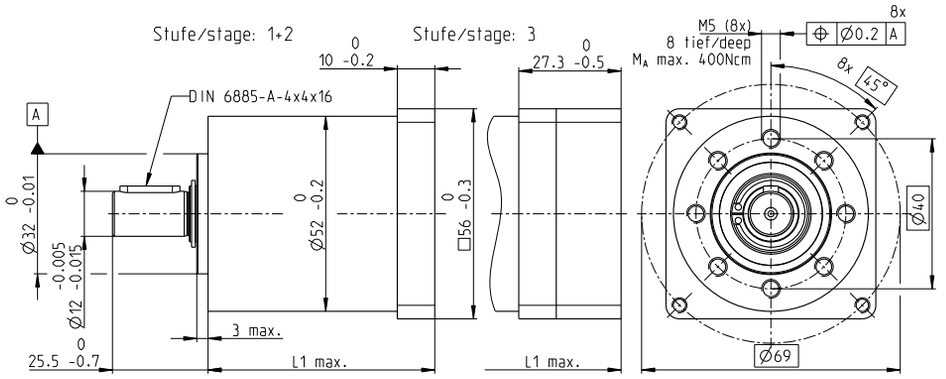
Modular system		Page
EC motor	№ of stages [opt.]	
IDX 56 S	1–3	249
IDX 56 M	1–3	250
IDX 56 L	1–3	251

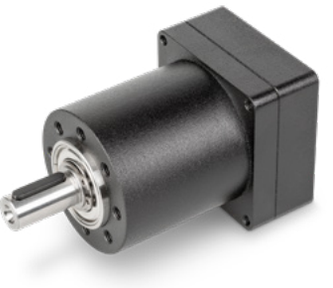
		Page
Compact drive	№ of stages [opt.]	
IDX 56 S	1–3	353
IDX 56 M	1–3	354
IDX 56 L	1–3	355

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 52 ∅52 mm, planetary gearhead

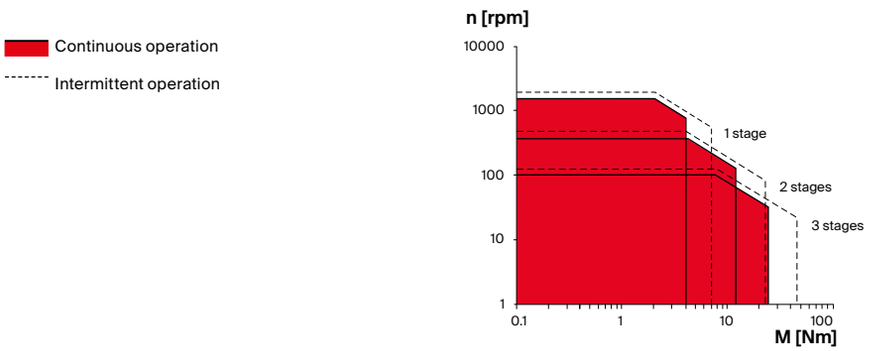




GPX

Key data		LN Noise reduced
Max. transmittable power	W	320
Max. continuous torque	Nm	24.0
Max. continuous input speed	rpm	6000
Ambient temperature	°C	-20...+85
Bearing at output		Ball bearing
Typical noise level	dBA	-5 compared to standard configuration

Operating range (output shaft) — LN Noise reduced



Specifications		LN Noise reduced		
Number of stages		1	2	3
Max. transmittable power (continuous)	W	320	160	80
Max. transmittable power (intermittent)	W	400	200	100
Max. continuous torque	Nm	4.0	12.0	24.0
Max. intermittent torque	Nm	7.0	23.0	45.0
Max. continuous input speed	rpm	6000	6000	6000
Max. intermittent input speed	rpm	7500	7500	7500
Max. efficiency	%	95	92	89
Average backlash no load	°	0.5	0.6	0.8
Max. axial load (dynamic)	N	200	200	200
Max. permissible radial load, 10 mm from flange	N	420	630	900
Gearhead length L1[1]	mm	44	61	78
Weight	g	544	712	995

Configuration	LN Noise reduced		
Number of stages	1	2	3
Reduction	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 172
Version	Standard/noise reduced/ultra performance		
Flange	Standard flange		
Shaft	Length/diameter/feather key		

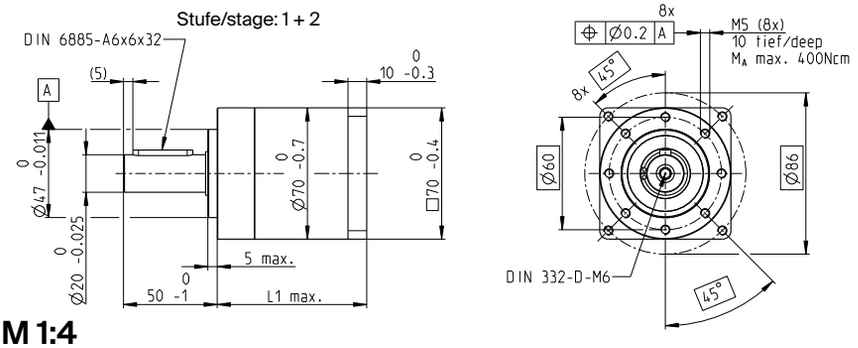
Modular system		Page
EC motor	№ of stages [opt.]	
IDX 56 S	1–3	249
IDX 56 M	1–3	250
IDX 56 L	1–3	251

		Page
Compact drive	№ of stages [opt.]	
IDX 56 S	1–3	353
IDX 56 M	1–3	354
IDX 56 L	1–3	355

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 70 ∅70 mm, planetary gearhead



M 1:4



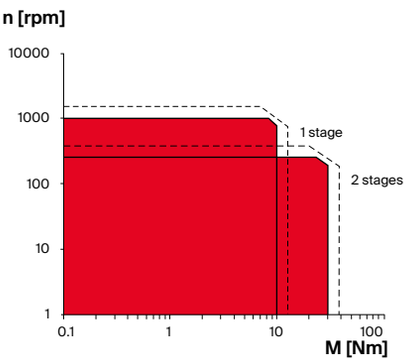
Key data		A Standard version	UP Ultra performance
Max. transmittable power	W	850	1200
Max. continuous torque	Nm	30.0	70.0
Max. continuous input speed	rpm	4000	4000
Ambient temperature	°C	-20...+100	-20...+100
Bearing at output		Ball bearing	Ball bearing

Operating range (output shaft)

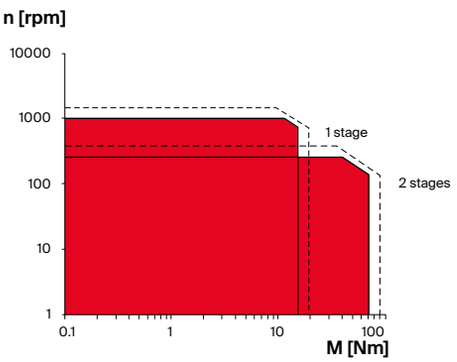
Continuous operation

Intermittent operation

A Standard version



UP Ultra performance



Specifications		A Standard version			UP Ultra performance			
Number of stages		1	2		1	2		
Max. transmittable power (continuous)	W	850	600		1200	1050		
Max. transmittable power (intermittent)	W	1063	750		1500	1313		
Max. continuous torque	Nm	10.0	30.0		15.0	70.0		
Max. intermittent torque	Nm	12.5	37.5		18.8	87.5		
Max. continuous input speed	rpm	4000	4000		4000	4000		
Max. intermittent input speed	rpm	6000	6000		6000	6000		
Max. efficiency	%	95	92		95	92		
Average backlash no load	°	0.5	0.5		0.5	0.5		
Max. axial load (dynamic)	N	825	825		825	825		
Max. permissible radial load, 10 mm from flange	N	1000	1200		1000	1200		
Gearhead length L1[1]	mm	58	80		58	80		
Weight	g	993	1399		1001	1425		

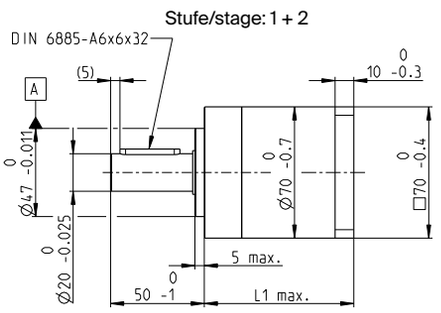
Configuration	A Standard version				UP Ultra performance			
Number of stages	1	2			1	2		
Reduction	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44			3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44		
Version	Standard/noise reduced/ultra performance							
Flange	Standard flange							
Shaft								

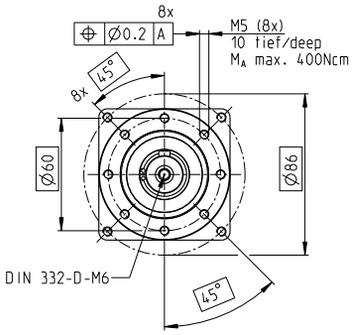
Modular system		Page	Compact drive		Page
EC motor	№ of stages [opt.]		**Compact drive**	№ of stages [opt.]	
IDX 70 S	1–2	252	IDX 70 S	1–2	356
IDX 70 M	1–2	253	IDX 70 M	1–2	357

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 70 ∅70 mm, planetary gearhead







GPX

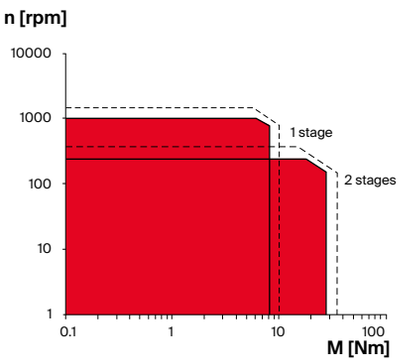
M 1:4

Key data		LN Noise reduced
Max. transmittable power	W	700
Max. continuous torque	Nm	27.0
Max. continuous input speed	rpm	4000
Ambient temperature	°C	-20...+85
Bearing at output		Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration

Operating range (output shaft) — LN Noise reduced

Continuous operation

Intermittent operation



Specifications		LN Noise reduced	
Number of stages		1	2
Max. transmittable power (continuous)	W	700	450
Max. transmittable power (intermittent)	W	875	563
Max. continuous torque	Nm	8.0	27.0
Max. intermittent torque	Nm	10.0	34.0
Max. continuous input speed	rpm	4000	4000
Max. intermittent input speed	rpm	6000	6000
Max. efficiency	%	95	92
Average backlash no load	°	0.5	0.5
Max. axial load (dynamic)	N	825	825
Max. permissible radial load, 10 mm from flange	N	1000	1200
Gearhead length L1[1]	mm	58	80
Weight	g	924	1330

Configuration	LN Noise reduced	
Number of stages	1	2
Reduction	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44
Version	Standard/noise reduced/ultra performance	
Flange	Standard flange	
Shaft		

Modular system		Page			Page
EC motor	№ of stages [opt.]		**Compact drive**	№ of stages [opt.]	
IDX 70 S	1–2	252	IDX 70 S	1–2	356
IDX 70 M	1–2	253	IDX 70 M	1–2	357

[1]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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For your personal notes

maxon planetary gearhead

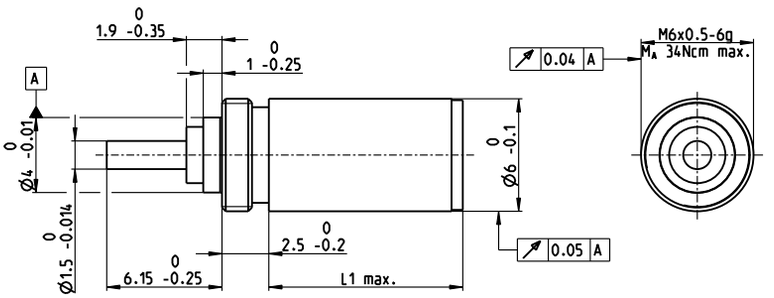
Standard specification no. 102		91
Terminology explanations		368
GP 6 A ∅6 mm, 0.002–0.03 Nm		412
GP 8 A ∅8 mm, 0.01–0.1 Nm		413
GP 10 A ∅10 mm, 0.01–0.15 Nm		414
GP 13 A ∅13 mm, 0.2–0.35 Nm		415
GP 16 A ∅16 mm, 0.1–0.3 Nm		416
GP 16 C ∅16 mm, 0.2–0.6 Nm		417
GP 19 B ∅19 mm, 0.1–0.3 Nm		418
GP 22 B ∅22 mm, 0.1–0.3 Nm		419
GP 22 A ∅22 mm, 0.5–1.0 Nm		420
GP 22 C ∅22 mm, 0.5–2.0 Nm		421–422
GP 22 HP ∅22 mm, 2.0–3.4 Nm		423
GP 22 HD ∅22 mm, 2.0–4.0 Nm		424
GP 26 A ∅26 mm, 0.75–4.5 Nm		425
GP 32 BZ ∅32 mm, 0.75–4.5 Nm		426
GP 32 A ∅32 mm, 0.75–4.5 Nm		427–428
GP 32 C ∅32 mm, 1.0–6.0 Nm		429–431
GP 32 HP ∅32 mm, 4.0–8.0 Nm		432–433
GP 32 HD ∅32 mm, 3.0–8.0 Nm		434
Koaxdrive KD 32 ∅32 mm, 1.0–4.5 Nm		435
GP 42 A ∅42 mm, 2.25–11.3 Nm	NEW	436–438
GP 42 C ∅42 mm, 3.0–15.0 Nm		439–441
GP 42 HD ∅42 mm, 10.0–50.0 Nm		442
GP 52 C ∅52 mm, 4.0–30.0 Nm		443–444
GP 62 A ∅62 mm, 6.2–38.5 Nm		445
GP 81 A ∅81 mm, 15.4–92.3 Nm		446



Precision planetary gearheads matched to maxon motors. Gears are advantageously adapted directly to the desired motors in the delivery plant. The motor pinion is the input gearwheel for the first stage and is rigidly affixed to the motor shaft.

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Planetary Gearhead GP 6 A ∅6 mm, 0.002–0.03 Nm

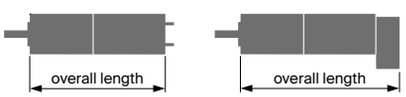


M 5:2

Technical data						
Planetary Gearhead						straight teeth
Output shaft						stainless steel
Bearing at output						ball bearing
Option						sleeve bearing
Radial play, 5 mm from flange						max. 0.12 mm
Axial play						max. 0.10 mm
Max. axial load (dynamic)						5 N
Max. force for press fits						10 N
Direction of rotation, drive to output						=
Max. continuous input speed						40 000 rpm
Recommended temperature range						-40...+100°C
Number of stages	1	2	3	4	5	
Max. radial load, 5 mm from flange	5 N	6 N	7 N	8 N	8 N	

Stock program
Standard program
Special program (on request)

Part numbers	472919	472920	472921	472229	472922
Gearhead data					
1 Reduction	3.9:1	15:1	57:1	221:1	854:1
2 Absolute reduction	27/7	729/49	19683/343	531441/2401	14348907/16807
3 Max. motor shaft diameter mm	1	1	1	1	1
4 Number of stages	1	2	3	4	5
5 Max. continuous torque Nm	0.002	0.005	0.010	0.030	0.030
6 Max. intermittent torque at gear output Nm	0.005	0.010	0.020	0.060	0.060
7 Max. efficiency %	88	77	68	60	52
8 Weight g	1.7	2.1	2.5	2.9	3.3
9 Average backlash no load °	1.8	2.0	2.2	2.5	2.8
10 Mass inertia gcm²	0.001	0.001	0.001	0.001	0.001
11 Gearhead length L1 mm	5.3	7.8	10.4	13.0	15.6

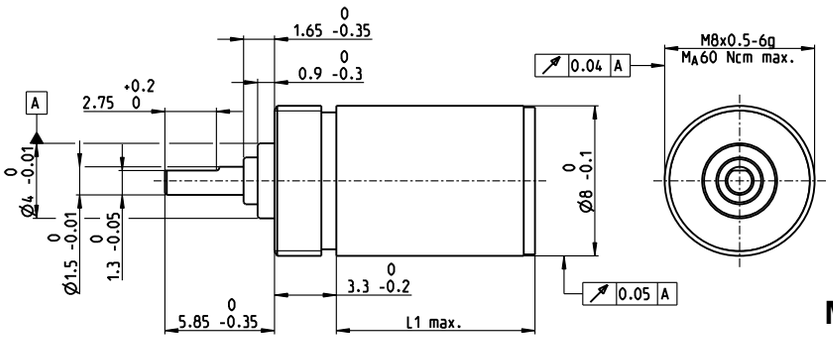


Modular system

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts				
RE 6, 0.3 W, A	129			21.0	23.5	26.1	28.7	31.3
RE 6, 0.3 W, B	129			25.0	27.5	30.1	32.7	35.3

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Planetary Gearhead GP 8 A ∅8 mm, 0.01–0.1 Nm



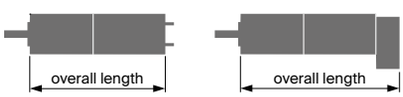
M 5:2

Technical data	
Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	ball bearing
Radial play, 5 mm from flange	max. 0.08 mm
Axial play	max. 0.08 mm
Max. axial load (dynamic)	5 N
Max. force for press fits	10 N
Direction of rotation, drive to output	=
Max. continuous input speed	12 000 rpm
Recommended temperature range	-15...+80°C

Number of stages	1	2	3	4	5
Max. radial load, 5 mm from flange	5 N	6 N	7 N	8 N	8 N

Stock program
Standard program
Special program (on request)

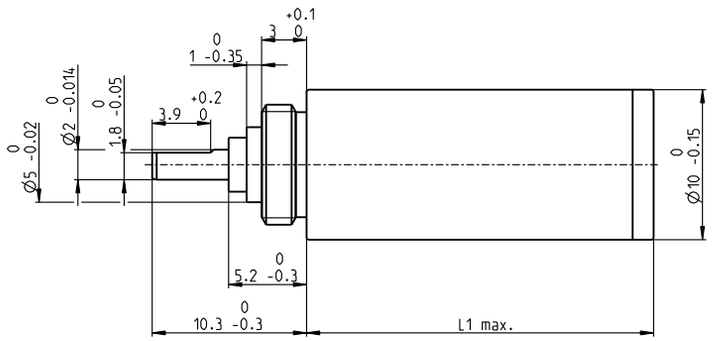
Part numbers	468999	468998	474124	468997	474127	468996	474129	468995
Gearhead data								
1 Reduction	4:1	16:1	36:1	64:1	216:1	256:1	1296:1	1024:1
2 Absolute reduction	4	16	36	64	216	256	1296	1024
3 Max. motor shaft diameter mm	1	1	0.65	1	0.65	1	0.65	1
4 Number of stages	1	2	2	3	3	4	4	5
5 Max. continuous torque Nm	0.01	0.020	0.008	0.060	0.020	0.080	0.040	0.100
6 Max. intermittent torque at gear output Nm	0.015	0.030	0.012	0.090	0.030	0.120	0.060	0.150
7 Max. efficiency %	90	81	76	73	66	65	57	59
8 Weight g	2.6	3.2	3.2	3.8	3.8	4.4	4.4	5.0
9 Average backlash no load °	1.80	2.0	2.4	2.2	2.6	2.50	2.8	2.80
10 Mass inertia gcm²	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
11 Gearhead length L1 mm	5.5	8.1	8.3	10.7	11.1	13.3	13.9	15.9



Modular system				Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts							
+ Motor	Page	**+ Sensor/Brake**	Page								
RE 8, 0.5 W, A	130			22.2	24.8	25.0	27.4	27.8	30.0	30.6	32.6
RE 8, 0.5 W, B	130			25.2	27.8	28.0	30.4	30.8	33.0	33.6	35.6
RE 8, 0.5 W, A	130	ENX 8 IMR	499	28.8	31.4	31.6	34.0	34.4	36.6	37.2	39.2
RE 8, 0.5 W, A	130	8 OPT	534	30.4	33.0	33.2	35.6	36.0	38.2	38.8	40.8

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Planetary Gearhead GP 10 A ∅10 mm, 0.01–0.15 Nm

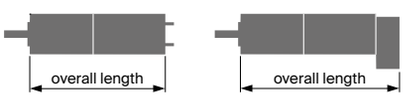


M 2:1

Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel				
Bearing at output	preloaded ball bearings				
Radial play, 5 mm from flange	max. 0.08 mm				
Axial play at axial load	< 2 N	0 mm			
	> 2 N	max. 0.04 mm			
Max. axial load (dynamic)	5 N				
Max. force for press fits	10 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	12 000 rpm				
Recommended temperature range	-40...+80°C				
Number of stages	1	2	3	4	5
Max. radial load, 5 mm from flange	5 N	10 N	15 N	20 N	25 N

Stock program
Standard program
Special program (on request)

Part numbers	218415	218416	218417	218418	218419
Gearhead data					
1 Reduction	4:1	16:1	64:1	256:1	1024:1
2 Absolute reduction	4	16	64	256	1024
3 Max. motor shaft diameter mm	1.2	1.2	1.2	1.2	1.2
4 Number of stages	1	2	3	4	5
5 Max. continuous torque Nm	0.010	0.030	0.100	0.150	0.150
6 Max. intermittent torque at gear output Nm	0.020	0.050	0.150	0.200	0.200
7 Max. efficiency %	90	81	73	65	59
8 Weight g	6.7	7.2	7.7	8.2	8.7
9 Average backlash no load °	1.5	1.8	2.0	2.2	2.5
10 Mass inertia gcm²	0.005	0.005	0.005	0.005	0.005
11 Gearhead length L1 mm	10.4	14.1	17.2	20.4	23.5

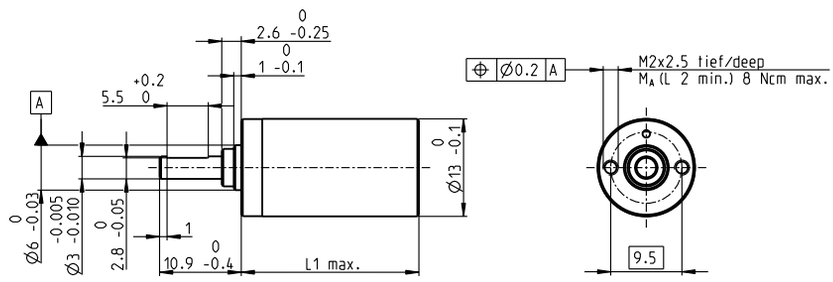


Modular system

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts				
RE 10, 0.75 W	131/132			27.5	31.2	34.3	37.5	40.6
RE 10, 0.75 W	132	ENX 10 GAMA	497	35.6	39.3	42.4	45.6	48.7
RE 10, 0.75 W	132	ENX 10 IMR	500	33.3	37.0	40.1	43.3	46.4
RE 10, 0.75 W	132	MR	532	33.3	37.0	40.1	43.3	46.4
RE 10, 1.5 W	133/134			35.1	38.8	41.9	45.1	48.2
RE 10, 1.5 W	134	ENX 10 GAMA	497	43.2	46.9	50.0	53.2	56.3
RE 10, 1.5 W	134	ENX 10 IMR	500	40.9	44.6	47.7	50.9	54.0
RE 10, 1.5 W	134	MR	532	40.9	44.6	47.7	50.9	54.0
A-max 12	169/170			31.7	35.4	38.5	41.7	44.8
EC 9.2 flat, 0.5 W	319			23.0	26.7	29.8	33.0	36.1

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Planetary Gearhead GP 13 A ∅13 mm, 0.2–0.35 Nm



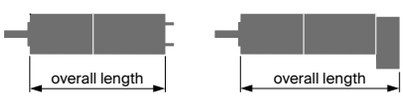
M 1:1

Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel, hardened				
Bearing at output	sleeve bearing				
Radial play, 6 mm from flange	max. 0.055 mm				
Axial play	0.02–0.10 mm				
Max. axial load (dynamic)	8 N				
Max. force for press fits	100 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	8000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 6 mm from flange	8 N	12 N	16 N	20 N	20 N

Stock program
Standard program
Special program (on request)

Part numbers	110313	110314	110315	110316	110317
Gearhead data					
1 Reduction	4.1:1	17:1	67:1	275:1	1119:1
2 Absolute reduction	57/14	3249/196	185193/2744	10556001/38416	60169205 7/537824
3 Max. motor shaft diameter mm	1.5	1.5	1.5	1.5	1.5
Part numbers	352365	352366	352367	352368	352369
1 Reduction	5.1:1	26:1	131:1	664:1	3373:1
2 Absolute reduction	66/13	4356/169	287496/2197	18974736/28561	1252332576/371293
3 Max. motor shaft diameter mm	1.5	1.5	1.5	1.5	1.5
4 Number of stages	1	2	3	4	5
5 Max. continuous torque Nm	0.20	0.20	0.30	0.30	0.35
6 Max. intermittent torque at gear output Nm	0.30	0.30	0.45	0.45	0.53
7 Max. efficiency %	91	83	75	69	62
8 Weight g	11	14	17	20	23
9 Average backlash no load °	1.0	1.2	1.5	1.8	2.0
10 Mass inertia gcm²	0.025	0.015	0.015	0.015	0.015
11 Gearhead length L1* mm	16.0	19.9	23.7	27.6	31.4

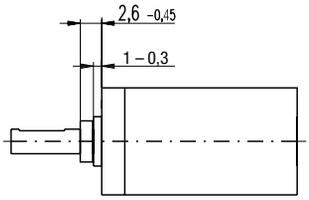
* for A-max 12 is L1 + 0.3 mm



Modular system

+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts				
RE 13	136/138			35.4	39.3	43.1	47.0	50.8
RE 13, 0.75 W	136	ENX 13 GAMA	498	43.2	47.1	50.9	54.8	58.6
RE 13, 0.75 W	136	ENX 13 IMR	501	42.5	46.4	50.2	54.1	57.9
RE 13, 0.75 W	136	MR	532	42.5	46.4	50.2	54.1	57.9
RE 13	140/142			47.6	51.5	55.3	59.2	63.0
RE 13, 2 W	140	ENX 13 GAMA	498	55.4	59.3	63.1	67.0	70.8
RE 13, 2 W	140	ENX 13 IMR	501	54.7	58.6	62.4	66.3	70.1
RE 13, 2 W	140	MR	532	54.7	58.6	62.4	66.3	70.1
RE 13, 1.5 W	144/146			38.5	42.4	46.2	50.1	53.9
RE 13, 1.5 W	146	ENX 13 GAMA	498	46.5	50.4	54.2	58.1	61.9
RE 13, 1.5 W	146	ENX 13 IMR	501	44.6	48.5	52.3	56.2	60.0
RE 13, 1.5 W	146	MR	532	44.6	48.5	52.3	56.2	60.0
RE 13, 3 W	148/150			50.7	54.6	58.4	62.3	66.1
RE 13, 3 W	150	ENX 13 GAMA	498	58.7	62.6	66.4	70.3	74.1
RE 13, 3 W	150	ENX 13 IMR	501	56.8	60.7	64.5	68.4	72.2
RE 13, 3 W	150	MR	532	56.8	60.7	64.5	68.4	72.2
A-max 12	169–170			37.6	41.5	45.3	49.2	53.0
A-max 12, 0.5 W	170	MR	532	41.7	45.6	49.4	53.3	57.1

Option ball bearing



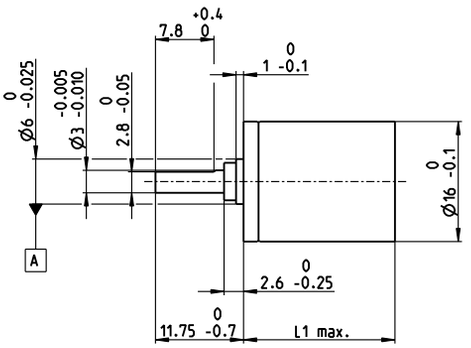
Gearhead length: L1 + 0.2 mm

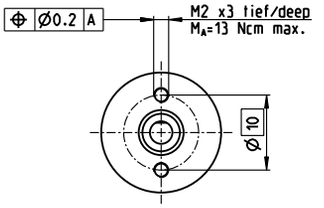
Part numbers			
4.1:1	144300	131:1	352393
5.1:1	352391	275:1	144303
17:1	144301	664:1	352394
26:1	352392	1119:1	144304
67:1	144302	3373:1	352395

Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel, hardened				
Bearing at output	preloaded ball bearings				
Radial play, 6 mm from flange	max. 0.04 mm				
Axial play at axial load	< 5 N	0 mm			
	> 5 N	max. 0.04 mm			
Max. axial load (dynamic)	8 N				
Max. force for press fits	25 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	8000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 6 mm from flange	10 N	15 N	20 N	25 N	25 N
Gearhead values according to sleeve bearing version					

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Planetary Gearhead GP 16 A ∅16 mm, 0.1–0.3 Nm



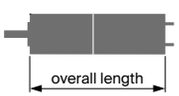


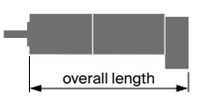
M 1:1

Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel, hardened				
Bearing at output	sleeve bearing				
Radial play, 6 mm from flange	max. 0.06 mm				
Axial play	0.02–0.10 mm				
Max. axial load (dynamic)	8 N				
Max. force for press fits	100 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	8000 rpm				
Recommended temperature range	-30...+100°C				
Extended range as option	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 6 mm from flange	8 N	12 N	16 N	20 N	20 N

Stock program
Standard program
Special program (on request)

Part numbers	110321	110322	110323	118186	110324	134782	110325	134785
Gearhead data								
1 Reduction	4.4:1	19:1	84:1	157:1	370:1	690:1	1621:1	3027:1
2 Absolute reduction	57/13	3249/169	185193/2197	19683/125	10556001/28561	1121931/1625	601692057/371293	63950067/21125
3 Max. motor shaft diameter mm	2	2	2	1.5	2	2	2	2
Part numbers	118184	134777	134778		134780	118187	134783	134786
1 Reduction	5.4:1	24:1	104:1		455:1	850:1	1996:1	3728:1
2 Absolute reduction	27/5	1539/65	87723/845		5000211/10985	531441/625	285012027/142805	30292137/8125
3 Max. motor shaft diameter mm	1.5	2	2		2	1.5	2	2
Part numbers		118185	134779		134781		134784	118188
1 Reduction		29:1	128:1		561:1		2458:1	4592:1
2 Absolute reduction		729/25	41553/325		236852/4225		135005697/54925	14348907/3125
3 Max. motor shaft diameter mm		1.5	2		2		2	1.5
4 Number of stages	1	2	3	3	4	4	5	5
5 Max. continuous torque Nm	0.10	0.15	0.20	0.20	0.25	0.25	0.30	0.30
6 Max. intermittent torque at gear output Nm	0.150	0.225	0.300	0.300	0.375	0.375	0.450	0.450
7 Max. efficiency %	90	81	73	73	65	65	59	59
8 Weight g	20	23	27	27	31	31	35	35
9 Average backlash no load °	1.4	1.6	2.0	2.0	2.4	2.4	3.0	3.0
10 Mass inertia gcm²	0.07	0.05	0.05	0.04	0.05	0.05	0.05	0.05
11 Gearhead length L1 mm	15.5	19.1	22.7	22.7	26.3	26.3	29.9	29.9

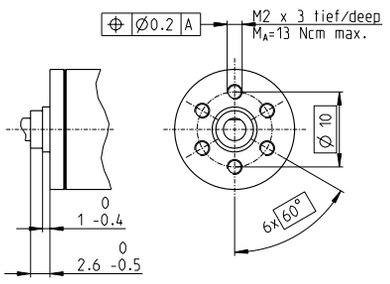




Modular system

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts							
RE 16, 2 W	151			37.9	41.5	45.1	45.1	48.7	48.7	52.3	52.3
RE 16, 2 W	151	ENX 16 IMR	502	43.6	47.2	50.8	50.8	54.4	54.4	58.0	58.0
RE 16, 2 W	151	MR	533	43.6	47.2	50.8	50.8	54.4	54.4	58.0	58.0
RE 16, 3.2 W	152/153			56.0	59.6	63.2	63.2	66.8	66.8	70.4	70.4
RE 16, 3.2 W	153	ENX 13 GAMA	498	62.1	65.7	69.3	69.3	72.9	72.9	76.5	76.5
RE 16, 3.2 W	153	ENX 16 IMR	502	61.0	64.6	68.2	68.2	71.8	71.8	75.4	75.4
RE 16, 3.2 W	153	MR	533	61.0	64.6	68.2	68.2	71.8	71.8	75.4	75.4
RE 16, 4.5 W	154/155			59.0	62.6	66.2	66.2	69.8	69.8	73.4	73.4
RE 16, 4.5 W	155	ENX 13 GAMA	498	65.2	68.8	72.4	72.4	76.0	76.0	79.6	79.6
RE 16, 4.5 W	155	ENX 16 IMR	502	64.0	67.6	71.2	71.2	74.8	74.8	78.4	78.4
RE 16, 4.5 W	155	MR	533	64.0	67.6	71.2	71.2	74.8	74.8	78.4	78.4
A-max 16	171–174			41.0	44.6	48.2	48.2	51.8	51.8	55.4	55.4
A-max 16	172/174	ENX 13 GAMA	498	49.1	52.7	56.3	56.3	59.9	59.9	63.5	63.5
A-max 16	172/174	ENX 16 IMR	502	46.0	49.6	53.2	53.2	56.8	56.8	60.4	60.4
A-max 16	172/174	MR	533	46.0	49.6	53.2	53.2	56.8	56.8	60.4	60.4
EC-max 16, 5 W	279			39.6	43.2	46.8	46.8	50.4	50.4	54.0	54.0
EC-max 16, 5 W	279	16 EASY/XT/Abs.	509–511	49.8	53.4	57.0	57.0	60.6	60.6	64.2	64.2
EC-max 16, 5 W	279	16 EASY Abs. XT	512	50.3	53.9	57.5	57.5	61.1	61.1	64.7	64.7
EC-max 16, 2-wire	279			49.1	52.7	56.3	56.3	59.9	59.9	63.5	63.5
EC-max 16, 8 W	281			51.6	55.2	58.8	58.8	62.4	62.4	66.0	66.0
EC-max 16, 8 W	281	16 EASY/XT/Abs.	509–511	61.8	65.4	69.0	69.0	72.6	72.6	76.2	76.2
EC-max 16, 8 W	281	16 EASY Abs. XT	512	62.3	65.9	69.5	69.5	73.1	73.1	76.7	76.7

Option ball bearing



Part numbers			
4.4:1	138333	455:1	138343
5.4:1	138334	561:1	138344
19:1	138335	690:1	138345
24:1	138336	850:1	138346
29:1	138337	1621:1	138347
84:1	138338	1996:1	138348
104:1	138339	2458:1	138349
128:1	138340	3027:1	138350
157:1	138341	3728:1	138351
370:1	138342	4592:1	138352

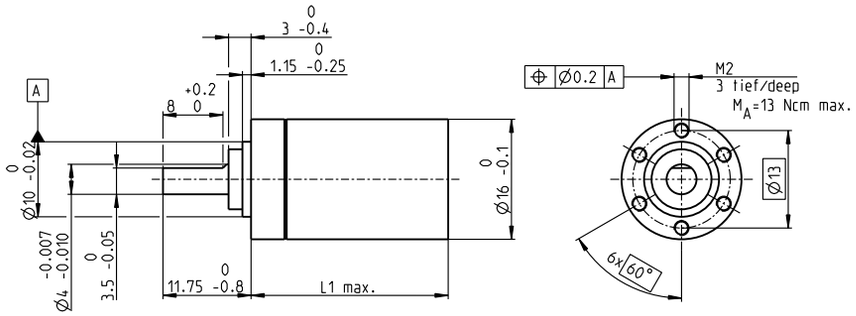
Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel, hardened				
Bearing at output	preloaded ball bearings				
Radial play, 6 mm from flange	max. 0.08 mm				
Axial play at axial load	< 4 N	0 mm			
	> 4 N	max. 0.05 mm			
Max. axial load (dynamic)	8 N				
Max. force for press fits	25 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	8000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 6 mm from flange	10 N	15 N	20 N	20 N	20 N

Gearhead values according to sleeve bearing version

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Planetary Gearhead GP 16 C ∅16 mm, 0.2–0.6 Nm

Ceramic Version

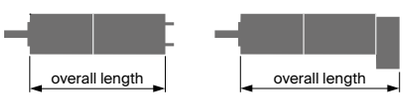


M 1:1

Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel, hardened				
Bearing at output	preloaded ball bearings				
Radial play, 6 mm from flange	max. 0.08 mm				
Axial play at axial load	< 4 N	0 mm			
	> 4 N	max. 0.05 mm			
Max. axial load (dynamic)	12 N				
Max. force for press fits	100 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	12 000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 6 mm from flange	20 N	40 N	60 N	80 N	80 N

Stock program
Standard program
Special program (on request)

Part numbers	416328	407883	416391	401954	328699	416028	416188	414453
Gearhead data								
1 Reduction	4.4:1	19:1	84:1	157:1	370:1	690:1	1621:1	3027:1
2 Absolute reduction	57/13	3249/169	185193/2197	19683/125	10556001/28561	1121931/1625	601692057/371293	63950067/21125
3 Max. motor shaft diameter mm	2	2	2	1.5	2	1.5	2	2
Part numbers	416500	416499	416385		416115	415807	415893	415476
1 Reduction	5.4:1	24:1	104:1		455:1	850:1	1996:1	3728:1
2 Absolute reduction	27/5	1539/65	87723/845		5000211/10985	53144 1/625	285012027/142805	30292137/8125
3 Max. motor shaft diameter mm	1.5	1.5	2		2	1.5	2	1.5
Part numbers		416428	402672		416097		415786	409316
1 Reduction		29:1	128:1		561:1		2458:1	4592:1
2 Absolute reduction		729/25	41553/325		2368521/4225		135005697/54925	14348907/3125
3 Max. motor shaft diameter mm		1.5	1.5		2		2	1.5
4 Number of stages	1	2	3	3	4	4	5	5
5 Max. continuous torque Nm	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6
6 Max. intermittent torque at gear output Nm	0.3	0.45	0.6	0.6	0.75	0.75	0.9	0.9
7 Max. efficiency %	90	81	73	73	65	65	59	59
8 Weight g	22	25	29	29	33	33	37	37
9 Average backlash no load °	1.4	1.6	2	2	2.4	2.4	3	3
10 Mass inertia gcm²	0.07	0.05	0.05	0.04	0.05	0.04	0.05	0.05
11 Gearhead length L1 mm	18.1	23.2	26.8	26.8	30.4	30.4	33.9	33.9



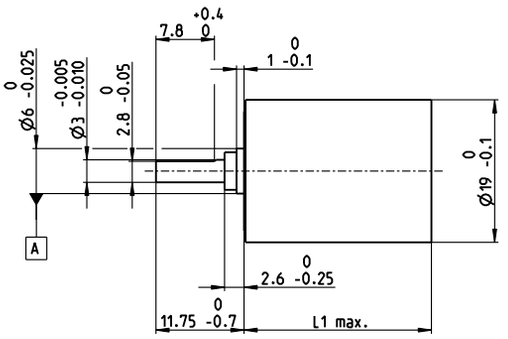
Modular system

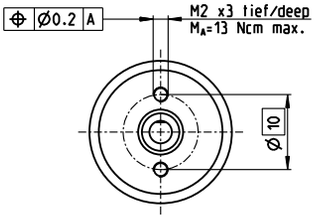
+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts							
RE 16, 2 W	151			40.5	45.6	49.2	49.2	52.8	52.8	56.3	56.3
RE 16, 2 W	151	ENX 16 IMR	502	46.2	51.3	54.9	54.9	58.5	58.5	62.0	62.0
RE 16, 2 W	151	MR	533	46.2	51.3	54.9	54.9	58.5	58.5	62.0	62.0
RE 16, 3.2 W	152/153			58.6	63.7	67.3	67.3	70.9	70.9	74.4	74.4
RE 16, 3.2 W	153	ENX 13 GAMA	498	64.7	69.8	73.4	73.4	77.0	77.0	80.5	80.5
RE 16, 3.2 W	153	ENX 16 IMR	502	63.6	68.7	72.3	72.3	75.9	75.9	79.4	79.4
RE 16, 3.2 W	153	MR	533	63.6	68.7	72.3	72.3	75.9	75.9	79.4	79.4
RE 16, 4.5 W	154/155			61.6	66.7	70.3	70.3	73.9	73.9	77.4	77.4
RE 16, 4.5 W	155	ENX 13 GAMA	498	67.8	72.9	76.5	76.5	80.1	80.1	83.6	83.6
RE 16, 4.5 W	155	ENX 16 IMR	502	66.6	71.7	75.3	75.3	78.9	78.9	82.4	82.4
RE 16, 4.5 W	155	MR	533	66.6	71.7	75.3	75.3	78.9	78.9	82.4	82.4
A-max 16	171–174			43.6	48.7	52.3	52.3	55.9	55.9	59.4	59.4
A-max 16	172/174	ENX 13 GAMA	498	67.8	72.9	76.5	76.5	80.1	80.1	83.6	83.6
A-max 16	172/174	ENX 16 IMR	502	48.6	53.7	57.3	57.3	60.9	60.9	64.4	64.4
A-max 16	172/174	MR	533	48.6	53.7	57.3	57.3	60.9	60.9	64.4	64.4
EC-max 16, 5 W	279			42.1	47.3	50.9	50.9	54.4	54.4	57.9	57.9
EC-max 16, 5 W	279	16 EASY/XT/Abs.	509–511	52.3	57.5	61.1	61.1	64.6	64.6	68.1	68.1
EC-max 16, 5 W	279	16 EASY Abs. XT	512	52.8	58.0	61.6	61.6	65.1	65.1	68.6	68.6
EC-max 16, 8 W	281			54.1	59.3	62.9	62.9	66.4	66.4	69.9	69.9
EC-max 16, 8 W	281	16 EASY/XT/Abs.	509–511	64.3	69.5	73.1	73.1	76.6	76.6	80.1	80.1
EC-max 16, 8 W	281	16 EASY Abs. XT	512	64.8	70.0	73.6	73.6	77.1	77.1	80.6	80.6

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Planetary Gearhead GP 19 B ∅19 mm, 0.1–0.3 Nm

gear





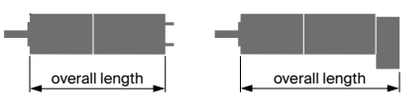
M 1:1

Technical data	
Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6 mm from flange	max. 0.08 mm
Axial play	0.02–0.12 mm
Max. axial load (dynamic)	8 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-30...+100°C
Extended range as option	-40...+100°C

Number of stages	1	2	3	4	5
Max. radial load, 6 mm from flange	8 N	12 N	16 N	20 N	20 N

Stock program
Standard program
Special program (on request)

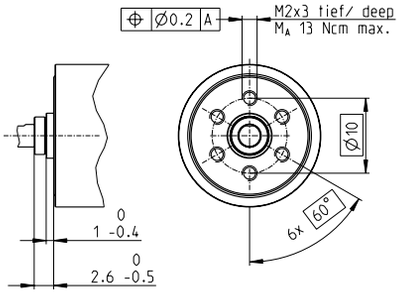
Part numbers	149039	149041	149044	149047	149048	149051	149053	149056
Gearhead data								
1 Reduction	4.4:1	19:1	84:1	157:1	370:1	690:1	1621:1	3027:1
2 Absolute reduction	57/13	3249/169	185193/2197	19683/125	10556001/28561	1121931/1625	601692057/371293	63950067/21125
3 Max. motor shaft diameter mm	2	2	2	1.5	2	2	2	2
Part numbers	149040	149042	149045		149049	149052	149054	149057
1 Reduction	5.4:1	24:1	104:1		455:1	850:1	1996:1	3728:1
2 Absolute reduction	27/5	1539/65	87723/845		5000211/10985	531441/625	285012027/142805	30292137/8125
3 Max. motor shaft diameter mm	1.5	2	2		2	1.5	2	2
Part numbers		149043	149046		149050		149055	149058
1 Reduction		29:1	128:1		561:1		2458:1	4592:1
2 Absolute reduction		729/25	41553/325		236852/4225		135005697/54925	14348907/3125
3 Max. motor shaft diameter mm		1.5	2		2		2	1.5
4 Number of stages	1	2	3	3	4	4	5	5
5 Max. continuous torque Nm	0.10	0.15	0.20	0.20	0.25	0.25	0.30	0.30
6 Max. intermittent torque at gear output Nm	0.150	0.225	0.300	0.300	0.375	0.375	0.450	0.450
7 Max. efficiency %	90	81	73	73	65	65	59	59
8 Weight g	26	31	36	36	41	41	46	46
9 Average backlash no load °	1.4	1.6	2.0	2.0	2.4	2.4	3.0	3.0
10 Mass inertia gcm²	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11 Gearhead length L1 mm	15.9	19.5	23.1	23.1	26.7	26.7	30.3	30.3



Modular system

+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts							
A-max 19	175–176			44.9	48.5	52.1	52.1	55.7	55.7	59.3	59.3
A-max 19, 1.5 W	176	ENX 13 GAMA	498	52.4	56.0	59.6	59.6	63.2	63.2	66.8	66.8
A-max 19, 1.5 W	176	ENX 19 IMR	503	50.0	53.6	57.2	57.2	60.8	60.8	64.4	64.4
A-max 19, 1.5 W	176	MR	533	50.0	53.6	57.2	57.2	60.8	60.8	64.4	64.4
A-max 19, 2.5 W	177–178			47.5	51.1	54.7	54.7	58.3	58.3	61.9	61.9
A-max 19, 2.5 W	178	ENX 13 GAMA	498	55.0	58.6	62.2	62.2	65.8	65.8	69.4	69.4
A-max 19, 2.5 W	178	ENX 19 IMR	503	51.8	55.4	59.0	59.0	62.6	62.6	66.2	66.2
A-max 19, 2.5 W	178	MR	533	51.8	55.4	59.0	59.0	62.6	62.6	66.2	66.2

Option ball bearing

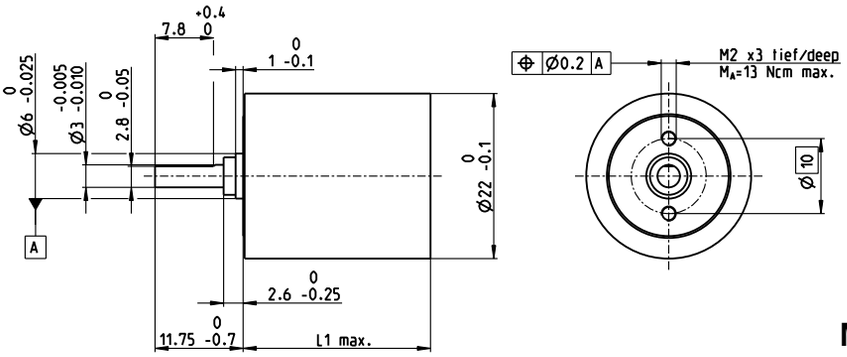


Part numbers			
4.4 : 1	227632	455 : 1	227642
5.4 : 1	227633	561 : 1	227643
19 : 1	227634	690 : 1	227644
24 : 1	227635	850 : 1	227645
29 : 1	227636	1621 : 1	227646
84 : 1	227637	1996 : 1	227647
104 : 1	227638	2458 : 1	227648
128 : 1	227639	3027 : 1	227649
157 : 1	227640	3728 : 1	227650
370 : 1	227641	4592 : 1	227651

Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel, hardened				
Bearing at output	preloaded ball bearings				
Radial play, 6 mm from flange	max. 0.08 mm				
Axial play at axial load	< 4 N	0 mm			
	> 4 N	max. 0.05 mm			
Max. axial load (dynamic)	8 N				
Max. force for press fits	25 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	8000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 6 mm from flange	10 N	15 N	20 N	20 N	20 N
Gearhead values according to sleeve bearing version					

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Planetary Gearhead GP 22 B ∅22 mm, 0.1–0.3 Nm

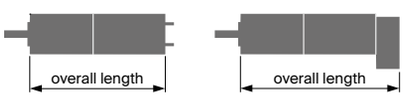


M 1:1

Technical data					
Planetary Gearhead	straight teeth				
Housing	steel				
Output shaft	stainless steel, hardened				
Bearing at output	sleeve bearing				
Radial play, 6 mm from flange	max. 0.06 mm				
Axial play	0.02–0.10 mm				
Max. axial load (dynamic)	8 N				
Max. force for press fits	100 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	8000 rpm				
Recommended temperature range	-30...+100°C				
Extended range as option	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 6 mm from flange	8 N	12 N	16 N	20 N	20 N

Stock program
Standard program
Special program (on request)

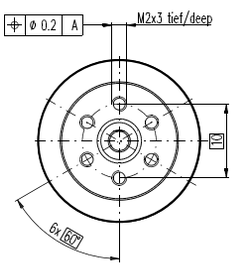
Part numbers	110355	110356	110357	118653	110358	134772	110359	134775
Gearhead data								
1 Reduction	4.4:1	19:1	84:1	157:1	370:1	690:1	1621:1	3027:1
2 Absolute reduction	57/13	3249/169	185193/2197	19683/125	10556001/28561	1121931/1625	601692057/371293	63950067/21125
3 Max. motor shaft diameter mm	2	2	2	1.5	2	2	2	2
Part numbers	118651	134767	134768		134770	118654	134773	134776
1 Reduction	5.4:1	24:1	104:1		455:1	850:1	1996:1	3728:1
2 Absolute reduction	27/5	1539/65	87723/845		5000211/10985	53144 1/625	285012027/142805	30292137/8125
3 Max. motor shaft diameter mm	1.5	2	2		2	1.5	2	2
Part numbers		118652	134769		134771		134774	118655
1 Reduction		29:1	128:1		561:1		2458:1	4592:1
2 Absolute reduction		729/25	41553/325		2368521/4225		135005697/54925	14348907/3125
3 Max. motor shaft diameter mm		1.5	2		2		2	1.5
4 Number of stages	1	2	3	3	4	4	5	5
5 Max. continuous torque Nm	0.10	0.15	0.20	0.20	0.25	0.25	0.30	0.30
6 Max. intermittent torque at gear output Nm	0.150	0.225	0.300	0.300	0.375	0.375	0.450	0.450
7 Max. efficiency %	90	81	73	73	65	65	59	59
8 Weight g	39	48	57	57	65	65	73	73
9 Average backlash no load °	1.4	1.6	2.0	2.0	2.4	2.4	3.0	3.0
10 Mass inertia gcm²	0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11 Gearhead length L1 mm	15.9	19.5	23.1	23.1	26.7	26.7	30.3	30.3



Modular system

+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts							
A-max 22	179–181			47.9	51.5	55.1	55.1	58.7	58.7	62.3	62.3
A-max 22	179–181	ENX 13 GAMA	498	55.0	58.6	62.2	62.2	65.8	65.8	69.4	69.4
A-max 22	179–181	ENX 22 IMR	504	52.9	56.5	60.1	60.1	63.7	63.7	67.3	67.3
A-max 22	179–181	MR	533	52.9	56.5	60.1	60.1	63.7	63.7	67.3	67.3

Option ball bearing

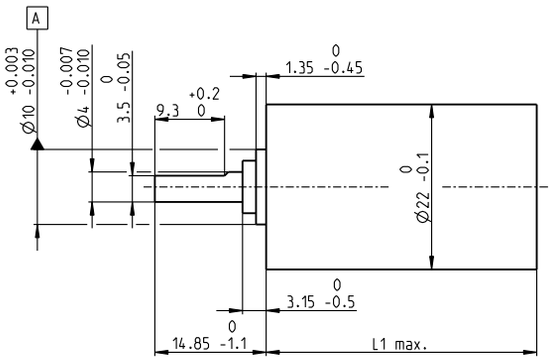


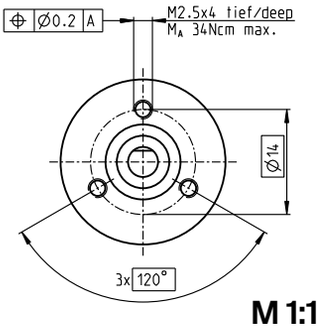
Part numbers			
4.4 : 1	144137	455 : 1	144147
5.4 : 1	144138	561 : 1	144148
19 : 1	144139	690 : 1	144149
24 : 1	144140	850 : 1	144150
29 : 1	144141	1621 : 1	144151
84 : 1	144142	1996 : 1	144152
104 : 1	144143	2458 : 1	144153
128 : 1	144144	3027 : 1	144154
157 : 1	144145	3728 : 1	144155
370 : 1	144146	4592 : 1	144156

Technical data					
Planetary Gearhead	straight teeth				
Housing	steel				
Output shaft	stainless steel, hardened				
Bearing at output	preloaded ball bearings				
Radial play, 6 mm from flange	max. 0.08 mm				
Axial play at axial load	< 4 N	0 mm			
	> 4 N	max. 0.05 mm			
Max. axial load (dynamic)	8 N				
Max. force for press fits	25 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	8000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 6 mm from flange	10 N	15 N	20 N	20 N	20 N
Gearhead values according to sleeve bearing version					

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Planetary Gearhead GP 22 A ∅22 mm, 0.5–1.0 Nm





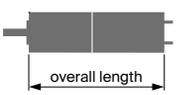
M 1:1

Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel, hardened				
Bearing at output	ball bearing				
Option	sleeve bearing				
Radial play, 10 mm from flange	max. 0.2 mm				
Axial play	max. 0.2 mm				
Max. axial load (dynamic)	100 N				
Max. force for press fits	100 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	6000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 10 mm from flange	30 N	50 N	55 N	55 N	55 N

Stock program
Standard program
Special program (on request)

			Part numbers										
			134156	134158	134163	134168	134172	110340	134183	134186	134190	134195	134203
Gearhead data													
1	Reduction		3.8:1	14:1	53:1	104:1	198:1	370:1	590:1	742:1	1386:1	1996:1	3189:1
2	Absolute reduction		15/4	225/16	3375/64	87723/845	50625/256	10556001/28561	59049/100	759375/1024	158340015/114244	285012027/142805	1594323/500
3	Max. motor shaft diameter	mm	4	4	4	3.2	4	3.2	4	4	3.2	3.2	4
	Part numbers		110337	134159	134164	134169	134173	134178	134184	134187	134193	134198	134204
1	Reduction		4.4:1	16:1	62:1	109:1	231:1	389:1	690:1	867:1	1460:1	2102:1	3728:1
2	Absolute reduction		57/13	855/52	12825/208	2187/20	192375/832	263169/676	1121931/1625	2885625/3328	3947535/2704	7105563/3380	30292137/8125
3	Max. motor shaft diameter	mm	3.2	3.2	3.2	4	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	Part numbers		134157	110338	134165	134170	134174	134180	134185	134188	134196	134200	134205
1	Reduction		5.4:1	19:1	72:1	128:1	270:1	410:1	850:1	1014:1	1538:1	2214:1	4592:1
2	Absolute reduction		27/5	3249/169	48735/676	41553/325	731025/2704	656/16	53144/625	10965375/10816	98415/64	177147/80	14348907/3125
3	Max. motor shaft diameter	mm	2.5	3.2	3.2	3.2	3.2	4	2.5	3.2	4	4	2.5
	Part numbers			134160	134166	134171	134176	134179		134191	110341	134199	
1	Reduction			20:1	76:1	157:1	285:1	455:1		1068:1	1621:1	2458:1	
2	Absolute reduction			81/4	1215/16	19683/125	18225/64	5000211/10985		273375/256	60169205 7/371293	135005697/54925	
3	Max. motor shaft diameter	mm		4	4	2.5	4	3.2		4	3.2	3.2	
	Part numbers			134161	110339		134175	134181		134189	134194	134201	
1	Reduction			24:1	84:1		316:1	479:1		1185:1	1707:1	2589:1	
2	Absolute reduction			1539/65	185193/2197		2777895/8788	124659/260		41668425/35152	15000633/8788	3365793/1300	
3	Max. motor shaft diameter	mm		3.2	3.2		3.2	3.2		3.2	3.2	3.2	
	Part numbers			134162	134167		134177	134182		134192	134197	134202	
1	Reduction			29:1	89:1		333:1	561:1		1249:1	1798:1	3027:1	
2	Absolute reduction			729/25	4617/52		69255/208	236852 1/4225		1038825/832	373977/208	6395006 7/21125	
3	Max. motor shaft diameter	mm		2.5	3.2		3.2	3.2		3.2	3.2	3.2	
4	Number of stages		1	2	3	3	4	4	4	5	5	5	5
5	Max. continuous torque	Nm	0.5	0.5	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
6	Max. intermittent torque at gear output	Nm	0.8	0.8	1.2	1.2	1.6	1.6	1.6	1.6	1.6	1.6	1.6
7	Max. efficiency	%	84	70	59	59	49	49	49	42	42	42	42
8	Weight	g	42	55	68	68	81	81	81	94	94	94	94
9	Average backlash no load	°	1.0	1.2	1.6	1.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10	Mass inertia	gcm²	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11	Gearhead length L1*	mm	22.6	29.4	36.2	36.2	43.0	43.0	43.0	49.8	49.8	49.8	49.8

*for EC 32fl. L1 is + 7.1 mm





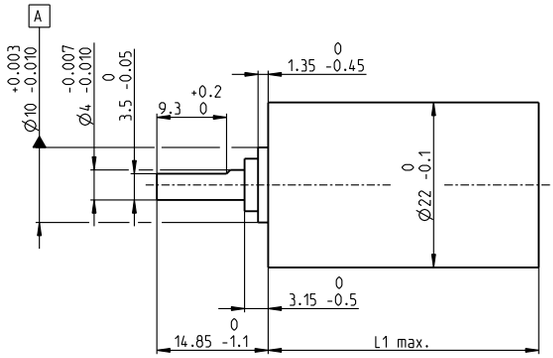
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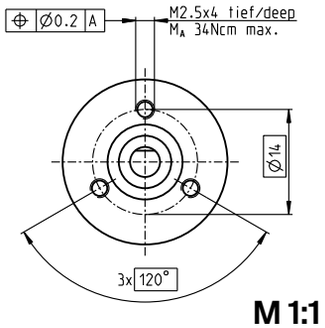
+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts										
A-max 19	175–178			51.6	58.4	65.2	65.2	72.0	72.0	72.0	78.8	78.8	78.8	78.8
A-max 19, 1.5 W	176	ENX 13 GAMA	498	59.1	65.9	72.7	72.7	79.5	79.5	79.5	86.3	86.3	86.3	86.3
A-max 19, 1.5 W	176	ENX 19 IMR	503	56.7	63.5	70.3	70.3	77.1	77.1	77.1	83.9	83.9	83.9	83.9
A-max 19, 1.5 W	176	MR	533	56.7	63.5	70.3	70.3	77.1	77.1	77.1	83.9	83.9	83.9	83.9
A-max 19, 2.5 W	178			54.2	61.0	67.8	67.8	74.6	74.6	74.6	81.4	81.4	81.4	81.4
A-max 19, 2.5 W	178	ENX 13 GAMA	498	61.7	68.5	75.3	75.3	82.1	82.1	82.1	88.9	88.9	88.9	88.9
A-max 19, 2.5 W	178	ENX 19 IMR	503	58.5	65.3	72.1	72.1	78.9	78.9	78.9	85.7	85.7	85.7	85.7
A-max 19, 2.5 W	178	MR	533	58.5	65.3	72.1	72.1	78.9	78.9	78.9	85.7	85.7	85.7	85.7
A-max 22	179–182			54.6	61.4	68.2	68.2	75.0	75.0	75.0	81.8	81.8	81.8	81.8
A-max 22	180–182	ENX 13 GAMA	498	61.7	68.5	75.3	75.3	82.1	82.1	82.1	88.9	88.9	88.9	88.9
A-max 22	180–182	ENX 22 IMR	503	59.6	66.4	73.2	73.2	80.0	80.0	80.0	86.8	86.8	86.8	86.8
A-max 22	180–182	MR	533	59.6	66.4	73.2	73.2	80.0	80.0	80.0	86.8	86.8	86.8	86.8
EC-max 22, 12 W	282			57.4	64.2	71.0	71.0	77.8	77.8	77.8	84.6	84.6	84.6	84.6
EC-max 22, 12 W	282	16 EASY/XT/Abs.	509–511	67.0	73.8	80.6	80.6	87.4	87.4	87.4	94.2	94.2	94.2	94.2
EC-max 22, 12 W	282	16 EASY Abs. XT	512	67.5	74.3	81.1	81.1	87.9	87.9	87.9	94.7	94.7	94.7	94.7
EC-max 22, 12 W	282	AB 20	584	93.0	99.8	106.6	106.6	113.4	113.4	113.4	120.2	120.2	120.2	120.2
EC-max 22, 25 W	283			73.9	80.7	87.5	87.5	94.3	94.3	94.3	101.1	101.1	101.1	101.1
EC-max 22, 25 W	283	16 EASY/XT/Abs.	509–511	83.5	90.3	97.1	97.1	103.9	103.9	103.9	110.7	110.7	110.7	110.7
EC-max 22, 25 W	283	16 EASY Abs. XT	512	84.0	90.8	97.6	97.6	104.4	104.4	104.4	111.2	111.2	111.2	111.2
EC-max 22, 25 W	283	AB 20	584	109.5	116.3	123.1	123.1	129.9	129.9	129.9	136.7	136.7	136.7	136.7

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Planetary Gearhead GP 22 C ∅22 mm, 0.5–2.0 Nm

Ceramic Version





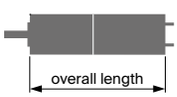
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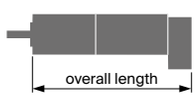
Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel, hardened				
Bearing at output	ball bearing				
Radial play, 10 mm from flange	max. 0.2 mm				
Axial play	max. 0.2 mm				
Max. axial load (dynamic)	100 N				
Max. force for press fits	100 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	8000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 10 mm from flange	30 N	50 N	55 N	55 N	55 N

Stock program
Standard program
Special program (on request)

Part numbers											
	143971	143974	143980	143986	143990	143996	144002	144004	144011	144017	144023
Gearhead data											
1 Reduction	3.8:1	14:1	53:1	104:1	198:1	370:1	590:1	742:1	1386:1	1996:1	3189:1
2 Absolute reduction	15/4	225/16	3375/64	87723/845	50625/256	10556001/28561	59049/100	759375/1024	158340015/114244	285012027/142805	1594323/500
3 Max. motor shaft diameter mm	4	4	4	3.2	4	3.2	4	4	3.2	3.2	4
Part numbers	143972	143975	143981	143987	143991	143997	144003	144006	144012	144018	144024
1 Reduction	4.4:1	16:1	62:1	109:1	231:1	389:1	690:1	867:1	1460:1	2102:1	3728:1
2 Absolute reduction	57/13	855/52	12825/208	2187/20	192375/832	263169/676	1121931/1625	2885625/3328	3947535/2704	7105563/3380	30292137/8125
3 Max. motor shaft diameter mm	3.2	3.2	3.2	4	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Part numbers	143973	143976	143982	143988	143992	143998	144005	144007	144013	144019	144025
1 Reduction	5.4:1	19:1	72:1	128:1	270:1	410:1	850:1	1014:1	1538:1	2214:1	4592:1
2 Absolute reduction	27/5	3249/169	48735/676	41553/325	731025/2704	656/16	53144/625	1096575/10816	98415/64	177147/80	14348907/3125
3 Max. motor shaft diameter mm	2.5	3.2	3.2	3.2	3.2	4	2.5	3.2	4	4	2.5
Part numbers		143977	143983	143989	143993	143999		144008	144014	144020	
1 Reduction		20:1	76:1	157:1	285:1	455:1		1068:1	1621:1	2458:1	
2 Absolute reduction		81/4	1215/16	19683/125	18225/64	5000211/10985		273375/256	601692057/371293	135005697/54925	
3 Max. motor shaft diameter mm		4	4	2.5	4	3.2		4	3.2	3.2	
Part numbers		143978	143984		143994	144000		144009	144015	144021	
1 Reduction		24:1	84:1		316:1	479:1		1185:1	1707:1	2589:1	
2 Absolute reduction		1539/65	185193/2197		2777895/8788	124659/260		41668425/35152	15000633/8788	3365793/1300	
3 Max. motor shaft diameter mm		3.2	3.2		3.2	3.2		3.2	3.2	3.2	
Part numbers		143979	143985		143995	144001		144010	144016	144022	
1 Reduction		29:1	89:1		333:1	561:1		1249:1	1798:1	3027:1	
2 Absolute reduction		729/25	4617/52		69255/208	236852/4225		1038825/832	373977/208	63950067/21125	
3 Max. motor shaft diameter mm		2.5	3.2		3.2	3.2		3.2	3.2	3.2	
4 Number of stages	1	2	3	3	4	4	4	5	5	5	5
5 Max. continuous torque Nm	0.5	0.6	1.2	1.2	1.8	1.8	1.8	2.0	2.0	2.0	2.0
6 Max. intermittent torque at gear output Nm	0.8	0.9	1.9	1.9	2.7	2.7	2.7	3.0	3.0	3.0	3.0
7 Max. efficiency %	84	70	59	59	49	49	49	42	42	42	42
8 Weight g	42	55	68	68	81	81	81	94	94	94	94
9 Average backlash no load °	1.0	1.2	1.6	1.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10 Mass inertia gcm²	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11 Gearhead length L1* mm	25.4	32.2	39.0	39.0	45.8	45.8	45.8	52.6	52.6	52.6	52.6

*L1 is–2.8 mm for calculating the overall length





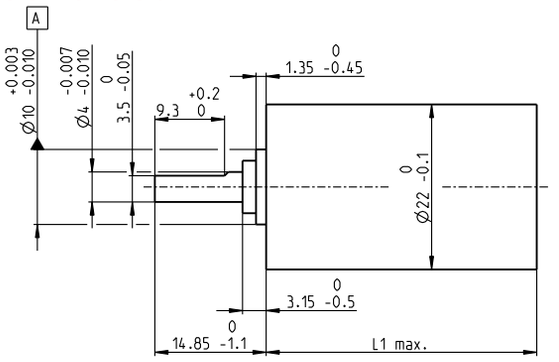
Modular system

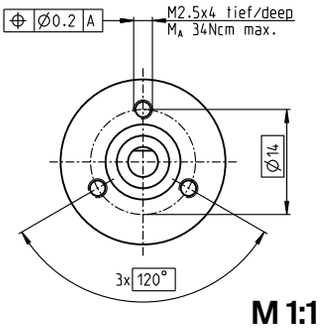
+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts										
A-max 19	175–176			51.6	58.4	65.2	65.2	72.0	72.0	72.0	78.8	78.8	78.8	78.8
A-max 19, 1.5 W	176	ENX 13 GAMA	498	59.1	65.9	72.7	72.7	79.5	79.5	79.5	86.3	86.3	86.3	86.3
A-max 19, 1.5 W	176	ENX 19 IMR	503	56.7	63.5	70.3	70.3	77.1	77.1	77.1	83.9	83.9	83.9	83.9
A-max 19, 1.5 W	176	MR	533	56.7	63.5	70.3	70.3	77.1	77.1	77.1	83.9	83.9	83.9	83.9
A-max 19, 2.5 W	177–178			54.2	61.0	67.8	67.8	74.6	74.6	74.6	81.4	81.4	81.4	81.4
A-max 19, 2.5 W	178	ENX 13 GAMA	498	61.7	68.5	75.3	75.3	82.1	82.1	82.1	88.9	88.9	88.9	88.9
A-max 19, 2.5 W	178	ENX 19 IMR	503	58.5	65.3	72.1	72.1	78.9	78.9	78.9	85.7	85.7	85.7	85.7
A-max 19, 2.5 W	178	MR	533	58.5	65.3	72.1	72.1	78.9	78.9	78.9	85.7	85.7	85.7	85.7
A-max 22	179–182			54.6	61.4	68.2	68.2	75.0	75.0	75.0	81.8	81.8	81.8	81.8
A-max 22	179–182	ENX 13 GAMA	498	61.7	68.5	75.3	75.3	82.1	82.1	82.1	88.9	88.9	88.9	88.9
A-max 22	179–182	ENX 22 IMR	504	59.6	66.4	73.2	73.2	80.0	80.0	80.0	86.8	86.8	86.8	86.8
A-max 22	179–182	MR	533	59.6	66.4	73.2	73.2	80.0	80.0	80.0	86.8	86.8	86.8	86.8

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Planetary Gearhead GP 22 C ∅22 mm, 0.5–2.0 Nm

Ceramic Version





M 1:1

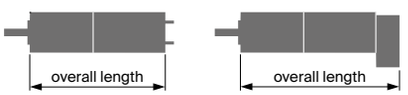
Technical data	
Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	ball bearing
Radial play, 10 mm from flange	max. 0.2 mm
Axial play	max. 0.2 mm
Max. axial load (dynamic)	100 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C

Number of stages	1	2	3	4	5
Max. radial load, 10 mm from flange	30 N	50 N	55 N	55 N	55 N

Stock program
Standard program
Special program (on request)

Part numbers	143971	143974	143980	143986	143990	143996	144002	144004	144011	144017	144023
Gearhead data											
1 Reduction	3.8:1	14:1	53:1	104:1	198:1	370:1	590:1	742:1	1386:1	1996:1	3189:1
2 Absolute reduction	15/4	225/16	3375/64	87723/845	50625/256	1055600/28561	59049/100	759375/1024	158340015/114244	285012027/142805	1594323/500
3 Max. motor shaft diameter mm	4	4	4	3.2	4	3.2	4	4	3.2	3.2	4
Part numbers	143972	143975	143981	143987	143991	143997	144003	144006	144012	144018	144024
1 Reduction	4.4:1	16:1	62:1	109:1	231:1	389:1	690:1	867:1	1460:1	2102:1	3728:1
2 Absolute reduction	57/13	855/52	12825/208	2187/20	192375/832	263169/676	1121931/1625	2885625/3328	3947535/2704	7105563/3380	30292137/8125
3 Max. motor shaft diameter mm	3.2	3.2	3.2	4	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Part numbers	143973	143976	143982	**143988**	143992	143998	144005	144007	144013	144019	144025
1 Reduction	5.4:1	19:1	72:1	128:1	270:1	410:1	850:1	1014:1	1538:1	2214:1	4592:1
2 Absolute reduction	27/5	3249/169	48735/676	41553/325	731025/2704	656/16	53144/625	1096575/10816	98415/64	177147/80	14348907/3125
3 Max. motor shaft diameter mm	2.5	3.2	3.2	3.2	3.2	4	2.5	3.2	4	4	2.5
Part numbers		143977	143983	143989	143993	143999		144008	144014	144020	
1 Reduction		20:1	76:1	157:1	285:1	455:1		1068:1	1621:1	2458:1	
2 Absolute reduction		81/4	1215/16	19683/125	18225/64	5000211/10985		273375/256	60169205 7/371293	135005697/54925	
3 Max. motor shaft diameter mm		4	4	2.5	4	3.2		4	3.2	3.2	
Part numbers		143978	**143984**		143994	144000		144009	144015	144021	
1 Reduction		24:1	84:1		316:1	479:1		1185:1	1707:1	2589:1	
2 Absolute reduction		1539/65	185193/2197		2777895/8788	124659/260		41668425/35152	15000633/8788	3365793/1300	
3 Max. motor shaft diameter mm		3.2	3.2		3.2	3.2		3.2	3.2	3.2	
Part numbers		143979	143985		143995	144001		144010	144016	144022	
1 Reduction		29:1	89:1		333:1	561:1		1249:1	1798:1	3027:1	
2 Absolute reduction		729/25	4617/52		69255/208	236852/1/4225		1038825/832	373977/208	6395006 7/21125	
3 Max. motor shaft diameter mm		2.5	3.2		3.2	3.2		3.2	3.2	3.2	
4 Number of stages	1	2	3	3	4	4	4	5	5	5	5
5 Max. continuous torque Nm	0.5	0.6	1.2	1.2	1.8	1.8	1.8	2.0	2.0	2.0	2.0
6 Max. intermittent torque at gear output Nm	0.8	0.9	1.9	1.9	2.7	2.7	2.7	3.0	3.0	3.0	3.0
7 Max. efficiency %	84	70	59	59	49	49	49	42	42	42	42
8 Weight g	42	55	68	68	81	81	81	94	94	94	94
9 Average backlash no load °	1.0	1.2	1.6	1.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10 Mass inertia gcm²	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11 Gearhead length L1* mm	25.4	32.2	39.0	39.0	45.8	45.8	45.8	52.6	52.6	52.6	52.6

*for EC-max 16 L1 is–2.8 mm



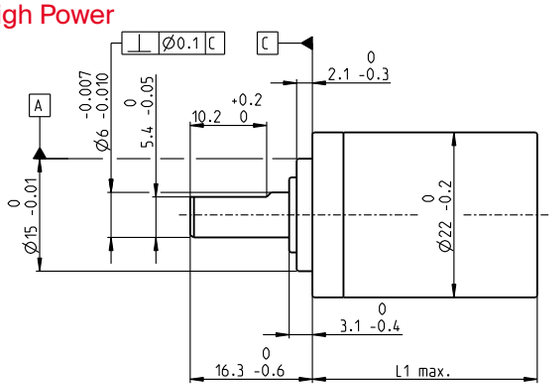
Modular system

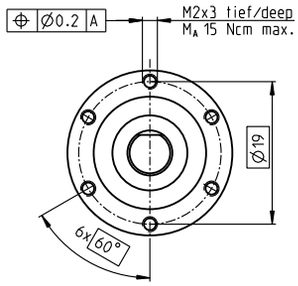
+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts										
EC-max 16, 8 W	281			58.7	65.5	72.3	72.3	79.1	79.1	79.1	85.9	85.9	85.9	85.9
EC-max 16, 8 W	281	16 EASY/XT/Abs.	509–511	68.9	75.7	82.5	82.5	89.3	89.3	89.3	96.1	96.1	96.1	96.1
EC-max 16, 8 W	281	16 EASY Abs. XT	512	69.4	76.2	83.0	83.0	89.8	89.8	89.8	96.6	96.6	96.6	96.6
EC-max 22, 12 W	282			57.5	64.3	71.1	71.1	77.9	77.9	77.9	84.7	84.7	84.7	84.7
EC-max 22, 12 W	282	16 EASY Abs. XT	512	67.6	74.4	81.2	81.2	88.0	88.0	88.0	94.8	94.8	94.8	94.8
EC-max 22, 12 W	282	AB 20	584	93.1	99.9	106.7	106.7	113.5	113.5	113.5	120.3	120.3	120.3	120.3
EC-max 22, 25 W	283			74.0	80.8	87.6	87.6	94.4	94.4	94.4	101.2	101.2	101.2	101.2
EC-max 22, 25 W	283	16 EASY/XT/Abs.	509–511	83.6	90.4	97.2	97.2	104.0	104.0	104.0	110.8	110.8	110.8	110.8
EC-max 22, 25 W	283	16 EASY Abs. XT	512	84.1	90.9	97.7	97.7	104.5	104.5	104.5	111.3	111.3	111.3	111.3
EC-max 22, 25 W	283	AB 20	584	109.6	116.4	123.2	123.2	130.0	130.0	130.0	136.8	136.8	136.8	136.8

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Planetary Gearhead GP 22 HP ∅22 mm, 2.0–3.4 Nm

High Power



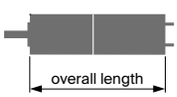


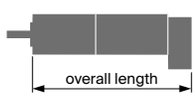
M 1:1

Technical data				
Planetary Gearhead	straight teeth			
Output shaft	stainless steel, hardened			
Bearing at output	ball bearing			
Radial play, 10 mm from flange	max. 0.2 mm			
Axial play	max. 0.1 mm			
Max. axial load (dynamic)	100 N			
Max. force for press fits	100 N			
Direction of rotation, drive to output	=			
Max. continuous input speed	12 000 rpm			
Recommended temperature range	-40...+100°C			
Number of stages	1	2	3	4
Max. radial load, 10 mm from flange	55 N	85 N	100 N	110 N

Stock program
Standard program
Special program (on request)

Gearhead data (provisional)											
Part numbers		370683	370687	370690	**370776**	370780	370783	370792	370797	370802	370807
1 Reduction		3.8:1	14:1	20:1	53:1	76:1	104:1	198:1	316:1	410:1	590:1
2 Absolute reduction		15/4	225/16	81/4	3375/64	1215/16	87723/845	50625/256	2777895/8788	6561/16	59049/100
3 Max. motor shaft diameter	mm	4	4	4	4	4	3.2	4	3.2	4	4
Part numbers		370685	370688	370691	370778	370781	370784	370794	370799	370803	370808
1 Reduction		4.4:1	16:1	24:1	62:1	84:1	109:1	231:1	333:1	455:1	690:1
2 Absolute reduction		57/13	855/52	1539/65	12825/208	185193/2197	2187/20	192375/832	69255/208	500021/10985	112193/1625
3 Max. motor shaft diameter	mm	3.2	3.2	3.2	3.2	3.2	4	3.2	3.2	3.2	3.2
Part numbers		370686	**370689**	370692	370779	370782	**370785**	370795	370800	370805	370809
1 Reduction		5.4:1	19:1	29:1	72:1	89:1	128:1	270:1	370:1	479:1	850:1
2 Absolute reduction		27/5	3249/169	729/25	48735/676	4617/52	41553/325	731025/2704	10556001/28561	124659/260	531441/625
3 Max. motor shaft diameter	mm	2.5	3.2	2.5	3.2	3.2	3.2	3.2	3.2	3.2	2.5
Part numbers							370786	370796	370801	370806	
1 Reduction							157:1	285:1	389:1	561:1	
2 Absolute reduction							19683/125	18225/64	263169/676	2368521/4225	
3 Max. motor shaft diameter	mm						2.5	4	3.2	3.2	
4 Number of stages		1	2	2	3	3	3	4	4	4	4
5 Max. continuous torque	Nm	2	2.4	2.4	3	3	3	3.4	3.4	3.4	3.4
6 Max. intermittent torque at gear output	Nm	2.5	3	3	3.5	3.5	3.5	3.8	3.8	3.8	3.8
7 Max. efficiency	%	84	70	70	59	59	59	49	49	49	49
8 Weight	g	51	64	64	78	78	78	91	91	91	91
9 Average backlash no load	°	1.0	1.2	1.2	1.6	1.6	1.6	2.0	2.0	2.0	2.0
10 Mass inertia	gcm²	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11 Gearhead length L1	mm	25.3	32.3	32.3	39.0	39.0	39.0	45.7	45.7	45.7	45.7



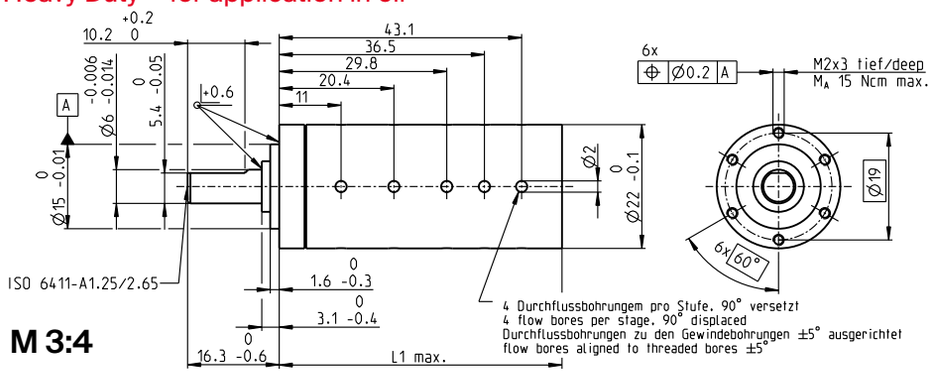


Modular system											
+ Motor	Page	**+ Sensor/Brake**	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts							
EC-max 22, 12 W	282			57.4	64.4	64.4	71.1	71.1	71.1	77.8	77.8	77.8	77.8
EC-max 22, 12 W	282	16 EASY/XT/Abs.	509–511	67.0	74.0	74.0	80.7	80.7	80.7	87.4	87.4	87.4	87.4
EC-max 22, 12 W	282	16 EASY Abs. XT	512	67.5	74.5	74.5	81.2	81.2	81.2	87.9	87.9	87.9	87.9
EC-max 22, 12 W	282	AB 20	584	93.0	100.0	100.0	106.7	106.7	106.7	113.4	113.4	113.4	113.4
EC-max 22, 25 W	283			73.9	80.9	80.9	87.6	87.6	87.6	94.3	94.3	94.3	94.3
EC-max 22, 25 W	283	16 EASY/XT/Abs.	509–511	83.5	90.5	90.5	97.2	97.2	97.2	103.9	103.9	103.9	103.9
EC-max 22, 25 W	283	16 EASY Abs. XT	512	84.0	91.0	91.0	97.7	97.7	97.7	104.4	104.4	104.4	104.4
EC-max 22, 25 W	283	AB 20	584	109.5	116.5	116.5	123.2	123.2	123.2	129.9	129.9	129.9	129.9
EC-4pole 22, 90 W	291			74.0	81.0	81.0	87.7	87.7	87.7	94.4	94.4	94.4	94.4
EC-4pole 22, 90 W	291	ENX 22 EMT	518	99.8	106.8	106.8	113.5	113.5	113.5	120.2	120.2	120.2	120.2
EC-4pole 22, 90 W	291	16 EASY/XT/Abs.	509–511	86.2	93.2	93.2	99.9	99.9	99.9	106.6	106.6	106.6	106.6
EC-4pole 22, 90 W	291	16 EASY Abs. XT	512	86.7	93.7	93.7	100.4	100.4	100.4	107.1	107.1	107.1	107.1
EC-4pole 22, 90 W	291	ENX 16 RIO	519	84.7	91.7	91.7	98.4	98.4	98.7	105.1	105.1	105.1	105.1
EC-4pole 22, 120 W	292			91.4	98.4	98.4	105.1	105.1	105.1	111.8	111.8	111.8	111.8
EC-4pole 22, 120 W	292	ENX 22 EMT	518	117.2	124.2	124.2	130.9	130.9	130.9	137.6	137.6	137.6	137.6
EC-4pole 22, 120 W	292	16 EASY/XT/Abs.	509–511	103.6	110.6	110.6	117.3	117.3	117.3	124.0	124.0	124.0	124.0
EC-4pole 22, 120 W	292	16 EASY Abs. XT	512	104.1	111.1	111.1	117.8	117.8	117.8	124.5	124.5	124.5	124.5
EC-4pole 22, 120 W	292	ENX 16 RIO	519	102.1	109.1	109.1	115.8	115.8	115.8	122.5	122.5	122.5	122.5

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Planetary Gearhead GP 22 HD ∅22 mm, 2.0–4.0 Nm

Heavy Duty – for application in oil



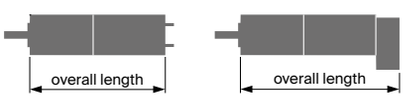
M 3:4

Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel, hardened				
Bearing at output	ball bearing				
Radial play, 10 mm from flange	max. 0.2 mm				
Axial play	max. 0.1 mm				
Max. axial load (dynamic)	100 N				
Max. force for press fits	100 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	11'000 rpm				
Recommended temperature range	-55...+200°C				
Extended range as option	-55...+260°C				
Number of stages	1	2	3	4	5
Max. radial load, 10 mm from flange	55 N	85 N	100 N	110 N	110 N

Stock program
Standard program
Special program (on request)

Part numbers		410657	410637	410558	416698	409667	416709	416738	416211	416747	416753	416760
Gearhead data (provisional)												
1 Reduction		3.8:1	14:1	53:1	104:1	198:1	370:1	561:1	742:1	1386:1	1798:1	3027:1
2 Absolute reduction		15/4	225/16	3375/64	87723/845	50625/256	10556001/28561	2368521/4225	759375/1024	158340015/114244	373977/208	63950067/21125
3 Max. motor shaft diameter	mm	4	4	4	3.2	4	3.2	3.2	4	3.2	3.2	3.2
Part numbers		416684	416686	416693	416699	416703	416710	416739	416742	416748	416754	416762
1 Reduction		4.4:1	16:1	62:1	109:1	231:1	389:1	590:1	867:1	1460:1	1996:1	3189:1
2 Absolute reduction		57/13	855/52	12825/208	2187/20	192375/832	263169/676	59049/100	2885625/3328	3947535/2704	285012027/142805	1594323/500
3 Max. motor shaft diameter	mm	3.2	3.2	3.2	4	3.2	3.2	4	3.2	3.2	3.2	4
Part numbers			416687	416694	416701	416704	416711	416740	416743	416749	416756	416763
1 Reduction			19:1	72:1	128:1	270:1	410:1	690:1	1014:1	1538:1	2102:1	3728:1
2 Absolute reduction			3249/169	48735/676	41553/325	731025/2704	656/16	1121931/1625	10965375/10816	98415/64	7105563/3380	30292137/8125
3 Max. motor shaft diameter	mm		3.2	3.2	3.2	3.2	4	3.2	3.2	4.0	3.2	3.2
Part numbers			416688	416695		416706	416736		416744	416751	416757	
1 Reduction			20:1	76:1		285:1	455:1		1068:1	1621:1	2214:1	
2 Absolute reduction			81/4	1215/16		18225/64	5000211/10985		273375/256	601692057/371293	177147/80	
3 Max. motor shaft diameter	mm		4	4		4	3.2		4	3.2	4	
Part numbers			416689	416696		416707	416737		416745	416752	416758	
1 Reduction			24:1	84:1		316:1	479:1		1185:1	1707:1	2458:1	
2 Absolute reduction			1539/65	185193/2197		2777895/8788	124659/260		41668425/35152	15000633/8788	135005697/54925	
3 Max. motor shaft diameter	mm		3.2	3.2		3.2	3.2		3.2	3.2	3.2	
Part numbers				416697		416708			416746		416759	
1 Reduction				89:1		333:1			1249:1		2589:1	
2 Absolute reduction				4617/52		69255/208			1038825/832		3365793/1300	
3 Max. motor shaft diameter	mm			3.2		3.2			3.2		3.2	
4 Number of stages		1	2	3	3	4	4	4	5	5	5	5
5 Max. continuous torque	Nm	2	2.4	3	3	3.4	3.4	3.4	4	4	4	4
6 Max. intermittent torque at gear output	Nm	2.5	3	3.5	3.5	3.8	3.8	3.8	4.4	4.4	4.4	4.4
15 Max. overload torque[1)]	Nm	6	9	12	12	12	12	12	12	12	12	12
7 Max. efficiency	%	95	87	78	78	65	65	65	52	52	52	52
8 Weight	g	46	65	82	82	96	96	96	110	110	110	110
9 Average backlash no load	°	1.0	1.2	1.6	1.6	2.0	2.0	2.0	2.5	2.5	2.5	2.5
10 Mass inertia	gcm²	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11 Gearhead length L1	mm	20.6	29.7	38.2	38.2	45.0	45.0	45.0	51.8	51.8	51.8	51.8
13 Max. transmittable power (continuous)	W	160	100	40	40	20	20	20	6	6	6	6
14 Max. transmittable power (intermittent)	W	240	150	60	60	30	30	30	9	9	9	9

1) Reduced expected life span



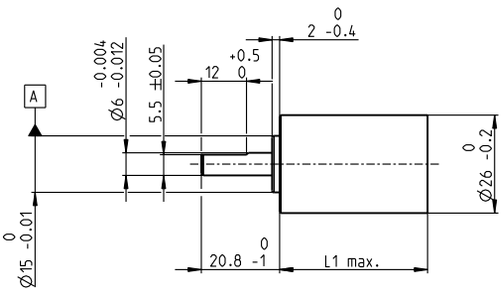
Modular system

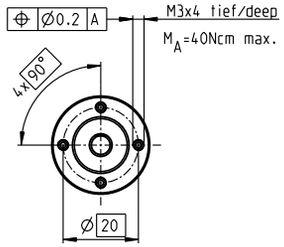
+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts										
EC 22, 240 W, A	270			110.5	119.5	128.0	128.0	135.0	135.0	135.0	141.5	141.5	141.5	141.5
EC 22, 240 W, B	270			98.1	107.5	116.0	116.0	122.4	122.4	122.4	129.5	129.5	129.5	129.5

	Application	Important Notice
	General	This gearhead has been designed for applications in oil and is only equipped with minimum lubrication. Therefore it is not permitted to use it under normal air conditions.
	– extreme temperature applications	
	– vibration tested according to MIL-STD810F/ Jan2000 Fig. 514.5C-10	
	– operation in oil and high pressure	
	Oil & Gas Industry	
	– oil, gas and geothermal wells	

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Planetary Gearhead GP 26 A ∅26 mm, 0.75–4.5 Nm





M 1:2

Technical data			
Planetary Gearhead		straight teeth	
Output shaft		stainless steel, hardened	
Bearing at output		preloaded ball bearings	
Radial play, 5 mm from flange		max. 0.1 mm	
Axial play at axial load	< 6 N	0 mm	
	> 6 N	max. 0.4 mm	
Max. axial load (dynamic)		120 N	
Max. force for press fits		120 N	
Direction of rotation, drive to output		=	
Max. continuous input speed		8000 rpm	
Recommended temperature range		-30...+100°C	
Extended range as option		-40...+100°C	
Number of stages	1	2	3
Max. radial load, 12 mm from flange	70 N	110 N	140 N

Stock program
Standard program
Special program (on request)

Part numbers	406757	406762	406764	406767	406128	406769	406770	406771	406092
Gearhead data									
1 Reduction	5.2:1	19:1	27:1	35:1	71:1	100:1	139:1	181:1	236:1
2 Absolute reduction	57/11	3591/187	3249/121	1539/44	226233/3179	204687/2057	185193/1331	87723/484	41553/176
3 Max. motor shaft diameter mm	3	3	3	3	3	3	3	3	3
4 Number of stages	1	2	2	2	3	3	3	3	3
5 Max. continuous torque Nm	0.75	2.25	2.25	2.25	4.5	4.5	4.5	4.5	4.5
6 Max. intermittent torque at gear output Nm	1.1	3.2	3.2	3.2	6.2	6.2	6.2	6.2	6.2
7 Max. efficiency %	90	80	80	80	70	70	70	70	70
8 Weight g	53	77	77	77	93	93	93	93	93
9 Average backlash no load °	0.5	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8
10 Mass inertia gcm²	0.96	0.54	0.54	0.54	0.31	0.31	0.31	0.31	0.31
11 Gearhead length L1 mm	23.4	32.9	32.9	32.9	39.5	39.5	39.5	39.5	39.5
13 Max. transmittable power (continuous) W	60	35	35	35	20	20	20	20	20
14 Max. transmittable power (intermittent) W	90	50	50	50	30	30	30	30	30





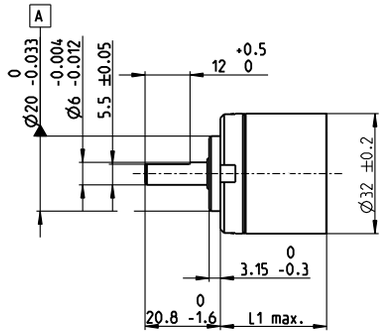
Modular system

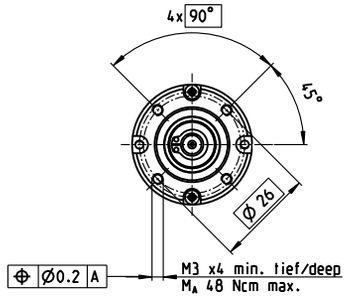
+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts								
RE 25	156/158			78.0	87.5	87.5	87.5	94.1	94.1	94.1	94.1	94.1
RE 25	156/158	ENX 25 IMR	505	89.0	98.5	98.5	98.5	105.1	105.1	105.1	105.1	105.1
RE 25	156/158	HED_5540	535/537	98.8	108.3	108.3	108.3	114.9	114.9	114.9	114.9	114.9
RE 25	156/158	DCT 22	542	100.3	109.8	109.8	109.8	116.4	116.4	116.4	116.4	116.4
RE 25, 20 W	157			66.5	76.0	76.0	76.0	82.6	82.6	82.6	82.6	82.6
RE 25, 20 W	157	ENX 25 IMR	505	77.5	87.0	87.0	87.0	93.6	93.6	93.6	93.6	93.6
RE 25, 20 W	157	HED_5540	536	87.3	96.8	96.8	96.8	103.4	103.4	103.4	103.4	103.4
RE 25, 20 W	157	DCT 22	542	88.8	98.3	98.3	98.3	104.9	104.9	104.9	104.9	104.9
RE 25, 20 W	157	AB 28	587	100.6	110.1	110.1	110.1	116.7	116.7	116.7	116.7	116.7
RE 25, 20 W	157	HED_5540/AB 28	536/587	117.8	127.3	127.3	127.3	133.9	133.9	133.9	133.9	133.9
RE 25, 20 W	158	AB 28	587	112.1	121.6	121.6	121.6	128.2	128.2	128.2	128.2	128.2
RE 25, 20 W	158	HED_5540/AB 28	537/587	129.3	138.8	138.8	138.8	145.4	145.4	145.4	145.4	145.4
A-max 26	183–186			68.2	77.7	77.7	77.7	84.3	84.3	84.3	84.3	84.3
A-max 26	184–186	ENX 13 GAMA	498	75.3	84.8	84.8	84.8	91.4	91.4	91.4	91.4	91.4
A-max 26	184–186	ENX 25 IMR	505	77.0	86.5	86.5	86.5	93.1	93.1	93.1	93.1	93.1
A-max 26	184–186	HED_5540	536/538	86.6	96.1	96.1	96.1	102.7	102.7	102.7	102.7	102.7

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Planetary Gearhead GP 32 BZ ∅32 mm, 0.75–4.5 Nm

Low Backlas





M 1:2

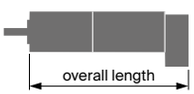
Technical data			
Planetary Gearhead	straight teeth		
Output shaft	stainless steel, hardened		
Bearing at output	ball bearing		
Radial play, 5 mm from flange	max. 0.1 mm		
Axial play	max. 0.7 mm		
Max. axial load (dynamic)	120 N		
Max. force for press fits	120 N		
Direction of rotation, drive to output	=		
Max. continuous input speed	4000 rpm		
Recommended temperature range	-40...+100°C		
Number of stages	1	2	3
Max. radial load, 12 mm from flange	70 N	110 N	130 N

Stock program
Standard program
Special program (on request)

Gearhead data			Part numbers									
			358975	351942	358331	357988	358335	358385	358512	358513	358515	358516
1	Reduction		3.7:1	5.2:1	19:1	27:1	35:1	71:1	100:1	139:1	181:1	236:1
2	Absolute reduction		63/17	57/11	3591/187	3249/121	1539/44	226233/3179	204687/2057	185193/1331	87723/484	41553/176
3	Max. motor shaft diameter	mm	5.5	3	3	3	3	3	3	3	3	3
4	Number of stages		1	1	2	2	2	3	3	3	3	3
5	Max. continuous torque	Nm	0.75	0.75	2.25	2.25	2.25	4.5	4.5	4.5	4.5	4.5
	Max. continuous torque within the preloading	Nm	0.5	0.5	1.1	1.1	1.1	1.7	1.7	1.7	1.7	1.7
6	Max. intermittent torque at gear output	Nm	1.1	1.1	3.2	3.2	3.2	6.2	6.2	6.2	6.2	6.2
7	Max. efficiency	%	85	85	80	80	80	70	70	70	70	70
8	Weight	g	150	150	190	190	190	240	240	240	240	240
9	Average backlash no load	°	0.15	0.15	0.35	0.35	0.35	0.5	0.5	0.5	0.5	0.5
10	Mass inertia	gcm²	1.25	1.25	0.75	0.75	0.75	0.7	0.7	0.7	0.7	0.7
11	Gearhead length L1*	mm	33.5	33.5	43.6	43.6	43.6	53.1	53.1	53.1	53.1	53.1

*for EC 32 L1 is + 6.4 mm, for RE 30 L1 is + 1.0 mm



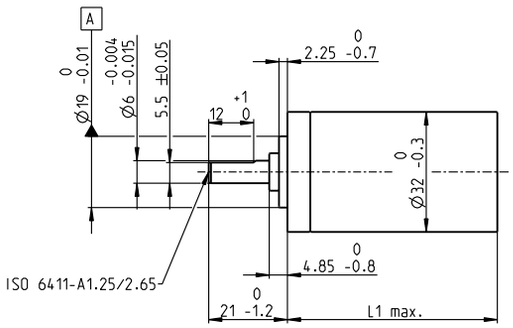


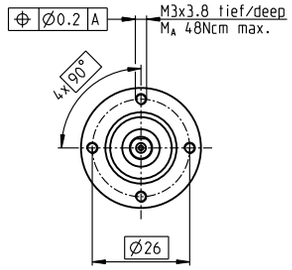
Modular system

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts									
RE 25	156/158			88.1	88.1	98.2	98.2	98.2	107.7	107.7	107.7	107.7	107.7
RE 25	156/158	ENX 25 IMR	505	99.1	99.1	109.2	109.2	109.2	118.7	118.7	118.7	118.7	118.7
RE 25	156/158	HED_5540	535/537	108.9	108.9	119.0	119.0	119.0	128.5	128.5	128.5	128.5	128.5
RE 25	156/158	DCT 22	542	110.4	110.4	120.5	120.5	120.5	130.0	130.0	130.0	130.0	130.0
RE 25, 20 W	157			76.6	76.6	86.7	86.7	86.7	96.2	96.2	96.2	96.2	96.2
RE 25, 20 W	157	ENX 25 IMR	505	87.6	87.6	97.7	97.7	97.7	107.2	107.2	107.2	107.2	107.2
RE 25, 20 W	157	HED_5540	536/537	97.4	97.4	107.5	107.5	107.5	117.0	117.0	117.0	117.0	117.0
RE 25, 20 W	157	DCT 22	542	98.9	98.9	109.0	109.0	109.0	118.5	118.5	118.5	118.5	118.5
RE 25, 20 W	157	AB 28	587	110.7	110.7	120.8	120.8	120.8	130.3	130.3	130.3	130.3	130.3
RE 25, 20 W	157	HED_5540/AB 28	536/587	127.9	127.9	138.0	138.0	138.0	147.5	147.5	147.5	147.5	147.5
RE 25, 20 W	158	AB 28	587	122.2	122.2	132.3	132.3	132.3	141.8	141.8	141.8	141.8	141.8
RE 25, 20 W	158	HED_5540/AB 28	536/587	139.4	139.4	149.5	149.5	149.5	159.0	159.0	159.0	159.0	159.0
RE 30, 60 W	160			102.6	102.6	112.7	112.7	112.7	122.2	122.2	122.2	122.2	122.2
RE 30, 60 W	160	ENX 32 IMR	506	114.0	114.0	124.1	124.1	124.1	133.6	133.6	133.6	133.6	133.6
RE 30, 60 W	160	HED_5540	535/537	123.4	123.4	133.5	133.5	133.5	143.0	143.0	143.0	143.0	143.0
RE 35, 90 W	161			104.6	104.6	114.7	114.7	114.7	124.2	124.2	124.2	124.2	124.2
RE 35, 90 W	161	ENX 32 IMR	506	116.0	116.0	126.1	126.1	126.1	135.6	135.6	135.6	135.6	135.6
RE 35, 90 W	161	HED_5540	535/537	125.3	125.3	135.4	135.4	135.4	144.9	144.9	144.9	144.9	144.9
RE 35, 90 W	161	DCT 22	542	122.7	122.7	132.8	132.8	132.8	142.3	142.3	142.3	142.3	142.3
RE 35, 90 W	161	AB 28	587	140.7	140.7	150.8	150.8	150.8	160.3	160.3	160.3	160.3	160.3
RE 35, 90 W	161	HEDS 5540/AB 28	536/587	157.9	157.9	168.0	168.0	168.0	177.5	177.5	177.5	177.5	177.5
A-max 26	183/186			78.3	78.3	88.4	88.4	88.4	97.9	97.9	97.9	97.9	97.9
A-max 26	184/186	ENX 13 GAMA	498	85.4	85.4	95.5	95.5	95.5	105.0	105.0	105.0	105.0	105.0
A-max 26	184/186	ENX 25 IMR	505	87.1	87.1	97.2	97.2	97.2	106.7	106.7	106.7	106.7	106.7
A-max 26	184/186	HED_5540	535/537	96.7	96.7	106.8	106.8	106.8	116.3	116.3	116.3	116.3	116.3
A-max 32	187			96.5	96.5	106.6	106.6	106.6	116.1	116.1	116.1	116.1	116.1
A-max 32	188			95.1	95.1	105.2	105.2	105.2	114.7	114.7	114.7	114.7	114.7
A-max 32	188	ENX 32 IMR	506	106.3	106.3	116.4	116.4	116.4	125.9	125.9	125.9	125.9	125.9
A-max 32	188	HED_5540	535/537	115.9	115.9	126.0	126.0	126.0	135.5	135.5	135.5	135.5	135.5
EC 32, 80 W	271			100.2	100.2	110.3	110.3	110.3	119.8	119.8	119.8	119.8	119.8
EC 32, 80 W	271	HED_5540	535/537	118.6	118.6	128.7	128.7	128.7	138.2	138.2	138.2	138.2	138.2
EC 32, 80 W	271	Res 26	543	120.3	120.3	130.4	130.4	130.4	139.9	139.9	139.9	139.9	139.9

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Planetary Gearhead GP 32 A ∅32 mm, 0.75–4.5 Nm





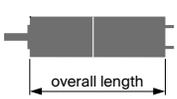
M 1:2

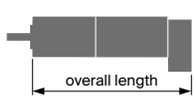
Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel				
Shaft diameter as option	8 mm				
Bearing at output	ball bearing				
Radial play, 5 mm from flange	max. 0.14 mm				
Axial play	max. 0.4 mm				
Max. axial load (dynamic)	120 N				
Max. force for press fits	120 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	6000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 10 mm from flange	90 N	140 N	200 N	220 N	220 N

Option: Low-noise version

Stock program
Standard program
Special program (on request)

Gearhead data			Part numbers											
			166155	166158	166163	166164	166169	166174	166179	166184	166187	166192	166197	166202
1	Reduction		3.7:1	14:1	33:1	51:1	111:1	246:1	492:1	762:1	1181:1	1972:1	2829:1	4380:1
2	Absolute reduction		26/7	676/49	529/16	17576/343	13824/125	421824/1715	86112/175	19044/25	10123776/8575	8626176/4375	495144/175	109503/25
3	Max. motor shaft diameter	mm	6	6	3	6	4	4	3	3	4	4	3	3
	Part numbers		166156	166159		166165	166170	166175	166180	166185	166188	166193	166198	166203
1	Reduction		4.8:1	18:1		66:1	123:1	295:1	531:1	913:1	1414:1	2189:1	3052:1	5247:1
2	Absolute reduction		24/5	624/35		16224/245	6877/56	101062/343	331776/625	36501/40	2425488/1715	536406/245	1907712/625	839523/160
3	Max. motor shaft diameter	mm	4	4		4	3	3	4	3	3	3	3	3
	Part numbers		166157	166160		166166	166171	166176	166181	166186	166189	166194	166199	166204
1	Reduction		5.8:1	21:1		79:1	132:1	318:1	589:1	1093:1	1526:1	2362:1	3389:1	6285:1
2	Absolute reduction		23/4	299/14		3887/49	3312/25	389376/1225	2063/35	27984/256	9345024/6125	2066688/875	474513/140	6436343/1024
3	Max. motor shaft diameter	mm	3	3		3	3	4	3	3	4	3	3	3
	Part numbers			166161		166167	166172	166177	166182		166190	166195	166200	
1	Reduction			23:1		86:1	159:1	411:1	636:1		1694:1	2548:1	3656:1	
2	Absolute reduction			576/25		14976/175	1587/10	359424/875	79488/125		1162213/686	7962624/3125	457056/125	
3	Max. motor shaft diameter	mm		4		4	3	4	3		3	4	3	
	Part numbers			166162		166168	166173	166178	166183		166191	166196	166201	
1	Reduction			28:1		103:1	190:1	456:1	706:1		1828:1	2623:1	4060:1	
2	Absolute reduction			138/5		3588/35	12167/64	89401/196	158171/224		2238912/1225	2056223/784	3637933/896	
3	Max. motor shaft diameter	mm		3		3	3	3	3		3	3	3	
4	Number of stages		1	2	2	3	3	4	4	4	5	5	5	5
5	Max. continuous torque	Nm	0.75	2.25	2.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
6	Max. intermittent torque at gear output	Nm	1.1	3.4	3.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
7	Max. efficiency	%	80	75	75	70	70	60	60	60	50	50	50	50
8	Weight	g	118	162	162	194	194	226	226	226	258	258	258	258
9	Average backlash no load	°	0.7	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
10	Mass inertia	gcm²	1.5	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
11	Gearhead length L1	mm	26.5	36.4	36.4	43.1	43.1	49.8	49.8	49.8	56.5	56.5	56.5	56.5

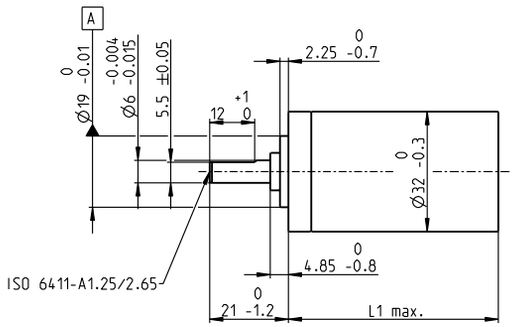


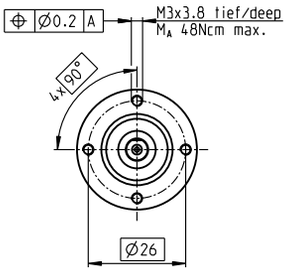


Modular system														
+ Motor	Page	**+ Sensor/Brake**	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts										
RE 25	156/158			81.1	91.0	91.0	97.7	97.7	104.4	104.4	104.4	111.1	111.1	111.1	111.1
RE 25	156/158	ENX 25 IMR	505	92.1	102.0	102.0	108.7	108.7	115.4	115.4	115.4	122.1	122.1	122.1	122.1
RE 25	156/158	HED_5540	535/537	101.9	111.8	111.8	118.5	118.5	125.2	125.2	125.2	131.9	131.9	131.9	131.9
RE 25	156/158	DCT 22	542	103.4	113.3	113.3	120.0	120.0	126.7	126.7	126.7	133.4	133.4	133.4	133.4
RE 25, 20 W	157			69.6	79.5	79.5	86.2	86.2	92.9	92.9	92.9	99.6	99.6	99.6	99.6
RE 25, 20 W	157	ENX 25 IMR	505	80.6	90.5	90.5	97.2	97.2	103.9	103.9	103.9	110.6	110.6	110.6	110.6
RE 25, 20 W	157	HED_5540	536	90.4	100.3	100.3	107.0	107.0	113.7	113.7	113.7	120.4	120.4	120.4	120.4
RE 25, 20 W	157	DCT 22	542	91.9	101.8	101.8	108.5	108.5	115.2	115.2	115.2	121.9	121.9	121.9	121.9
RE 25, 20 W	157	AB 28	587	103.7	113.6	113.6	120.3	120.3	127.0	127.0	127.0	133.7	133.7	133.7	133.7
RE 25, 20 W	157	HED_5540/AB 28	536/587	120.9	130.8	130.8	137.5	137.5	144.2	144.2	144.2	150.9	150.9	150.9	150.9
RE 25, 20 W	158	AB 28	587	115.2	125.1	125.1	131.8	131.8	138.5	138.5	138.5	145.2	145.2	145.2	145.2
RE 25, 20 W	158	HED_5540/AB 28	536/587	132.4	142.3	142.3	149.0	149.0	155.7	155.7	155.7	162.4	162.4	162.4	162.4
RE 30, 15 W	159			94.6	104.5	104.5	111.2	111.2	117.9	117.9	117.9	124.6	124.6	124.6	124.6
RE 30, 15 W	159	ENX 32 IMR	506	106.0	115.9	115.9	122.6	122.6	129.3	129.3	129.3	136.0	136.0	136.0	136.0
RE 30, 15 W	159	HED_5540	535/537	115.4	125.3	125.3	132.0	132.0	138.7	138.7	138.7	145.4	145.4	145.4	145.4
RE 30, 60 W	160			94.6	104.5	104.5	111.2	111.2	117.9	117.9	117.9	124.6	124.6	124.6	124.6
RE 30, 60 W	160	ENX 32 IMR	506	106.0	115.9	115.9	122.6	122.6	129.3	129.3	129.3	136.0	136.0	136.0	136.0
RE 30, 60 W	160	HED_5540	535/537	115.4	125.3	125.3	132.0	132.0	138.7	138.7	138.7	145.4	145.4	145.4	145.4
RE 35, 90 W	161			97.6	107.5	107.5	114.2	114.2	120.9	120.9	120.9	127.6	127.6	127.6	127.6
RE 35, 90 W	161	ENX 32 IMR	506	109.0	118.9	118.9	125.6	125.6	132.3	132.3	132.3	139.0	139.0	139.0	139.0
RE 35, 90 W	161	HED_5540	535/537	118.3	128.2	128.2	134.9	134.9	141.6	141.6	141.6	148.3	148.3	148.3	148.3
RE 35, 90 W	161	DCT 22	542	115.7	125.6	125.6	132.3	132.3	139.0	139.0	139.0	145.7	145.7	145.7	145.7
RE 35, 90 W	161	AB 28	587	133.7	143.6	143.6	150.3	150.3	157.0	157.0	157.0	163.7	163.7	163.7	163.7
RE 35, 90 W	161	HED_5540/AB 28	536/587	150.9	160.8	160.8	167.5	167.5	174.2	174.2	174.2	180.9	180.9	180.9	180.9

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Planetary Gearhead GP 32 A ∅32 mm, 0.75–4.5 Nm





M 1:2

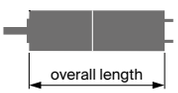
Technical data						
Planetary Gearhead						straight teeth
Output shaft						stainless steel
Shaft diameter as option						8 mm
Bearing at output						ball bearing
Radial play, 5 mm from flange						max. 0.14 mm
Axial play						max. 0.4 mm
Max. axial load (dynamic)						120 N
Max. force for press fits						120 N
Direction of rotation, drive to output						=
Max. continuous input speed						6000 rpm
Recommended temperature range						-40...+100°C
Number of stages	1	2	3	4	5	
Max. radial load, 10 mm from flange	90 N	140 N	200 N	220 N	220 N	

Option: Low-noise version

Stock program
Standard program
Special program (on request)

Part numbers

166155	166158	166163	166164	**166169**	**166174**	166179	166184	166187	166192	166197	166202
166156	**166159**		**166165**	166170	166175	166180	166185	166188	166193	166198	166203
166157	166160		166166	166171	166176	166181	166186	166189	166194	166199	166204
	166161		166167	166172	166177	166182		166190	166195	166200	
	166162		166168	166173	166178	166183		166191	166196	166201	





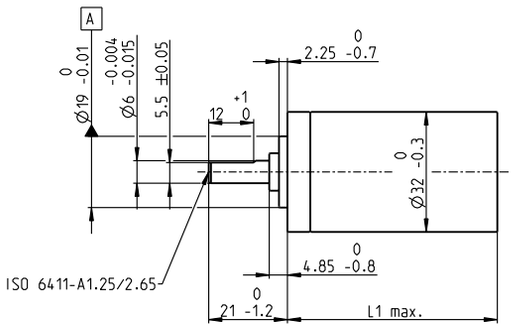
Modular system

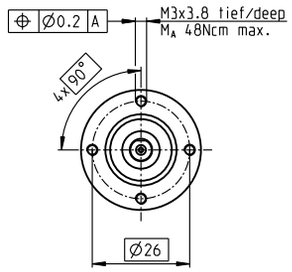
+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts											
A-max 26	183–186			71.3	81.2	81.2	87.9	87.9	94.6	94.6	94.6	101.3	101.3	101.3	101.3
A-max 26	184/186	ENX 13 GAMA	498	78.4	88.3	88.3	95.0	95.0	101.7	101.7	101.7	108.4	108.4	108.4	108.4
A-max 26	184/186	ENX 25 IMR	505	80.1	90.0	90.0	96.7	96.7	103.4	103.4	103.4	110.1	110.1	110.1	110.1
A-max 26	184/186	HED_5540	536/538	89.7	99.6	99.6	106.3	106.3	113.0	113.0	113.0	119.7	119.7	119.7	119.7
A-max 32	187			89.5	99.4	99.4	106.1	106.1	112.8	112.8	112.8	119.5	119.5	119.5	119.5
A-max 32	188			88.1	98.0	98.0	104.7	104.7	111.4	111.4	111.4	118.1	118.1	118.1	118.1
A-max 32	188	ENX 32 IMR	506	99.3	109.2	109.2	115.9	115.9	122.6	122.6	122.6	129.3	129.3	129.3	129.3
A-max 32	188	HED_5540	536/538	108.9	118.8	118.8	125.5	125.5	132.2	132.2	132.2	138.9	138.9	138.9	138.9
EC 32, 80 W	271	Res 26	543	106.7	116.6	116.6	123.3	123.3	130.0	130.0	130.0	136.7	136.7	136.7	136.7
EC-max 30, 40 W	284			68.6	78.5	78.5	85.2	85.2	91.9	91.9	91.9	98.6	98.6	98.6	98.6
EC-max 30, 40 W	283	16 EASY/XT/Abs.	509–511	79.7	89.6	89.6	96.3	96.3	103.0	103.0	103.0	109.7	109.7	109.7	109.7
EC-max 30, 40 W	283	16 EASY Abs. XT	512	80.2	90.1	90.1	96.8	96.8	103.5	103.5	103.5	110.2	110.2	110.2	110.2
EC-max 30, 40 W	284	HEDL 5540	539	89.2	99.1	99.1	105.8	105.8	112.5	112.5	112.5	119.2	119.2	119.2	119.2
EC-max 30, 40 W	284	AB 20	584	104.2	114.1	114.1	120.8	120.8	127.5	127.5	127.5	134.2	134.2	134.2	134.2
EC-max 30, 40 W	284	HEDL 5540/AB20	539/584	124.8	134.7	134.7	141.4	141.4	148.1	148.1	148.1	154.8	154.8	154.8	154.8
EC-max 30, 60 W	285			90.6	100.5	100.5	107.2	107.2	113.9	113.9	113.9	120.6	120.6	120.6	120.6
EC-max 30, 60 W	285	16 EASY/XT/Abs.	509–511	101.7	111.6	111.6	118.3	118.3	125.0	125.0	125.0	131.7	131.7	131.7	131.7
EC-max 30, 60 W	285	16 EASY Abs. XT	512	102.2	112.1	112.1	118.8	118.8	125.5	125.5	125.5	132.2	132.2	132.2	132.2
EC-max 30, 60 W	285	HEDL 5540	539	111.2	121.1	121.1	127.8	127.8	134.5	134.5	134.5	141.2	141.2	141.2	141.2
EC-max 30, 60 W	285	AB 20	584	126.2	136.1	136.1	142.8	142.8	149.5	149.5	149.5	156.2	156.2	156.2	156.2
EC-max 30, 60 W	285	HEDL 5540/AB20	539/584	146.8	156.7	156.7	163.4	163.4	170.1	170.1	170.1	176.8	176.8	176.8	176.8

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Planetary Gearhead GP 32 C ∅32 mm, 1.0–6.0 Nm

Ceramic Version





M 1:2

Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel				
Shaft diameter as option	8 mm				
Bearing at output	ball bearing				
Radial play, 5 mm from flange	max. 0.14 mm				
Axial play	max. 0.4 mm				
Max. axial load (dynamic)	120 N				
Max. force for press fits	120 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	8000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 10 mm from flange	90 N	140 N	200 N	220 N	220 N

Option: Low-noise version

Stock program
Standard program
Special program (on request)

			Part numbers											
			166930	166933	166938	166939	166944	166949	166954	166959	166962	166967	166972	166977
Gearhead data														
1	Reduction		3.7:1	14:1	33:1	51:1	111:1	246:1	492:1	762:1	1181:1	1972:1	2829:1	4380:1
2	Absolute reduction		26/7	676/49	529/16	17576/343	13824/125	421824/1715	86112/175	19044/25	10123776/8575	8626176/4375	495144/175	109503/25
3	Max. motor shaft diameter	mm	6	6	3	6	4	4	3	3	4	4	3	3
	Part numbers		166931	166934		166940	166945	166950	166955	166960	166963	166968	166973	166978
1	Reduction		4.8:1	18:1		66:1	123:1	295:1	531:1	913:1	1414:1	2189:1	3052:1	5247:1
2	Absolute reduction		24/5	624/35		16224/245	6877/56	101062/343	331776/625	36501/40	2425488/1715	536406/245	1907712/625	839523/160
3	Max. motor shaft diameter	mm	4	4		4	3	3	4	3	3	3	3	3
	Part numbers		166932	166935		166941	166946	166951	166956	166961	166964	166969	166974	166979
1	Reduction		5.8:1	21:1		79:1	132:1	318:1	589:1	1093:1	1526:1	2362:1	3389:1	6285:1
2	Absolute reduction		23/4	299/14		3887/49	3312/25	389376/1225	2063/35	27984/256	9345024/6125	2066688/875	474513/140	6436343/1024
3	Max. motor shaft diameter	mm	3	3		3	3	4	3	3	4	3	3	3
	Part numbers			166936		166942	166947	166952	166957		166965	166970	166975	
1	Reduction			23:1		86:1	159:1	411:1	636:1		1694:1	2548:1	3656:1	
2	Absolute reduction			576/25		14976/175	1587/10	359424/875	79488/125		1162213/686	7962624/3125	457056/125	
3	Max. motor shaft diameter	mm		4		4	3	4	3		3	4	3	
	Part numbers			166937		166943	166948	166953	166958		166966	166971	166976	
1	Reduction			28:1		103:1	190:1	456:1	706:1		1828:1	2623:1	4060:1	
2	Absolute reduction			138/5		3588/35	12167/64	89401/196	158171/224		2238912/1225	2056223/784	3637933/896	
3	Max. motor shaft diameter	mm		3		3	3	3	3		3	3	3	
4	Number of stages		1	2	2	3	3	4	4	4	5	5	5	5
5	Max. continuous torque	Nm	1	3	3	6	6	6	6	6	6	6	6	6
6	Max. intermittent torque at gear output	Nm	1.25	3.75	3.75	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
7	Max. efficiency	%	80	75	75	70	70	60	60	60	50	50	50	50
8	Weight	g	118	162	162	194	194	226	226	226	258	258	258	258
9	Average backlash no load	°	0.7	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
10	Mass inertia	gcm²	1.5	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
11	Gearhead length L1	mm	26.5	36.4	36.4	43.1	43.1	49.8	49.8	49.8	56.5	56.5	56.5	56.5





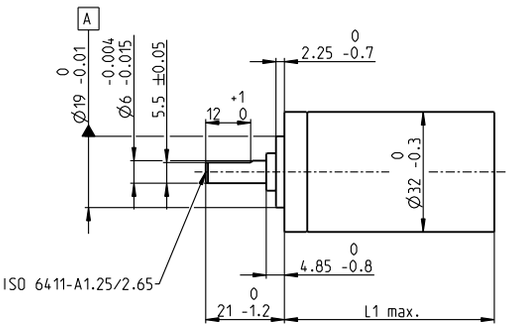
Modular system

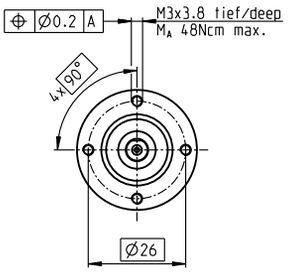
+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts										
RE 25	156/158			81.1	91.0	91.0	97.7	97.7	104.4	104.4	104.4	111.1	111.1	111.1	111.1
RE 25	156/158	ENX 25 IMR	505	92.1	102.0	102.0	108.7	108.7	115.4	115.4	115.4	122.1	122.1	122.1	122.1
RE 25	156/158	HED_5540	535/537	101.9	111.8	111.8	118.5	118.5	125.2	125.2	125.2	131.9	131.9	131.9	131.9
RE 25	156/158	DCT 22	542	103.4	113.3	113.3	120.0	120.0	126.7	126.7	126.7	133.4	133.4	133.4	133.4
RE 25, 20 W	157			69.6	79.5	79.5	86.2	86.2	92.9	92.9	92.9	99.6	99.6	99.6	99.6
RE 25, 20 W	157	ENX 25 IMR	505	80.6	90.5	90.5	97.2	97.2	103.9	103.9	103.9	110.6	110.6	110.6	110.6
RE 25, 20 W	157	HED_5540	535–537	90.4	100.3	100.3	107.0	107.0	113.7	113.7	113.7	120.4	120.4	120.4	120.4
RE 25, 20 W	157	DCT 22	542	91.9	101.8	101.8	108.5	108.5	115.2	115.2	115.2	121.9	121.9	121.9	121.9
RE 25, 20 W	157	AB 28	587	103.7	113.6	113.6	120.3	120.3	127.0	127.0	127.0	133.7	133.7	133.7	133.7
RE 25, 20 W	157	HED_5540/AB 28	535/587	120.9	130.8	130.8	137.5	137.5	144.2	144.2	144.2	150.9	150.9	150.9	150.9
RE 25, 20 W	158	AB 28	587	115.2	125.1	125.1	131.8	131.8	138.5	138.5	138.5	145.2	145.2	145.2	145.2
RE 25, 20 W	158	HED_5540/AB 28	535/587	132.4	142.3	142.3	149.0	149.0	155.7	155.7	155.7	162.4	162.4	162.4	162.4
RE 30, 60 W	160			94.6	104.5	104.5	111.2	111.2	117.9	117.9	117.9	124.6	124.6	124.6	124.6
RE 30, 60 W	160	ENX 32 IMR	506	106.0	115.9	115.9	122.6	122.6	129.3	129.3	129.3	136.0	136.0	136.0	136.0
RE 30, 60 W	160	HED_5540	535/537	115.4	125.3	125.3	132.0	132.0	138.7	138.7	138.7	145.4	145.4	145.4	145.4
RE 35, 90 W	161			97.6	107.5	107.5	114.2	114.2	120.9	120.9	120.9	127.6	127.6	127.6	127.6
RE 35, 90 W	161	ENX 32 IMR	506	109.0	118.9	118.9	125.6	125.6	132.3	132.3	132.3	139.0	139.0	139.0	139.0
RE 35, 90 W	161	HED_5540	535–537	118.3	128.2	128.2	134.9	134.9	141.6	141.6	141.6	148.3	148.3	148.3	148.3
RE 35, 90 W	161	DCT 22	542	115.7	125.6	125.6	132.3	132.3	139.0	139.0	139.0	145.7	145.7	145.7	145.7
RE 35, 90 W	161	AB 28	587	133.7	143.6	143.6	150.3	150.3	157.0	157.0	157.0	163.7	163.7	163.7	163.7
RE 35, 90 W	161	HED_5540/AB 28	535/587	150.9	160.8	160.8	167.5	167.5	174.2	174.2	174.2	180.9	180.9	180.9	180.9
A-max 26	183–186			71.3	81.2	81.2	87.9	87.9	94.6	94.6	94.6	101.3	101.3	101.3	101.3
A-max 26	184/186	13 GAMA	498	78.4	88.3	88.3	95.0	95.0	101.7	101.7	101.7	108.4	108.4	108.4	108.4
A-max 26	184/186	ENX 25 IMR	505	80.1	90.0	90.0	96.7	96.7	103.4	103.4	103.4	110.1	110.1	110.1	110.1
A-max 26	184/186	HED_5540	536/538	89.7	99.6	99.6	106.3	106.3	113.0	113.0	113.0	119.7	119.7	119.7	119.7
A-max 32, 20 W	187			89.5	99.4	99.4	106.1	106.1	112.8	112.8	112.8	119.5	119.5	119.5	119.5
A-max 32, 20 W	188			88.1	98.0	98.0	104.7	104.7	111.4	111.4	111.4	118.1	118.1	118.1	118.1
A-max 32, 20 W	188	ENX 32 IMR	506	99.3	109.2	109.2	115.9	115.9	122.6	122.6	122.6	129.3	129.3	129.3	129.3
A-max 32, 20 W	188	HED_5540	536/538	108.9	118.8	118.8	125.5	125.5	132.2	132.2	132.2	138.9	138.9	138.9	138.9

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Planetary Gearhead GP 32 C ∅32 mm, 1.0–6.0 Nm

Ceramic Version





M 1:2

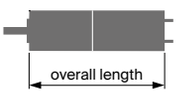
Technical data					
Planetary Gearhead	straight teeth				
Output shaft	stainless steel				
Shaft diameter as option	8 mm				
Bearing at output	ball bearing				
Radial play, 5 mm from flange	max. 0.14 mm				
Axial play	max. 0.4 mm				
Max. axial load (dynamic)	120 N				
Max. force for press fits	120 N				
Direction of rotation, drive to output	=				
Max. continuous input speed	8000 rpm				
Recommended temperature range	-40...+100°C				
Number of stages	1	2	3	4	5
Max. radial load, 10 mm from flange	90 N	140 N	200 N	220 N	220 N

Option: Low-noise version

Stock program
Standard program
Special program (on request)

Part numbers

166930	166933	166938	166939	**166944**	166949	166954	166959	166962	166967	166972	166977
166931	**166934**		**166940**	166945	166950	166955	166960	166963	166968	166973	166978
166932	166935		166941	166946	**166951**	166956	166961	166964	166969	166974	166979
	166936		166942	166947	166952	166957		166965	166970	166975	
	166937		166943	166948	166953	166958		166966	166971	166976	





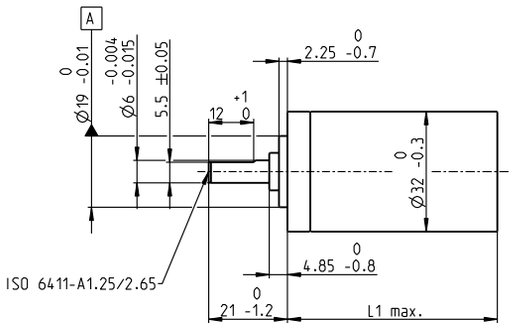
Modular system

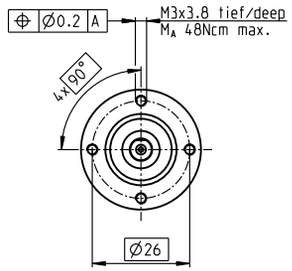
+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts											
EC 32, 80 W	271			86.6	96.5	96.5	103.2	103.2	109.9	109.9	109.9	116.6	116.6	116.6	116.6
EC 32, 80 W	271	HED_5540	536/538	105.0	114.9	114.9	121.6	121.6	128.3	128.3	128.3	135.0	135.0	135.0	135.0
EC 32, 80 W	271	Res 26	543	106.7	116.6	116.6	123.3	123.3	130.0	130.0	130.0	136.7	136.7	136.7	136.7
EC-max 22, 25 W	283			75.1	85.0	85.0	91.7	91.7	98.4	98.4	98.4	105.1	105.1	105.1	105.1
EC-max 22, 25 W	283	16 EASY/XT/Abs.	509–511	84.7	94.6	94.6	101.3	101.3	108.0	108.0	108.0	114.7	114.7	114.7	114.7
EC-max 22, 25 W	283	16 EASY Abs. XT	512	85.2	95.1	95.1	101.8	101.8	108.5	108.5	108.5	115.2	115.2	115.2	115.2
EC-max 22, 25 W	283	AB 20	584	110.7	120.6	120.6	127.3	127.3	134.0	134.0	134.0	140.7	140.7	140.7	140.7
EC-max 30, 40 W	284			68.6	78.5	78.5	85.2	85.2	91.9	91.9	91.9	98.6	98.6	98.6	98.6
EC-max 30, 40 W	284	16 EASY/XT/Abs.	509–511	79.7	89.6	89.6	96.3	96.3	103.0	103.0	103.0	109.7	109.7	109.7	109.7
EC-max 30, 40 W	284	16 EASY Abs. XT	512	80.2	90.1	90.1	96.8	96.8	103.5	103.5	103.5	110.2	110.2	110.2	110.2
EC-max 30, 40 W	284	HEDL 5540	539	89.2	99.1	99.1	105.8	105.8	112.5	112.5	112.5	119.2	119.2	119.2	119.2
EC-max 30, 40 W	284	AB 20	584	104.2	114.1	114.1	120.8	120.8	127.5	127.5	127.5	134.2	134.2	134.2	134.2
EC-max 30, 40 W	284	HEDL 5540/AB 20	539/584	124.8	134.7	134.7	141.4	141.4	148.1	148.1	148.1	154.8	154.8	154.8	154.8
EC-max 30, 60 W	285			90.6	100.5	100.5	107.2	107.2	113.9	113.9	113.9	120.6	120.6	120.6	120.6
EC-max 30, 60 W	285	16 EASY/XT/Abs.	509–511	101.7	111.6	111.6	118.3	118.3	125.0	125.0	125.0	131.7	131.7	131.7	131.7
EC-max 30, 60 W	285	16 EASY Abs. XT	512	102.2	112.1	112.1	118.8	118.8	125.5	125.5	125.5	132.2	132.2	132.2	132.2
EC-max 30, 60 W	285	HEDL 5540	539	111.2	121.1	121.1	127.8	127.8	134.5	134.5	134.5	141.2	141.2	141.2	141.2
EC-max 30, 60 W	285	AB 20	584	126.2	136.1	136.1	142.8	142.8	149.5	149.5	149.5	156.2	156.2	156.2	156.2
EC-max 30, 60 W	285	HEDL 5540/AB 20	539/584	146.8	156.7	156.7	163.4	163.4	170.1	170.1	170.1	176.8	176.8	176.8	176.8
EC-4pole 22, 90 W	291			75.2	85.1	85.1	91.8	91.8	98.5	98.5	98.5	105.2	105.2	105.2	105.2
EC-4pole 22, 90 W	291	22 EMT	518	101.0	110.9	110.9	117.6	117.6	124.3	124.3	124.3	131.0	131.0	131.0	131.0
EC-4pole 22, 90 W	291	16 EASY/XT/Abs.	509–511	87.4	97.3	97.3	104.0	104.0	110.7	110.7	110.7	117.4	117.4	117.4	117.4
EC-4pole 22, 90 W	291	16 EASY Abs. XT	512	87.9	97.8	97.8	104.5	104.5	111.2	111.2	111.2	117.9	117.9	117.9	117.9
EC-4pole 22, 90 W	291	16 RIO	519	85.9	95.8	95.8	102.5	102.5	109.2	109.2	109.2	115.9	115.9	115.9	115.9
EC-4pole 22, 120 W	292			92.6	102.5	102.5	109.2	109.2	115.9	115.9	115.9	122.6	122.6	122.6	122.6
EC-4pole 22, 120 W	292	22 EMT	518	118.4	128.3	128.3	135.0	135.0	141.7	141.7	141.7	148.4	148.4	148.4	148.4
EC-4pole 22, 120 W	292	16 EASY/XT/Abs.	509–511	104.8	114.7	114.7	121.4	121.4	128.1	128.1	128.1	134.8	134.8	134.8	134.8
EC-4pole 22, 120 W	292	16 EASY Abs. XT	512	105.3	115.3	115.3	121.9	121.9	128.6	128.6	128.6	135.3	135.3	135.3	135.3
EC-4pole 22, 120 W	292	16 RIO	519	103.3	113.3	113.3	119.9	119.9	126.6	126.6	126.6	133.3	133.3	133.3	133.3
EC-4pole 30, 100 W	293			73.6	83.5	83.5	90.2	90.2	96.9	96.9	96.9	103.6	103.6	103.6	103.6
EC-4pole 30, 100 W	293	16 EASY/XT/Abs.	509–511	87.5	97.4	97.4	104.1	104.1	110.8	110.8	110.8	117.5	117.5	117.5	117.5
EC-4pole 30, 100 W	293	16 EASY Abs. XT	512	88.0	97.9	97.9	104.6	104.6	111.3	111.3	111.3	118.0	118.0	118.0	118.0
EC-4pole 30, 100 W	293	22 EMT	518	101.5	111.4	111.4	118.1	118.1	124.8	124.8	124.8	131.5	131.5	131.5	131.5
EC-4pole 30, 100 W	293	16 RIO	519	86.0	95.9	95.9	102.6	102.6	109.3	109.3	109.3	116.0	116.0	116.0	116.0
EC-4pole 30, 100 W	293	AB 20	584	109.8	119.7	119.7	126.4	126.4	133.1	133.1	133.1	139.8	139.8	139.8	139.8
EC-4pole 30, 100 W	293	16 EASY/XT/Abs./AB 20	509/584	123.9	133.8	133.8	140.5	140.5	147.2	147.2	147.2	153.9	153.9	153.9	153.9
EC-4pole 30, 100 W	293	16 EASY Abs. XT/AB 20	512/584	124.4	134.3	134.3	141.0	141.0	147.7	147.7	147.7	154.4	154.4	154.4	154.4
EC-4pole 30, 100 W	293	22 EMT/AB 20	518/584	141.0	150.9	150.9	157.6	157.6	164.3	164.3	164.3	171.0	171.0	171.0	171.0
EC-4pole 30, 100 W	293	16 RIO/AB 20	519/584	122.4	132.3	132.3	139.0	139.0	145.7	145.7	145.7	152.4	152.4	152.4	152.4
EC-4pole 30, 200 W	295			90.6	100.5	100.5	107.2	107.2	113.9	113.9	113.9	120.6	120.6	120.6	120.6
EC-4pole 30, 200 W	295	16 EASY/XT/Abs.	509–511	104.5	114.4	114.4	121.1	121.1	127.8	127.8	127.8	134.5	134.5	134.5	134.5
EC-4pole 30, 200 W	295	16 EASY Abs. XT	512	105.0	114.9	114.9	121.6	121.6	128.3	128.3	128.3	135.0	135.0	135.0	135.0
EC-4pole 30, 200 W	295	22 EMT	518	118.5	128.4	128.4	135.1	135.1	141.8	141.8	141.8	148.5	148.5	148.5	148.5
EC-4pole 30, 200 W	295	16 RIO	519	103.0	112.9	112.9	119.6	119.6	126.3	126.3	126.3	133.0	133.0	133.0	133.0
EC-4pole 30, 200 W	295	AB 20	584	126.8	136.7	136.7	143.4	143.4	150.1	150.1	150.1	156.8	156.8	156.8	156.8
EC-4pole 30, 200 W	295	16 EASY/XT/Abs./AB 20	509/584	140.9	150.8	150.8	157.5	157.5	164.2	164.2	164.2	170.9	170.9	170.9	170.9
EC-4pole 30, 200 W	295	16 EASY Abs. XT/AB 20	512/584	141.4	151.3	151.3	158.0	158.0	164.7	164.7	164.7	171.4	171.4	171.4	171.4
EC-4pole 30, 200 W	295	22 EMT/AB 20	518/584	158.0	167.9	167.9	174.6	174.6	181.3	181.3	181.3	188.0	188.0	188.0	188.0
EC-4pole 30, 200 W	295	16 RIO/AB 20	519/584	139.4	149.3	149.3	156.0	156.0	162.7	162.7	162.7	169.4	169.4	169.4	169.4
EC-i 30, 20 W	301			68.6	78.5	78.5	85.2	85.2	91.9	91.9	91.9	98.6	98.6	98.6	98.6
EC-i 30, 30 W	302			68.8	78.7	78.7	85.4	85.4	92.1	92.1	92.1	98.8	98.8	98.8	98.8
EC-i 30, 30 W	302	22 EMT	518	96.8	106.7	106.7	113.4	113.4	120.1	120.1	120.1	126.8	126.8	126.8	126.8
EC-i 30, 30 W	302	16 EASY/Abs.	509–511	80.5	90.4	90.4	97.1	97.1	103.8	103.8	103.8	110.5	110.5	110.5	110.5
EC-i 30, 30 W	302	16 RIO	519	79.0	88.9	88.9	95.6	95.6	102.3	102.3	102.3	109.0	109.0	109.0	109.0

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Planetary Gearhead GP 32 C ∅32 mm, 1.0–6.0 Nm

Ceramic Version





M 1:2

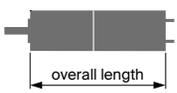
Technical data						
Planetary Gearhead						straight teeth
Output shaft						stainless steel
Shaft diameter as option						8 mm
Bearing at output						ball bearing
Radial play, 5 mm from flange						max. 0.14 mm
Axial play						max. 0.4 mm
Max. axial load (dynamic)						120 N
Max. force for press fits						120 N
Direction of rotation, drive to output						=
Max. continuous input speed						8000 rpm
Recommended temperature range						-40...+100°C
Number of stages	1	2	3	4	5	
Max. radial load, 10 mm from flange	90 N	140 N	200 N	220 N	220 N	

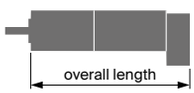
Option: Low-noise version

Stock program
Standard program
Special program (on request)

Part numbers

166930	166933	166938	166939	**166944**	166949	166954	166959	166962	166967	166972	166977
166931	**166934**		**166940**	166945	166950	166955	166960	166963	166968	166973	166978
166932	166935		166941	166946	**166951**	166956	166961	166964	166969	166974	166979
	166936		166942	166947	166952	166957		166965	166970	166975	
	166937		166943	166948	166953	166958		166966	166971	166976	





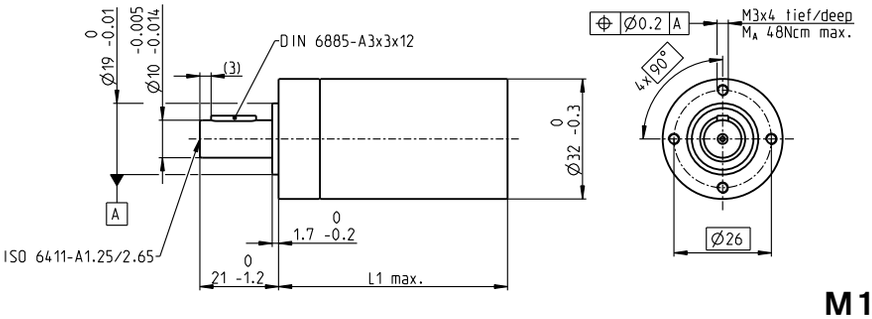
Modular system

+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts											
EC-i 30, 45 W	303			68.8	78.7	78.7	85.4	85.4	92.1	92.1	92.1	98.8	98.8	98.8	98.8
EC-i 30, 45 W	303	22 EMT	518	96.8	106.7	106.7	113.4	113.4	120.1	120.1	120.1	126.8	126.8	126.8	126.8
EC-i 30, 45 W	303	16 EASY/Abs./XT	509–512	80.5	90.4	90.4	97.1	97.1	103.8	103.8	103.8	110.5	110.5	110.5	110.5
EC-i 30, 45 W	303	16 RIO	519	79.0	88.9	88.9	95.6	95.6	102.3	102.3	102.3	109.0	109.0	109.0	109.0
EC-i 30, 50 W	304			90.8	100.7	100.7	107.4	107.4	114.1	114.1	114.1	120.8	120.8	120.8	120.8
EC-i 30, 50 W	304	22 EMT	518	118.8	128.7	128.7	135.4	135.4	142.1	142.1	142.1	148.8	148.8	148.8	148.8
EC-i 30, 50 W	304	16 EASY/Abs./XT	509–512	102.5	112.4	112.4	119.1	119.1	125.8	125.8	125.8	132.5	132.5	132.5	132.5
EC-i 30, 50 W	304	16 RIO	519	101.0	110.9	110.9	117.6	117.6	124.3	124.3	124.3	131.0	131.0	131.0	131.0
EC-i 30, 75 W	305			90.8	100.7	100.7	107.4	107.4	114.1	114.1	114.1	120.8	120.8	120.8	120.8
EC-i 30, 75 W	305	22 EMT	518	118.8	128.7	128.7	135.4	135.4	142.1	142.1	142.1	148.8	148.8	148.8	148.8
EC-i 30, 75 W	305	16 EASY/Abs./XT	509–512	102.5	112.4	112.4	119.1	119.1	125.8	125.8	125.8	132.5	132.5	132.5	132.5
EC-i 30, 75 W	305	16 RIO	519	101.0	110.9	110.9	117.6	117.6	124.3	124.3	124.3	131.0	131.0	131.0	131.0
EC-i 40, 50 W	306			58.3	68.2	68.2	74.9	74.9	81.6	81.6	81.6	88.3	88.3	88.3	88.3
EC-i 40, 50 W	306	22 EMT	518	86.3	96.2	96.2	102.9	102.9	109.6	109.6	109.6	116.3	116.3	116.3	116.3
EC-i 40, 50 W	306	TSX 40 MAG/RIO	526–527	70.0	79.9	79.9	86.6	86.6	93.3	93.3	93.3	100.0	100.0	100.0	100.0
EC-i 40, 50 W	306	16 EASY/Abs./XT	509–512	70.0	79.9	79.9	86.6	86.6	93.3	93.3	93.3	100.0	100.0	100.0	100.0
EC-i 40, 50 W	306	16 RIO	519	72.8	82.7	82.7	89.4	89.4	96.1	96.1	96.1	102.8	102.8	102.8	102.8
EC-i 40, 70 W	308			68.3	78.2	78.2	84.9	84.9	91.6	91.6	91.6	98.3	98.3	98.3	98.3
EC-i 40, 70 W	308	22 EMT	518	96.3	106.2	106.2	112.9	112.9	119.6	119.6	119.6	126.3	126.3	126.3	126.3
EC-i 40, 70 W	308	TSX 40 MAG/RIO	526–527	80.0	89.9	89.9	96.6	96.6	103.3	103.3	103.3	110.0	110.0	110.0	110.0
EC-i 40, 70 W	308	16 EASY/Abs./XT	509–512	80.0	89.9	89.9	96.6	96.6	103.3	103.3	103.3	110.0	110.0	110.0	110.0
EC-i 40, 70 W	308	16 RIO	519	82.8	92.7	92.7	99.4	99.4	106.1	106.1	106.1	112.8	112.8	112.8	112.8

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Planetary Gearhead GP 32 HP ∅32 mm, 4.0–8.0 Nm

High Power



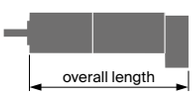
M 1:2

Technical data			
Planetary Gearhead	straight teeth		
Output shaft	stainless steel		
Bearing at output	ball bearing		
Radial play, 10 mm from flange	max. 0.14 mm		
Axial play	max. 0.4 mm		
Max. axial load (dynamic)	120 N		
Max. force for press fits	120 N		
Direction of rotation, drive to output	=		
Max. continuous input speed	8000 rpm		
Recommended temperature range	-40...+100°C		
Number of stages	2	3	4
Max. radial load, 10 mm from flange	200 N	250 N	300 N

Stock program
Standard program
Special program (on request)

			Part numbers						
			320247	326663	326664	326668	326672	324947	324952
Gearhead data									
1	Reduction		14:1	33:1	51:1	111:1	190:1	456:1	706:1
2	Absolute reduction		676/49	529/16	17576/343	13824/125	456976/2401	89401/196	15817/224
3	Max. motor shaft diameter	mm	6	3	6	4	6	3	3
	Part numbers		326659		326665	326669	324942	324948	324953
1	Reduction		18:1		66:1	123:1	246:1	492:1	762:1
2	Absolute reduction		624/35		16224/245	6877/56	421824/1715	86112/175	19044/25
3	Max. motor shaft diameter	mm	6		6	3	6	6	4
	Part numbers		326660		326666	326670	324944	324949	324954
1	Reduction		21:1		79:1	132:1	295:1	531:1	913:1
2	Absolute reduction		299/14		3887/49	3312/25	101062/343	33177/625	3650/40
3	Max. motor shaft diameter	mm	6		6	4	6	4	3
	Part numbers		326661		326667	326671	324945	324950	
1	Reduction		23:1		86:1	159:1	318:1	589:1	
2	Absolute reduction		576/25		14976/175	1587/10	389376/1225	20631/35	
3	Max. motor shaft diameter	mm	4		6	3	6	6	
	Part numbers		326662		320297		324946	324951	
1	Reduction		28:1		103:1		411:1	636:1	
2	Absolute reduction		138/5		3588/35		359424/875	79488/125	
3	Max. motor shaft diameter	mm	4		6		6	4	
4	Number of stages		2	2	3	3	4	4	4
5	Max. continuous torque	Nm	4	4	8	8	8	8	8
6	Max. intermittent torque at gear output	Nm	6	6	12	12	12	12	12
7	Max. efficiency	%	75	75	70	70	60	60	60
8	Weight	g	178	178	213	213	249	249	249
9	Average backlash no load	°	0.8	0.8	1.0	1.0	1.0	1.0	1.0
10	Mass inertia	gcm²	1.6	0.5	1.5	0.7	1.5	1.5	0.7
11	Gearhead length L1	mm	48.3	48.3	55.0	55.0	61.7	61.7	61.7





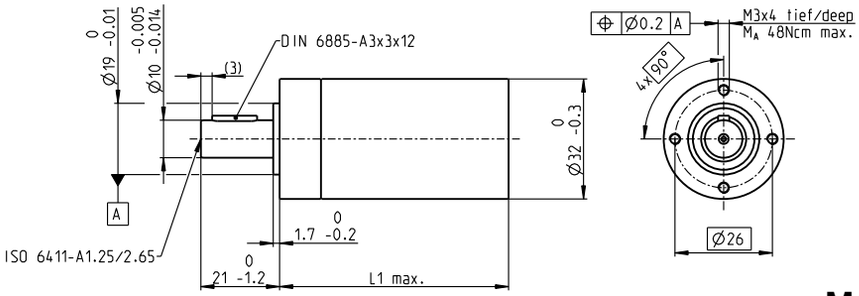
Modular system

+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts						
RE 35, 90 W	161			119.4	119.4	126.1	126.1	132.8	132.8	132.8
RE 35, 90 W	161	ENX 32 IMR	506	130.8	130.8	137.5	137.5	144.2	144.2	144.0
RE 35, 90 W	161	HED_ 5540	535/537	140.1	140.1	146.8	146.8	153.5	153.5	153.5
RE 35, 90 W	161	DCT 22	542	137.5	137.5	144.2	144.2	150.9	150.9	150.9
RE 35, 90 W	161	AB 28	587	155.5	155.5	162.2	162.2	168.9	168.9	168.9
RE 35, 90 W	161	HEDS 5540/AB 28	535/587	172.7	172.7	179.4	179.4	186.1	186.1	186.1
EC-max 30, 40 W	284			90.4	90.4	97.1	97.1	103.8	103.8	103.8
EC-max 30, 40 W	284	16 EASY/XT/Abs.	509–511	101.5	101.5	108.2	108.2	114.9	114.9	114.9
EC-max 30, 40 W	284	16 EASY Abs. XT	512	102.0	102.0	108.7	108.7	115.4	115.4	115.4
EC-max 30, 40 W	284	HEDL 5540	539	111.0	111.0	117.7	117.7	124.4	124.4	124.4
EC-max 30, 40 W	284	HEDL 5540/AB 20	539/584	146.6	146.6	153.3	153.3	160.0	160.0	160.0
EC-max 30, 60 W	285			112.4	112.4	119.1	119.1	125.8	125.8	125.8
EC-max 30, 60 W	285	16 EASY/XT/Abs.	509–511	123.5	123.5	130.2	130.2	136.9	136.9	136.9
EC-max 30, 60 W	285	16 EASY Abs. XT	512	124.0	124.0	130.7	130.7	137.4	137.4	137.4
EC-max 30, 60 W	285	HEDL 5540	539	133.0	133.0	139.7	139.7	146.4	146.4	146.4
EC-max 30, 60 W	285	AB 20	584	148.0	148.0	154.7	154.7	161.4	161.4	161.4
EC-max 30, 60 W	285	HEDL 5540/AB 20	539/584	168.6	168.6	175.3	175.3	182.0	182.0	182.0
EC-4pole 30, 100 W	293			95.4	94.5	102.1	102.1	108.8	108.8	108.8
EC-4pole 30, 100 W	293	22 EMT	518	123.3	123.3	130.0	130.0	136.7	136.7	136.7
EC-4pole 30, 100 W	293	16 EASY/XT/Abs.	509–511	109.3	109.3	116.0	116.0	122.7	122.7	122.7
EC-4pole 30, 100 W	293	16 EASY Abs. XT	512	109.8	109.8	116.5	116.5	123.2	123.7	123.7
EC-4pole 30, 100 W	293	16 RIO	519	107.8	107.8	114.5	114.5	121.2	121.2	121.2
EC-4pole 30, 100 W	293	AB 20	584	131.6	131.6	138.3	138.3	145.0	145.0	145.0
EC-4pole 30, 100 W	293	22 EMT/AB20	518/584	162.8	162.8	169.5	169.5	176.2	176.2	176.2
EC-4pole 30, 100 W	293	16 EASY/XT/Abs./AB 20	509/584	145.7	145.7	152.4	152.4	159.1	159.1	159.1
EC-4pole 30, 100 W	293	16 EASY Abs. XT/AB 20	512/584	146.2	146.2	152.9	152.9	159.6	159.6	159.6
EC-4pole 30, 100 W	293	16 RIO/AB 20	519/584	144.2	144.2	150.9	150.9	157.6	157.6	157.6
EC-4pole 30, 200 W	295			112.4	112.4	119.1	119.1	125.8	125.8	125.8
EC-4pole 30, 200 W	295	22 EMT	518	140.3	140.3	147.0	147.0	153.7	153.7	153.7
EC-4pole 30, 200 W	295	16 EASY/XT/Abs.	509–511	126.3	126.3	133.0	133.0	139.7	139.7	139.7
EC-4pole 30, 200 W	295	16 EASY Abs. XT	512	126.8	126.8	133.5	133.5	140.2	140.2	140.2

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Planetary Gearhead GP 32 HP ∅32 mm, 4.0–8.0 Nm

High Power

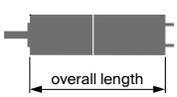


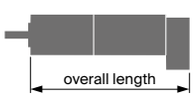
M 1:2

Technical data			
Planetary Gearhead	straight teeth		
Output shaft	stainless steel		
Bearing at output	ball bearing		
Radial play, 10 mm from flange	max. 0.14 mm		
Axial play	max. 0.4 mm		
Max. axial load (dynamic)	120 N		
Max. force for press fits	120 N		
Direction of rotation, drive to output	=		
Max. continuous input speed	8000 rpm		
Recommended temperature range	-40...+100°C		
Number of stages	2	3	4
Max. radial load, 10 mm from flange	200 N	250 N	300 N

Stock program
Standard program
Special program (on request)

			Part numbers						
			320247	326663	326664	326668	326672	324947	324952
Gearhead data									
1	Reduction		14:1	33:1	51:1	111:1	190:1	456:1	706:1
2	Absolute reduction		676/49	529/16	17576/343	13824/125	456976/2401	89401/196	158171/224
3	Max. motor shaft diameter	mm	6	3	6	4	6	3	3
	Part numbers		326659		326665	326669	324942	324948	324953
1	Reduction		18:1		66:1	123:1	246:1	492:1	762:1
2	Absolute reduction		624/35		16224/245	6877/56	421824/1715	86112/175	19044/25
3	Max. motor shaft diameter	mm	6		6	3	6	6	4
	Partnumbers		326660		326666	326670	324944	324949	324954
1	Reduction		21:1		79:1	132:1	295:1	531:1	913:1
2	Absolute reduction		299/14		3887/49	3312/25	101062/343	331776/625	3650/40
3	Max. motor shaft diameter	mm	6		6	4	6	4	3
	Part numbers		326661		326667	326671	324945	324950	
1	Reduction		23:1		86:1	159:1	318:1	589:1	
2	Absolute reduction		576/25		14976/175	1587/10	389376/1225	20631/35	
3	Max. motor shaft diameter	mm	4		6	3	6	6	
	Part numbers		326662		320297		324946	324951	
1	Reduction		28:1		103:1		411:1	636:1	
2	Absolute reduction		138/5		3588/35		359424/875	79488/125	
3	Max. motor shaft diameter	mm	4		6		6	4	
4	Number of stages		2	2	3	3	4	4	4
5	Max. continuous torque	Nm	4	4	8	8	8	8	8
6	Max. intermittent torque at gear output	Nm	6	6	12	12	12	12	12
7	Max. efficiency	%	75	75	70	70	60	60	60
8	Weight	g	178	178	213	213	249	249	249
9	Average backlash no load	°	0.8	0.8	1.0	1.0	1.0	1.0	1.0
10	Mass inertia	gcm²	1.6	0.5	1.5	0.7	1.5	1.5	0.7
11	Gearhead length L1	mm	48.3	48.3	55.0	55.0	61.7	61.7	61.7





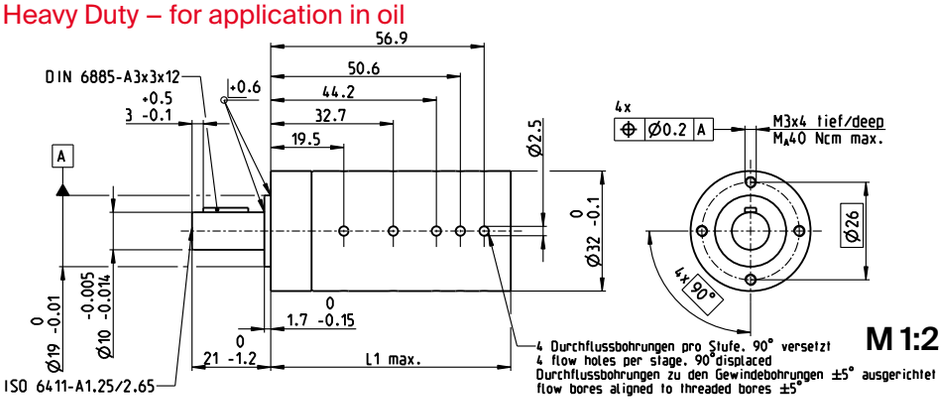
Modular system

+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts						
EC-4pole 30, 200 W	295	16 RIO	519	124.8	124.8	131.5	131.5	138.2	138.2	138.2
EC-4pole 30, 200 W	295	AB 20	584	148.6	148.6	155.3	155.3	162.0	162.0	162.0
EC-4pole 30, 200 W	295	22 EMT/AB 20	518/584	179.8	179.8	186.5	186.5	193.2	193.2	193.2
EC-4pole 30, 200 W	295	16 EASY/XT/Abs./AB 20	509/584	162.7	162.7	169.4	169.4	176.1	176.1	176.1
EC-4pole 30, 200 W	295	16 EASY Abs. XT/AB 20	512/584	163.2	163.2	169.9	169.9	176.6	176.6	176.6
EC-4pole 30, 200 W	295	16 RIO/AB 20	519/584	161.2	161.2	167.9	167.9	174.6	174.6	174.6

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Planetary Gearhead GP 32 HD ∅32 mm, 3.0–8.0 Nm

Heavy Duty – for application in oil



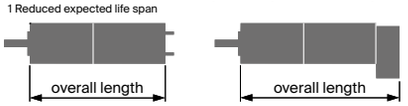
Technical data	
Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	ball bearing
Radial play, 10 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	< 8000 rpm
Recommended temperature range	-55...+200°C
Extended range as option	-55...+260°C

Number of stages	1	2	3	4	5
Max. radial load, 10 mm from flange	120 N	200 N	250 N	300 N	300 N

Stock program
Standard program
Special program (on request)

			Part numbers									
			526077	526080	526086	526092	526095	526101	526106	526112	526117	526123
Gearhead data (provisional)												
1	Reduction		3.7:1	14:1	51:1	123:1	190:1	492:1	707:1	1694:1	2548:1	4060:1
2	Absolute reduction		26/7	676/49	17576/343	6877/56	456976/2401	86112/175	11881376/16807	1162213/686	7962624/3125	3637933/896
3	Max. motor shaft diameter	mm	6	6	6	3	6	6	6	6	4	6
	Part numbers		526078	526081	526087	526093	526096	526102	526107	526113	526118	526124
1	Reduction		4.8:1	18:1	66:1	132:1	246:1	531:1	914:1	1828:1	2623:1	4380:1
2	Absolute reduction		24/5	624/35	16224/245	3312/25	421824/1715	331776/625	10967424/12005	2238912/1225	2056223/784	109503/25
3	Max. motor shaft diameter	mm	4	6	6	4	6	4	6	6	6	4
	Part numbers		526079*	526082	526088	526094*	526097	526103	526108	526114	526119	526125
1	Reduction		5.8:1	21:1	79:1	159:1	295:1	589:1	1094:1	1972:1	2829:1	5247:1
2	Absolute reduction		23/4	299/14	3887/49	1587/10	101062/343	20631/35	2627612/2401	8626176/4375	495144/175	839523/160
3	Max. motor shaft diameter	mm	3	6	6	3	6	6	6	4	6	4
	Part numbers			526083	526089		526098	526104	526109	526115	526120	526126*
1	Reduction			23:1	86:1		318:1	636:1	1181:1	2189:1	3052:1	6285:1
2	Absolute reduction			576/25	14976/175		389376/1225	79488/125	10123776/8575	536406/245	1907712/625	6436343/1024
3	Max. motor shaft diameter	mm		4	6		6	4	6	6	4	3
	Part numbers			526084	526090		526099	526105	526110	526116	526121	
1	Reduction			28:1	103:1		411:1	762:1	1414:1	2362:1	3389:1	
2	Absolute reduction			138/5	3588/35		359424/875	19044/25	2425488/1715	2066688/875	474513/140	
3	Max. motor shaft diameter	mm		4	6		6	4	6	6	6	
	Part numbers			526085*	526091		526100		526111		526122	
1	Reduction			33:1	111:1		456:1		1526:1		3656:1	
2	Absolute reduction			529/16	13824/125		8940/196		9345024/6125		457056/125	
3	Max. motor shaft diameter	mm		3	4		6		4		4	
4	Number of stages		1	2	3	3	4	4	5	5	5	5
5	Max. continuous torque	Nm	3	4	8	8	8	8	8	8	8	8
6	Max. intermittent torque at gear output	Nm	4.5	6	12	12	12	12	12	12	12	12
15	Max. overload torque[1]	Nm	9	12	24	24	24	24	24	24	24	24
7	Max. efficiency	%	95	87	78	78	65	65	53	53	53	53
8	Weight	g	176	234	277	277	309	309	340	340	340	340
9	Average backlash no load	°	0.7	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
10	Mass inertia	gcm²	1.59	1.59	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
11	Gearhead length L1	mm	32.9	45.3	55.1	55.1	61.6	61.6	68.1	68.1	68.1	68.1
13	Max. transmittable power (continuous)	W	320	200	80	80	40	40	12	12	12	12
14	Max. transmittable power (intermittent)	W	480	300	120	120	60	60	18	18	18	18

1 Reduced expected life span



Modular system

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts									
EC-4pole 32 HD oil, A	297			194.0	206.5	216.5	216.5	223.0	223.0	229.5	229.5	229.5	229.5
EC-4pole 32 HD oil, B	297			174.0	186.5	196.5	196.5	203.0	203.0	209.5	209.5	209.5	209.5

*Overall length + 2 mm

Application

General
- extreme temperature applications
- vibration tested according to MIL-STD810F/ Jan2000 Fig. 514.5C-10
- operation in oil and high pressure

Oil & Gas Industry
- oil, gas and geothermal wells

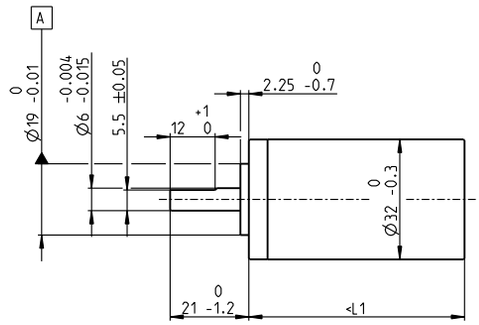
Important Notice

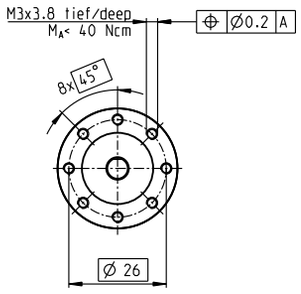
This gearhead has been designed for applications in oil and is only equipped with minimum lubrication. Therefore it is not permitted to use it under normal air conditions.

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Koaxdrive KD 32 ∅32 mm, 1.0–4.5 Nm

Low Noise





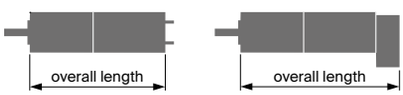
M 1:2

Technical data			
Planetary Gearhead	special toothing		
Output shaft	stainless steel		
Bearing at output	ball bearing		
Radial play, 5 mm from flange	max. 0.14 mm		
Axial play	max. 0.4 mm		
Max. axial load (dynamic)	120 N		
Max. force for press fits	120 N		
Direction of rotation, drive to output	=		
Max. continuous input speed	8000 rpm		
Recommended temperature range	-15...+80°C		
Number of stages	1	2	3
Max. radial load, 10 mm from flange	90 N	140 N	200 N

Option: higher reduction ratio on request

Stock program
Standard program
Special program (on request)

Part numbers	354722	354725	354962	354730	354731	354734	354737	354963	354742
Gearhead data									
1 Reduction	11:1	41:1	82:1	158:1	152:1	253:1	392:1	705:1	1091:1
2 Absolute reduction	11/1	286/7	408/5	792/5	7436/49	6336/25	9792/25	9867/14	17457/16
7 Max. efficiency %	78	70	65	61	63	63	59	55	55
10 Mass inertia gcm²	0.65	0.60	0.60	0.35	0.60	0.60	0.35	0.35	0.22
Part numbers	354723	354726	354728	354744	354732	354735	354738	354740	
1 Reduction	17:1	53:1	98:1	190:1	196:1	304:1	455:1	760:1	
2 Absolute reduction	17/1	264/5	391/4	759/4	6864/35	1518/5	22308/49	19008/25	
7 Max. efficiency %	72	70	65	65	63	63	55	55	
10 Mass inertia gcm²	0.38	0.60	0.35	0.35	0.60	0.60	0.22	0.22	
Part numbers	354724	354727	354729		354733	354736	354739	354741	
1 Reduction	33:1	63:1	123:1		235:1	364:1	588:1	911:1	
2 Absolute reduction	33/1	442/7	858/7		11492/49	5819/16	20592/35	4554/5	
7 Max. efficiency %	68	70	61		63	63	59	55	
10 Mass inertia gcm²	0.65	0.60	0.22		0.60	0.60	0.35	0.22	
3 Max. motor shaft diameter mm	3	3	3	3	3	3	3	3	3
4 Number of stages	1	2	2	2	3	3	3	3	3
5 Max. continuous torque Nm	1	3.5	3.5	3.5	4.5	4.5	4.5	4.5	4.5
6 Max. intermittent torque at gear output Nm	1.25	4.4	4.4	4.4	6.5	6.5	6.5	6.5	6.5
8 Weight g	130	230	230	230	262	262	262	262	262
9 Average backlash no load °	3.5	1	1	1	1	1	1	1	1
11 Gearhead length L1 mm	40.7	57.9	57.9	57.9	67.6	67.6	67.6	67.6	67.6



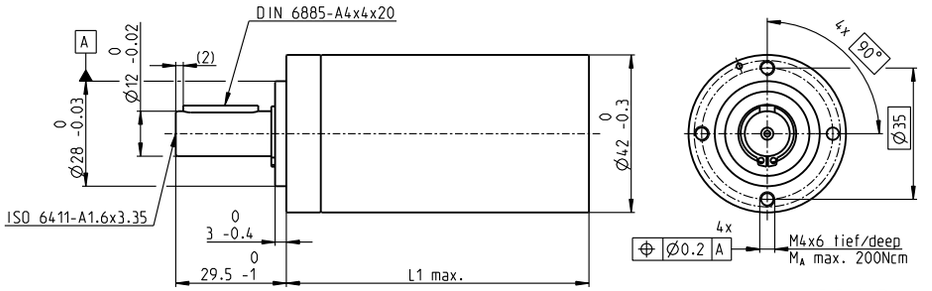
Modular system

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts								
RE 25	156/158			95.3	112.5	112.5	112.5	122.2	122.2	122.2	122.2	122.2
RE 25	156/158	ENX 25 IMR	505	106.3	123.5	123.5	123.5	133.2	133.2	133.2	133.2	133.2
RE 25	156/158	HED_5540	535/537	116.1	133.3	133.3	133.3	143.0	143.0	143.0	143.0	143.0
RE 25	156/158	DCT 22	542	117.6	134.8	134.8	134.8	144.5	144.5	144.5	144.5	144.5
RE 25, 20 W	157			83.8	101.0	101.0	101.0	110.7	110.7	110.7	110.7	110.7
RE 25, 20 W	157	ENX 25 IMR	505	94.8	112.0	112.0	112.0	121.7	121.7	121.7	121.7	121.7
RE 25, 20 W	157	HED_5540	536/537	104.6	121.8	121.8	121.8	131.5	131.5	131.5	131.5	131.5
RE 25, 20 W	157	DCT 22	542	106.1	123.3	123.3	123.3	133.0	133.0	133.0	133.0	133.0
RE 25, 20 W	157	AB 28	587	117.9	135.1	135.1	135.1	144.8	144.8	144.8	144.8	144.8
RE 25, 20 W	157	HED_5540/AB 28	536/587	135.1	152.3	152.3	152.3	162.0	162.0	162.0	162.0	162.0
RE 30, 60 W	160			108.8	126.0	126.0	126.0	135.7	135.7	135.7	135.7	135.7
RE 30, 60 W	160	ENX 32 IMR	506	120.2	137.4	137.4	137.4	147.1	147.1	147.1	147.1	147.1
RE 30, 60 W	160	HEDL 5540	537	129.6	146.8	146.8	146.8	156.5	156.5	156.5	156.5	156.5
EC-max 22, 12 W	282			72.8	89.9	89.9	89.9	99.6	99.6	99.6	99.6	99.6
EC-max 22, 12 W	282	16 EASY/XT/Abs.	509–511	82.4	99.5	99.5	99.5	109.2	109.2	109.2	109.2	109.2
EC-max 22, 12 W	282	16 EASY Abs. XT	512	82.9	100.0	100.0	100.0	109.7	109.7	109.7	109.7	109.7
EC-max 22, 12 W	282	AB 20	584	108.4	125.5	125.5	125.5	135.2	135.2	135.2	135.2	135.2
EC-max 22, 25 W	283			89.3	106.4	106.4	106.4	116.1	116.1	116.1	116.1	116.1
EC-max 22, 25 W	283	16 EASY/XT/Abs.	509–511	89.9	116.0	116.0	116.0	125.7	125.7	125.7	125.7	125.7
EC-max 22, 25 W	283	16 EASY Abs. XT	512	90.4	116.5	116.5	116.5	126.2	126.2	126.2	126.2	126.2
EC-max 22, 25 W	283	AB 20	584	124.9	142.0	142.0	142.0	151.7	151.7	151.7	151.7	151.7
EC-max 30, 40 W	284			82.8	99.9	99.9	99.9	109.6	109.6	109.6	109.6	109.6
EC-max 30, 40 W	284	16 EASY/XT/Abs.	509–511	93.9	111.0	111.0	111.0	120.7	120.7	120.7	120.7	120.7
EC-max 30, 40 W	284	16 EASY Abs. XT	512	94.4	111.5	111.5	111.5	121.2	121.2	121.2	121.2	121.2
EC-max 30, 40 W	284	HEDL 5540	539	103.4	120.5	120.5	120.5	130.2	130.2	130.2	130.2	130.2
EC-max 30, 40 W	284	AB 20	584	118.4	135.5	135.5	135.5	145.2	145.2	145.2	145.2	145.2
EC-max 30, 40 W	284	HEDL 5540/AB 20	539/584	139.0	156.1	156.1	156.1	165.8	165.8	165.8	165.8	165.8
EC-max 30, 60 W	285			104.8	121.9	121.9	121.9	131.6	131.6	131.6	131.6	131.6
EC-max 30, 60 W	285	16 EASY/XT/Abs.	509–511	115.9	133.0	133.0	133.0	142.7	142.7	142.7	142.7	142.7
EC-max 30, 60 W	285	16 EASY Abs. XT	512	116.4	133.5	133.5	133.5	143.2	143.2	143.2	143.2	143.2
EC-max 30, 60 W	285	HEDL 5540	539	125.4	142.5	142.5	142.5	152.2	152.2	152.2	152.2	152.2
EC-max 30, 60 W	285	AB 20	584	140.4	157.5	157.5	157.5	167.2	167.2	167.2	167.2	167.2
EC-max 30, 60 W	285	HEDL 5540/AB 20	539/584	161.0	178.1	178.1	178.1	187.8	187.8	187.8	187.8	187.8

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Planetary Gearhead GP 42 A ∅42 mm, 2.25–11.3 Nm

NEW



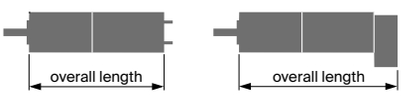
M 1:2

Technical data					
Planetary Gearhead					straight teeth
Output shaft					stainless steel
Bearing at output					preloaded ball bearings
Radial play, 12 mm from flange					max. 0.06 mm
Axial play at axial load	< 5 N				0 mm
	> 5 N				max. 0.3 mm
Max. axial load (dynamic)					150 N
Max. force for press fits					300 N
Direction of rotation, drive to output					=
Max. continuous input speed					6000 rpm
Recommended temperature range					-40...+100°C
Number of stages	1	2	3	4	
Max. radial load, 12 mm from flange	120 N	240 N	360 N	360 N	

Stock program
Standard program
Special program (on request)

			Part numbers									
			838267	838259	838250	838271	838257	838249	838246	838245	838263	838240
Gearhead data												
1	Reduction		3.5:1	12:1	26:1	43:1	81:1	156:1	150:1	285:1	441:1	756:1
2	Absolute reduction		7/2	49/4	26	343/8	2197/27	156	240 1/16	15379/54	441	756
10	Mass inertia	gcm²	14	15	9.1	15	9.4	9.1	15	15	14	14
3	Max. motor shaft diameter	mm	10	10	8	10	8	8	10	10	10	10
	Part numbers		838252	838244	838260*	838262	838269	838247*	838265	838264	838255	838242
1	Reduction		4.3:1	15:1	36:1	53:1	91:1	216:1	186:1	319:1	488:1	936:1
2	Absolute reduction		13/3	91/6	36/1	637/12	91	216/1	4459/24	637/2	439/9	936
10	Mass inertia	gcm²	9.1	15	5.0	15	15	5.0	15	15	9.4	9.1
3	Max. motor shaft diameter	mm	8	10	4	10	10	4	10	10	8	8
	Part numbers		838268*	838272		838254	838243		838266	838258	838256	838239*
1	Reduction		6:1	19:1		66:1	113:1		230:1	353:1	546:1	1296:1
2	Absolute reduction		6/1	169/9		1183/18	338/3		8281/36	28561/81	546	1296/1
10	Mass inertia	gcm²	4.9	9.4		15	9.4		15	9.4	14	5.0
3	Max. motor shaft diameter	mm	4	8		10	8		10	8	10	4
	Part numbers			838248		838251	838253		838261	838241	838270	
1	Reduction			21:1		74:1	126:1		257:1	394:1	676:1	
2	Absolute reduction			21		147/2	126		1029/4	1183/3	676	
10	Mass inertia	gcm²		14		15	14		15	15	9.1	
3	Max. motor shaft diameter	mm		10		10	10		10	10	8	
4	Number of stages		1	2	2	3	3	3	4	4	4	4
5	Max. continuous torque	Nm	2.25	5.6	5.6	11.3	11.3	11.3	11.3	11.3	11.3	11.3
6	Max. intermittent torque at gear output	Nm	3.40	8.5	8.5	19.9	19.9	19.9	19.9	19.9	19.9	19.9
7	Max. efficiency	%	90	81	81	72	72	72	64	64	64	64
8	Weight	g	260	360	360	460	460	460	560	560	560	560
9	Average backlash no load	°	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
11	Gearhead length L1**	mm	41.0	55.5	55.5	70.0	70.0	70.0	84.5	84.5	84.5	84.5

*no combination with EC 45 (150/250 W) and EC-i 40



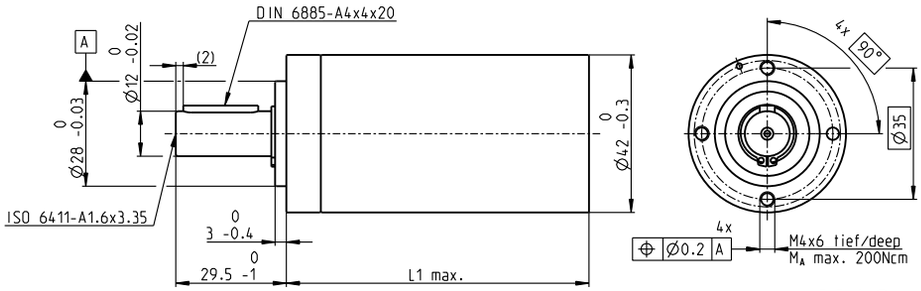
Modular system

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts									
RE 35, 90 W	161					112.1	126.6	126.6	141.1	141.1	141.1	155.6	155.6	155.6	155.6
RE 35, 90 W	161	ENX 32 IMR	506			123.5	138.0	138.0	152.5	152.5	152.5	167.0	167.0	167.0	167.0
RE 35, 90 W	161	HED_5540	535/537			132.8	147.3	147.3	161.8	161.8	161.8	176.3	176.3	176.3	176.3
RE 35, 90 W	161	DCT 22	542			130.2	144.7	144.7	159.2	159.2	159.2	173.7	173.7	173.7	173.7
RE 35, 90 W	161			AB 28	587	148.2	162.7	162.7	177.2	177.2	177.2	191.7	191.7	191.7	191.7
RE 35, 90 W	161	HED_5540	535/537	AB 28	587	165.4	179.9	179.9	194.4	194.4	194.4	208.9	208.9	208.9	208.9
RE 40, 150 W	163					112.1	126.6	126.6	141.1	141.1	141.1	155.6	155.6	155.6	155.6
RE 40, 150 W	163	ENX 32 IMR	506			123.5	138.0	138.0	152.5	152.5	152.5	167.0	167.0	167.0	167.0
RE 40, 150 W	163	HED_5540	535/537			132.8	147.3	147.3	161.8	161.8	161.8	176.3	176.3	176.3	176.3
RE 40, 150 W	163	HEDL 9140	540			166.2	180.7	180.7	195.2	195.2	195.2	209.7	209.7	209.7	209.7
RE 40, 150 W	163			AB 28	587	148.2	162.7	162.7	177.2	177.2	177.2	191.7	191.7	191.7	191.7
RE 40, 150 W	163			AB 28	588	156.2	170.7	170.7	185.2	185.2	185.2	199.7	199.7	199.7	199.7
RE 40, 150 W	163	HED_5540	535/537	AB 28	587	165.4	179.9	179.9	194.4	194.4	194.4	208.9	208.9	208.9	208.9
RE 40, 150 W	163	HEDL 9140	540	AB 28	588	176.7	191.2	191.2	205.7	205.7	205.7	220.2	220.2	220.2	220.2
EC 40, 170 W	272					121.1	135.6	135.6	150.1	150.1	150.1	164.6	164.6	164.6	164.6
EC 40, 170 W	272	HED_5540	536/538			144.5	159.0	159.0	173.5	173.5	173.5	188.0	188.0	188.0	188.0
EC 40, 170 W	272	Res 26	543			148.3	162.8	162.8	177.3	177.3	177.3	191.8	191.8	191.8	191.8
EC 40, 170 W	272			AB 32	589	163.8	178.3	178.3	192.8	192.8	192.8	207.3	207.3	207.3	207.3
EC 40, 170 W	272	HED_5540	536/538	AB 32	589	182.2	196.7	196.7	211.2	211.2	211.2	225.7	225.7	225.7	225.7
EC 45, 150 W	273					152.3	166.8	166.8	181.3	181.3	181.3	195.8	195.8	195.8	195.8
EC 45, 150 W	273	HEDL 9140	540			167.9	182.4	182.4	196.9	196.9	196.9	211.4	211.4	211.4	211.4
EC 45, 150 W	273	Res 26	543			152.3	166.8	166.8	181.3	181.3	181.3	195.8	195.8	195.8	195.8
EC 45, 150 W	273			AB 28	588	159.7	174.2	174.2	188.7	188.7	188.7	203.2	203.2	203.2	203.2
EC 45, 150 W	273	HEDL 9140	540	AB 28	588	176.7	191.2	191.2	205.7	205.7	205.7	220.2	220.2	220.2	220.2
EC 45, 250 W	274					185.1	199.6	199.6	214.1	214.1	214.1	228.6	228.6	228.6	228.6
EC 45, 250 W	274	HEDL 9140	540			200.7	215.2	215.2	229.7	229.7	229.7	244.2	244.2	244.2	244.2
EC 45, 250 W	274	Res 26	543			185.1	199.6	199.6	214.1	214.1	214.1	228.6	228.6	228.6	228.6
EC 45, 250 W	274			AB 28	588	192.5	207.0	207.0	221.5	221.5	221.5	236.0	236.0	236.0	236.0
EC 45, 250 W	274	HEDL 9140	540	AB 28	588	209.5	224.0	224.0	238.5	238.5	238.5	253.0	253.0	253.0	253.0

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Planetary Gearhead GP 42 A ∅42 mm, 2.25–11.3 Nm

NEW



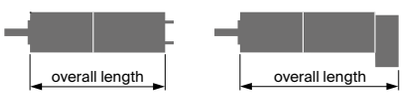
M 1:2

Technical data				
Planetary Gearhead	straight teeth			
Output shaft	stainless steel			
Bearing at output	preloaded ball bearings			
Radial play, 12 mm from flange	max. 0.06 mm			
Axial play at axial load	< 5 N	0 mm		
	> 5 N	max. 0.3 mm		
Max. axial load (dynamic)	150 N			
Max. force for press fits	300 N			
Direction of rotation, drive to output	=			
Max. continuous input speed	6000 rpm			
Recommended temperature range	-40...+100°C			
Number of stages	1	2	3	4
Max. radial load, 12 mm from flange	120 N	240 N	360 N	360 N

Stock program
Standard program
Special program (on request)

			Part numbers									
			838267	838259	838250	838271	838257	838249	838246	838245	838263	838240
Gearhead data												
1	Reduction		3.5:1	12:1	26:1	43:1	81:1	156:1	150:1	285:1	441:1	756:1
2	Absolute reduction		7/2	49/4	26	343/8	2197/27	156	2401/16	15379/54	441	756
10	Mass inertia	gcm²	14	15	9.1	15	9.4	9.1	15	15	14	14
3	Max. motor shaft diameter	mm	10	10	8	10	8	8	10	10	10	10
	Part numbers		838252	838244	838260*	838262	838269	838247*	838265	838264	838255	838242
1	Reduction		4.3:1	15:1	36:1	53:1	91:1	216:1	186:1	319:1	488:1	936:1
2	Absolute reduction		13/3	91/6	36/1	637/12	91	216/1	4459/24	637/2	4394/9	936
10	Mass inertia	gcm²	9.1	15	5.0	15	15	5.0	15	15	9.4	9.1
3	Max. motor shaft diameter	mm	8	10	4	10	10	4	10	10	8	8
	Part numbers		838268*	838272		838254	838243		838266	838258	838256	838239*
1	Reduction		6:1	19:1		66:1	113:1		230:1	353:1	546:1	1296:1
2	Absolute reduction		6/1	169/9		1183/18	338/3		8281/36	28561/81	546	1296/1
10	Mass inertia	gcm²	4.9	9.4		15	9.4		15	9.4	14	5.0
3	Max. motor shaft diameter	mm	4	8		10	8		10	8	10	4
	Part numbers			838248		838251	838253		838261	838241	838270	
1	Reduction			21:1		74:1	126:1		257:1	394:1	676:1	
2	Absolute reduction			21		147/2	126		1029/4	1183/3	676	
10	Mass inertia	gcm²		14		15	14		15	15	9.1	
3	Max. motor shaft diameter	mm		10		10	10		10	10	8	
4	Number of stages		1	2	2	3	3	3	4	4	4	4
5	Max. continuous torque	Nm	2.25	5.6	5.6	11.3	11.3	11.3	11.3	11.3	11.3	11.3
6	Max. intermittent torque at gear output	Nm	3.40	8.5	8.5	19.9	19.9	19.9	19.9	19.9	19.9	19.9
7	Max. efficiency	%	90	81	81	72	72	72	64	64	64	64
8	Weight	g	260	360	360	460	460	460	560	560	560	560
9	Average backlash no load	°	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
11	Gearhead length L1**	mm	41.0	55.5	55.5	70.0	70.0	70.0	84.5	84.5	84.5	84.5

*no combination with EC 45 (150/250 W) and EC-i 40



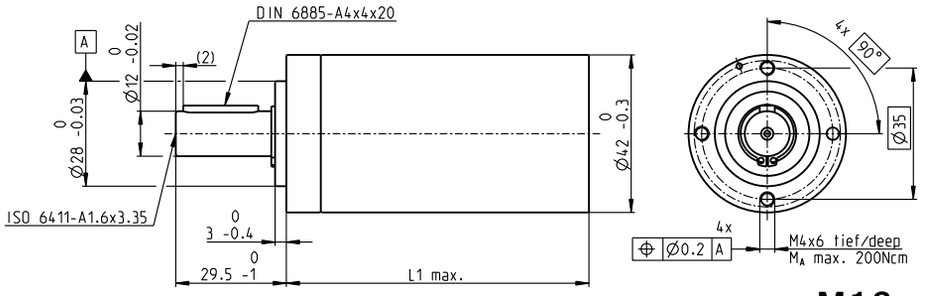
Modular system

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts									
EC-max 30, 60 W	285					105.1	119.6	119.6	134.1	134.1	134.1	148.6	148.6	148.6	148.6
EC-max 30, 60 W	285	16 EASY/XT/Abs.	509–511			116.2	130.7	130.7	145.2	145.2	145.2	159.7	159.7	159.7	159.7
EC-max 30, 60 W	285	16 EASY Abs. XT	512			116.7	131.2	131.2	145.7	145.7	145.7	160.2	160.2	160.2	160.2
EC-max 30, 60 W	285	HEDL 5540	539			125.7	140.2	140.2	154.7	154.7	154.7	169.2	169.2	169.2	169.2
EC-max 30, 60 W	285			AB 20	584	140.7	155.2	155.2	169.7	169.7	169.7	184.2	184.2	184.2	184.2
EC-max 30, 60 W	285	HEDL 5540	539	AB 20	584	161.3	175.8	175.8	190.3	190.3	190.3	204.8	204.8	204.8	204.8
EC-max 40, 70 W	286					99.1	113.6	113.6	128.1	128.1	128.1	142.6	142.6	142.6	142.6
EC-max 40, 70 W	286	16 EASY/XT/Abs.	509–511			110.0	124.5	124.5	139.0	139.0	139.0	153.5	153.5	153.5	153.5
EC-max 40, 70 W	286	16 EASY Abs. XT	512			110.5	125.0	125.0	139.5	139.5	139.5	154.0	154.0	154.0	154.0
EC-max 40, 70 W	286	HEDL 5540	539			122.5	137.0	137.0	151.5	151.5	151.5	166.0	166.0	166.0	166.0
EC-max 40, 70 W	286			AB 28	586	133.5	148.0	148.0	162.5	162.5	162.5	177.0	177.0	177.0	177.0
EC-max 40, 70 W	286	HEDL 5540	539	AB 28	586	151.8	166.3	166.3	180.8	180.8	180.8	195.3	195.3	195.3	195.3
EC-max 40, 120 W	287					129.1	143.6	143.6	158.1	158.1	158.1	172.6	172.6	172.6	172.6
EC-max 40, 120 W	287	16 EASY/XT/Abs.	509–511			140.0	154.5	154.5	169.0	169.0	169.0	183.5	183.5	183.5	183.5
EC-max 40, 120 W	287	16 EASY Abs. XT	512			140.5	155.0	155.0	169.5	169.5	169.5	184.0	184.0	184.0	184.0
EC-max 40, 120 W	287	HEDL 5540	539			152.5	167.0	167.0	181.5	181.5	181.5	196.0	196.0	196.0	196.0
EC-max 40, 120 W	287			AB 28	586	163.5	178.0	178.0	192.5	192.5	192.5	207.0	207.0	207.0	207.0
EC-max 40, 120 W	287	HEDL 5540	539	AB 28	586	181.8	196.3	196.3	210.8	210.8	210.8	225.3	225.3	225.3	225.3
EC-4pole 30, 100 W	293					88.1	102.6	102.6	117.1	117.1	117.1	131.6	131.6	131.6	131.6
EC-4pole 30, 100 W	293	ENX 22 EMT	518			116.0	130.5	130.5	145.0	145.0	145.0	159.5	159.5	159.5	159.5
EC-4pole 30, 100 W	293	16 EASY/XT/Abs.	509–511			102.0	116.5	116.5	131.0	131.0	131.0	145.5	145.5	145.5	145.5
EC-4pole 30, 100 W	293	16 EASY Abs. XT	512			102.5	117.0	117.0	131.5	131.5	131.5	146.0	146.0	146.0	146.0
EC-4pole 30, 100 W	293	16 RIO	519			100.5	115.0	115.0	129.5	129.5	129.5	144.0	144.0	144.0	144.0
EC-4pole 30, 100 W	293			AB 20	584	124.3	138.8	138.8	153.3	153.3	153.3	167.8	167.8	167.8	167.8
EC-4pole 30, 100 W	293	ENX 22 EMT	518	AB 20	584	155.5	170.0	170.0	184.5	184.5	184.5	199.0	199.0	199.0	199.0
EC-4pole 30, 100 W	293	16 EASY/XT/Abs.	509–511	AB 20	584	138.4	152.9	152.9	167.4	167.4	167.4	181.9	181.9	181.9	181.9
EC-4pole 30, 100 W	293	16 EASY Abs. XT	512	AB 20	584	138.9	153.4	153.4	167.9	167.9	167.9	182.4	182.4	182.4	182.4
EC-4pole 30, 100 W	293	16 RIO	519	AB 20	584	136.9	151.4	151.4	165.9	165.9	165.9	180.4	180.4	180.4	180.4
EC-4pole 30, 200 W	295					105.1	119.6	119.6	134.1	134.1	134.1	148.6	148.6	148.6	148.6

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Planetary Gearhead GP 42 A ∅42 mm, 2.25–11.3 Nm

NEW



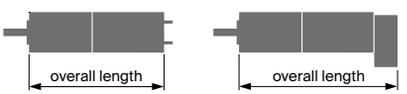
M 1:2

Technical data				
Planetary Gearhead				straight teeth
Output shaft				stainless steel
Bearing at output				preloaded ball bearings
Radial play, 12 mm from flange				max. 0.06 mm
Axial play at axial load	< 5 N			0 mm
	> 5 N			max. 0.3 mm
Max. axial load (dynamic)				150 N
Max. force for press fits				300 N
Direction of rotation, drive to output				=
Max. continuous input speed				6000 rpm
Recommended temperature range				-40...+100°C
Number of stages	1	2	3	4
Max. radial load, 12 mm from flange	120 N	240 N	360 N	360 N

Stock program
Standard program
Special program (on request)

			Part numbers									
			838267	838259	838250	838271	838257	838249	838246	838245	838263	838240
Gearhead data												
1	Reduction		3.5:1	12:1	26:1	43:1	81:1	156:1	150:1	285:1	441:1	756:1
2	Absolute reduction		7/2	49/4	26	343/8	2197/27	156	2401/16	15379/54	441	756
10	Mass inertia	gcm²	14	15	9.1	15	9.4	9.1	15	15	14	14
3	Max. motor shaft diameter	mm	10	10	8	10	8	8	10	10	10	10
	Part numbers		838252	838244	838260*	838262	838269	838247*	838265	838264	838255	838242
1	Reduction		4.3:1	15:1	36:1	53:1	91:1	216:1	186:1	319:1	488:1	936:1
2	Absolute reduction		13/3	91/6	36/1	637/12	91	216/1	4459/24	637/2	439/9	936
10	Mass inertia	gcm²	9.1	15	5.0	15	15	5.0	15	15	9.4	9.1
3	Max. motor shaft diameter	mm	8	10	4	10	10	4	10	10	8	8
	Part numbers		838268*	838272		838254	838243		838266	838258	838256	838239*
1	Reduction		6:1	19:1		66:1	113:1		230:1	353:1	546:1	1296:1
2	Absolute reduction		6/1	169/9		1183/18	338/3		8281/36	28561/81	546	1296/1
10	Mass inertia	gcm²	4.9	9.4		15	9.4		15	9.4	14	5.0
3	Max. motor shaft diameter	mm	4	8		10	8		10	8	10	4
	Part numbers			838248		838251	838253		838261	838241	838270	
1	Reduction			21:1		74:1	126:1		257:1	394:1	676:1	
2	Absolute reduction			21		147/2	126		1029/4	1183/3	676	
10	Mass inertia	gcm²		14		15	14		15	15	9.1	
3	Max. motor shaft diameter	mm		10		10	10		10	10	8	
4	Number of stages		1	2	2	3	3	3	4	4	4	4
5	Max. continuous torque	Nm	2.25	5.6	5.6	11.3	11.3	11.3	11.3	11.3	11.3	11.3
6	Max. intermittent torque at gear output	Nm	3.40	8.5	8.5	19.9	19.9	19.9	19.9	19.9	19.9	19.9
7	Max. efficiency	%	90	81	81	72	72	72	64	64	64	64
8	Weight	g	260	360	360	460	460	460	560	560	560	560
9	Average backlash no load	°	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
11	Gearhead length L1**	mm	41.0	55.5	55.5	70.0	70.0	70.0	84.5	84.5	84.5	84.5

*no combination with EC 45 (150/250 W) and EC-i 40



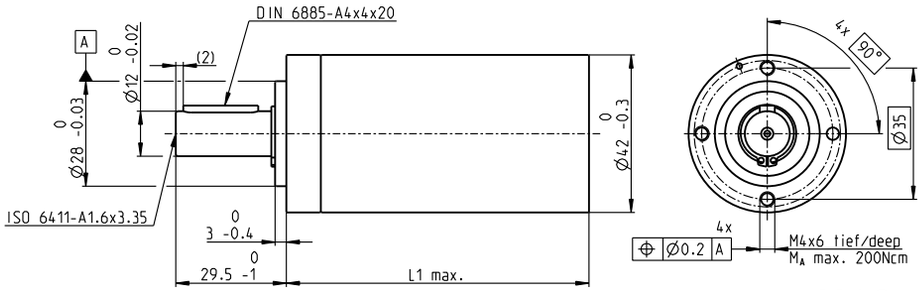
Modular system

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts									
EC-4pole 30, 200 W	295	ENX 22 EMT	518			133.0	147.5	147.5	162.0	162.0	162.0	176.5	176.5	176.5	176.5
EC-4pole 30, 200 W	295	16 EASY/XT/Abs.	509–511			119.0	133.5	133.5	148.0	148.0	148.0	162.5	162.5	162.5	162.5
EC-4pole 30, 200 W	295	16 EASY Abs. XT	512			119.5	134.0	134.0	148.5	148.5	148.5	163.0	163.0	163.0	163.0
EC-4pole 30, 200 W	295	16 RIO	519			117.5	132.0	132.0	146.5	146.5	146.5	161.0	161.0	161.0	161.0
EC-4pole 30, 200 W	295			AB 20	584	141.3	155.8	155.8	170.3	170.3	170.3	184.8	184.8	184.8	184.8
EC-4pole 30, 200 W	295	ENX 22 EMT	518	AB 20	584	172.5	187.0	187.0	201.5	201.5	205.1	216.0	261.0	216.0	216.0
EC-4pole 30, 200 W	295	16 EASY/XT/Abs.	509–511	AB 20	584	155.4	169.9	169.9	184.4	184.4	184.4	198.9	198.9	198.9	198.9
EC-4pole 30, 200 W	295	16 EASY Abs. XT	512	AB 20	584	155.9	170.4	170.4	184.9	184.9	184.9	199.4	199.4	199.4	199.4
EC-4pole 30, 200 W	295	16 RIO	519	AB 20	584	153.9	168.4	168.4	182.9	182.9	182.9	197.4	197.4	197.4	197.4
EC-i 40, 50 W	306/307					67.1	81.6	81.6	96.1	96.1	96.1	110.6	110.6	110.6	110.6
EC-i 40, 50 W	306/307	ENX 22 EMT	518			95.1	109.6	109.6	124.1	124.1	124.1	138.6	138.6	138.6	138.6
EC-i 40, 50 W	306/307	TSX 40 MAG/RIO	526–527			78.8	93.3	93.3	107.8	107.8	107.8	122.3	122.3	122.3	122.3
EC-i 40, 50 W	306/307	16 EASY/Abs.	509/511			78.8	93.3	93.3	107.8	107.8	107.8	122.3	122.3	122.3	122.3
EC-i 40, 50 W	306/307	16 RIO	519			81.6	96.1	96.1	110.6	110.6	110.6	125.1	125.1	125.1	125.1
EC-i 40, 70 W	308/309					77.1	91.6	91.6	106.1	106.1	106.1	120.6	120.6	120.6	120.6
EC-i 40, 70 W	308/309	ENX 22 EMT	518			105.1	119.6	119.6	134.1	134.1	134.1	148.6	148.6	148.6	148.6
EC-i 40, 70 W	308/309	TSX 40 MAG/RIO	526–527			88.8	103.8	103.8	117.8	117.8	117.8	132.3	132.3	132.3	132.3
EC-i 40, 70 W	308/309	16 EASY/Abs.	509/511			88.8	103.3	103.3	117.8	117.8	117.8	132.3	132.3	132.3	132.3
EC-i 40, 70 W	308/309	16 RIO	519			91.6	106.1	106.1	120.6	120.6	120.6	135.1	135.1	135.1	135.1
EC-i 40, 100 W	310					97.1	111.6	111.6	126.1	126.1	126.1	140.6	140.6	140.6	140.6
EC-i 40, 100 W	310	ENX 22 EMT	518			125.1	139.6	139.6	154.1	154.1	154.1	168.6	168.6	168.6	168.6
EC-i 40, 100 W	310	TSX 40 MAG/RIO	526–527			108.8	123.3	123.3	137.8	137.8	137.8	152.3	152.3	152.3	152.3
EC-i 40, 100 W	310	16 EASY/XT/Abs.	509–511			108.8	123.3	123.3	137.8	137.8	137.8	152.3	152.3	152.3	152.3
EC-i 40, 100 W	310	16 EASY Abs. XT	512			109.3	123.8	123.8	138.3	138.3	138.3	152.8	152.8	152.8	152.8
EC-i 40, 100 W	310	16 RIO	519			111.6	126.1	126.1	140.6	140.6	140.6	155.1	155.1	155.1	155.1
EC-i 40, 130 W	311					131.9	146.4	146.4	160.9	160.9	160.9	175.4	175.4	175.4	175.4
EC-i 40, 130 W	311	ENX22 EMT	518			159.9	174.4	174.4	188.9	188.9	188.9	203.4	203.4	203.4	203.4
EC-i 40, 130 W	311	TSX 40 MAG/RIO	526–527			143.6	158.1	158.1	172.6	172.6	172.6	187.1	187.1	187.1	187.1
EC-i 40, 130 W	311	16 EASY/XT/Abs.	509–511			143.6	158.1	158.1	172.6	172.6	172.6	187.1	187.1	187.1	187.1
EC-i 40, 130 W	311	16 EASY Abs. XT	512			144.1	158.6	158.6	173.1	173.1	173.1	187.6	187.6	187.6	187.6
EC-i 40, 130 W	311	16 RIO	519			146.4	160.9	160.9	175.4	175.4	175.4	189.9	189.9	189.9	189.9

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Planetary Gearhead GP 42 C ∅42 mm, 3.0–15.0 Nm

Ceramic Version



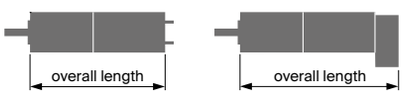
M 1:2

Technical data				
Planetary Gearhead	straight teeth			
Output shaft	stainless steel			
Bearing at output	preloaded ball bearings			
Radial play, 12 mm from flange	max. 0.06 mm			
Axial play at axial load	< 5 N	0 mm		
	> 5 N	max. 0.3 mm		
Max. axial load (dynamic)	150 N			
Max. force for press fits	300 N			
Direction of rotation, drive to output	=			
Max. continuous input speed	8000 rpm			
Recommended temperature range	-40...+100°C			
Number of stages	1	2	3	4
Max. radial load, 12 mm from flange	120 N	240 N	360 N	360 N

Stock program
Standard program
Special program (on request)

			Part numbers									
			203113	203115	203119	203120	203124	203129	203128	203133	203137	203141
Gearhead data												
1	Reduction		3.5:1	12:1	26:1	43:1	81:1	156:1	150:1	285:1	441:1	756:1
2	Absolute reduction		7/2	49/4	26	343/8	2197/27	156	2401/16	15379/54	441	756
10	Mass inertia	gcm²	14	15	9.1	15	9.4	9.1	15	15	14	14
3	Max. motor shaft diameter	mm	10	10	8	10	8	8	10	10	10	10
	Part numbers		203114	203116	260552*	203121	203125	260553*	203130	203134	203138	203142
1	Reduction		4.3:1	15:1	36:1	53:1	91:1	216:1	186:1	319:1	488:1	936:1
2	Absolute reduction		13/3	91/6	36/1	637/12	91	216/1	4459/24	637/2	4394/9	936
10	Mass inertia	gcm²	9.1	15	5.0	15	15	5.0	15	15	9.4	9.1
3	Max. motor shaft diameter	mm	8	10	4	10	10	4	10	10	8	8
	Part numbers		260551*	203117		203122	203126		203131	203135	203139	260554*
1	Reduction		6:1	19:1		66:1	113:1		230:1	353:1	546:1	1296:1
2	Absolute reduction		6/1	169/9		1183/18	338/3		8281/36	2856/81	546	1296/1
10	Mass inertia	gcm²	4.9	9.4		15	9.4		15	9.4	14	5.0
3	Max. motor shaft diameter	mm	4	8		10	8		10	8	10	4
	Part numbers			203118		203123	203127		203132	203136	203140	
1	Reduction			21:1		74:1	126:1		257:1	394:1	676:1	
2	Absolute reduction			21		147/2	126		1029/4	1183/3	676	
10	Mass inertia	gcm²		14		15	14		15	15	9.1	
3	Max. motor shaft diameter	mm		10		10	10		10	10	8	
4	Number of stages		1	2	2	3	3	3	4	4	4	4
5	Max. continuous torque	Nm	3.0	7.5	7.5	15.0	15.0	15.0	15.0	15.0	15.0	15.0
6	Max. intermittent torque at gear output	Nm	4.5	11.3	11.3	22.5	22.5	22.5	22.5	22.5	22.5	22.5
7	Max. efficiency	%	90	81	81	72	72	72	64	64	64	64
8	Weight	g	260	360	360	460	460	460	560	560	560	560
9	Average backlash no load	°	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
11	Gearhead length L1	mm	41.0	55.5	55.5	70.0	70.0	70.0	84.5	84.5	84.5	84.5

*no combination with EC 45 (150/250 W) and EC-i 40



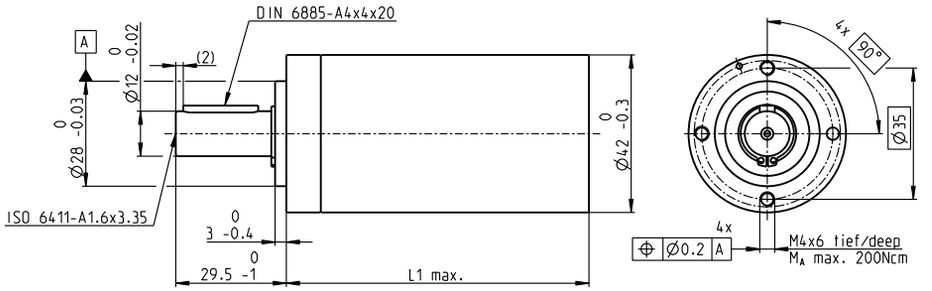
Modular system

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts									
RE 35, 90 W	161					112.1	126.6	126.6	141.1	141.1	141.1	155.6	155.6	155.6	155.6
RE 35, 90 W	161	ENX 32 IMR	506			123.5	138.0	138.0	152.5	152.5	152.5	167.0	167.0	167.0	167.0
RE 35, 90 W	161	HED_5540	535/537			132.8	147.3	147.3	161.8	161.8	161.8	176.3	176.3	176.3	176.3
RE 35, 90 W	161	DCT 22	542			130.2	144.7	144.7	159.2	159.2	159.2	173.7	173.7	173.7	173.7
RE 35, 90 W	161			AB 28	587	148.2	162.7	162.7	177.2	177.2	177.2	191.7	191.7	191.7	191.7
RE 35, 90 W	161	HED_5540	535/537	AB 28	587	165.4	179.9	179.9	194.4	194.4	194.4	208.9	208.9	208.9	208.9
RE 40, 150 W	163					112.1	126.6	126.6	141.1	141.1	141.1	155.6	155.6	155.6	155.6
RE 40, 150 W	163	ENX 32 IMR	506			123.5	138.0	138.0	152.5	152.5	152.5	167.0	167.0	167.0	167.0
RE 40, 150 W	163	HED_5540	535/537			132.8	147.3	147.3	161.8	161.8	161.8	176.3	176.3	176.3	176.3
RE 40, 150 W	163	HEDL 9140	540			166.2	180.7	180.7	195.2	195.2	195.2	209.7	209.7	209.7	209.7
RE 40, 150 W	163			AB 28	588	148.2	162.7	162.7	177.2	177.2	177.2	191.7	191.7	191.7	191.7
RE 40, 150 W	163			AB 28	588	156.2	170.7	170.7	185.2	185.2	185.2	199.7	199.7	199.7	199.7
RE 40, 150 W	163	HED_5540	535/537	AB 28	588	165.4	179.9	179.9	194.4	194.4	194.4	208.9	208.9	208.9	208.9
RE 40, 150 W	163	HEDL 9140	540	AB 28	588	176.7	191.2	191.2	205.7	205.7	205.7	220.2	220.2	220.2	220.2
EC 40, 170 W	272					121.1	135.6	135.6	150.1	150.1	150.1	164.6	164.6	164.6	164.6
EC 40, 170 W	272	HED_5540	535/537			144.5	159.0	159.0	173.5	173.5	173.5	188.0	188.0	188.0	188.0
EC 40, 170 W	272	Res 26	543			148.3	162.8	162.8	177.3	177.3	177.3	191.8	191.8	191.8	191.8
EC 40, 170 W	272			AB 32	589	163.8	178.3	178.3	192.8	192.8	192.8	207.3	207.3	207.3	207.3
EC 40, 170 W	272	HED_5540	536/538	AB 32	589	182.2	196.7	196.7	211.2	211.2	211.2	225.7	225.7	225.7	225.7
EC 45, 150 W	273					152.3	166.8	166.8	181.3	181.3	181.3	195.8	195.8	195.8	195.8
EC 45, 150 W	273	HEDL 9140	540			167.9	182.4	182.4	196.9	196.9	196.9	211.4	211.4	211.4	211.4
EC 45, 150 W	273	Res 26	543			152.3	166.8	166.8	181.3	181.3	181.3	195.8	195.8	195.8	195.8
EC 45, 150 W	273			AB 28	588	159.7	174.2	174.2	188.7	188.7	188.7	203.2	203.2	203.2	203.2
EC 45, 150 W	273	HEDL 9140	540	AB 28	588	176.7	191.2	191.2	205.7	205.7	205.7	220.2	220.2	220.2	220.2
EC 45, 250 W	274					185.1	199.6	199.6	214.1	214.1	214.1	228.6	228.6	228.6	228.6
EC 45, 250 W	274	HEDL 9140	540			200.7	215.2	215.2	229.7	229.7	229.7	244.2	244.2	244.2	244.2
EC 45, 250 W	274	Res 26	543			185.1	199.6	199.6	214.1	214.1	214.1	228.6	228.6	228.6	228.6
EC 45, 250 W	274			AB 28	588	192.5	207.0	207.0	221.5	221.5	221.5	236.0	236.0	236.0	236.0
EC 45, 250 W	274	HEDL 9140	540	AB 28	588	209.5	224.0	224.0	238.5	238.5	238.5	253.0	253.0	253.0	253.0
EC-max 30, 60 W	285					105.1	119.6	119.6	134.1	134.1	134.1	148.6	148.6	148.6	148.6
EC-max 30, 60 W	285	16 EASY/XT/Abs.	509–511			116.2	130.7	130.7	145.2	145.2	145.2	159.7	159.7	159.7	159.7

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Planetary Gearhead GP 42 C ∅42 mm, 3.0–15.0 Nm

Ceramic Version



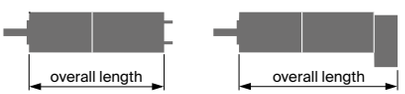
M 1:2

Technical data				
Planetary Gearhead	straight teeth			
Output shaft	stainless steel			
Bearing at output	preloaded ball bearings			
Radial play, 12 mm from flange	max. 0.06 mm			
Axial play at axial load	< 5 N	0 mm		
	> 5 N	max. 0.3 mm		
Max. axial load (dynamic)	150 N			
Max. force for press fits	300 N			
Direction of rotation, drive to output	=			
Max. continuous input speed	8000 rpm			
Recommended temperature range	-40...+100°C			
Number of stages	1	2	3	4
Max. radial load, 12 mm from flange	120 N	240 N	360 N	360 N

Stock program
Standard program
Special program (on request)

			Part numbers									
			203113	203115	203119	203120	203124	203129	203128	203133	203137	203141
Gearhead data												
1	Reduction		3.5:1	12:1	26:1	43:1	81:1	156:1	150:1	285:1	441:1	756:1
2	Absolute reduction		7/2	49/4	26	343/8	2197/27	156	2401/16	15379/54	441	756
10	Mass inertia	gcm²	14	15	9.1	15	9.4	9.1	15	15	14	14
3	Max. motor shaft diameter	mm	10	10	8	10	8	8	10	10	10	10
	Part numbers		203114	203116	260552*	203121	203125	260553*	203130	203134	203138	203142
1	Reduction		4.3:1	15:1	36:1	53:1	91:1	216:1	186:1	319:1	488:1	936:1
2	Absolute reduction		13/3	91/6	36/1	637/12	91	216/1	4459/24	637/2	439/9	936
10	Mass inertia	gcm²	9.1	15	5.0	15	15	5.0	15	15	9.4	9.1
3	Max. motor shaft diameter	mm	8	10	4	10	10	4	10	10	8	8
	Part numbers		260551*	203117		203122	203126		203131	203135	203139	260554*
1	Reduction		6:1	19:1		66:1	113:1		230:1	353:1	546:1	1296:1
2	Absolute reduction		6/1	169/9		1183/18	338/3		8281/36	28561/81	546	1296/1
10	Mass inertia	gcm²	4.9	9.4		15	9.4		15	9.4	14	5.0
3	Max. motor shaft diameter	mm	4	8		10	8		10	8	10	4
	Part numbers			203118		203123	203127		203132	203136	203140	
1	Reduction			21:1		74:1	126:1		257:1	394:1	676:1	
2	Absolute reduction			21		147/2	126		1029/4	1183/3	676	
10	Mass inertia	gcm²		14		15	14		15	15	9.1	
3	Max. motor shaft diameter	mm		10		10	10		10	10	8	
4	Number of stages		1	2	2	3	3	3	4	4	4	4
5	Max. continuous torque	Nm	3.0	7.5	7.5	15.0	15.0	15.0	15.0	15.0	15.0	15.0
6	Max. intermittent torque at gear output	Nm	4.5	11.3	11.3	22.5	22.5	22.5	22.5	22.5	22.5	22.5
7	Max. efficiency	%	90	81	81	72	72	72	64	64	64	64
8	Weight	g	260	360	360	460	460	460	560	560	560	560
9	Average backlash no load	°	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
11	Gearhead length L1	mm	41.0	55.5	55.5	70.0	70.0	70.0	84.5	84.5	84.5	84.5

*no combination with EC 45 (150/250 W) and EC-i 40



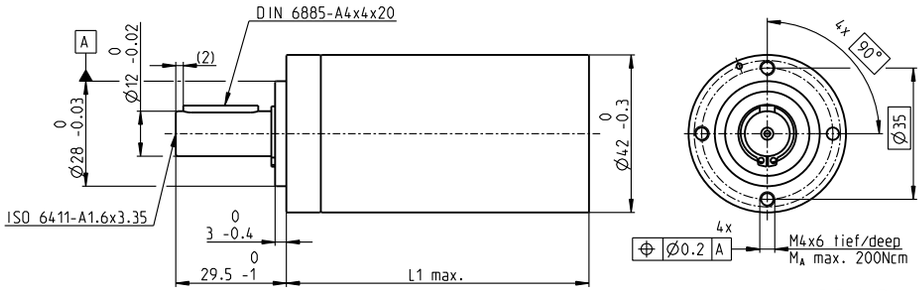
Modular system

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts									
EC-max 30, 60 W	285	16 EASY Abs. XT	512			116.7	131.2	131.2	145.7	145.7	145.7	160.2	160.2	160.2	160.2
EC-max 30, 60 W	285	HEDL 5540	539			125.7	140.2	140.2	154.7	154.7	154.7	169.2	169.2	169.2	169.2
EC-max 30, 60 W	285			AB 20	584	140.7	155.2	155.2	169.7	169.7	169.7	184.2	184.2	184.2	184.2
EC-max 30, 60 W	285	HEDL 5540	539	AB 20	584	161.3	175.8	175.8	190.3	190.3	190.3	204.8	204.8	204.8	204.8
EC-max 40, 70 W	286					99.1	113.6	113.6	128.1	128.1	128.1	142.6	142.6	142.6	142.6
EC-max 40, 70 W	286	16 EASY/XT/Abs.	509-511			110.0	124.5	124.5	139.0	139.0	139.0	153.5	153.5	153.5	153.5
EC-max 40, 70 W	286	16 EASY Abs. XT	512			110.5	125.0	125.0	139.5	139.5	139.5	154.0	154.0	154.0	154.0
EC-max 40, 70 W	286	HEDL 5540	539			122.5	137.0	137.0	151.5	151.5	151.5	166.0	166.0	166.0	166.0
EC-max 40, 70 W	286			AB 28	586	133.5	148.0	148.0	162.5	162.5	162.5	177.0	177.0	177.0	177.0
EC-max 40, 70 W	286	HEDL 5540	539	AB 28	586	151.8	166.3	166.3	180.8	180.8	180.8	195.3	195.3	195.3	195.3
EC-max 40, 120 W	287					129.1	143.6	143.6	158.1	158.1	158.1	172.6	172.6	172.6	172.6
EC-max 40, 120 W	287	16 EASY/XT/Abs.	509-511			140.0	154.5	154.5	169.0	169.0	169.0	183.5	183.5	183.5	183.5
EC-max 40, 120 W	287	16 EASY Abs. XT	512			140.5	155.0	155.0	169.5	169.5	169.5	184.0	184.0	184.0	184.0
EC-max 40, 120 W	287	HEDL 5540	539			152.5	167.0	167.0	181.5	181.5	181.5	196.0	196.0	196.0	196.0
EC-max 40, 120 W	287			AB 28	586	163.5	178.0	178.0	192.5	192.5	192.5	207.0	207.0	207.0	207.0
EC-max 40, 120 W	287	HEDL 5540	539	AB 28	586	181.8	196.3	196.3	210.8	210.8	210.8	225.3	225.3	225.3	225.3
EC-4pole 30, 100 W	293					88.1	102.6	102.6	117.1	117.1	117.1	131.6	131.6	131.6	131.6
EC-4pole 30, 100 W	293	ENX 22 EMT	518			116.0	130.5	130.5	145.0	145.0	145.0	159.5	159.5	159.5	159.5
EC-4pole 30, 100 W	293	16 EASY/XT/Abs.	509-511			102.0	116.5	116.5	131.0	131.0	131.0	145.5	145.5	145.5	145.5
EC-4pole 30, 100 W	293	16 EASY Abs. XT	512			102.5	117.0	117.0	131.5	131.5	131.5	146.0	146.0	146.0	146.0
EC-4pole 30, 100 W	293	16 RIO	519			100.5	115.0	115.0	129.5	129.5	129.5	144.0	144.0	144.0	144.0
EC-4pole 30, 100 W	293			AB 20	584	124.3	138.8	138.8	153.3	153.3	153.3	167.8	167.8	167.8	167.8
EC-4pole 30, 100 W	293	ENX 22 EMT	518	AB 20	584	155.5	170.0	170.0	184.5	184.5	184.5	199.0	199.0	199.0	199.0
EC-4pole 30, 100 W	293	16 EASY/XT/Abs.	509-511	AB 20	584	138.4	152.9	152.9	167.4	167.4	167.4	181.9	181.9	181.9	181.9
EC-4pole 30, 100 W	293	16 EASY Abs. XT	512	AB 20	584	138.9	153.4	153.4	167.9	167.9	167.9	182.4	182.4	182.4	182.4
EC-4pole 30, 100 W	293	16 RIO	519	AB 20	584	136.9	151.4	151.4	165.9	165.9	165.9	180.4	180.4	180.4	180.4
EC-4pole 30, 200 W	295					105.1	119.6	119.6	134.1	134.1	134.1	148.6	148.6	148.6	148.6
EC-4pole 30, 200 W	295	ENX 22 EMT	518			133.0	147.5	147.5	162.0	162.0	162.0	176.5	176.5	176.5	176.5
EC-4pole 30, 200 W	295	16 EASY/XT/Abs.	509-511			119.0	133.5	133.5	148.0	148.0	148.0	162.5	162.5	162.5	162.5

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Planetary Gearhead GP 42 C ∅42 mm, 3.0–15.0 Nm

Ceramic Version



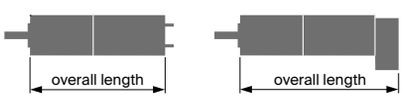
M 1:2

Technical data				
Planetary Gearhead	straight teeth			
Output shaft	stainless steel			
Bearing at output	preloaded ball bearings			
Radial play, 12 mm from flange	max. 0.06 mm			
Axial play at axial load	< 5 N	0 mm		
	> 5 N	max. 0.3 mm		
Max. axial load (dynamic)	150 N			
Max. force for press fits	300 N			
Direction of rotation, drive to output	=			
Max. continuous input speed	8000 rpm			
Recommended temperature range	-40...+100°C			
Number of stages	1	2	3	4
Max. radial load, 12 mm from flange	120 N	240 N	360 N	360 N

Stock program
Standard program
Special program (on request)

			Part numbers									
			203113	203115	203119	203120	203124	203129	203128	203133	203137	203141
Gearhead data												
1	Reduction		3.5:1	12:1	26:1	43:1	81:1	156:1	150:1	285:1	441:1	756:1
2	Absolute reduction		7/2	49/4	26	343/8	2197/27	156	2401/16	15379/54	441	756
10	Mass inertia	gcm²	14	15	9.1	15	9.4	9.1	15	15	14	14
3	Max. motor shaft diameter	mm	10	10	8	10	8	8	10	10	10	10
	Part numbers		203114	203116	260552*	203121	203125	260553*	203130	203134	203138	203142
1	Reduction		4.3:1	15:1	36:1	53:1	91:1	216:1	186:1	319:1	488:1	936:1
2	Absolute reduction		13/3	91/6	36/1	637/12	91	216/1	4459/24	637/2	4394/9	936
10	Mass inertia	gcm²	9.1	15	5.0	15	15	5.0	15	15	9.4	9.1
3	Max. motor shaft diameter	mm	8	10	4	10	10	4	10	10	8	8
	Part numbers		260551*	203117		203122	203126		203131	203135	203139	260554*
1	Reduction		6:1	19:1		66:1	113:1		230:1	353:1	546:1	1296:1
2	Absolute reduction		6/1	169/9		1183/18	338/3		8281/36	28561/81	546	1296/1
10	Mass inertia	gcm²	4.9	9.4		15	9.4		15	9.4	14	5.0
3	Max. motor shaft diameter	mm	4	8		10	8		10	8	10	4
	Part numbers			203118		203123	203127		203132	203136	203140	
1	Reduction			21:1		74:1	126:1		257:1	394:1	676:1	
2	Absolute reduction			21		147/2	126		1029/4	1183/3	676	
10	Mass inertia	gcm²		14		15	14		15	15	9.1	
3	Max. motor shaft diameter	mm		10		10	10		10	10	8	
4	Number of stages		1	2	2	3	3	3	4	4	4	4
5	Max. continuous torque	Nm	3.0	7.5	7.5	15.0	15.0	15.0	15.0	15.0	15.0	15.0
6	Max. intermittent torque at gear output	Nm	4.5	11.3	11.3	22.5	22.5	22.5	22.5	22.5	22.5	22.5
7	Max. efficiency	%	90	81	81	72	72	72	64	64	64	64
8	Weight	g	260	360	360	460	460	460	560	560	560	560
9	Average backlash no load	°	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
11	Gearhead length L1	mm	41.0	55.5	55.5	70.0	70.0	70.0	84.5	84.5	84.5	84.5

*no combination with EC 45 (150/250 W) and EC-i 40



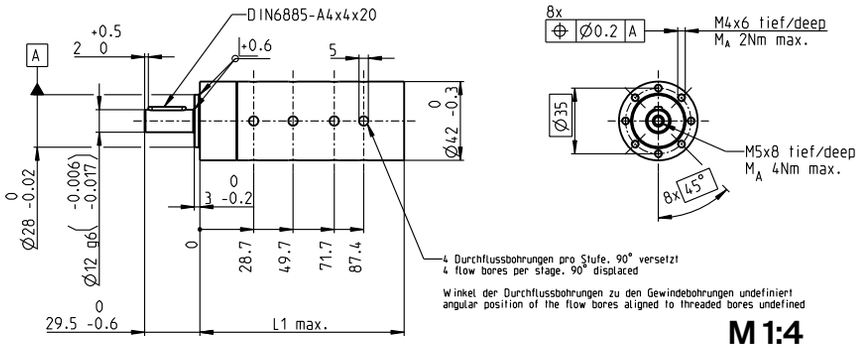
Modular system

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts									
EC-4pole 30, 200 W	295	16 EASY Abs. XT	512			119.5	134.0	134.0	148.5	148.5	148.5	163.0	163.0	163.0	163.0
EC-4pole 30, 200 W	295	16 RIO	519			117.5	132.0	132.0	146.5	146.5	146.5	161.0	161.0	161.0	161.0
EC-4pole 30, 200 W	295			AB 20	584	141.3	155.8	155.8	170.3	170.3	170.3	184.8	184.8	184.8	184.8
EC-4pole 30, 200 W	295	ENX22 EMT	518	AB 20	584	172.5	187.0	187.0	201.5	201.5	205.1	216.0	261.0	216.0	216.0
EC-4pole 30, 200 W	295	16 EASY/XT/Abs.	509-511	AB 20	584	155.4	169.9	169.9	184.4	184.4	184.4	198.9	198.9	198.9	198.9
EC-4pole 30, 200 W	295	16 EASY Abs. XT	512	AB 20	584	155.9	170.4	170.4	184.9	184.9	184.9	199.4	199.4	199.4	199.4
EC-4pole 30, 200 W	295	16 RIO	519	AB 20	584	153.9	168.4	168.4	182.9	182.9	182.9	197.4	197.4	197.4	197.4
EC-i 40, 50 W	306/307					67.1	81.6	81.6	96.1	96.1	96.1	110.6	110.6	110.6	110.6
EC-i 40, 50 W	306/307	22 EMT	518			95.1	109.6	109.6	124.1	124.1	124.1	138.6	138.6	138.6	138.6
EC-i 40, 50 W	306/307	TSX 40 MAG/RIO	526-527			78.8	93.3	93.3	107.8	107.8	107.8	122.3	122.3	122.3	122.3
EC-i 40, 50 W	306/307	16 EASY/Abs.	509/511			78.8	93.3	93.3	107.8	107.8	107.8	122.3	122.3	122.3	122.3
EC-i 40, 50 W	306/307	16 RIO	519			81.6	96.1	96.1	110.6	110.6	110.6	125.1	125.1	125.1	125.1
EC-i 40, 70 W	308/309					77.1	91.6	91.6	106.1	106.1	106.1	120.6	120.6	120.6	120.6
EC-i 40, 70 W	308/309	22 EMT	518			105.1	119.6	119.6	134.1	134.1	134.1	148.6	148.6	148.6	148.6
EC-i 40, 70 W	308/309	TSX 40 MAG/RIO	526-527			88.8	103.8	103.8	117.8	117.8	117.8	132.3	132.3	132.3	132.3
EC-i 40, 70 W	308/309	16 EASY/Abs.	509/511			88.8	103.3	103.3	117.8	117.8	117.8	132.3	132.3	132.3	132.3
EC-i 40, 70 W	308/309	16 RIO	519			91.6	106.1	106.1	120.6	120.6	120.6	135.1	135.1	135.1	135.1
EC-i 40, 100 W	310					97.1	111.6	111.6	126.1	126.1	126.1	140.6	140.6	140.6	140.6
EC-i 40, 100 W	310	ENX22 EMT	518			125.1	139.6	139.6	154.1	154.1	154.1	168.6	168.6	168.6	168.6
EC-i 40, 100 W	310	TSX 40 MAG/RIO	526-527			108.8	123.3	123.3	137.8	137.8	137.8	152.3	152.3	152.3	152.3
EC-i 40, 100 W	310	16 EASY/XT/Abs.	509-511			108.8	123.3	123.3	137.8	137.8	137.8	152.3	152.3	152.3	152.3
EC-i 40, 100 W	310	16 EASY Abs. XT	512			109.3	123.8	123.8	138.3	138.3	138.3	152.8	152.8	152.8	152.8
EC-i 40, 100 W	310	16 RIO	519			111.6	126.1	126.1	140.6	140.6	140.6	155.1	155.1	155.1	155.1
EC-i 40, 130 W	311					131.9	146.4	146.4	160.9	160.9	160.9	175.4	175.4	175.4	175.4
EC-i 40, 130 W	311	ENX22 EMT	518			159.9	174.4	174.4	188.9	188.9	188.9	203.4	203.4	203.4	203.4
EC-i 40, 130 W	311	TSX 40 MAG/RIO	526-527			143.6	158.1	158.1	172.6	172.6	172.6	187.1	187.1	187.1	187.1
EC-i 40, 130 W	311	16 EASY/XT/Abs.	509-511			143.6	158.1	158.1	172.6	172.6	172.6	187.1	187.1	187.1	187.1
EC-i 40, 130 W	311	16 EASY Abs. XT	512			144.1	158.6	158.6	173.1	173.1	173.1	187.6	187.6	187.6	187.6
EC-i 40, 130 W	311	16 RIO	519			146.4	160.9	160.9	175.4	175.4	175.4	189.9	189.9	189.9	189.9

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Planetary Gearhead GP 42 HD ∅42 mm, 10.0–50.0 Nm

Heavy Duty – for application in oil



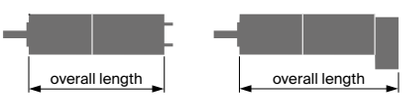
M 1:4

Technical data				
Planetary Gearhead	straight teeth			
Output shaft	stainless steel			
Bearing at output	ball bearing			
Radial play, 12 mm from flange	max. 0.05 mm			
Axial play	max. 0.2 mm			
Max. axial load (dynamic)	250 N			
Max. force for press fits	450 N			
Direction of rotation, drive to output	=			
Max. continuous input speed	< 8000 rpm			
Recommended temperature range	-55...+200°C			
Extended range as option	-55...+260°C			
Number of stages	1	2	3	4
Max. radial load, 12 mm from flange	250 N	480 N	720 N	720 N

Stock program
Standard program
Special program (on request)

Part numbers	454742	454744	454745	476936	454280	476945	476949
Gearhead data (provisional)							
1 Reduction	3.5:1	12:1	43:1	81:1	150:1	285:1	441:1
2 Absolute reduction	7/2	49/4	343/8	2197/27	2401/16	15379/54	441/1
10 Mass inertia gcm²	17.5	29	35.5	23.9	41.3	33.1	30.6
3 Max. motor shaft diameter mm	10	10	10	8	10	8	10
Part numbers	476927	476928	476933	476937	476942	476946	476950
1 Reduction	4.3:1	15:1	53:1	91:1	186:1	319:1	488:1
2 Absolute reduction	13/3	91/6	637/12	91/1	4459/24	637/2	4394/9
10 Mass inertia gcm²	11.1	23.3	31.8	25.4	37.6	34.2	26.3
3 Max. motor shaft diameter mm	8	8	10	8	10	10	8
Part numbers		476929	476934	476938	476943	476947	476951
1 Reduction		19:1	66:1	113:1	230:1	353:1	546:1
2 Absolute reduction		169/9	1183/18	338/3	8281/36	2856/81	546/1
10 Mass inertia gcm²		19.1	28.1	21.2	36.6	28.9	28.1
3 Max. motor shaft diameter mm		8	8	8	10	8	8
Part numbers			454746		476944	476948	476952
1 Reduction			74:1		257:1	394:1	676:1
2 Absolute reduction			147/2		1029/4	1183/3	676/1
10 Mass inertia gcm²			28.2		37.6	30.4	23.9
3 Max. motor shaft diameter mm			10		10	8	8
4 Number of stages	1	2	3	3	4	4	4
5 Max. continuous torque Nm	10	20	40	40	50	50	50
6 Max. intermittent torque at gear output Nm	15	30	60	60	75	75	75
15 Max. overload torque[1] Nm	20	40	80	80	100	100	100
7 Max. efficiency %	95	87	78	78	65	65	65
8 Weight g	430	600	710	710	780	780	780
9 Average backlash no load °	0.6	0.8	0.8	1.0	1.0	1.0	1.0
11 Gearhead length L1 mm	57.7	79.9	102.2	102.2	116.9	116.9	116.9
13 Max. transmittable power (continuous) W	2000	880	300	300	62	62	62
14 Max. transmittable power (intermittent) W	3000	1320	450	450	93	93	93

1 Reduced expected life span



Modular system									
+ Motor	Page	**+ Sensor/Brake**	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts					
EC-4pole 32 HD oil, A	297			221.3	243.5	265.8	265.8	280.5	280.5	280.5
EC-4pole 32 HD oil, B	297			201.3	223.5	245.8	245.8	260.5	260.5	260.5

Application

General
- extreme temperature applications
- vibration tested according to MIL-STD810F/ Jan2000 Fig. 514.5C-10
- operation in oil and high pressure

Oil & Gas Industry
- oil, gas and geothermal wells

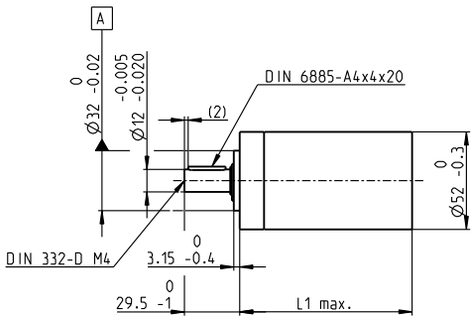
Important notice

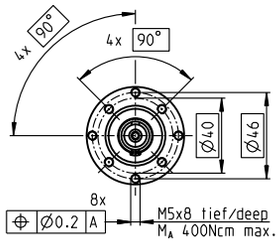
This gearhead has been designed for applications in oil and is only equipped with minimum lubrication. Therefore it is not permitted to use it under normal air conditions.

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Planetary Gearhead GP 52 C ∅52 mm, 4.0–30.0 Nm

Ceramic Version



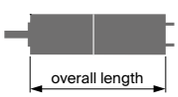


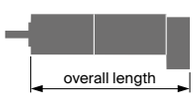
M 1:4

Technical data				
Planetary Gearhead	straight teeth			
Output shaft	stainless steel			
Bearing at output	preloaded ball bearings			
Radial play, 12 mm from flange	max. 0.06 mm			
Axial play at axial load	< 5 N	0 mm		
	> 5 N	max. 0.3 mm		
Max. axial load (dynamic)	200 N			
Max. force for press fits	500 N			
Direction of rotation, drive to output	=			
Max. continuous input speed	6000 rpm			
Recommended temperature range	-15...+80°C			
Extended range as option	-40...+100°C			
Number of stages	1	2	3	4
Max. radial load, 12 mm from flange	420 N	630 N	900 N	900 N

Stock program
Standard program
Special program (on request)

Part numbers							
	223080	223083	**223089**	223094	223097	223104	223109
Gearhead data							
1 Reduction	3.5:1	12:1	43:1	91:1	150:1	319:1	546:1
2 Absolute reduction	7/2	49/4	343/8	91	2401/16	637/2	546
10 Mass inertia gcm²	20.7	17.6	17.3	16.7	17.3	16.8	16.4
3 Max. motor shaft diameter mm	10	10	10	10	10	10	10
Part numbers	**223081**	223084	223090	223095	223099	223105	223110
1 Reduction	4.3:1	15:1	53:1	113:1	186:1	353:1	676:1
2 Absolute reduction	13/3	91/6	637/12	338/3	4459/24	28561/81	676
10 Mass inertia gcm²	12	16.8	17.2	9.3	17.3	9.4	9.1
3 Max. motor shaft diameter mm	8	10	10	8	10	8	8
Part numbers		**223085**	223091	223096	223101	223106	223111
1 Reduction		19:1	66:1	126:1	230:1	394:1	756:1
2 Absolute reduction		169/9	1183/18	126	8281/36	1183/3	756
10 Mass inertia gcm²		9.5	16.7	16.4	16.8	16.7	16.4
3 Max. motor shaft diameter mm		8	10	10	10	10	10
Part numbers		223086	223092	223098	223102	223107	223112
1 Reduction		21:1	74:1	156:1	257:1	441:1	936:1
2 Absolute reduction		21	147/2	156	1029/4	441	936
10 Mass inertia gcm²		16.5	17.2	9.1	17.3	16.5	9.1
3 Max. motor shaft diameter mm		10	10	8	10	10	8
Part numbers		223087	**223093**		223103	223108	
1 Reduction		26:1	81:1		285:1	488:1	
2 Absolute reduction		26	2197/27		15379/54	4394/9	
10 Mass inertia gcm²		9.1	9.4		16.7	9.4	
3 Max. motor shaft diameter mm		8	8		10	8	
4 Number of stages	1	2	3	3	4	4	4
5 Max. continuous torque Nm	4	15	30	30	30	30	30
6 Max. intermittent torque at gear output Nm	6	22.5	45	45	45	45	45
7 Max. efficiency %	91	83	75	75	68	68	68
8 Weight g	460	620	770	770	920	920	920
9 Average backlash no load °	0.6	0.8	1.0	1.0	1.0	1.0	1.0
11 Gearhead length L1 mm	49.0	65.0	78.5	78.5	92.0	92.0	92.0





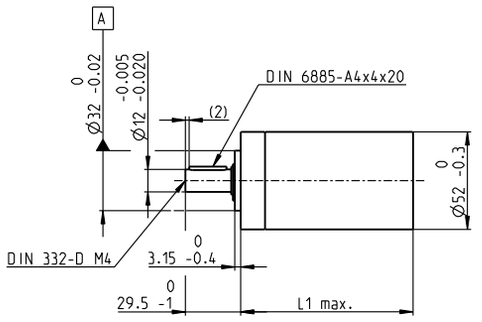
Modular system

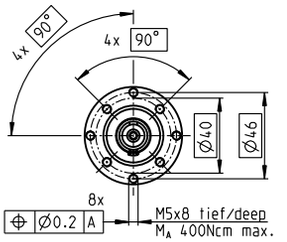
+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts						
RE 40, 150 W	163					120.1	136.1	149.6	149.6	163.1	163.1	163.1
RE 40, 150 W	163	ENX 32 IMR	506			131.5	147.5	161.0	161.0	174.5	174.5	174.5
RE 40, 150 W	163	HED_ 5540	535/538			140.8	156.8	170.3	170.3	183.8	183.8	183.8
RE 40, 150 W	163	HEDL 9140	540			174.1	190.1	203.6	203.6	217.1	217.1	217.1
RE 40, 150 W	163			AB 28	588	156.2	172.2	185.7	185.7	199.2	199.2	199.2
RE 40, 150 W	163			AB 28	588	164.2	180.2	193.7	193.7	207.2	207.2	207.2
RE 40, 150 W	163	HED_ 5540	535/538	AB 28	588	173.4	189.4	202.9	202.9	216.4	216.4	216.4
RE 40, 150 W	163	HEDL 9140	540	AB 28	588	184.6	200.6	214.1	214.1	227.6	227.6	227.6
RE 50, 200 W	164					157.1	173.1	186.6	186.6	200.1	200.1	200.1
RE 50, 200 W	164	HED_5540	536/538			177.8	193.8	207.3	207.3	220.8	220.8	220.8
RE 50, 200 W	164	HEDL 9140	541			219.5	235.5	249.0	249.0	262.5	262.5	262.5
RE 50, 200 W	164			AB 44	591	219.5	235.5	249.0	249.0	262.5	262.5	262.5
RE 50, 200 W	164	HEDL 9140	541	AB 44	591	232.5	248.5	262.0	262.0	275.5	275.5	275.5
EC 40, 170 W	272	HED_5540	536/538			152.5	168.5	182.0	182.0	195.5	195.5	195.5
EC 40, 170 W	272	Res 26	543			156.3	172.3	185.8	185.8	199.3	199.3	199.3
EC 40, 170 W	272			AB 32	589	171.8	187.8	201.3	201.3	214.8	214.8	214.8
EC 40, 170 W	272	HED_5540	536/538	AB 32	589	190.2	206.2	219.7	219.7	233.2	233.2	233.2
EC 45, 150 W	273					160.3	176.3	189.8	189.8	203.3	203.3	203.3
EC 45, 150 W	273	HEDL 9140	540			175.9	191.9	205.4	205.4	218.9	218.9	218.9
EC 45, 150 W	273	Res 26	543			160.3	176.3	189.8	189.8	203.3	203.3	203.3
EC 45, 150 W	273			AB 28	588	167.7	183.7	197.2	197.2	210.7	210.7	210.7
EC 45, 150 W	273	HEDL 9140	540	AB 28	588	184.7	200.7	214.2	214.2	227.7	227.7	227.7
EC 45, 250 W	274					193.1	209.1	222.6	222.6	236.1	236.1	236.1
EC 45, 250 W	274	HEDL 9140	540			208.7	224.7	238.2	238.2	251.7	251.7	251.7
EC 45, 250 W	274	Res 26	543			193.1	209.1	222.6	222.6	236.1	236.1	236.1

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Planetary Gearhead GP 52 C ∅52 mm, 4.0–30.0 Nm

Ceramic Version





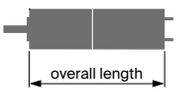
M 1:4

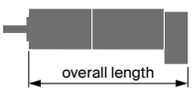
Technical data				
Planetary Gearhead				straight teeth
Output shaft				stainless steel
Bearing at output				preloaded ball bearings
Radial play, 12 mm from flange				max. 0.06 mm
Axial play at axial load	< 5 N			0 mm
	> 5 N			max. 0.3 mm
Max. axial load (dynamic)				200 N
Max. force for press fits				500 N
Direction of rotation, drive to output				=
Max. continuous input speed				6000 rpm
Recommended temperature range				-15...+80°C
Extended range as option				-40...+100°C
Number of stages	1	2	3	4
Max. radial load, 12 mm from flange	420 N	630 N	900 N	900 N

Stock program
Standard program
Special program (on request)

Part numbers

223080	223083	**223089**	223094	223097	223104	223109
223081	223084	223090	223095	223099	223105	223110
	223085	223091	223096	223101	223106	223111
	223086	223092	223098	223102	223107	223112
	223087	**223093**		223103	223108	



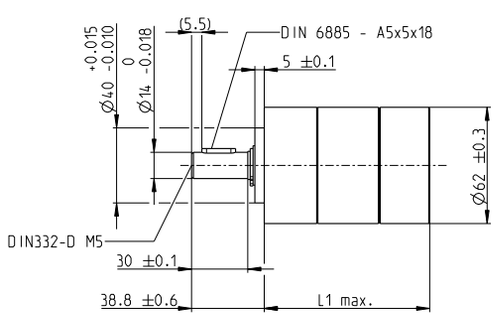


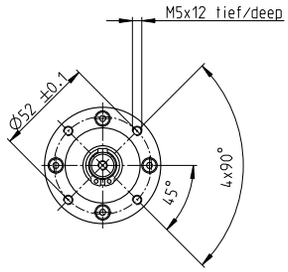
Modular system

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts						
EC 45, 250 W	274			AB 28	588	200.5	216.5	230.0	230.0	243.5	243.5	243.5
EC 45, 250 W	274	HEDL 9140	540	AB 28	588	217.5	233.5	247.0	247.0	260.5	260.5	260.5
EC-max 40, 120 W	287					137.1	153.1	166.6	166.6	180.1	180.1	180.1
EC-max 40, 120 W	287	16 EASY/XT/Abs.	509–511			148.0	164.0	177.5	177.5	191.0	191.0	191.0
EC-max 40, 120 W	287	16 EASY Abs. XT	512			148.5	164.5	178.0	178.0	191.5	191.5	191.5
EC-max 40, 120 W	287	HEDL 5540	539			160.5	176.5	190.0	190.0	203.5	203.5	203.5
EC-max 40, 120 W	287			AB 28	586	171.5	187.5	201.0	201.0	214.5	214.5	214.5
EC-max 40, 120 W	287	HEDL 5540	539	AB 28	586	189.8	205.8	219.3	219.3	232.8	232.8	232.8
EC-i 52, 180 W	312					129.1	145.1	158.6	158.6	172.1	172.1	172.1
EC-i 52, 180 W	312	22 EMT	518			157.1	173.1	186.6	186.6	200.1	200.1	200.1
EC-i 52, 180 W	312	TSX 40 MAG/RIO	526–527			140.8	156.8	170.3	170.3	183.8	183.8	183.8
EC-i 52, 180 W	312	16 EASY/Abs.	509/511			142.8	158.8	172.3	172.3	185.8	185.8	185.8
EC-i 52, 180 W	312	16 RIO	519			142.8	158.8	172.3	172.3	185.8	185.8	185.8
EC-i 52, 200 W	313					159.1	175.1	188.6	188.6	202.1	202.1	202.1
EC-i 52, 200 W	313	22 EMT	518			187.1	203.1	216.6	216.6	230.1	230.1	230.1
EC-i 52, 200 W	313	TSX 40 MAG/RIO	526–527			170.8	186.8	200.3	200.3	213.8	213.8	213.8
EC-i 52, 200 W	313	16 EASY/XT/Abs.	509–511			172.8	188.8	202.3	202.3	215.8	215.8	215.8
EC-i 52, 200 W	313	16 EASY Abs. XT	512			173.3	189.3	202.8	202.8	216.3	216.3	216.3
EC-i 52, 200 W	313	16 RIO	519			172.8	188.8	202.3	202.3	215.8	215.8	215.8
EC 60 flat, 100 W	321					89.8	105.8	119.3	119.3	132.8	132.8	132.8
EC 60 flat, 100 W	321	MILE	530			90.8	106.8	120.3	120.3	133.8	133.8	133.8
EC 60 flat, 150 W	322					89.8	105.8	119.3	119.3	132.8	132.8	132.8
EC 60 flat, 150 W	322	MILE	530			90.8	106.8	120.3	120.3	133.8	133.8	133.8
EC 60 flat, 200 W	323					97.6	113.6	127.1	127.1	140.6	140.6	140.6
EC 60 flat, 200 W	323	MILE	530			98.6	114.6	128.1	128.1	141.6	141.6	141.6
EC 90 flat, 160 W	324					74.5	90.5	103.5	103.5	117.0	117.0	117.0
EC 90 flat, 160 W	324	MILE	531			75.0	91.0	104.0	104.0	117.5	117.5	117.5
EC 90 flat, 220 W	325					74.5	90.5	103.5	103.5	117.0	117.0	117.0
EC 90 flat, 220 W	325	MILE	531			75.0	91.0	104.0	104.0	117.5	117.5	117.5
EC 90 flat, 360 W	326					87.0	103.0	116.0	116.0	129.5	129.5	129.5
EC 90 flat, 360 W	326	MILE	531			87.5	103.5	116.5	116.5	130.0	130.0	130.0
EC 90 flat, 260 W	327					87.0	103.0	116.0	116.0	129.5	129.5	129.5
EC 90 flat, 260 W	327	MILE	531			87.5	103.5	116.5	116.5	130.0	130.0	130.0
EC 90 flat, 400 W	328					87.0	103.0	116.0	116.0	129.5	129.5	129.5
EC 90 flat, 400 W	328	MILE	531			87.5	103.5	116.5	116.5	130.0	130.0	130.0
EC 90 flat, 600 W	329					99.5	115.5	128.5	128.5	142.0	142.0	142.0
EC 90 flat, 600 W	329	MILE	531			100.0	116.0	129.0	129.0	142.5	142.5	142.5

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Planetary Gearhead GP 62 A ∅62 mm, 6.2–38.5 Nm





M 1:4

Technical data			
Planetary Gearhead			straight teeth
Output shaft			steel
Bearing at output			ball bearing
Radial play, 7 mm from flange			max. 0.08 mm
Axial play			max. 1.28 mm
Max. force for press fits			1000 N
Direction of rotation, drive to output			=
Max. continuous input speed			3000 rpm
Recommended temperature range			-30...+120°C
Number of stages	1	2	3
Max. radial load, 24 mm from flange	240 N	360 N	520 N
Max. axial load (dynamic)	70 N	100 N	150 N

Stock program
Standard program
Special program (on request)

Gearhead data		Part numbers								
		701923	701924	701925	701926	701927	701928	701929	701930	701931
1 Reduction		5.2:1	19:1	27:1	35:1	71:1	100:1	139:1	181:1	236:1
2 Absolute reduction		57/11	359/187	3249/121	1539/44	226223/3179	204687/2057	185193/1331	87723/484	41553/176
3 Max. motor shaft diameter	mm	8	8	8	8	8	8	8	8	8
4 Number of stages		1	2	2	2	3	3	3	3	3
5 Max. continuous torque	Nm	6.2	19.2	19.2	19.2	38.5	38.5	38.5	38.5	38.5
6 Max. intermittent torque at gear output	Nm	9.2	28.5	28.5	28.5	57.7	57.7	57.7	57.7	57.7
7 Max. efficiency	%	80	75	75	75	70	70	70	70	70
8 Weight	g	848	1167	1167	1167	1472	1472	1472	1472	1472
9 Average backlash no load	°	0.65	0.7	0.7	0.7	0.75	0.75	0.75	0.75	0.75
10 Mass inertia	gcm²	46.34	44.73	44.23	40.06	44.61	44.17	44.15	40.02	39.92
11 Gearhead length L1	mm	71.9	88.8	88.8	88.8	105.8	105.8	105.8	105.8	105.8

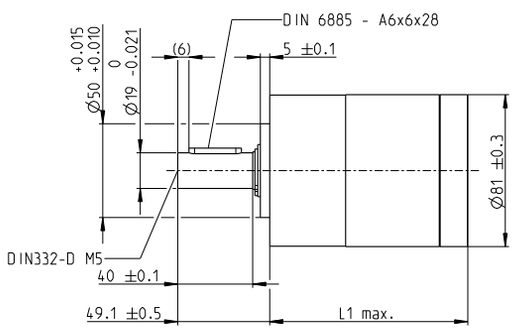


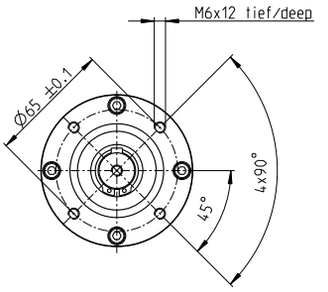


Modular system														
+ Motor	Page	**+ Sensor**	Page	**Brake**	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts								
RE 50, 200 W	164					180.0	196.9	196.9	196.9	213.9	213.9	213.9	213.9	213.9
RE 50, 200 W	164	HEDS 5540	536			200.7	217.6	217.6	217.6	234.6	234.6	234.6	234.6	234.6
RE 50, 200 W	164	HEDL 5540	538			200.7	217.6	217.6	217.6	234.6	234.6	234.6	234.6	234.6
RE 50, 200 W	164	HEDL 9140	541			242.4	259.3	259.3	259.3	276.3	276.3	276.3	276.3	280.3
RE 50, 200 W	164			AB 44	591	242.4	259.3	259.3	259.3	276.3	276.3	276.3	276.3	280.3
RE 50, 200 W	164	HEDL 9140	541	AB 44	591	255.4	272.3	272.3	272.3	289.3	289.3	289.3	289.3	289.3
EC 45, 250 W	274					216.0	232.9	232.9	232.9	249.9	249.9	249.9	249.9	249.9
EC 45, 250 W	274	HEDL 9140	540			231.6	248.5	248.5	248.5	265.5	265.5	265.5	265.5	265.5
EC 45, 250 W	274	Res 26	543			216.0	232.9	232.9	232.9	249.9	249.9	249.9	249.9	249.9
EC 45, 250 W	274			AB 28	588	223.4	240.3	240.3	240.3	257.3	257.3	257.3	257.3	257.3
EC 45, 250 W	274	HEDL 9140	540	AB 28	588	240.4	257.3	257.3	257.3	274.3	274.3	274.3	274.3	274.3

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Planetary Gearhead GP 81 A ∅81 mm, 15.4–92.3 Nm



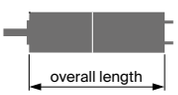


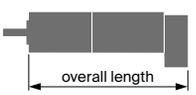
M 1:4

Technical data			
Planetary Gearhead			straight teeth
Output shaft			steel
Bearing at output			ball bearing
Radial play, 8 mm from flange			max. 0.1 mm
Axial play			max. 1.28 mm
Max. force for press fits			1500 N
Direction of rotation, drive to output			=
Max. continuous input speed			3000 rpm
Recommended temperature range			-30...+120°C
Number of stages	1	2	3
Max. radial load, 29 mm from flange	400 N	600 N	1000 N
Max. axial load (dynamic)	80 N	120 N	200 N

Stock program
Standard program
Special program (on request)

Part numbers						
		701932	701933	**701934**	701935	701936	**701937**
Gearhead data							
1 Reduction		3.7:1	14:1	25:1	51:1	93:1	308:1
2 Absolute reduction		63/17	3969/289	1701/68	250047/4913	107163/1156	19683/64
3 Max. motor shaft diameter	mm	14	14	14	14	14	14
4 Number of stages		1	2	2	3	3	3
5 Max. continuous torque	Nm	15.4	46.2	46.2	92.3	92.3	92.3
6 Max. intermittent torque at gear output	Nm	23.1	69.2	69.2	138.5	138.5	138.5
7 Max. efficiency	%	80	75	75	70	70	70
8 Weight	g	1902	2624	2624	3336	3336	3336
9 Average backlash no load	°	0.5	0.55	0.55	0.6	0.6	0.6
10 Mass inertia	gcm²	192.86	183.6	90.29	182.92	90.9	88.48
11 Gearhead length L1	mm	91.9	113.6	113.6	135.2	135.2	135.2





Modular system

+ Motor	Page	+ Sensor	Page	Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts					
RE 65, 250 W	165					223.40	245.10	245.10	266.70	266.70	266.70
RE 65, 250 W	165	HEDS 5540	536			249.30	271.00	271.00	292.60	292.60	292.60
RE 65, 250 W	165	HEDL 5540	538			249.30	271.00	271.00	292.60	292.60	292.60
RE 65, 250 W	165	HEDL 9140	541			279.50	301.20	301.20	322.80	322.80	322.80
RE 65, 250 W	165			AB 44	591	279.50	301.20	301.20	322.80	322.80	322.80
RE 65, 250 W	165	HEDL 9140	541	AB 44	591	297.50	319.20	319.20	340.80	340.80	340.80
EC 60, 400 W	275					269.30	291.00	291.00	312.60	312.60	312.60
EC 60, 400 W	275	HEDL 9140	540			269.30	291.00	291.00	312.60	312.60	312.60
EC 60, 400 W	275	Res 26	543			269.30	291.00	291.00	312.60	312.60	312.60
EC 60, 400 W	275			AB 41	590	282.90	304.60	304.60	326.20	326.20	326.20
EC 60, 400 W	275	HEDL 9140	540	AB 41	590	306.90	328.60	328.60	350.20	350.20	350.20

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maxon spur gearhead

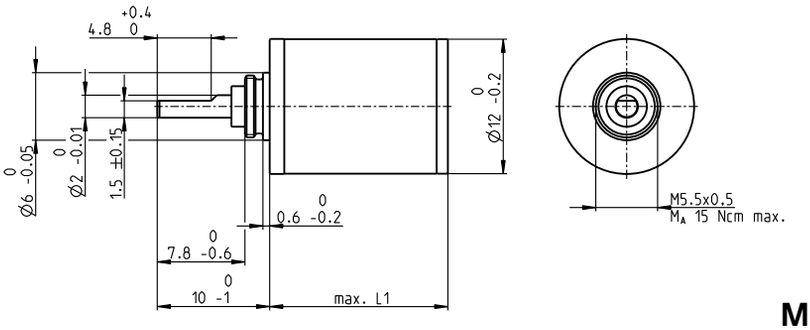
Standard specification no. 102	91
Terminology explanations	368
GS 12 A ∅12 mm, 0.01–0.03 Nm	448
GS 16 A ∅16 mm, 0.015–0.04 Nm	449
GS 16 V ∅16 mm, 0.06–0.1 Nm	450
GS 16 VZ ∅16 mm, 0.1 Nm	451
GS 24 A ∅24 mm, 0.1 Nm	452



Precision spur gearheads matched to maxon motors. Gears are advantageously adapted directly to the desired motors in the delivery plant. The motor pinion is the input gearwheel for the first stage and is rigidly affixed to the motor shaft.

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Spur Gearhead GS 12 A ∅12 mm, 0.01–0.03 Nm

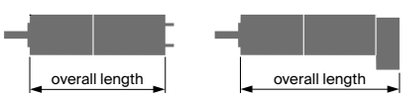


M 3:2

Technical data	
Spur Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6.5 mm from flange	max. 0.05 mm
Axial play	0.02–0.12 mm
Max. axial load (dynamic)	2 N
Max. force for press fits	30 N
Max. continuous input speed	8000 rpm
Recommended temperature range	-15...+100°C
Extended range as option	-40...+100°C
Max. radial load, 6.5 mm from flange	2 N

Stock program
Standard program
Special program (on request)

			Part numbers						
			310301	313872	313990	313991	310311	313993	310316
Gearhead data									
1	Reduction		6.4:1	13:1	58:1	141:1	371:1	485:1	3101:1
2	Absolute reduction		403/63	21866/1694	724594/12474	20138716/142884	26782109/72171	624300196/1285956	11537547853/3720087
3	Max. motor shaft diameter	mm	1.2	1.0	1.0	1.2	1.0	1.2	1.2
	Part numbers		310302	310304	310307	313992		310313	310317
1	Reduction		9.1:1	22:1	76:1	200:1		900:1	4402:1
2	Absolute reduction		899/99	12493/567	387283/5103	22462414/112266		372178963/413343	25737606749/5845851
3	Max. motor shaft diameter	mm	1.0	1.2	1.2	1.0		1.2	1.0
	Part numbers			310305	310308	310310		310314	
1	Reduction			31:1	108:1	261:1		1278:1	
2	Absolute reduction			27869/891	863939/8019	12005773/45927		830245379/649539	
3	Max. motor shaft diameter	mm		1.0	1.0	1.2		1.0	
4	Number of stages		2	3	4	5	5	6	7
5	Max. continuous torque	Nm	0.010	0.015	0.020	0.025	0.025	0.030	0.030
6	Max. intermittent torque at gear output	Nm	0.030	0.035	0.040	0.045	0.045	0.050	0.050
12	Direction of rotation, drive to output		=	≠	=	≠	≠	=	≠
7	Max. efficiency	%	81	73	66	59	59	53	48
8	Weight	g	6.5	7.4	8.3	9.2	9.2	10.1	11
9	Average backlash no load	°	1	1	1.2	1.2	1.2	1.2	1.5
10	Mass inertia	gcm²	0.002	0.002	0.002	0.002	0.002	0.002	0.002
11	Gearhead length L1	mm	10	12	14	16	16	18	20

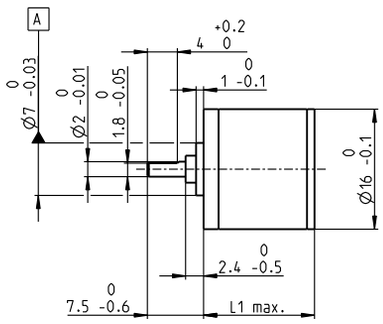


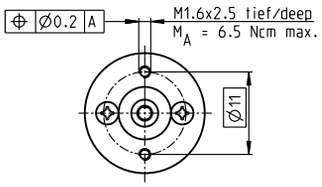
Modular system

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts						
A-max 12	169/170			31.3	33.3	35.3	37.3	37.3	39.3	41.3
A-max 12, 0.5 W	170	MR	532	35.4	37.4	39.4	41.4	41.4	43.4	45.4

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Spur Gearhead GS 16 A ∅16 mm, 0.015–0.04 Nm





M 1:1

Technical data	
Spur Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6.5 mm from flange	max. 0.15 mm
Axial play	0.02–0.12 mm
Max. axial load (dynamic)	2 N
Max. force for press fits	30 N
Max. continuous input speed	8000 rpm
Recommended temperature range	-15...+100°C
Extended range as option	-40...+100°C
Max. radial load, 6.5 mm from flange	2 N

Stock program
Standard program
Special program (on request)

			Part numbers						
Gearhead data			144409	143761	143763	143765	143767	143769	
1	Reduction		6.4:1	22:1	76:1	261:1	900:1	3101:1	
2	Absolute reduction		403/63	12493/567	387283/5103	12005773/45927	372178963/413343	11537547853/3720087	
3	Max. motor shaft diameter	mm	1.5	1.5	1.5	1.5	1.5	1.5	
	Part numbers		207834	207835	207836	207837	207838	207839	
1	Reduction		9.1:1	31:1	108:1	371:1	1278:1	4402:1	
2	Absolute reduction		899/99	27869/891	863939/8019	26782109/72171	830245379/649539	25737606749/5845851	
3	Max. motor shaft diameter	mm	1.5	1.5	1.5	1.5	1.5	1.5	
	Part numbers		144410	143762	143764	143766	143768	143770	
1	Reduction		12:1	41:1	141:1	485:1	1670:1	5752:1	
2	Absolute reduction		96/81	2979/729	92352/6561	2862915/59049	88750368/531441	27512614111/4782969	
3	Max. motor shaft diameter	mm	1	1	1	1	1	1	
4	Number of stages		2	3	4	5	6	7	
5	Max. continuous torque	Nm	0.015	0.025	0.035	0.040	0.040	0.040	
6	Max. intermittent torque at gear output	Nm	0.10	0.10	0.10	0.10	0.10	0.10	
12	Direction of rotation, drive to output		=	≠	=	≠	=	≠	
7	Max. efficiency	%	81	73	66	59	53	48	
8	Weight	g	9.0	9.8	10.2	10.7	11.3	11.7	
9	Average backlash no load	°	1.0	1.0	1.2	1.2	1.5	1.5	
10	Mass inertia	gcm²	0.0032	0.0031	0.0031	0.0031	0.0031	0.0031	
11	Gearhead length L1	mm	11.8	12.8	14.8	16.8	18.8	20.8	





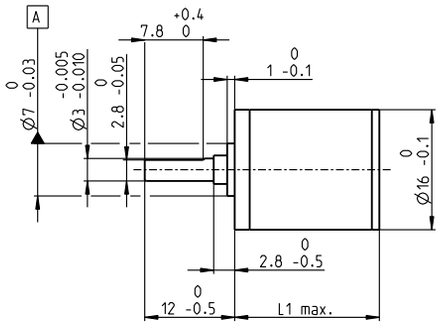
Modular system

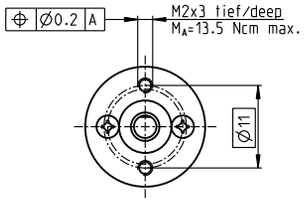
+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts					
A-max 16	171–174			37.3	38.3	40.3	42.3	44.3	46.3
A-max 16	172/174	13 GAMA	498	45.4	46.4	48.4	50.4	52.4	54.4
A-max 16	172/174	ENX 16 IMR	502	42.3	43.3	45.3	47.3	49.3	51.3
A-max 16	172/174	MR	533	42.3	43.3	45.3	47.3	49.3	51.3

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Spur Gearhead GS 16 V ∅16 mm, 0.06–0.1 Nm

Reinforced





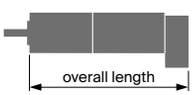
M 1:1

Technical data						
Spur Gearhead	straight teeth					
Output shaft	stainless steel, hardened					
Bearing at output	preloaded ball bearings					
Radial play, 6.5 mm from flange	max. 0.02 mm					
Axial play at axial load	< 5 N	0 mm				
	> 5 N	max. 0.05 mm				
Max. axial load (dynamic)	5 N					
Max. force for press fits	5 N					
Max. continuous input speed	8000 rpm					
Recommended temperature range	-15...+100°C					
Extended range as option	-40...+100°C					
Number of stages	2	3	4	5	6	7
Max. radial load, 6.5 mm from flange	10 N	15 N	20 N	22 N	22 N	22 N

Stock program
Standard program
Special program (on request)

Part numbers						
	235066	235070	235073	235076	235079	235082
Gearhead data						
1 Reduction	6.4:1	22:1	76:1	261:1	900:1	3101:1
2 Absolute reduction	403/63	12493/567	387283/5103	12005773/45927	372178963/413343	11537547853/3720087
3 Max. motor shaft diameter mm	1.5	1.5	1.5	1.5	1.5	1.5
Part numbers	235068	235071	235074	235077	235080	235083
1 Reduction	9.1:1	31:1	108:1	371:1	1278:1	4402:1
2 Absolute reduction	899/99	27869/891	863939/8019	26782109/72171	830245379/649539	25737606749/5845851
3 Max. motor shaft diameter mm	1.5	1.5	1.5	1.5	1.5	1.5
Part numbers	235069	235072	235075	235078	235081	235084
1 Reduction	12:1	41:1	141:1	485:1	1670:1	5752:1
2 Absolute reduction	96/81	29791/729	923521/6561	28629151/59049	887503681/531441	27512614111/4782969
3 Max. motor shaft diameter mm	1	1	1	1	1	1
4 Number of stages	2	3	4	5	6	7
5 Max. continuous torque Nm	0.06	0.06	0.10	0.10	0.10	0.10
6 Max. intermittent torque at gear output Nm	0.15	0.15	0.30	0.30	0.30	0.30
12 Direction of rotation, drive to output	=	≠	=	≠	=	≠
7 Max. efficiency %	81	73	66	59	53	48
8 Weight g	13.8	14.5	15.8	17.0	17.9	18.5
9 Average backlash no load °	1.0	1.0	1.2	1.2	1.5	1.5
10 Mass inertia gcm²	0.0057	0.0052	0.0035	0.0032	0.0032	0.0032
11 Gearhead length L1 mm	14.3	17.3	19.3	21.3	23.3	25.3





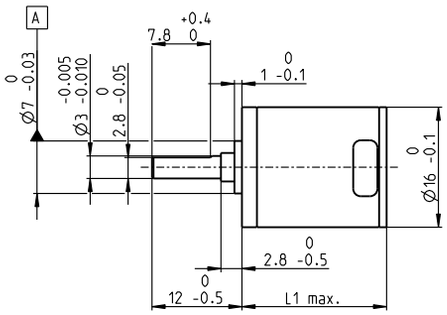
Modular system

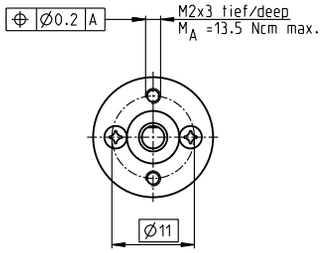
+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts					
A-max 16	171–174			39.8	42.8	44.8	46.8	48.8	50.8
A-max 16	172/174	13 GAMA	498	47.9	50.9	52.9	54.9	56.9	58.9
A-max 16	172/174	ENX 16 IMR	502	44.8	47.8	49.8	51.8	53.8	55.8
A-max 16	172/174	MR	533	44.8	47.8	49.8	51.8	53.8	55.8

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Spur Gearhead GS 16 VZ ∅16 mm, 0.1 Nm

Low Backlash





M 1:1

Technical data			
Spur Gearhead		straight teeth	
Output shaft		stainless steel, hardened	
Bearing at output		preloaded ball bearings	
Radial play, 6.5 mm from flange		max. 0.02 mm	
Axial play at axial load	< 5 N	0 mm	
	> 5 N	max. 0.05 mm	
Max. axial load (dynamic)		5 N	
Max. force for press fits		5 N	
Max. continuous input speed		8000 rpm	
Recommended temperature range		-15...+100°C	
Extended range as option		-40...+100°C	
Number of stages	4	5	6
Max. radial load, 6.5 mm from flange	20 N	22 N	22 N

Stock program
Standard program
Special program (on request)

Gearhead data			Part numbers		
			327789	327796	327800
1	Reduction		76:1	261:1	900:1
2	Absolute reduction		387283/5103	1200577/45927	372178963/413343
3	Max. motor shaft diameter	mm	1.5	1.5	1.5
	Part numbers		327788	327797	327801
1	Reduction		108:1	371:1	1278:1
2	Absolute reduction		863939/8019	26782109/72171	830245379/649539
3	Max. motor shaft diameter	mm	1.5	1.5	1.5
	Part numbers		327790	327799	327802
1	Reduction		141:1	485:1	1670:1
2	Absolute reduction		92352/6561	2862915/59049	88750368/531441
3	Max. motor shaft diameter	mm	1	1	1
4	Number of stages		4	5	6
5	Max. continuous torque	Nm	0.10	0.10	0.10
6	Max. intermittent torque at gear output	Nm	0.30	0.30	0.30
12	Direction of rotation, drive to output		=	≠	=
7	Max. efficiency	%	62	54	48
8	Weight	g	17.2	18.7	20.2
9	Average backlash no load	°	0.3	0.45	0.5
10	Mass inertia	gcm²	0.017	0.014	0.013
11	Gearhead length L1	mm	19.3	21.3	23.3



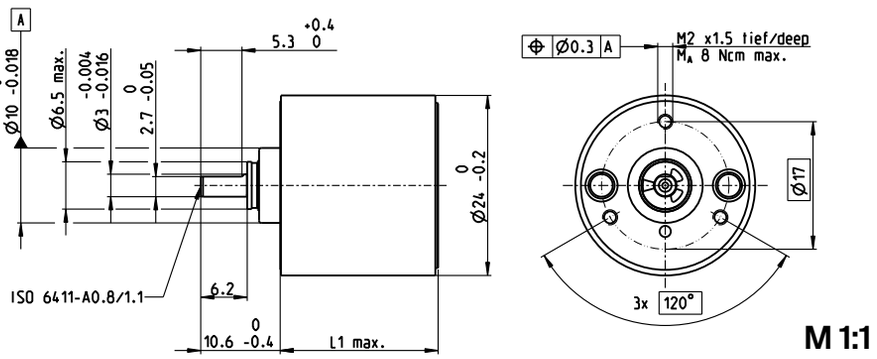


Modular system

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts		
A-max 16	171–174			44.8	46.8	48.8
A-max 16	172/174	13 GAMA	498	52.9	54.9	56.9
A-max 16	172/174	ENX 16 IMR	502	49.8	51.8	83.8
A-max 16	172/174	MR	533	49.8	51.8	53.8

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Spur Gearhead GS 24 A ∅24 mm, 0.1 Nm



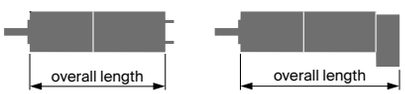
M 1:1

Technical data	
Spur Gearhead	straight teeth
Housing	plastic
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 8 mm from flange	max. 0.038 mm
Axial play	0.03–0.30 mm
Max. axial load (dynamic)	8 N
Max. force for press fits	500 N
Max. continuous input speed	4000 rpm
Recommended temperature range	-15...+80°C
Max. radial load, 8 mm from flange	5 N

Stock program
Standard program
Special program (on request)

Gearhead data			Part numbers						
			110480	110481	110482	110483	110484	110485	110486
1	Reduction		7.2:1	20:1	32:1	64:1	131:1	199:1	325:1
2	Absolute reduction		93/13	753424/38025	923521/28561	837/13	212629/1625	887503681/4455516	14070001/43264
3	Max. motor shaft diameter	mm	2	2	2	2	2	2	2
4	Number of stages		2	4	4	4	4	6	6
5	Max. continuous torque	Nm	0.1	0.1	0.1	0.1	0.1	0.1	0.1
6	Max. intermittent torque at gear output	Nm	0.15	0.15	0.15	0.15	0.15	0.15	0.15
12	Direction of rotation, drive to output		=	=	=	=	=	=	=
7	Max. efficiency	%	81	66	66	66	66	53	53
8	Weight	g	25	28	28	28	28	30	30
9	Average backlash no load	°	1.0	2.0	2.0	2.0	2.0	3.0	3.0
10	Mass inertia	gcm²	0.008	0.01	0.008	0.007	0.006	0.008	0.006
11	Gearhead length L1*	mm	16.5	20.2	20.2	20.2	20.2	24	24

*L1 for A-max 22 L1 is -2.8 mm



Modular system

+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts						
A-max 19	175/176			45.5	49.2	49.2	49.2	49.2	53.0	53.0
A-max 19, 1.5 W	176	13 GAMA	498	53.0	56.7	56.7	56.7	56.7	60.5	60.5
A-max 19, 1.5 W	176	ENX 19 IMR	503	50.6	54.3	54.3	54.3	54.3	58.1	58.1
A-max 19, 1.5 W	176	MR	533	50.6	54.3	54.3	54.3	54.3	58.1	58.1
A-max 19, 2.5 W	178			48.1	51.8	51.8	51.8	51.8	55.6	55.6
A-max 19, 2.5 W	178	13 GAMA	498	55.6	59.3	59.3	59.3	59.3	63.1	63.1
A-max 19, 2.5 W	178	ENX 19 IMR	503	52.4	56.1	56.1	56.1	56.1	59.9	59.9
A-max 19, 2.5 W	178	MR	533	52.4	56.1	56.1	56.1	56.1	59.9	59.9
A-max 22	179–182			45.7	49.4	49.4	49.4	49.4	53.2	53.2
A-max 22	180/182	13 GAMA	498	52.8	56.5	56.5	56.5	56.5	60.3	60.3
A-max 22	180/182	ENX 22 IMR	504	50.7	54.4	54.4	54.4	54.4	58.2	58.2
A-max 22	180/182	MR	533	50.7	54.4	54.4	54.4	54.4	58.2	58.2

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maxon strain wave gear

Standard specification no. 102		91
Terminology explanations		454
GSW 55 A ∅55 mm, 4.8–7.7 Nm	NEW	455
GSW 62 A ∅62 mm, 18.0–27.0 Nm	NEW	456



Highly precise, compact and efficient. Particularly suitable for applications that require exact motion control and high torque transfer in the smallest of spaces.

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Explanations of maxon terminology: Strain wave gear

Dimensional drawings
Presentation of the views according to the projection method E (ISO). All dimensions in [mm].

Mounting in plastic
Screwed connections on motors with plastic flanges require special attention.

M_A Max. tightening torque [Ncm]
A torque screwdriver may be adjusted to this value.

L Active thread depth [mm]
The relation of the thread depth to the thread diameter must be at least 2:1. The screw-in depth must be less than the usable length of the thread!

Gearhead data
Values are based on an ambient temperature of around 25 °C (known as cold data).

Gearhead data

1 Reduction ratio
The reduction indicates the ratio by which the speed of the gear output shaft is smaller than the motor speed.

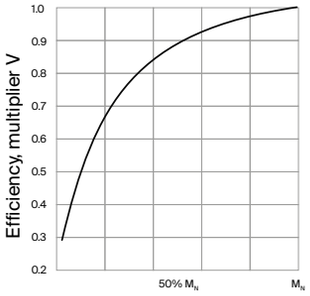
2 Max. continuous torque [Nm]
The continuous torque provides the maximum load permanently applied to the output shaft. If it is exceeded, the service life is significantly shortened.

3 Max. intermittent torque* [Nm]
The short-time torque is the maximum torque that may be output on the output shaft for a short period of time without damaging it.

4 Max. overload torque [Nm]
The maximum torque that may be applied for a short period of time without causing mechanical damage to the gearhead; for instance, in the event of a collision.

5 Max. continuous/intermittent* input speed [rpm]
It is based on service life considerations. If this value is greatly exceeded, the service life can be shortened, the gear heats up more and more noise is generated.

6 Efficiency [%]
The specified efficiency is a maximum value that applies under continuous torque load (M_N). Under very small loads, the efficiency decreases (by a factor of V).

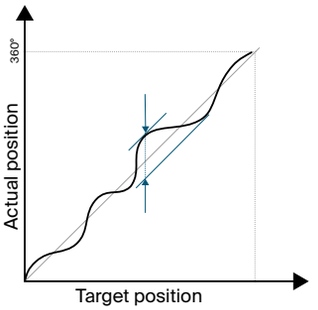


7 Weight [g]
The specified weight corresponds to the net weight, including motor add-on components.

8 Mass inertia [gcm²]
The gear moment of inertia is given at the motor shaft. It is required in order to calculate the additional torque needed for acceleration of the gear components in the case of highly dynamic drives. Variations may arise depending on how lubrication is distributed.

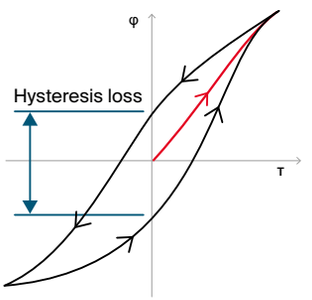
9 Gear length L1 [mm]
L1 describes the gear length down to the motor's axial mount area (reference C in motors).

10 Mech. positioning accuracy [arcmin]
The mechanical positioning accuracy describes the absolute positioning error at the output. It is measured over a full revolution (360°) at the output and shown as the maximum value of the bandwidth.

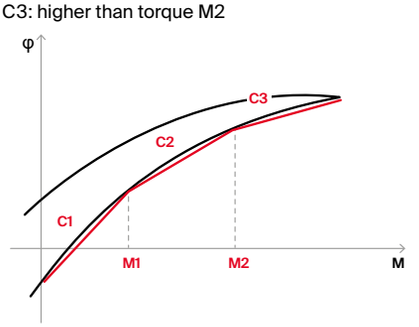


11 Mech. repeatability [arcmin]
The mechanical repeatability describes how accurately a position can be reached repeatedly from the same direction. It is defined as half of the maximum deviation and is expressed as a ± value.

12 Hysteresis loss [arcmin]
The hysteresis loss describes the angular deviation (φ) resulting from fluctuating loads on the output shaft (T). It is measured while the gearhead input is blocked.



13 Torsional rigidity [10⁴ Nm/rad]
The torsional rigidity describes the elastic deformation of the output under load. The torsional strength is presented in a linearized form, divided into three segments.
C1: up to torque M1
C2: between torque M1 and M2
C3: higher than torque M2



15 Starting torque, no load [mNm]
The starting torque specifies the torque that must be applied at the gearhead input to set the gearhead in motion. No load is applied to the gearhead output in this case.

16 Backdriving torque, no load [Nm]
The backdriving torque specifies the torque that must be applied at the gearhead output to drive the gearhead from the output side. No load is applied to the gearhead input in this case.

17 Ratcheting torque [Nm]
The ratcheting torque describes the torque during operation at which the tooth contact between the flexspline and circular spline is lost and the teeth slide over each other. This results in asymmetric tooth meshing. Continued operation leads to increased wear and tear, ultimately destroying the gearhead.

18 Buckling torque [Nm]
The buckling torque describes the torque at standstill at which the flexspline can plastically deform or even tear away from the base. The gearhead is irreparably damaged afterward.

Technical data

20 Tilting rigidity [Nm/arcmin]
The tilting rigidity describes the resistance of the output bearing to tilting.

21 Max. tilting torque [Nm]
The specified value only refers to the tilting torque without axial/radial load in a static condition.

22/23 Max. axial/radial load [N]
The specified value only refers to the axial/radial load without tilting torque in a static condition.

24/25 Dynamic/static load rating [N]
The load ratings are specifications for calculating the expected service life of the output bearing.

26 Distance rolling bearing center to output [mm]
This values describes the distance from the output to the center of the output bearing.

27 Pitch diameter [mm]
The pitch diameter describes the diameter of the circle along which the centers of the rolling elements move.

28 Ambient temperature [°C]
Specifies the permissible ambient temperature for proper operation of the gearhead. The gearhead properties depend on the ambient temperature. Special lubricants are available on request.

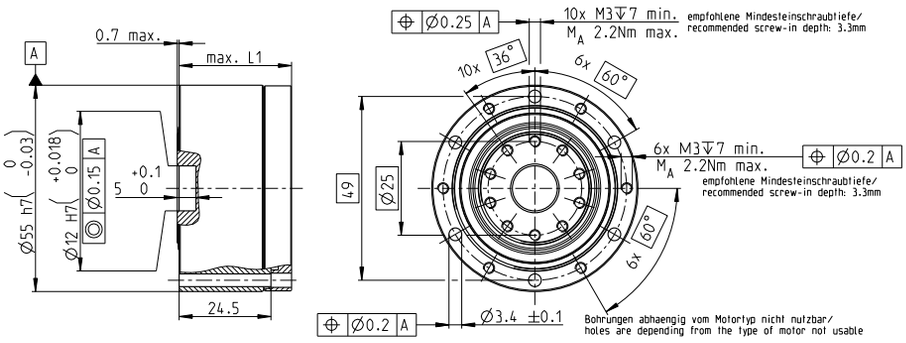
***intermittent**
Short-term operation is defined as follows:
– during 1 second
– during max. 10% of the operating cycle
If these values are exceeded, a reduced service life must be expected.

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GSW 55 A ∅55 mm, strain wave gearhead

Zero backlash

NEW





M 5:2

strain wave gear

Stock program
Standard program
Special program (on request)

			Part numbers		
			863427	863428	863429
Gearhead data					
1	Reduction		50:1	80:1	100:1
2	Max. continuous torque	Nm	4.8	7.7	7.7
3	Max. intermittent torque	Nm	12.0	16.0	19.0
4	Max. overload torque	Nm	24.0	35.0	35.0
5	Max. continuous input speed	rpm	3500	3500	3500
	Max. intermittent input speed	rpm	8500	8500	8500
6	Max. efficiency	%	72	72	75
7	Weight	g	300	300	300
8	Mass moment of inertia	gcm²	4.35	4.22	4.18
9	Gearhead length L1	mm	30.3	30.3	30.3
10	Mech. positioning accuracy	arcmin	1.50	2.10	2.40
11	Mech. repeatability	arcmin	0.01	0.01	0.03
12	Hysteresis loss	arcmin	2.50	2.00	2.00
13	Torsional rigidity C1	10^4 Nm/rad	0.29	0.44	0.33
	Torsional rigidity C2	10^4 Nm/rad	0.37	0.44	0.36
	Torsional rigidity C3	10^4 Nm/rad	0.47	0.48	0.45
14	Torque M1	Nm	1.58	1.58	1.58
	Torque M2	Nm	3.16	3.16	3.16
15	Starting torque, no load	mNm	22.0	16.0	14.0
16	Backdriving torque, no load	Nm	1.50	1.50	1.50
17	Ratcheting torque	Nm	60.0	75.0	55.0
18	Buckling torque	Nm	190	190	190

Technical data		
19	Bearing at output	cross roller bearings
20	Tilting rigidity	9.0 Nm/arcmin
21	Max. tilting torque	28.0 Nm
22	Max. radial load	1650 N
23	Max. axial load	3300 N
24	Dynamic load rating	1890 N
25	Static load rating	2140 N
26	Distance rolling bearing center to output	10 mm
27	Pitch diameter	34.7 mm
28	Ambient temperature	-40...+100 °C

Modular system

EC motor
263–265_ECX FLAT 42
306–311_EC-i 40
312–313_EC-i 52

Compact drive
365–366_ECX FLAT 42

Additional information

Explanation of the line numbers and additional information on page 454.

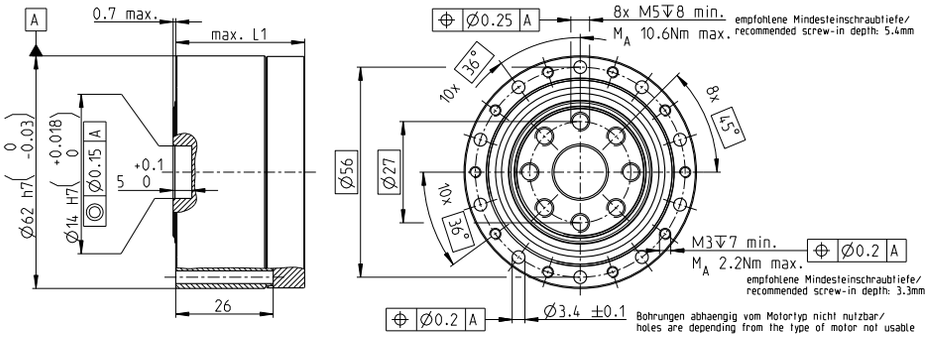
Gearhead

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GSW 62 A ∅62 mm, strain wave gearhead

Zero backlash

NEW





M 5:2

Stock program
Standard program
Special program (on request)

			Part numbers		
			867137	867132	867073
Gearhead data					
1	Reduction		50:1	80:1	100:1
2	Max. continuous torque	Nm	18.0	19.0	27.0
3	Max. intermittent torque	Nm	23.0	29.0	37.0
4	Max. overload torque	Nm	48.0	61.0	71.0
5	Max. continuous input speed	rpm	3500	3500	3500
	Max. intermittent input speed	rpm	7300	7300	7300
6	Max. efficiency	%	72	72	75
7	Weight	g	460	460	460
8	Mass moment of inertia	gcm²	8.77	8.49	8.40
9	Gearhead length L1	mm	32.4	32.4	32.4
10	Mech. positioning accuracy	arcmin	1.50	1.80	1.56
11	Mech. repeatability	arcmin	k.a.	0.036	0.047
12	Hysteresis loss	arcmin	2.00	1.00	1.00
13	Torsional rigidity C1	10^4 Nm/rad	0.67	0.56	0.63
	Torsional rigidity C2	10^4 Nm/rad	0.88	0.56	0.66
	Torsional rigidity C3	10^4 Nm/rad	1.20	0.67	0.56
14	Torque M1	Nm	3.90	3.00	3.00
	Torque M2	Nm	12.00	7.00	7.00
15	Starting torque, no load	mNm	34.0	22.0	19.0
16	Backdriving torque, no load	Nm	2.50	2.00	2.30
17	Ratcheting torque	Nm	105	140	110
18	Buckling torque	Nm	330	330	330

Technical data		
19	Bearing at output	cross roller bearings
20	Tilting rigidity	17 Nm/arcmin
21	Max. tilting torque	42.0 Nm
22	Max. radial load	2030 N
23	Max. axial load	4075 N
24	Dynamic load rating	2060 N
25	Static load rating	2640 N
26	Distance rolling bearing center to output	10 mm
27	Pitch diameter	42.7 mm
28	Ambient temperature	-40...+100 °C

Additional information

Explanation of the line numbers and additional information on page 454.

Modular system

EC motor

249–251_IDX 56
312–313_EC-i 52
321–323_EC 60 flat

Compact drive

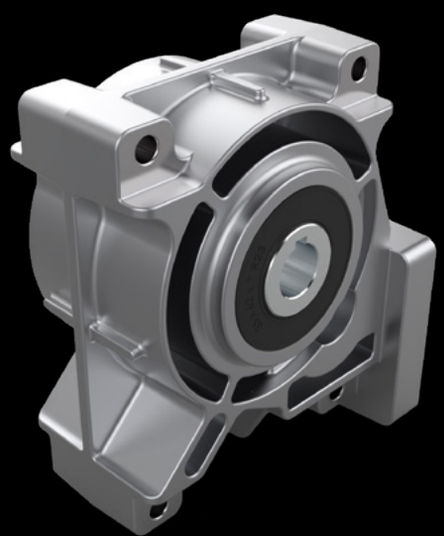
353–355_IDX 56

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parvalux right angle gear

parvalux
by maxon

Standard specification no. 102	91
Terminology explanations	368
parvalux right angle gear	458–461
GB 80, Composite, 6.0–8.0 Nm	458
GB 12, Bronze, 30.0 Nm	459
GB 9, Composite, 50.0 Nm	460
GB 65, Steel/bronze, 120.0 Nm	461



Parvalux angular gearheads – optimally matched to maxon motors. High torque and impressive power density with an extremely compact design, all made possible by the worm gear technology.

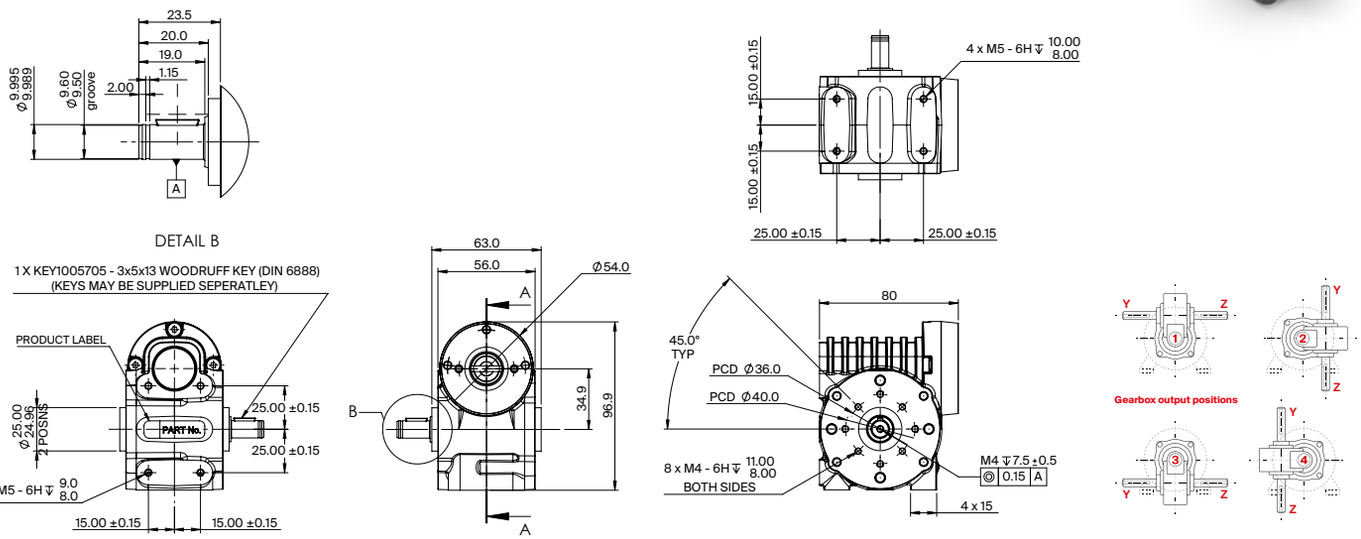
More Parvalux products at
www.parvalux.com

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GB 80 Worm Gear

Composite Version





Key data		Composite version
Max. continuous torque	Nm	8
Ambient temperature	°C	-30...+130
Max. continuous input speed	rpm	4000
Gearhead length[1]	mm	80
Bearing at output		Ball bearing
Weight	kg	0.7

Specifications		Composite version		
Part numbers (special program on request)		812954	848376	848379
Reduction	X:1	15.5	30	60
Number of stages		1	1	1
Max. continuous torque	Nm	8	8	6
Max. intermittent torque	Nm	13	13	10
Max. continuous input speed	rpm	4000	4000	4000
Max. intermittent input speed	rpm	5000	5000	5000
Max. efficiency	%	77	70	54
Average backlash no load	arcmin	10–25	10–25	10–25
Max. axial load (dynamic)	N	150	150	150
Max. permissible radial load, 12 mm from flange	N	500	500	500

Configuration	Composite version
Gearhead position to motor	4 positions, all at 90°

Modular system	
EC motor	Page
IDX 56	249–251
EC-i 52	312–313
EC 60 flat	321–323
EC 90 flat	324–329
Compact drive	
IDX 56	353–355

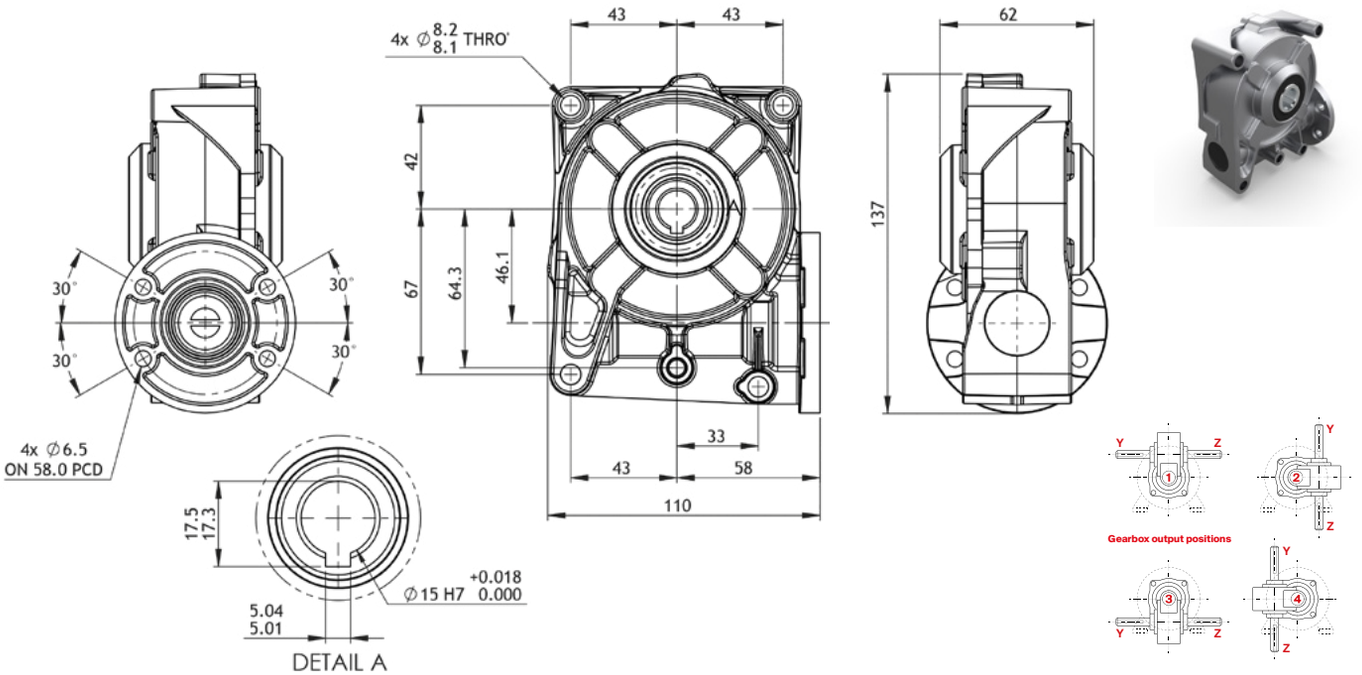
Notes

[1]Length given excludes intermediate plate for motor combination

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GB 12 Worm Gear

Bronze Version



Key data		Bronze version
Max. continuous torque	Nm	30
Ambent temperature	°C	-30...+130
Max. continuous input speed	rpm	4000
Gearhead length[1]	mm	110
Bearing at output		Ball bearing
Weight	kg	1.5

Specifications		Bronze version		
Part numbers (special program on request)		735900	735901	735902
Reduction	X:1	15	30	60
Number of stages		1	1	1
Max. continuous torque	Nm	30	30	30
Max. intermittent torque	Nm	48	48	48
Max. continuous input speed	rpm	4000	4000	4000
Max. intermittent input speed	rpm	5000	5000	5000
Max. efficiency	%	75	65	50
Average backlash no load	arcmin	10–25	10–25	10–25
Max. axial load (dynamic)	N	600	600	600
Max. permissible radial load, 12 mm from flange	N	800	800	800

Configuration	Bronze version
Gearhead position to motor	4 positions, all at 90°

Modular system	
EC motor	Page
IDX 56	249–251
IDX 70 S, M	252–253
EC-i 52	312–313
EC 90 flat	324–329
Compact drive	
IDX 56	353–355
IDX 70 S, M	356–357

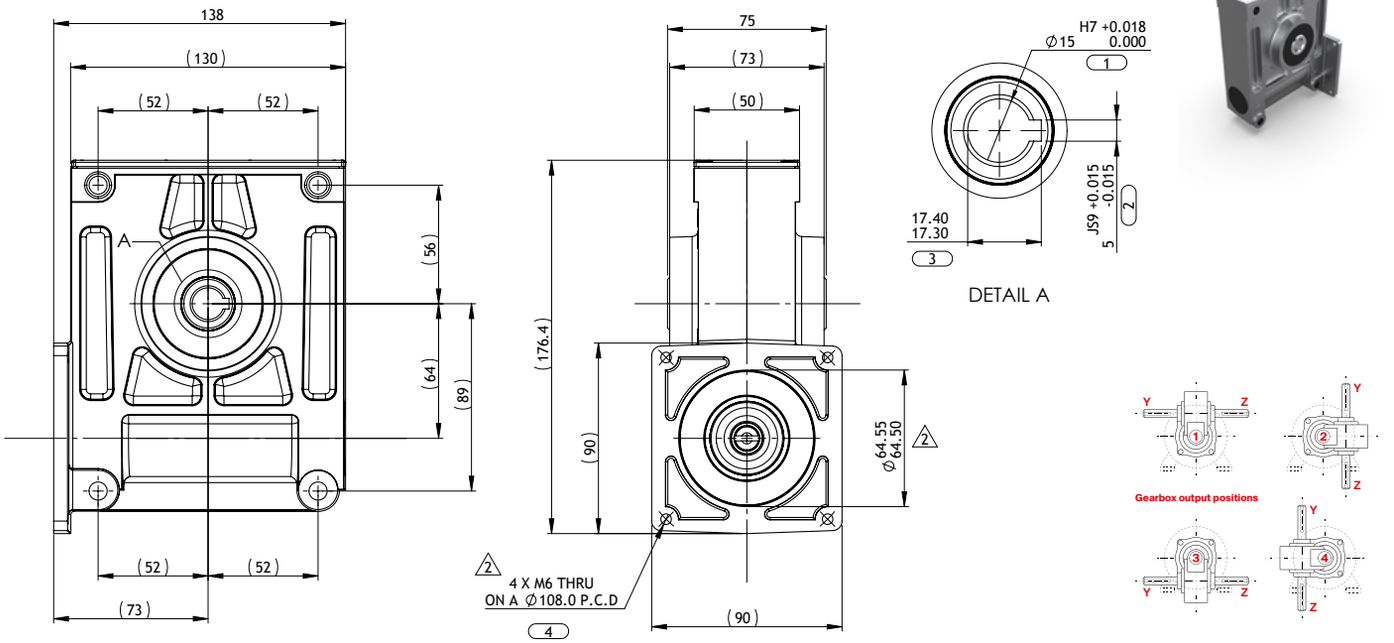
Notes

[1]Length given excludes intermediate plate for motor combination
Standard shaft ∅25, length 50 mm with 8 mm keyway 735903

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GB 9 Worm Gear

Composite Version



Key data		Composite version
Max. continuous torque	Nm	50
Ambient temperature	°C	-30...+130
Max. continuous input speed	rpm	4000
Gearhead length[1]	mm	138
Bearing at output		Ball bearing
Weight	kg	2.3

Specifications		Composite version		
Part numbers (special program on request)		735894	735895	735896
Reduction	X:1	15	30	60
Number of stages		1	1	1
Max. continuous torque	Nm	50	50	50
Max. intermittent torque	Nm	80	80	80
Max. continuous input speed	rpm	4000	4000	4000
Max. intermittent input speed	rpm	5000	5000	5000
Max. efficiency	%	85	75	65
Average backlash no load	arcmin	10–25	10–25	10–25
Max. axial load (dynamic)	N	600	600	600
Max. permissible radial load, 12 mm from flange	N	800	800	800

Configuration	Composite version
Gearhead position to motor	4 positions, all at 90°

Modular system	
EC motor	Page
EC 90 flat	324–329
IDX 70 S, M	252–253
Compact drive	
IDX 70 S, M	356–357

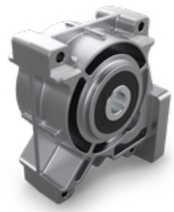
Notes

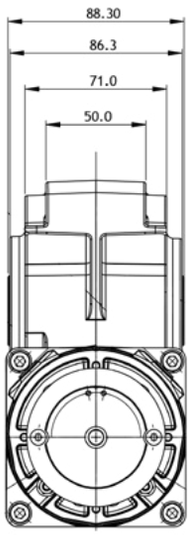
[1]Length given excludes intermediate plate for motor combination
Standard shaft ∅25, length 50 mm with 8 mm keyway **735898**

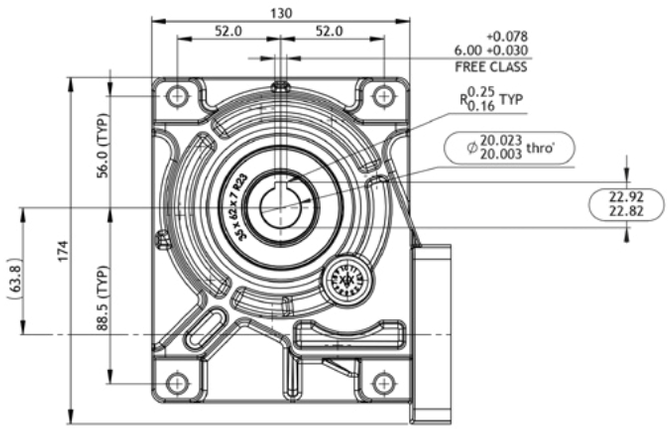
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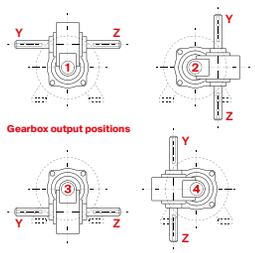
GB 65 Worm Gear

Steel/Bronze Version









Key data		Steel/bronze version
Max. continuous torque	Nm	120
Ambient temperature	°C	-30...+120
Max. continuous input speed	rpm	4000
Gearhead length[1]	mm	130
Bearing at output		Ball bearing
Weight	kg	3.5

Specifications		Steel/bronze version		
Part numbers (special program on request)		848390	848392	848393
Reduction	X:1	80	120	160
Number of stages		2	2	2
Max. continuous torque	Nm	120	120	120
Max. intermittent torque	Nm	300	300	300
Max. continuous input speed	rpm	4000	4000	4000
Max. intermittent input speed	rpm	5000	5000	5000
Max. efficiency	%	70	60	55
Average backlash no load	arcmin	35	35	35
Max. axial load (dynamic)	N	1000	1000	1000
Max. permissible radial load, 12 mm from flange	N	3000	3000	3000

Configuration	Steel/bronze version
Gearhead position to motor	4 positions, all at 90°

Modular system	
EC motor	Page
EC 90 flat	324–329
IDX 70 S, M	252–253
Compact drive	
IDX 70 S, M	356–357

Notes

[1]Length given excludes intermediate plate for motor combination

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For your personal notes

maxon screw drive

Standard specification no. 102	91
Important considerations	464
maxon screw drive	465–482
GP 6 S ∅6 mm, metric lead screw	465
GP 6 S ∅6 mm, metric lead screw, ceramic	466
GP 8 S ∅8 mm, metric lead screw	467
GP 8 S ∅8 mm, metric lead screw, ceramic	468
GP 16 S ∅16 mm, ball screw	469
GP 16 S ∅16 mm, metric lead screw	470
GP 16 S ∅16 mm, metric lead screw, ceramic	471
GP 22 S ∅22 mm, ball screw	472
GP 22 S ∅22 mm, metric lead screw	473
GP 32 S ∅32 mm, ball screw	474–476
GP 32 S ∅32 mm, metric lead screw	477–479
GP 32 S ∅32 mm, trapezoidal lead screw	480–482
Options	483–485



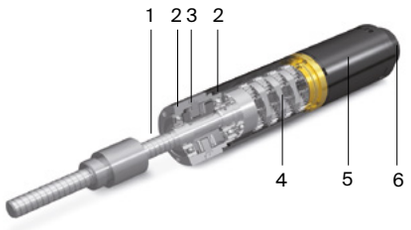
Compact, easy to configure linear actuators as part of a complete system with integrated thrust bearing for high axial loads. Versions available with metric lead screw, trapezoidal lead screw or ball screw.

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Screw Drive Basics

Design

1 Screw, directly implemented in the gearhead
2 Radial bearing
3 Axial bearing
4 Planetary gearhead 0–4 stages
5 Motor
6 Encoder



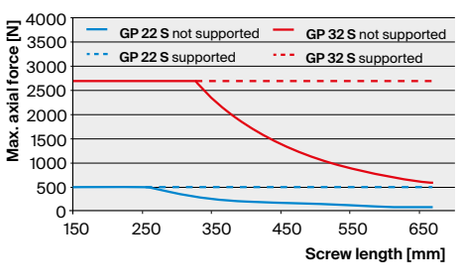
The particular type of screw required must first be established before a screw drive can be designed. Every type of screw has different characteristics and a number of specific limits. These limits are taken into account in the technical data.

Ball screw:
– highly efficient
– not self-locking
– high load capacity
Metric lead screw:
– self-locking
– low costs
Trapezoidal lead screw:
– same as metric lead screw
– higher load capacity than metric lead screw

Feed force

For the calculation of the feed force acceleration and friction forces as well as gravity have to be taken into consideration. Exceeding the maximum permissible load must be avoided, as this damages the screw. The maximum permissible feed force is displayed for standard screws. For longer screws, the permissible feed force can be limited by the critical compressive force of the screw. In this case, supporting the end of the screw may be necessary.

Limitation for ball screws



Torque

The required torque of the screw M_a [mNm] is calculated with the feed force F_L [N] (load), the thread lead p [mm] and the efficiency of the screw η_1.

$$M_a = \frac{F_L \cdot p}{2 \cdot \pi \cdot \eta_1}$$

In combination with the gearhead, the required motor torque M_{mot} [mNm] is:

$$M_{mot} = \frac{F_a \cdot p}{2 \cdot \pi \cdot i \cdot \eta}$$

Where i is the gearhead reduction ratio and η the efficiency of the complete screw drive.

Technical data

The “Technical Data” block contains generally applicable data on screw, nut and gearhead. These are independent of the gearhead reduction ratio.

Length

The data sheets show the screw drives with the standard lengths. Other lengths are available as an option in 5 mm steps up to a given maximum length. Please give detailed requirements for special lengths.

Max. efficiency/mass inertia

The values stated refer to the screw alone (without gearhead). The values with gearhead are given in the “Gearhead data” main data field.

Nut

Standard screw drives are supplied with a thread nut. Flange or cylinder nuts are also available as an option. See details with corresponding reference number on page 483.

Bearing

The output stage and the screw are supported by preloaded axial bearings. This means that the high axial forces can be absorbed directly by the gearhead without additional support.

Speed and feed velocity

Feed velocity v_L [mm/s] is linked to output speed n [rpm] by the lead p [mm].

$$v_L = \frac{p \cdot n}{60}$$

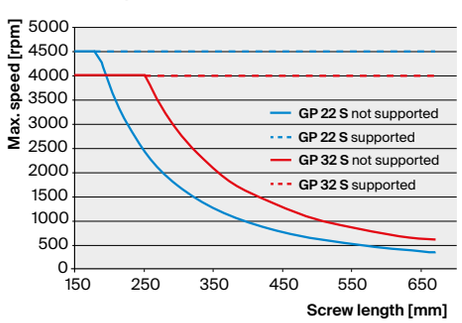
In combination with the gearhead, the motor speed n_{mot} [rpm] is:

$$n_{mot} = \frac{v_L \cdot 60 \cdot i}{p}$$

Where i is the gearhead reduction ratio and p the screw lead.

The screw speed is limited by the resonance frequency of the screw and for ball screws additionally by the ball return system.
In addition, the maximum permissible speed of the gearhead has to be considered.

Max. speed at ball screws



Explanation

7 Max. efficiency
The given efficiency is a maximum value that applies when loaded with maximum feed force. Efficiency falls sharply with very small loads. The stated value refers to the complete screw drive (gearhead and screw).

20 Max. feed velocity
Specifies the maximum permissible feed velocity.

21 Max. feed force (continuous)
Is the maximum permissible feed force which may be continuously applied. Exceeding this value results in a reduced service life.

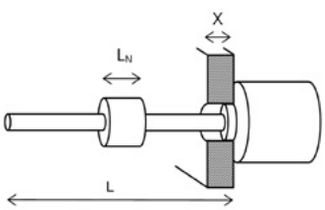
22 Max. feed force (intermittent)
Is the maximum permissible feed force which may be intermittently applied. “Intermittently” is defined as follows:
– during max. 1 second
– during max. 10% of operation
Exceeding these values results in a reduced service life.

23 Mechanical positioning accuracy
In this value, following factors are taken into consideration:
– backlash of the gearhead
– accuracy of the screw
– axial play of the nut

Maximum stroke

The maximum possible stroke depends on the length of the screw L [mm]. The length of the nut L_N [mm] and the thickness of its mounting plate X [mm] must be taken into consideration.

Stroke = L – (L_N + X + stroke reserve + Opt. FLEX-GEAR-SPIN06)

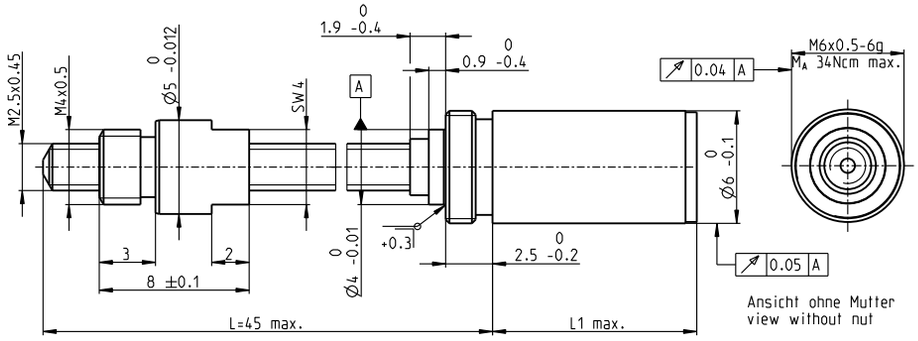


Mounting and safety instructions

Using a ball screw with a flange nut, the mounting through a hole is only possible with the optional rectangular mounting flange.
The ball screw nut may never be removed. As the balls are preloaded remounting would be impossible.
The screw may never block during operation, as this could damage the screw nut or gearhead.
Service life crucially depends on the precision with which the gear is fixed to the screw nut. Eccentricities and angle errors sometimes result in massive radial loading which must never exceed the given maximum value.
Additional information can be found in the maxon online shop at the item under downloads.

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Screw Drive GP 6 S ∅6 mm, metric lead screw



M 2.5:1

Technical data	
Screw	M2.5 x 0.45, stainless steel
Standard length	45 mm
Special length (5 mm steps)	max. 80 mm
Nut (standard)	thread nut
Material	bronze*
Axial play	< 0.088 mm
Planetary gearhead	straight teeth
Bearing	ball bearing
Radial play, 5 mm from flange	< 0.12 mm
Axial play	preloaded
Max. continuous input speed	12 000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static)[1]	10 N

Number of stages	1	2	3	4	5
Max. radial load, 5 mm from flange	5 N	5 N	5 N	5 N	5 N

Stock program
Standard program
Special program (on request)

Part numbers	428758	428757	428756	420663	428755
Screw drive data					
1 Reduction	3.9 : 1	15 : 1	57 : 1	221 : 1	854 : 1
2 Absolute reduction	27/7	729/49	19683/343	531441/2401	1438907/16807
20 Max. feed velocity[1] mm/s	15	10	2.6	0.7	0.2
21 Max. feed force (continuous)[1] N	2	3	4	6	10
22 Max. feed force (intermittent)[1] N	6	8	12	15	15
4 Number of stages	1	2	3	4	5
7 Max. efficiency gearhead incl. screw %	28	24	21	19	16
8 Weight[1] g	2.9	3.3	3.7	4.1	4.5
9 Average backlash no load °	1.8	2.0	2.2	2.5	2.8
23 Mechanical positioning accuracy[1] mm	0.106	0.107	0.107	0.107	0.108
10 Mass inertia gearhead incl. screw[1] gcm²	0.001	0.001	0.001	0.001	0.001
11 Gearhead length L1 mm	6.9	9.4	12.0	14.5	17.1

[1] based on screw length 45 mm



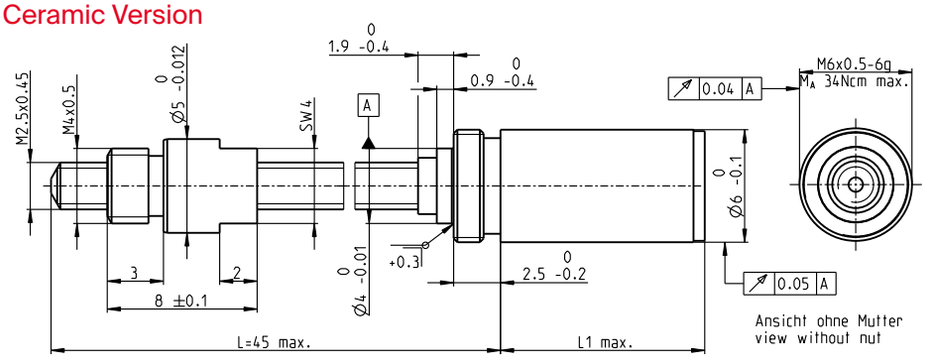
Modular system									
+ Motor	Page	**+ Sensor/Brake**	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor / brake) + assembly parts					
RE 6, 0.3 W, A	129			22.6	25.1	27.7	30.2	32.8	
RE 6, 0.3 W, B	129			26.6	29.1	31.7	34.2	36.8	

***Note:** This spindle nut contains leaded bronze for functional reasons. This product therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The screw drives may therefore only be used for devices that are not subject to this directive.

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Screw Drive GP 6 S ∅6 mm, metric lead screw

Ceramic Version



M 5:2

Technical data						
Screw						M2.5 x 0.45, ceramic
Standard length						45 mm
Special length (5 mm steps)						max. 80 mm
Nut (standard)						thread nut
Material						stainless steel
Axial play						< 0.079 mm
Planetary gearhead						straight teeth
Bearing						ball bearing
Radial play, 5 mm from flange						< 0.12 mm
Axial play						preloaded
Max. continuous input speed						12000 rpm
Recommended temperature range						-15...+80°C
Max. axial load (static)[1]						10 N
Number of stages	1	2	3	4	5	
Max. radial load, 5 mm from flange	5 N	5 N	5 N	5 N	5 N	

Stock program
Standard program
Special program (on request)

Part numbers	437380	437379	437378	437377	437375
Screw drive data					
1 Reduction	3.9 : 1	15 : 1	57 : 1	221 : 1	854 : 1
2 Absolute reduction	27/7	729/49	19683/343	531441/2401	1438907/16807
20 Max. feed velocity[1] mm/s	25	10	2.6	0.7	0.2
21 Max. feed force (continuous)[1] N	2	3	5	7	11
22 Max. feed force (intermittent)[1] N	6	10	15	15	15
4 Number of stages	1	2	3	4	5
7 Max. efficiency gearhead incl. screw %	39	34	30	27	23
8 Weight[1] g	2.9	3.3	3.7	4.1	4.5
9 Average backlash no load °	1.8	2.0	2.2	2.5	2.8
23 Mechanical positioning accuracy[1] mm	0.081	0.082	0.082	0.082	0.083
10 Mass inertia gearhead incl. screw[1] gcm²	0.001	0.001	0.001	0.001	0.001
11 Gearhead length L1 mm	6.9	9.4	12.0	14.5	17.1

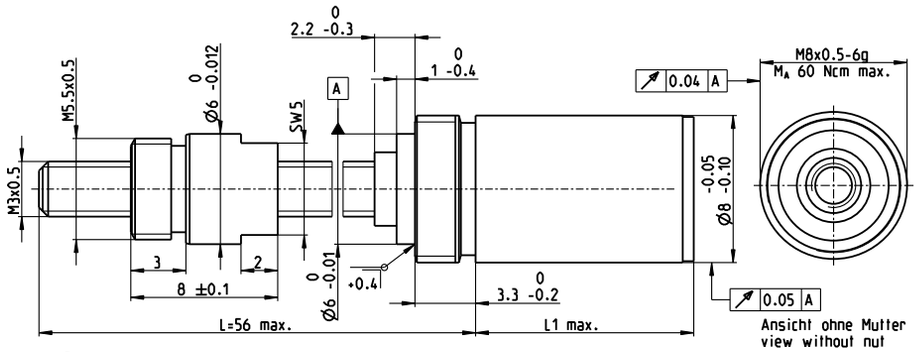
[1] based on screw length 45 mm



Modular system									
+ Motor	Page	**+ Sensor / Brake**	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor / brake) + assembly parts					
RE 6, 0.3 W, A	129			22.6	25.1	27.7	30.2	32.8	
RE 6, 0.3 W, B	129			26.6	29.1	31.7	34.2	36.8	

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Screw Drive GP 8 S ∅8 mm, metric lead screw



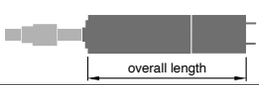
M 5:2

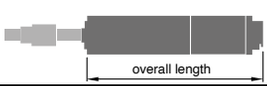
Technical data						
Screw						M3 x 0.5, stainless steel
Standard length						56 mm
Special length (5 mm steps)						max. 100 mm
Nut (standard)						thread nut
Material						bronze*
Axial play						< 0.1 mm
Planetary gearhead						straight teeth
Bearing						ball bearing
Radial play, 5 mm from flange						< 0.08 mm
Axial play						preloaded
Max. continuous input speed						12000 rpm
Recommended temperature range						-15...+80°C
Max. axial load (static)[1]						25 N
Number of stages	1	2	3	4	5	
Max. radial load, 5 mm from flange	5 N	5 N	5 N	5 N	5 N	

Stock program
Standard program
Special program (on request)

Part numbers	473643	473644	473645	473646	473647
Screw drive data					
1 Reduction	4:1	16:1	64:1	256:1	1024:1
2 Absolute reduction	4/1	16/1	64/1	256/1	1024/1
20 Max. feed velocity[1] mm/s	15	6.3	1.6	0.4	0.1
21 Max. feed force (continuous)[1] N	3	6	9	14	22
22 Max. feed force (intermittent)[1] N	8	18	27	27	27
4 Number of stages	1	2	3	4	5
7 Max. efficiency gearhead incl. screw %	27	24	22	19	17
8 Weight[1] g	6.3	6.9	7.5	8.1	8.7
9 Average backlash no load °	1.8	2.0	2.2	2.5	2.8
23 Mechanical positioning accuracy[1] mm	0.112	0.112	0.112	0.112	0.113
10 Mass inertia gearhead incl. screw[1] gcm²	0.005	0.004	0.004	0.004	0.004
11 Gearhead length L1 mm	7.0	9.6	12.2	14.8	17.4

[1] based on screw length 56 mm





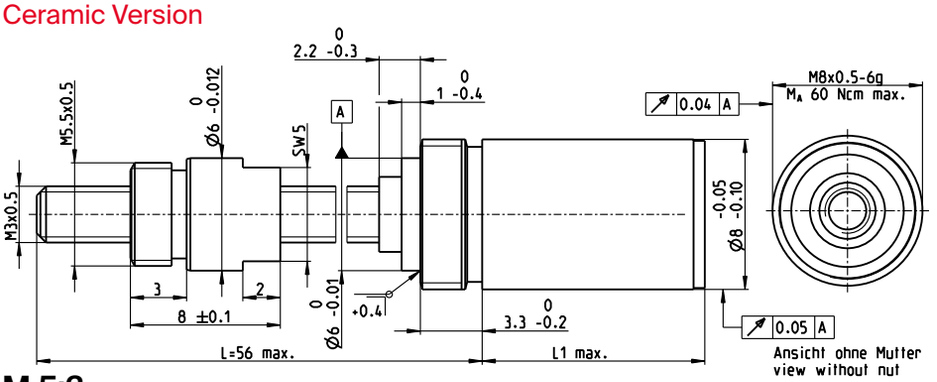
Modular system									
+ Motor	Page	**+ Sensor/Brake**	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts					
RE 8, 0.5 W, A	130			23.7	26.3	28.9	31.5	34.1	
RE 8, 0.5 W, B	130			26.7	29.3	31.9	34.5	37.1	
RE 8, 0.5 W, A	130	ENX 8 IMR	499	30.3	32.9	35.5	38.1	40.7	
RE 8, 0.5 W, A	130	Enc 8 OPT	534	31.9	34.5	37.1	39.7	42.3	

***Note:** This spindle nut contains leaded bronze for functional reasons. This product therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The screw drives may therefore only be used for devices that are not subject to this directive.

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Screw Drive GP 8 S ∅8 mm, metric lead screw

Ceramic Version



M 5:2

Technical data						
Screw						M3 x 0.5, ceramic
Standard length						56 mm
Special length (5 mm steps)						max. 100 mm
Nut (standard)						thread nut
Material						stainless steel
Axial play						< 0.09 mm
Planetary gearhead						straight teeth
Bearing						ball bearing
Radial play, 5 mm from flange						< 0.08 mm
Axial play						preloaded
Max. continuous input speed						12000 rpm
Recommended temperature range						-15...+80°C
Max. axial load (static)[1]						25 N
Number of stages	1	2	3	4	5	
Max. radial load, 5 mm from flange	5 N	5 N	5 N	5 N	5 N	

Stock program
Standard program
Special program (on request)

Part numbers	473636	473637	473639	473640	473641
Screw drive data (provisional)					
1 Reduction	4:1	16:1	64:1	256:1	1024:1
2 Absolute reduction	4/1	16/1	64/1	256/1	1024/1
20 Max. feed velocity[1] mm/s	25	6.3	1.6	0.4	0.1
21 Max. feed force (continuous)[1] N	3	7	11	17	27
22 Max. feed force (intermittent)[1] N	14	22	32	32	32
4 Number of stages	1	2	3	4	5
7 Max. efficiency gearhead incl. screw %	38	34	31	28	25
8 Weight[1] g	6.3	6.9	7.5	8.1	8.7
9 Average backlash no load °	1.8	2.0	2.2	2.5	2.8
23 Mechanical positioning accuracy[1] mm	0.087	0.087	0.087	0.087	0.088
10 Mass inertia gearhead incl. screw[1] gcm²	0.005	0.004	0.004	0.004	0.004
11 Gearhead length L1 mm	7.0	9.6	12.2	14.8	17.4

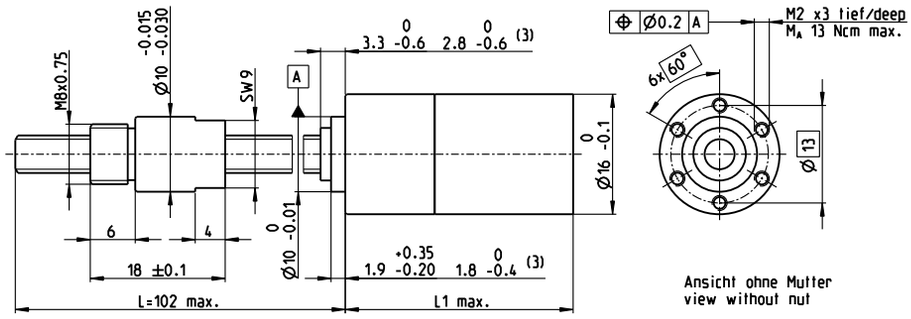
[1] based on screw length 56 mm



Modular system									
+ Motor	Page	**+ Sensor/Brake**	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts					
RE 8, 0.5 W, A	130			23.7	26.3	28.9	31.5	34.1	
RE 8, 0.5 W, B	130			26.7	29.3	31.9	34.5	37.1	
RE 8, 0.5 W, A	130	ENX 8 IMR	499	30.3	32.9	35.5	38.1	40.7	
RE 8, 0.5 W, A	130	Enc 8 OPT	534	31.9	34.5	37.1	39.7	42.3	

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Screw Drive GP 16 S ∅16 mm, ball screw



M 1:1

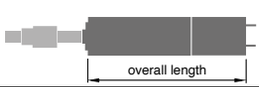
Technical data	
Screw	∅5 x 2, stainless steel
Standard length	102 mm
Special length (5 mm steps)	max. 200 mm
Nut (standard)	thread nut
Material	X46Cr13, hardened
Axial play	< 0.01 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/axial bearing
Radial play, 6 mm from flange	< 0.08 mm
Axial play	preloaded
Max. continuous input speed[2]	12000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static)[1]	500 N

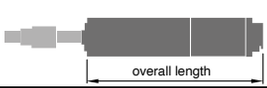
Number of stages	0	1	2	3	4
Max. radial load, 6 mm from flange	20 N	40 N	60 N	80 N	80 N

Stock program
Standard program
Special program (on request)

			Part numbers							
			424221	424222	424223	424219	424224			
Screw drive data (provisional)										
1	Reduction		1:1	4.4:1	19:1	84:1	370:1			
2	Absolute reduction		1/1	57/13	3249/169	185193/2197	1055600 1/28561			
20	Max. feed velocity[1]	mm/s	150	90.9	21.1	4.8	1.1			
21	Max. feed force (continuous)[1]	N	54	64	104	171	280			
22	Max. feed force (intermittent)[1]	N	149	176	287	403	403			
	Part numbers			424731	424733	424745	424749			
1	Reduction			5.4:1	24:1	104:1	455:1			
2	Absolute reduction			27/5	1539/65	87723/845	5000211/10985			
20	Max. feed velocity[1]	mm/s		74.1	16.7	3.8	0.9			
21	Max. feed force (continuous)[1]	N		69	113	184	300			
22	Max. feed force (intermittent)[1]	N		189	311	403	403			
	Part numbers				424744	424747	424750			
1	Reduction				29:1	128:1	561:1			
2	Absolute reduction				729/25	41553/325	236852 1/4225			
20	Max. feed velocity[1]	mm/s			13.8	3.1	0.7			
21	Max. feed force (continuous)[1]	N			120	197	322			
22	Max. feed force (intermittent)[1]	N			331	403	403			
	Part numbers					424748	424751			
1	Reduction					157:1	690:1			
2	Absolute reduction					19683/125	112193 1/1625			
20	Max. feed velocity[1]	mm/s				2.5	0.6			
21	Max. feed force (continuous)[1]	N				211	345			
22	Max. feed force (intermittent)[1]	N				403	403			
	Part numbers						424752			
1	Reduction						850:1			
2	Absolute reduction						531441/625			
20	Max. feed velocity[1]	mm/s					0.5			
21	Max. feed force (continuous)[1]	N					370			
22	Max. feed force (intermittent)[1]	N					403			
4	Number of stages		0	1	2	3	4			
7	Max. efficiency gearhead incl. screw	%	93	87	79	71	63			
8	Weight[1]	g	52	58	61	65	69			
9	Average backlash no load	°	1.0	1.4	1.6	2.0	2.4			
23	Mechanical positioning accuracy[1]	mm	0.039	0.041	0.042	0.044	0.046			
10	Mass inertia gearhead incl. screw[1]	gcm²	0.23	0.11	0.05	0.05	0.05			
11	Gearhead length L1	mm	19.2	22.3	27.4	31.0	34.6			

[1] based on screw length 102 mm (standard length) [2] for reduction 1:1 = 4500 rpm [3] for reduction 1:1



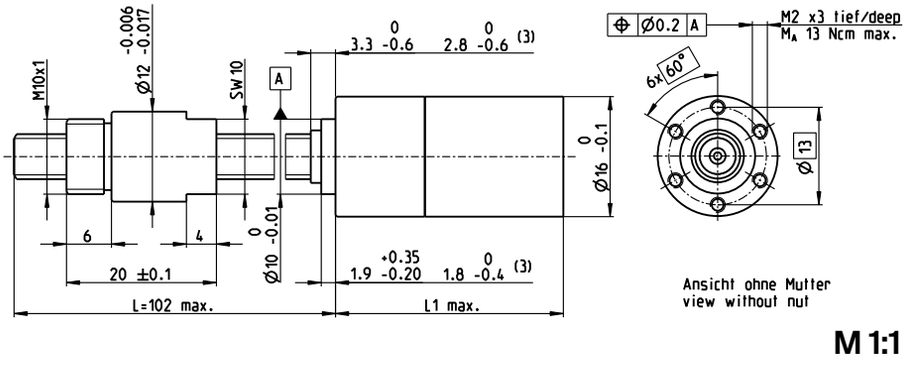


Modular system

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor / brake) + assembly parts				
RE 16, 2 W	151			41.6	44.7	49.8	53.4	57.0
RE 16, 2 W	151	ENX 16 IMR	502	47.3	50.4	55.5	59.1	62.7
RE 16, 2 W	151	MR	533	47.3	50.4	55.5	59.1	62.7
RE 16, 3.2 W	152/153			59.7	62.8	67.9	71.5	75.1
RE 16, 3.2 W	153	13 GAMA	498	65.8	68.9	74	77.6	81.2
RE 16, 3.2 W	153	ENX 16 IMR	502	64.7	67.8	72.9	76.5	80.1
RE 16, 3.2 W	153	MR	533	64.7	67.8	72.9	76.5	80.1
RE 16, 4.5 W	154/155			62.7	65.8	70.9	74.5	78.1
RE 16, 4.5 W	155	13 GAMA	498	68.9	72.0	77.1	80.7	84.3
RE 16, 4.5 W	155	ENX 16 IMR	502	67.7	70.8	75.9	79.5	83.1
RE 16, 4.5 W	155	MR	533	67.7	70.8	75.9	79.5	83.1
A-max 16	171–174			–	47.8	52.9	56.5	60.1
A-max 16	172/174	13 GAMA	498	–	55.9	61.0	64.6	68.2
A-max 16	172/174	ENX 16 IMR	502	–	52.8	57.9	61.5	65.1
A-max 16	172/174	MR	533	–	52.8	57.9	61.5	65.1
EC-max 16, 5 W	279			–	46.4	51.5	55.1	58.7
EC-max 16, 5 W	279	16 EASY/XT/Abs.	509-511	–	56.6	61.7	65.3	68.9
EC-max 16, 5 W	279	16 EASY Abs. XT	512	–	57.1	62.2	65.8	69.4
EC-max 16, 8 W	281			–	58.4	63.5	67.1	70.7
EC-max 16, 8 W	281	16 EASY/XT/Abs.	509-511	–	68.6	73.7	77.3	80.9
EC-max 16, 8 W	281	16 EASY Abs. XT	512	–	69.1	74.2	77.8	81.4

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Screw Drive GP 16 S ∅16 mm, metric lead screw



M 1:1

Technical data						
Screw						M6 x 1, stainless steel
Standard length						102 mm
Special length (5 mm steps)						max. 200 mm
Nut (standard)						thread nut
Material						bronze*
Axial play						< 0.134 mm
Planetary gearhead						straight teeth
Bearing						ball bearing/axial bearing
Radial play, 6 mm from flange						< 0.08 mm
Axial play						preloaded
Max. continuous input speed [2]						12 000 rpm
Recommended temperature range						-15...+80°C
Max. axial load (static)[1]						500 N
Number of stages	0	1	2	3	4	
Max. radial load, 6 mm from flange	20 N	40 N	60 N	80 N	80 N	

Stock program
Standard program
Special program (on request)

			Part numbers				
			424231	424232	424233	424234	424235
Screw drive data (provisional)							
1	Reduction		1:1	4.4:1	19:1	84:1	370:1
2	Absolute reduction		1/1	57/13	3249/169	185193/2197	1055600 1/28561
20	Max. feed velocity[1]	mm/s	50.0	45.5	10.5	2.4	0.5
21	Max. feed force (continuous)[1]	N	35	37	60	98	160
22	Max. feed force (intermittent)[1]	N	134	138	224	315	315
	Part numbers			424797	424798	424800	424806
1	Reduction			5.4:1	24:1	104:1	455:1
2	Absolute reduction			27/5	1539/65	87723/845	500021 1/10985
20	Max. feed velocity[1]	mm/s		37.0	8.3	1.9	0.4
21	Max. feed force (continuous)[1]	N		39	64	105	172
22	Max. feed force (intermittent)[1]	N		148	243	315	315
	Part numbers				424799	424803	424807
1	Reduction				29:1	128:1	561:1
2	Absolute reduction				729/25	41553/325	236852 1/4225
20	Max. feed velocity[1]	mm/s			6.9	1.6	0.4
21	Max. feed force (continuous)[1]	N			69	112	184
22	Max. feed force (intermittent)[1]	N			258	315	315
	Part numbers					424804	424808
1	Reduction					157:1	690:1
2	Absolute reduction					19683/125	1121931 1/1625
20	Max. feed velocity[1]	mm/s				1.3	0.3
21	Max. feed force (continuous)[1]	N				120	197
22	Max. feed force (intermittent)[1]	N				315	315
	Part numbers						424809
1	Reduction						850:1
2	Absolute reduction						531441 1/625
20	Max. feed velocity[1]	mm/s					0.2
21	Max. feed force (continuous)[1]	N					211
22	Max. feed force (intermittent)[1]	N					315
4	Number of stages		0	1	2	3	4
7	Max. efficiency gearhead incl. screw	%	28	27	24	22	19
8	Weight[1]	g	55	61	64	68	72
9	Average backlash no load	°	1.0	1.4	1.6	2.0	2.4
23	Mechanical positioning accuracy[1]	mm	0.166	0.167	0.167	0.169	0.170
10	Mass inertia gearhead incl. screw[1]	gcm²	0.23	0.11	0.05	0.05	0.05
11	Gearhead length L1	mm	19.2	22.3	27.4	31.0	34.6

[1] based on screw length 102 mm (standard length) [2] for reduction 1:1 = 3000 rpm [3] for reduction 1:1

Modular system

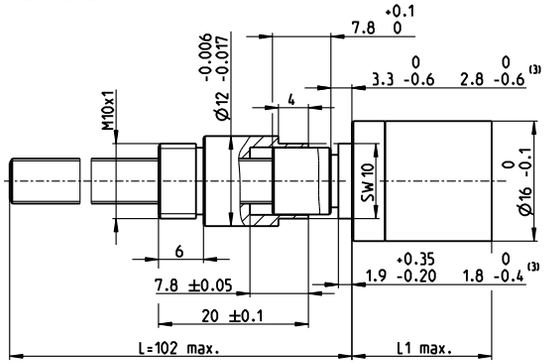
+ Motor	Page	+ Sensor / Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor / brake) + assembly parts				
RE 16, 2 W	151			41.6	44.7	49.8	53.4	57.0
RE 16, 2 W	151	ENX 16 IMR	502	47.3	50.4	55.5	59.1	62.7
RE 16, 2 W	151	MR	533	47.3	50.4	55.5	59.1	62.7
RE 16, 3.2 W	152/153			59.7	62.8	67.9	71.5	75.1
RE 16, 3.2 W	153	13 GAMA	498	65.8	68.9	74	77.6	81.2
RE 16, 3.2 W	153	ENX 16 IMR	502	64.7	67.8	72.9	76.5	80.1
RE 16, 3.2 W	153	MR	533	64.7	67.8	72.9	76.5	80.1
RE 16, 4.5 W	154/155			62.7	65.8	70.9	74.5	78.1
RE 16, 4.5 W	155	13 GAMA	498	68.9	72.0	77.1	80.7	84.3
RE 16, 4.5 W	155	ENX 16 IMR	502	67.7	70.8	75.9	79.5	83.1
RE 16, 4.5 W	155	MR	533	67.7	70.8	75.9	79.5	83.1
A-max 16	171–174			–	47.8	52.9	56.5	60.1
A-max 16	172/174	13 GAMA	498	–	55.9	61.0	64.6	68.2
A-max 16	172/174	ENX 16 IMR	502	–	52.8	57.9	61.5	65.1
A-max 16	172/174	MR	533	–	52.8	57.9	61.5	65.1
EC-max 16, 5 W	279			–	46.4	51.5	55.1	58.7
EC-max 16, 5 W	279	16 EASY/XT/Abs.	509-511	–	56.6	61.7	65.3	68.9
EC-max 16, 5 W	279	16 EASY Abs. XT	512	–	57.1	62.2	65.8	69.4
EC-max 16, 8 W	281			–	58.4	63.5	67.1	70.7
EC-max 16, 8 W	281	16 EASY/XT/Abs.	509-511	–	68.6	73.7	77.3	80.9
EC-max 16, 8 W	281	16 EASY Abs. XT	512	–	69.1	74.2	77.8	81.4

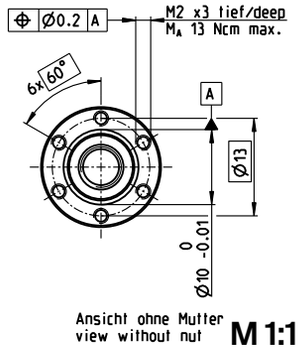
***Note:** This spindle nut contains leaded bronze for functional reasons. This product therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The screw drives may therefore only be used for devices that are not subject to this directive.

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Screw Drive GP 16 S ∅16 mm, metric lead screw

Ceramic Version



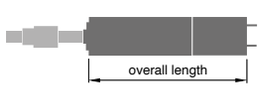


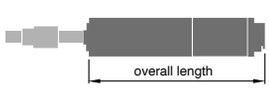
Technical data						
Screw						M6 x 1, ceramic
Standard length						102 mm
Special length (5 mm steps)						max. 200 mm
Nut (standard)						thread nut
Material						X8CrNiS18-9
Axial play						< 0.134 mm
Planetary gearhead						straight teeth
Bearing						ball bearing
Radial play, 6 mm from flange						< 0.08 mm
Axial play						preloaded
Max. continuous input speed [2]						12 000 rpm
Recommended temperature range						-15...+80°C
Max. axial load (static)[1]						500 N
Number of stages	0	1	2	3	4	
Max. radial load, 6 mm from flange	20 N	40 N	60 N	80 N	80 N	

Stock program
Standard program
Special program (on request)

Part numbers	424241	424242	424243	424244	424245
Screw drive data (provisional)					
1 Reduction	1:1	4.4:1	19:1	84:1	370:1
2 Absolute reduction	1/1	57/13	3249/169	185193/2197	1055600 1/28561
20 Max. feed velocity[1] mm/s	50.0	45.5	10.5	2.4	0.5
21 Max. feed force (continuous)[1] N	44	46	74	122	200
22 Max. feed force (intermittent)[1] N	134	138	224	315	315
Part numbers		424811	424812	424814	424819
1 Reduction		5.4:1	24:1	104:1	455:1
2 Absolute reduction		27/5	1539/65	87723/845	5000211 1/10985
20 Max. feed velocity[1] mm/s		37.0	8.3	1.9	0.4
21 Max. feed force (continuous)[1] N		49	80	131	215
22 Max. feed force (intermittent)[1] N		148	243	315	315
Part numbers			424813	424815	424820
1 Reduction			29:1	128:1	561:1
2 Absolute reduction			729/25	41553/325	236852 1/4225
20 Max. feed velocity[1] mm/s			6.9	1.6	0.4
21 Max. feed force (continuous)[1] N			86	141	230
22 Max. feed force (intermittent)[1] N			258	315	315
Part numbers				424818	424821
1 Reduction				157:1	690:1
2 Absolute reduction				19683/125	1121931 1/1625
20 Max. feed velocity[1] mm/s				1.3	0.3
21 Max. feed force (continuous)[1] N				150	246
22 Max. feed force (intermittent)[1] N				315	315
Part numbers					424822
1 Reduction					850:1
2 Absolute reduction					531441 1/625
20 Max. feed velocity[1] mm/s					0.2
21 Max. feed force (continuous)[1] N					264
22 Max. feed force (intermittent)[1] N					315
4 Number of stages	0	1	2	3	4
7 Max. efficiency gearhead incl. screw %	41	38	34	31	28
8 Weight[1] g	55	61	64	68	72
9 Average backlash no load °	1.0	1.4	1.6	2.0	2.4
23 Mechanical positioning accuracy[1] mm	0.166	0.167	0.167	0.169	0.170
10 Mass inertia gearhead incl. screw[1] gcm²	0.23	0.11	0.05	0.05	0.05
11 Gearhead length L1 mm	19.2	22.3	27.4	31.0	34.6

[1] based on screw length 102 mm (standard length) [2] for reduction 1:1 = 3000 rpm [3] for reduction 1:1



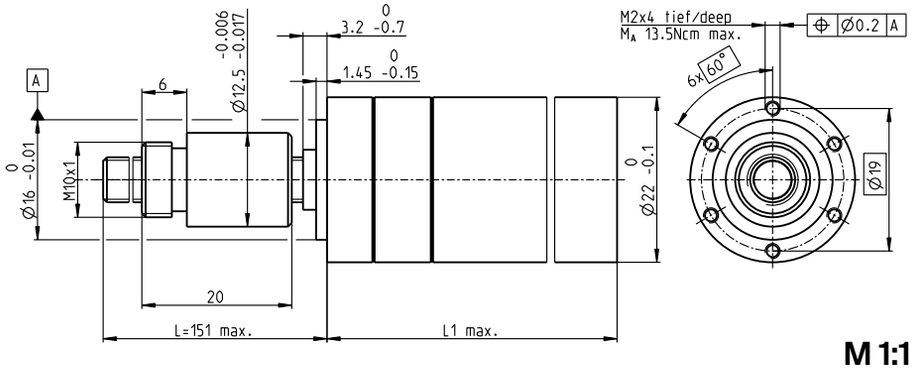


Modular system

+ Motor	Page	+ Sensor / Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor / brake) + assembly parts				
RE 16, 2 W	151			41.6	44.7	49.8	53.4	57.0
RE 16, 2 W	151	ENX 16 IMR	502	47.3	50.4	55.5	59.1	62.7
RE 16, 2 W	151	MR	533	47.3	50.4	55.5	59.1	62.7
RE 16, 3.2 W	152/153			59.7	62.8	67.9	71.5	75.1
RE 16, 3.2 W	153	13 GAMA	498	65.8	68.9	74	77.6	81.2
RE 16, 3.2 W	153	ENX 16 IMR	502	64.7	67.8	72.9	76.5	80.1
RE 16, 3.2 W	153	MR	533	64.7	67.8	72.9	76.5	80.1
RE 16, 4.5 W	154/155			62.7	65.8	70.9	74.5	78.1
RE 16, 4.5 W	155	13 GAMA	498	68.9	72.0	77.1	80.7	84.3
RE 16, 4.5 W	155	ENX 16 IMR	502	67.7	70.8	75.9	79.5	83.1
RE 16, 4.5 W	155	MR	533	67.7	70.8	75.9	79.5	83.1
A-max 16	171–174			–	47.8	52.9	56.5	60.1
A-max 16	172/174	13 GAMA	498	–	55.9	61.0	64.6	68.2
A-max 16	172/174	ENX 16 IMR	502	–	52.8	57.9	61.5	65.1
A-max 16	172/174	MR	533	–	52.8	57.9	61.5	65.1
EC-max 16, 5 W	279			–	46.4	51.5	55.1	58.7
EC-max 16, 5 W	279	16 EASY/XT/Abs.	509-511	–	56.6	61.7	65.3	68.9
EC-max 16, 5 W	279	16 EASY Abs. XT	512	–	57.1	62.2	65.8	69.4
EC-max 16, 8 W	281			–	58.4	63.5	67.1	70.7
EC-max 16, 8 W	281	16 EASY/XT/Abs.	509-511	–	68.6	73.7	77.3	80.9
EC-max 16, 8 W	281	16 EASY Abs. XT	512	–	69.1	74.2	77.8	81.4

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Screw Drive GP 22 S ∅22 mm, ball screw



M 1:1

Technical data						
Screw	∅6 x 2, stainless steel					
Standard length	151 mm					
Special length (5 mm steps)	max. 300 mm					
Nut (standard)	thread nut					
Material	100CR6, hardened					
Axial play	< 0.01 mm					
Planetary gearhead	straight teeth					
Bearing	ball bearing/thrust roller bearing					
Radial play, 5 mm from flange	< 0.05 mm					
Axial play	preloaded					
Max. continuous input speed [2]	8000 rpm					
Recommended temperature range	-15...+80°C					
Max. axial load (static)[1]	500 N					
Number of stages	0	1	2	3	4	
Max. radial load, 15 mm from flange	80 N	80 N	130 N	180 N	180 N	

Stock program
Standard program
Special program (on request)

Part numbers	363863	363864	363867	363871	363872	363877	363882	363887	363892
Screw drive data									
1 Reduction	1:1	3.8:1	14:1	29:1	53:1	89:1	198:1	333:1	479:1
2 Absolute reduction	1/1	15/4	225/16	729/25	3375/64	4617/52	50625/256	69255/208	124659/260
20 Max. feed velocity[1] mm/s	150	70	19	9.2	5.0	3.0	1.3	0.8	0.6
21 Max. feed force (continuous)[1] N	77	100	154	196	240	285	372	443	500
22 Max. feed force (intermittent)[1] N	183	236	365	465	500	500	500	500	500
Part numbers		363865	364041		363873	363878	363883	363888	363893
1 Reduction		4.4:1	16:1		62:1	104:1	231:1	370:1	561:1
2 Absolute reduction		57/13	885/52		12825/208	87723/845	192375/832	10556001/28561	2368521/4225
20 Max. feed velocity[1] mm/s		61	17		4.3	2.6	1.2	0.7	0.5
21 Max. feed force (continuous)[1] N		105	161		253	300	392	458	500
22 Max. feed force (intermittent)[1] N		248	381		500	500	500	500	500
Part numbers		363866	363868		363874	363879	363884	363889	363894
1 Reduction		5.4:1	19:1		72:1	109:1	270:1	389:1	590:1
2 Absolute reduction		27/5	3249/169		48735/676	2187/20	731025/2704	263169/676	59049/100
20 Max. feed velocity[1] mm/s		49	14		3.7	2.4	1.0	0.7	0.5
21 Max. feed force (continuous)[1] N		112	170		266	305	413	466	500
22 Max. feed force (intermittent)[1] N		266	404		500	500	500	500	500
Part numbers			363869		363875	363880	363885	363890	363895
1 Reduction			20:1		76:1	128:1	285:1	410:1	690:1
2 Absolute reduction			81/4		1215/16	41553/325	18225/64	6561/16	1121931/1625
20 Max. feed velocity[1] mm/s			13		3.5	2.1	0.9	0.7	0.4
21 Max. feed force (continuous)[1] N			173		270	322	420	474	500
22 Max. feed force (intermittent)[1] N			411		500	500	500	500	500
Part numbers			363870		363876	363881	363886	363891	363896
1 Reduction			24:1		84:1	157:1	316:1	455:1	850:1
2 Absolute reduction			1539/65		185193/2197	19683/125	2777895/8788	5000211/10985	531441/625
20 Max. feed velocity[1] mm/s			11		3.2	1.7	0.8	0.6	0.3
21 Max. feed force (continuous)[1] N			184		280	345	435	491	500
22 Max. feed force (intermittent)[1] N			437		500	500	500	500	500
4 Number of stages	0	1	2	2	3	3	4	4	4
7 Max. efficiency gearhead incl. screw %	96	81	67	67	57	57	47	47	47
8 Weight[1] g	103	103	115	115	128	128	141	141	141
9 Average backlash no load °	1.0	1.0	1.2	1.2	1.6	1.6	2.0	2.0	2.0
23 Mechanical positioning accuracy[1] mm	0.039	0.039	0.040	0.040	0.042	0.042	0.044	0.044	0.044
10 Mass inertia gearhead incl. screw[1] gcm²	10	1.0	0.4	0.4	0.3	0.3	0.3	0.3	0.3
11 Gearhead length L1 mm	38.0	38.0	44.8	44.8	51.6	51.6	58.4	58.4	58.4

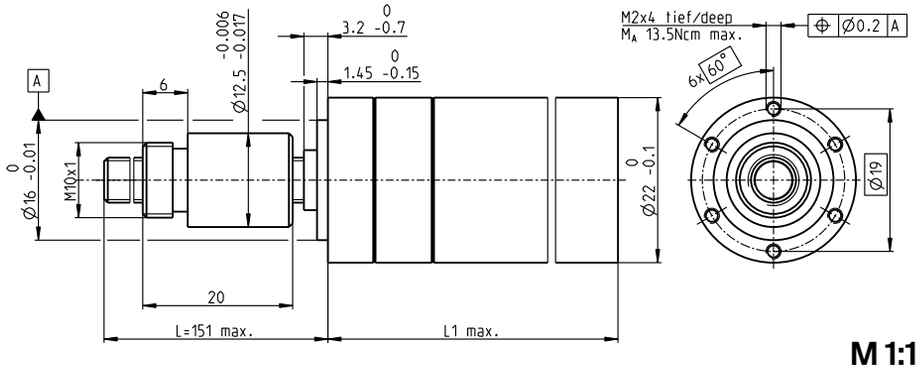
[1] based on screw length 151 mm (standard length) [2] for reduction 1:1 = 4500 rpm

Modular system

+ Motor	Page	+ Sensor/Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor / brake) + assembly parts							
A-max 19	175–178			–	64.2	71.0	71.0	77.8	77.8	84.6	84.6	84.6
A-max 19, 1.5 W	176	13 GAMA	498	–	71.7	78.5	78.5	85.3	85.3	92.1	92.1	92.1
A-max 19, 1.5 W	176	ENX 19 IMR	503	–	69.3	76.1	76.1	82.9	82.9	89.7	89.7	89.7
A-max 19, 1.5 W	176	MR	533	–	69.3	76.1	76.1	82.9	82.9	89.7	89.7	89.7
A-max 19, 2.5 W	178			–	66.8	73.6	73.6	80.4	80.4	87.2	87.2	87.2
A-max 19, 2.5 W	178	13 GAMA	498	–	74.3	81.1	81.1	87.9	87.9	94.7	94.7	94.7
A-max 19, 2.5 W	178	MR	533	–	71.1	77.9	77.9	84.7	84.7	91.5	91.5	91.5
A-max 19, 2.5 W	178	ENX 19 IMR	503	–	71.1	77.9	77.9	84.7	84.7	91.5	91.5	91.5
A-max 22	179–182			–	67.2	74.0	74.0	80.8	80.8	87.6	87.6	87.6
A-max 22	180/182	13 GAMA	498	–	74.3	81.1	81.1	87.9	87.9	94.7	94.7	94.7
A-max 22	180/182	ENX 22 IMR	504	–	72.2	79	79	85.8	85.8	92.6	92.6	92.6
A-max 22	180/182	MR	533	–	72.2	79.0	79.0	85.8	85.8	92.6	92.6	92.6
EC-max 16, 8 W	281			–	71.3	78.1	78.1	84.9	84.9	91.7	91.7	91.7
EC-max 16, 8 W	281	16 EASY/XT/Abs.	509–511	–	81.5	88.3	88.3	95.1	95.1	101.9	101.9	101.9
EC-max 16, 8 W	281	16 EASY Abs. XT	512	–	82.0	88.8	88.8	95.6	95.6	102.4	102.4	102.4
EC-max 22, 12 W	282			–	70.1	76.9	76.9	83.7	83.7	90.5	90.5	90.5
EC-max 22, 12 W	282	16 EASY/XT/Abs.	509–511	–	79.7	86.5	86.5	93.3	93.3	100.1	100.1	100.1
EC-max 22, 12 W	282	16 EASY Abs. XT	512	–	80.2	87.0	87.0	93.8	93.8	100.6	100.6	100.6
EC-max 22, 12 W	282	AB 20	584	–	105.7	112.5	112.5	119.3	119.3	126.1	126.1	126.1
EC-max 22, 25 W	283			86.6	86.6	93.4	93.4	100.2	100.2	107.0	107.0	107.0
EC-max 22, 25 W	283	16 EASY/XT/Abs.	509–511	96.2	96.2	103.0	103.0	109.8	109.8	116.6	116.6	116.6
EC-max 22, 25 W	283	16 EASY Abs. XT	512	96.7	96.7	103.5	103.5	110.3	110.3	117.1	117.1	117.1
EC-max 22, 25 W	283	AB 20	584	122.2	122.2	129.0	129.0	135.8	135.8	142.6	142.6	142.6

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Screw Drive GP 22 S ∅22 mm, metric lead screw



Technical data	
Screw	M6 x 1, stainless steel
Standard length	151 mm
Special length (5 mm steps)	max. 300 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed[2]	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static)[1]	550 N

Number of stages	0	1	2	3	4
Max. radial load, 15 mm from flange	80 N	80 N	130 N	180 N	180 N

Stock program
Standard program
Special program (on request)

			Part numbers								
			363826	363827	363830	363834	363835	363840	363845	363850	363855
Screw drive data											
1	Reduction		1:1	3.8:1	14:1	29:1	53:1	89:1	198:1	333:1	479:1
2	Absolute reduction		1/1	15/4	225/16	729/25	3375/64	4617/52	50625/256	69255/208	124659/260
20	Max. feed velocity[1]	mm/s	101	35	9.5	4.6	2.5	1.5	0.7	0.4	0.3
21	Max. feed force (continuous)[1]	N	42	60	92	118	144	171	223	266	300
22	Max. feed force (intermittent)[1]	N	118	167	259	330	350	350	350	350	350
	Part numbers			363828	364040		363836	363841	363846	363851	363856
1	Reduction			4.4:1	16:1		62:1	104:1	231:1	370:1	561:1
2	Absolute reduction			57/13	885/52		12825/208	87723/845	192375/832	1055600 1/28561	236852 1/4225
20	Max. feed velocity[1]	mm/s		30	8.3		2.2	1.3	0.6	0.4	0.2
21	Max. feed force (continuous)[1]	N		63	97		152	180	235	275	316
22	Max. feed force (intermittent)[1]	N		176	270		350	350	350	350	350
	Part numbers			363829	363831		363837	363842	363847	363852	363857
1	Reduction			5.4:1	19:1		72:1	109:1	270:1	389:1	590:1
2	Absolute reduction			27/5	3249/169		48735/676	2187/20	731025/2704	263169/676	59049/100
20	Max. feed velocity[1]	mm/s		25	7.0		1.9	1.2	0.5	0.3	0.2
21	Max. feed force (continuous)[1]	N		67	102		159	183	248	280	321
22	Max. feed force (intermittent)[1]	N		188	286		350	350	350	350	350
	Part numbers				363832		363838	363843	363848	363853	363858
1	Reduction				20:1		76:1	128:1	285:1	410:1	690:1
2	Absolute reduction				81/4		1215/16	41553/325	18225/64	6561/16	1121931/1625
20	Max. feed velocity[1]	mm/s			6.7		1.8	1.0	0.5	0.3	0.2
21	Max. feed force (continuous)[1]	N			104		162	193	252	285	339
22	Max. feed force (intermittent)[1]	N			291		350	350	350	350	350
	Part numbers				363833		363839	363844	363849	363854	363859
1	Reduction				24:1		84:1	157:1	316:1	455:1	850:1
2	Absolute reduction				1539/65		185193/2197	19683/125	2777895/8788	5000211/10985	531441/625
20	Max. feed velocity[1]	mm/s			5.6		1.6	0.8	0.4	0.3	0.2
21	Max. feed force (continuous)[1]	N			111		168	207	261	295	350
22	Max. feed force (intermittent)[1]	N			310		350	350	350	350	350
4	Number of stages		0	1	2	2	3	3	4	4	4
7	Max. efficiency gearhead incl. screw	%	42	35	29	29	25	25	20	20	20
8	Weight[1]	g	103	103	116	116	128	128	141	141	141
9	Average backlash no load	°	1.0	1.0	1.2	1.2	1.6	1.6	2.0	2.0	2.0
23	Mechanical positioning accuracy[1]	mm	0.034	0.034	0.034	0.034	0.034	0.034	0.037	0.037	0.037
10	Mass inertia gearhead incl. screw[1]	gcm²	10	1.0	0.4	0.4	0.3	0.3	0.3	0.3	0.3
11	Gearhead length L1	mm	38.0	38.0	44.8	44.8	51.6	51.6	58.4	58.4	58.4

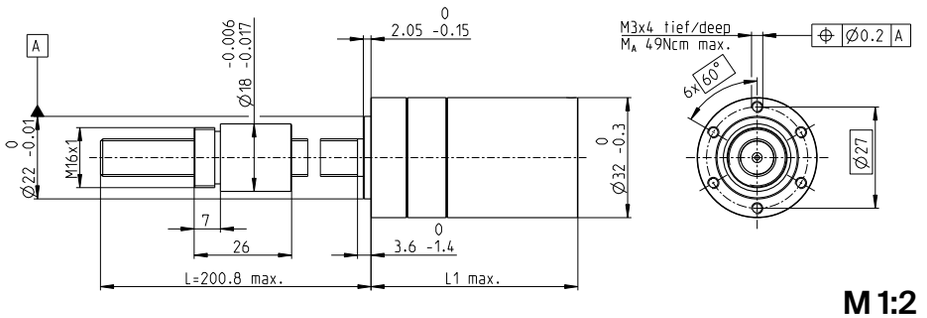
[1] based on screw length 151 mm (standard length) [2] for reduction 1:1 = 6088 rpm

Modular system

+ Motor	Page	+ Sensor / Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor / brake) + assembly parts							
A-max 19	175–178			–	64.2	71.0	71.0	77.8	77.8	84.6	84.6	84.6
A-max 19, 1.5 W	176	13 GAMA	498	–	71.7	78.5	78.5	85.3	85.3	92.1	92.1	92.1
A-max 19, 1.5 W	176	ENX 19 IMR	503	–	69.3	76.1	76.1	82.9	82.9	89.7	89.7	89.7
A-max 19, 1.5 W	176	MR	533	–	69.3	76.1	76.1	82.9	82.9	89.7	89.7	89.7
A-max 19, 2.5 W	177/178			–	66.8	73.6	73.6	80.4	80.4	87.2	87.2	87.2
A-max 19, 2.5 W	178	13 GAMA	498	–	74.3	81.1	81.1	87.9	87.9	94.7	94.7	94.7
A-max 19, 2.5 W	178	MR	533	–	71.1	77.9	77.9	84.7	84.7	91.5	91.5	91.5
A-max 19, 2.5 W	178	ENX 19 IMR	503	–	71.1	77.9	77.9	84.7	84.7	91.5	91.5	91.5
A-max 22	179–182			–	67.2	74.0	74.0	80.8	80.8	87.6	87.6	87.6
A-max 22	180/182	13 GAMA	498	–	74.3	81.1	81.1	87.9	87.9	94.7	94.7	94.7
A-max 22	180/182	ENX 22 IMR	503	–	72.2	79	79	85.8	85.8	92.6	92.6	92.6
A-max 22	180/182	MR	533	–	72.2	79.0	79.0	85.8	85.8	92.6	92.6	92.6
EC-max 16, 8 W	281			–	71.3	78.1	78.1	84.9	84.9	91.7	91.7	91.7
EC-max 16, 8 W	281	16 EASY/XT/Abs.	509–511	–	81.5	88.3	88.3	95.1	95.1	101.9	101.9	101.9
EC-max 16, 8 W	281	16 EASY Abs. XT	512	–	82.0	88.8	88.8	95.6	95.6	102.4	102.4	102.4
EC-max 22, 12 W	282			–	70.1	76.9	76.9	83.7	83.7	90.5	90.5	90.5
EC-max 22, 12 W	282	16 EASY/XT/Abs.	509–511	–	79.7	86.5	86.5	93.3	93.3	100.1	100.1	100.1
EC-max 22, 12 W	282	16 EASY Abs. XT	512	–	80.2	87.0	87.0	93.8	93.8	100.6	100.6	100.6
EC-max 22, 12 W	282	AB 20	584	–	105.7	112.5	112.5	119.3	119.3	126.1	126.1	126.1
EC-max 22, 25 W	283			86.6	86.6	93.4	93.4	100.2	100.2	107.0	107.0	107.0
EC-max 22, 25 W	283	16 EASY/XT/Abs.	509–511	96.2	96.2	103.0	103.0	109.8	109.8	116.6	116.6	116.6
EC-max 22, 25 W	283	16 EASY Abs. XT	512	96.7	96.7	103.5	103.5	110.3	110.3	117.1	117.1	117.1
EC-max 22, 25 W	283	AB 20	584	122.2	122.2	129.0	129.0	135.8	135.8	142.6	142.6	142.6

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Screw Drive GP 32 S ∅32 mm, ball screw



M 1:2

Technical data	
Screw	∅10 x 2, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	100CR6, hardened
Axial play	< 0.01 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed [2]	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static)[1]	2700 N

Number of stages	0	1	2	3	4
Max. radial load, 15 mm from flange	200 N	200 N	350 N	400 N	400 N

Stock program
Standard program
Special program (on request)

			Part numbers								
			363970	363971	363974	363979	363980	363985	363990	363995	364000
Screw drive data											
1	Reduction		1:1	3.7:1	14:1	33:1	51:1	111:1	246:1	492:1	762:1
2	Absolute reduction		1/1	26/7	676/49	529/16	17576/343	13824/125	421824/1715	86112/175	19044/25
20	Max. feed velocity[1]	mm/s	133	72	19	8.1	5.2	2.4	1.1	0.5	0.3
21	Max. feed force (continuous)[1]	N	386	474	739	983	1137	1473	1921	2420	2700
22	Max. feed force (intermittent)[1]	N	1023	1255	1956	2604	2700	2700	2700	2700	2700
	Part numbers			363972	363975		363981	363986	363991	363996	364001
1	Reduction			4.8:1	18:1		66:1	123:1	295:1	531:1	913:1
2	Absolute reduction			24/5	624/35		16224/245	6877/56	101062/343	331776/625	36501/40
20	Max. feed velocity[1]	mm/s		56	15		4.0	2.2	0.9	0.5	0.3
21	Max. feed force (continuous)[1]	N		517	803		1239	1524	2041	2482	2700
22	Max. feed force (intermittent)[1]	N		1369	2127		2700	2700	2700	2700	2700
	Part numbers			363973	363976		363982	363987	363992	363997	364002
1	Reduction			5.8:1	21:1		79:1	132:1	318:1	589:1	1093:1
2	Absolute reduction			23/4	299/14		3887/49	3312/25	389376/1225	20631/35	279841/256
20	Max. feed velocity[1]	mm/s		46	13		3.4	2.0	0.8	0.5	0.2
21	Max. feed force (continuous)[1]	N		551	846		1315	1561	2092	2569	2700
22	Max. feed force (intermittent)[1]	N		1458	2239		2700	2700	2700	2700	2700
	Part numbers				363977		363983	363988	363993	363998	
1	Reduction				23:1		86:1	159:1	411:1	636:1	
2	Absolute reduction				576/25		14976/175	1587/10	359424/875	79488/125	
20	Max. feed velocity[1]	mm/s			12		3.1	1.7	0.6	0.4	
21	Max. feed force (continuous)[1]	N			872		1353	1661	2279	2636	
22	Max. feed force (intermittent)[1]	N			2308		2700	2700	2700	2700	
	Part numbers				363978		363984	363989	363994	363999	
1	Reduction				28:1		103:1	190:1	456:1	706:1	
2	Absolute reduction				138/5		3588/35	12167/64	89401/196	158171/224	
20	Max. feed velocity[1]	mm/s			9.5		2.6	1.4	0.6	0.4	
21	Max. feed force (continuous)[1]	N			931		1437	1762	2359	2700	
22	Max. feed force (intermittent)[1]	N			2465		2700	2700	2700	2700	
4	Number of stages		0	1	2	2	3	3	4	4	4
7	Max. efficiency gearhead incl. screw	%	94	75	71	71	66	66	56	56	56
8	Weight[1]	g	304	304	331	331	359	359	387	387	387
9	Average backlash no load	°	0.7	0.7	0.8	0.8	1.0	1.0	1.0	1.0	1.0
23	Mechanical positioning accuracy[1]	mm	0.037	0.037	0.037	0.037	0.039	0.039	0.039	0.039	0.039
10	Mass inertia gearhead incl. screw[1]	gcm²	42.3	4.2	0.9	0.9	0.7	0.7	0.7	0.7	0.7
11	Gearhead length L1	mm	51.0	51.0	57.7	57.7	64.4	64.4	71.1	71.1	71.1

[1] based on screw length 200.8 mm (standard length) [2] for reduction 1:1 = 4000 rpm

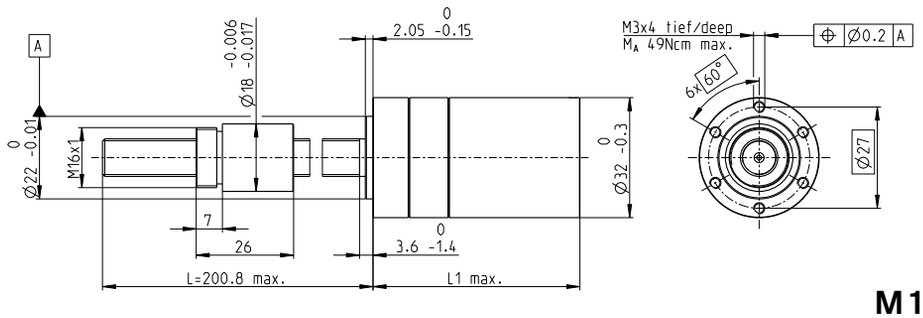
Modular system

+ Motor	Page	+ Sensor / Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts								
RE 25	156/158			105.6	105.6	112.3	112.3	119.0	119.0	125.7	125.7	125.7
RE 25	156/158	ENX 25 IMR	505	116.6	116.6	123.3	123.3	130	130	136.7	136.7	136.7
RE 25	156/158	HED_5540	535/537	126.4	126.4	133.1	133.1	139.8	139.8	146.5	146.5	146.5
RE 25	156/158	DCT 22	542	127.9	127.9	134.6	134.6	141.3	141.3	148.0	148.0	148.0
RE 25, 20 W	157			94.1	94.1	100.8	100.8	107.5	107.5	114.2	114.2	114.2
RE 25, 20 W	157	ENX 25 IMR	505	105.1	105.1	111.8	111.8	118.5	118.5	125.2	125.2	125.2
RE 25, 20 W	157	HED_5540	535/537	114.9	114.9	121.6	121.6	128.3	128.3	135.0	135.0	135.0
RE 25, 20 W	157	DCT 22	542	116.4	116.4	123.1	123.1	129.8	129.8	136.5	136.5	136.5
RE 25, 20 W	157	AB 28	587	128.2	128.2	134.9	134.9	141.6	141.6	148.3	148.3	148.3
RE 25, 20 W	157	HED_5540/AB 28	535/587	145.4	145.4	152.1	152.1	158.8	158.8	165.5	165.5	165.5
RE 25, 20 W	158	AB 28	587	139.7	139.7	146.4	146.4	153.1	153.1	159.8	159.8	159.8
RE 25, 20 W	158	HED_5540/AB 28	535/587	156.9	156.9	163.6	163.6	170.3	170.3	177.0	177.0	177.0
RE 30, 60 W	160			119.1	119.1	125.8	125.8	132.5	132.5	139.2	139.2	139.2
RE 30, 60 W	160	ENX 32 IMR	506	130.5	130.5	137.2	137.2	143.9	143.9	150.6	150.6	150.6
RE 30, 60 W	160	HED_5540	535/537	139.9	139.9	146.6	146.6	153.3	153.3	160.0	160.0	160.0

Continuation of the modular system on pages 477 and 480.

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Screw Drive GP 32 S ∅32 mm, ball screw



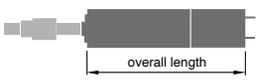
M 1:2

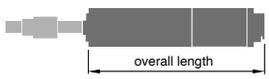
Technical data					
Screw	∅10 x 2, stainless steel				
Standard length	200.8 mm				
Special length (5 mm steps)	max. 600 mm				
Nut (standard)	thread nut				
Material	100CR6, hardened				
Axial play	< 0.01 mm				
Planetary gearhead	straight teeth				
Bearing	ball bearing/thrust roller bearing				
Radial play, 5 mm from flange	< 0.05 mm				
Axial play	preloaded				
Max. continuous input speed [2]	8000 rpm				
Recommended temperature range	-15...+80°C				
Max. axial load (static) [1]	2700 N				
Number of stages	0	1	2	3	4
Max. radial load, 15 mm from flange	200 N	200 N	350 N	400 N	400 N

Stock program
Standard program
Special program (on request)

Part numbers

363970	363971	363974	363979	363980	363985	363990	363995	364000
	363972	363975		363981	363986	363991	363996	364001
	363973	363976		363982	363987	363992	363997	364002
		363977		363983	363988	363993	363998	
		363978		363984	363989	363994	363999	



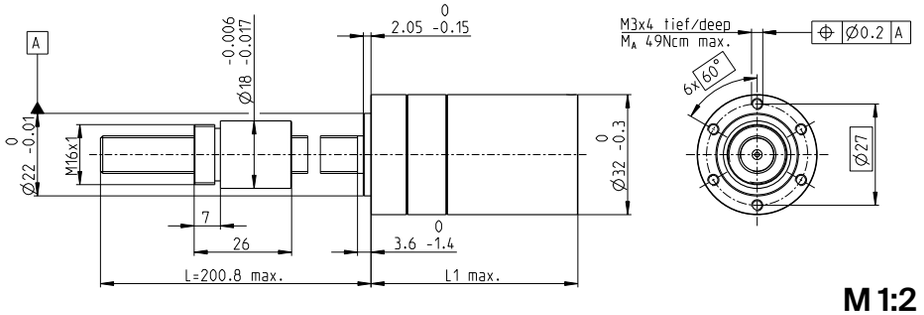


Modular system

+ Motor	Page	+ Sensor / Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts								
RE 35, 90 W	161			122.1	122.1	128.8	128.8	135.5	135.5	142.2	142.2	142.2
RE 35, 90 W	161	ENX 32 IMR	506	133.5	133.5	140.2	140.2	146.9	146.9	153.6	153.6	153.6
RE 35, 90 W	161	HED_5540	535/537	142.8	142.8	149.5	149.5	156.2	156.2	162.9	162.9	162.9
RE 35, 90 W	161	DCT 22	542	140.2	140.2	146.9	146.9	153.6	153.6	160.3	160.3	160.3
RE 35, 90 W	161	AB 28	587	158.2	158.2	164.9	164.9	171.6	171.6	178.3	178.3	178.3
RE 35, 90 W	161	HEDS 5540/AB 28	535/587	175.4	175.4	182.1	182.1	188.8	188.8	195.5	195.5	195.5
A-max 26	183–186			–	95.8	102.5	102.5	109.2	109.2	115.9	115.9	115.9
A-max 26	184–186	13 GAMA	498	–	102.9	109.6	109.6	116.3	116.3	123.0	123.0	123.0
A-max 26	184/186	ENX 25 IMR	505	–	104.6	111.3	111.3	118	118	124.7	124.7	124.7
A-max 26	184–186	HED_5540	536/538	–	114.2	120.9	120.9	127.6	127.6	134.3	134.3	134.3
A-max 32	187			–	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
A-max 32	188			–	112.6	119.3	119.3	126.0	126.0	132.7	132.7	132.7
A-max 32	188	ENX 32 IMR	506	–	123.8	130.5	130.5	137.2	137.2	143.9	143.9	143.9
A-max 32	188	HED_5540	535/537	–	133.4	140.1	140.1	146.8	146.8	153.5	153.5	153.5
EC 32, 80 W	271			111.1	111.1	117.8	117.8	124.5	124.5	131.2	131.2	131.2
EC 32, 80 W	271	Res 26	543	131.2	131.2	137.9	137.9	144.6	144.6	151.3	151.3	151.3
EC-max 22, 25 W	283			–	99.6	106.3	106.3	113.0	113.0	119.7	119.7	119.7
EC-max 22, 25 W	283	16 EASY/XT/Abs.	509–511	–	109.2	115.9	115.9	122.6	122.6	129.3	129.3	129.3
EC-max 22, 25 W	283	16 EASY Abs. XT	512	–	109.7	116.4	116.4	123.1	123.1	129.8	129.8	129.8
EC-max 22, 25 W	283	AB 20	584	–	135.2	141.9	141.9	148.6	148.6	155.3	155.3	155.3
EC-max 30, 40 W	284			–	93.1	99.8	99.8	106.5	106.5	113.2	113.2	113.2
EC-max 30, 40 W	284	16 EASY/XT/Abs.	509–511	–	104.2	110.9	110.9	117.6	117.6	124.3	124.3	124.3
EC-max 30, 40 W	284	16 EASY Abs. XT	512	–	104.7	111.4	111.4	118.1	118.1	124.8	124.8	124.8
EC-max 30, 40 W	284	HEDL 5540	537	–	113.7	120.4	120.4	127.1	127.1	133.8	133.8	133.8
EC-max 30, 40 W	284	AB 20	584	–	128.7	135.4	135.4	142.1	142.1	148.8	148.8	148.8
EC-max 30, 40 W	284	HEDL 5540/AB 20	537/584	–	149.3	156.0	156.0	162.7	162.7	169.4	169.4	169.4
EC-max 30, 60 W	285			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-max 30, 60 W	285	16 EASY/XT/Abs.	509–511	126.2	126.2	132.9	132.9	139.6	139.6	146.3	146.3	146.3
EC-max 30, 60 W	285	16 EASY Abs. XT	512	126.7	126.7	133.4	133.4	140.1	140.1	146.8	146.8	146.8
EC-max 30, 60 W	285	HEDL 5540	538	135.7	135.7	142.4	142.4	149.1	149.1	155.8	155.8	155.8
EC-max 30, 60 W	285	AB 20	584	150.7	150.7	157.4	157.4	164.1	164.1	170.8	170.8	170.8
EC-max 30, 60 W	285	HEDL 5540/AB 20	539/584	171.3	171.3	178.0	178.0	184.7	184.7	191.4	191.4	191.4
EC-4pole 22, 90 W	291			99.7	99.7	106.4	106.4	113.1	113.1	119.8	119.8	119.8
EC-4pole 22, 90 W	291	22 EMT	518	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-4pole 22, 90 W	291	16 EASY/XT/Abs.	509–511	111.9	111.9	118.6	118.6	125.3	125.3	132.0	132.0	132.0
EC-4pole 22, 90 W	291	16 EASY Abs. XT	512	112.4	112.4	119.1	119.1	125.8	125.8	132.5	132.5	132.5
EC-4pole 22, 90 W	291	16 RIO	519	110.4	110.4	117.1	117.1	123.8	123.8	130.5	130.5	130.5
EC-4pole 22, 120 W	292			117.1	117.1	123.8	123.8	130.5	130.5	137.2	137.2	137.2
EC-4pole 22, 120 W	292	22 EMT	518	142.9	142.9	149.6	149.6	156.3	156.3	163.0	163.0	163.0
EC-4pole 22, 120 W	292	16 EASY/XT/Abs.	509–511	129.3	129.3	136.0	136.0	142.7	142.7	149.4	149.4	149.4
EC-4pole 22, 120 W	292	16 EASY Abs. XT	512	129.8	129.8	136.5	136.5	143.2	143.2	149.9	149.9	149.9
EC-4pole 22, 120 W	292	16 RIO	519	127.8	127.8	134.5	134.5	141.2	141.2	147.9	147.9	147.9

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Screw Drive GP 32 S ∅32 mm, ball screw



M 1:2

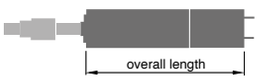
Technical data	
Screw	∅10 x 2, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	100CR6, hardened
Axial play	< 0.01 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed [2]	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) [1]	2700 N

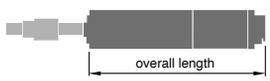
Number of stages	0	1	2	3	4
Max. radial load, 15 mm from flange	200 N	200 N	350 N	400 N	400 N

Stock program
Standard program
Special program (on request)

Part numbers

363970	363971	363974	363979	363980	363985	363990	363995	364000
	363972	363975		363981	363986	363991	363996	364001
	363973	363976		363982	363987	363992	363997	364002
		363977		363983	363988	363993	363998	
		363978		363984	363989	363994	363999	



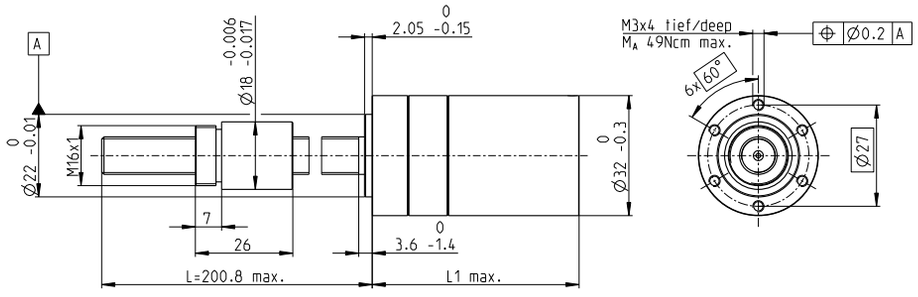


Modular system

+ Motor	Page	+ Sensor / Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts								
EC-4pole 30, 100 W	293			98.1	98.1	104.8	104.8	111.5	111.5	118.2	118.2	118.2
EC-4pole 30, 100 W	293	16 EASY/XT/Abs.	509-511	112.0	112.0	118.7	118.7	125.4	125.4	132.1	132.1	132.1
EC-4pole 30, 100 W	293	16 EASY Abs. XT	512	112.5	112.5	119.2	119.2	125.9	125.9	132.6	132.6	132.6
EC-4pole 30, 100 W	293	22 EMT	518	126.0	126.0	132.7	132.7	139.4	139.4	146.1	146.1	146.1
EC-4pole 30, 100 W	293	16 RIO	519	110.5	110.5	117.2	117.2	123.9	123.9	130.6	130.6	130.6
EC-4pole 30, 100 W	293	AB 20	585	134.3	134.3	141.0	141.0	147.7	147.7	154.4	154.4	154.4
EC-4pole 30, 100 W	293	16 EASY/XT/Abs./AB 20	509/585	148.4	148.4	155.1	155.1	161.8	161.8	168.5	168.5	168.5
EC-4pole 30, 100 W	293	16 EASY Abs. XT/AB 20	512/585	148.9	148.9	155.6	155.6	162.3	162.3	169.0	169.0	169.0
EC-4pole 30, 100 W	293	22 EMT/AB 20	518/585	165.5	165.5	172.2	172.2	178.9	178.9	185.6	185.6	185.6
EC-4pole 30, 100 W	293	16 RIO/AB 20	519/585	146.9	146.9	153.6	153.6	160.3	160.3	167.0	167.0	167.0
EC-4pole 30, 200 W	295			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-4pole 30, 200 W	295	16 EASY/XT/Abs.	509-511	129.0	129.0	135.7	135.7	142.4	142.4	149.1	149.1	149.1
EC-4pole 30, 200 W	295	16 EASY Abs. XT	512	129.5	129.5	136.2	136.2	142.9	142.9	149.6	149.6	149.6
EC-4pole 30, 200 W	295	22 EMT	518	143.0	143.0	149.7	149.7	156.4	156.4	163.1	163.1	163.1
EC-4pole 30, 200 W	295	16 RIO	519	127.5	127.5	134.2	134.2	140.9	140.9	147.6	147.6	147.6
EC-4pole 30, 200 W	295	AB 20	585	151.3	151.3	158.0	158.0	164.7	164.7	171.4	171.4	171.4
EC-4pole 30, 200 W	295	16 EASY/XT/Abs./AB 20	509/585	165.4	165.4	172.1	172.1	178.8	178.8	185.5	185.5	185.5
EC-4pole 30, 200 W	295	16 EASY Abs. XT/AB 20	512/585	165.9	165.9	172.6	172.6	179.3	179.3	186.0	186.0	186.0
EC-4pole 30, 200 W	295	22 EMT/AB 20	518/585	182.5	182.5	189.2	189.2	195.9	195.9	202.6	202.6	202.6
EC-4pole 30, 200 W	295	16 RIO/AB 20	519/585	163.9	163.9	170.6	170.6	177.3	177.3	184.0	184.0	184.0
EC-i 30, 30 W	302			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 30 W	302	22 EMT	518	121.3	121.3	128.0	128.0	134.7	134.7	141.4	141.4	141.4
EC-i 30, 30 W	302	16 EASY/Abs.	509-511	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 30 W	302	16 RIO	519	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 45 W	303			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 45 W	303	22 EMT	518	121.3	121.3	128.0	128.0	134.7	134.7	141.4	141.4	141.4
EC-i 30, 45 W	303	16 EASY/Abs.	509-511	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 45 W	303	16 RIO	519	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 50 W	304			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 50 W	304	22 EMT	518	143.3	143.3	150.0	150.0	156.7	156.7	163.4	163.4	163.4
EC-i 30, 50 W	304	16 EASY/Abs.	509-511	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 50 W	304	16 RIO	519	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 30, 75 W	305			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 75 W	305	22 EMT	518	143.3	143.3	150.0	150.0	156.7	156.7	163.4	163.4	163.4
EC-i 30, 75 W	305	16 EASY/Abs.	509-511	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 75 W	305	16 RIO	519	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 40, 50 W	306			82.7	82.7	89.4	89.4	96.1	96.1	102.8	102.8	102.8
EC-i 40, 50 W	306	22 EMT	518	110.7	110.7	117.4	117.4	124.1	124.1	130.8	130.8	130.8
EC-i 40, 50 W	306	TSX 40 MAG/RIO	526-527	94.4	82.7	89.4	89.4	96.1	96.1	102.8	102.8	102.8
EC-i 40, 50 W	306	16 EASY/Abs.	509-511	94.4	94.4	101.1	101.1	107.8	107.8	114.5	114.5	114.5
EC-i 40, 50 W	306	16 RIO	519	97.2	97.2	103.9	103.9	110.6	110.6	117.3	117.3	117.3
EC-i 40, 70 W	308			92.7	92.7	99.4	99.4	106.1	106.1	112.8	112.8	112.8
EC-i 40, 70 W	308	22 EMT	518	120.7	120.7	127.4	127.4	134.1	134.1	140.8	140.8	140.8
EC-i 40, 70 W	308	TSX 40 MAG/RIO	526-527	104.4	104.4	111.1	111.1	117.8	117.8	124.5	124.5	124.5
EC-i 40, 70 W	308	16 EASY/Abs.	509-511	104.4	104.4	111.1	111.1	117.8	117.8	124.5	124.5	124.5
EC-i 40, 70 W	308	16 RIO	519	107.2	107.2	113.9	113.9	120.6	120.6	127.3	127.3	127.3

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Screw Drive GP 32 S ∅32 mm, metric lead screw



M 1:2

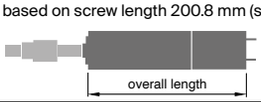
Technical data	
Screw	M10 x 1, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed[2]	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static)[1]	2700 N

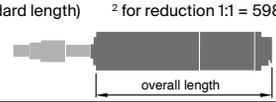
Number of stages	0	1	2	3	4
Max. radial load, 15 mm from flange	200 N	200 N	350 N	400 N	400 N

Stock program
Standard program
Special program (on request)

			Part numbers								
			363900	363901	363904	363909	363910	363915	363920	363925	363930
Screw drive data											
1	Reduction		1:1	3.7:1	14:1	33:1	51:1	111:1	246:1	492:1	762:1
2	Absolute reduction		1/1	26/7	676/49	529/16	17576/343	13824/125	421824/1715	86112/175	19044/25
20	Max. feed velocity[1]	mm/s	100	36	9.5	4.0	2.6	1.2	0.5	0.3	0.2
21	Max. feed force (continuous)[1]	N	183	257	400	533	616	798	1040	1311	1350
22	Max. feed force (intermittent)[1]	N	455	638	995	1324	1350	1350	1350	1350	1350
	Part numbers			363902	363905		363911	363916	363921	363926	363931
1	Reduction			4.8:1	18:1		66:1	123:1	295:1	531:1	913:1
2	Absolute reduction			24/5	624/35		16224/245	6877/56	101062/343	331776/625	36501/40
20	Max. feed velocity[1]	mm/s		28	7.4		2.0	1.1	0.5	0.3	0.1
21	Max. feed force (continuous)[1]	N		280	435		671	826	1105	1345	1350
22	Max. feed force (intermittent)[1]	N		696	1082		1350	1350	1350	1350	1350
	Part numbers			363903	363906		363912	363917	363922	363927	363932
1	Reduction			5.8:1	21:1		79:1	132:1	318:1	589:1	1093:1
2	Absolute reduction			23/4	299/14		3887/49	3312/25	389376/1225	20631/35	279841/256
20	Max. feed velocity[1]	mm/s		23	6.3		1.7	1.0	0.4	0.2	0.1
21	Max. feed force (continuous)[1]	N		298	458		712	845	1133	1350	1350
22	Max. feed force (intermittent)[1]	N		742	1139		1350	1350	1350	1350	1350
	Part numbers				363907		363913	363918	363923	363928	
1	Reduction				23:1		86:1	159:1	411:1	636:1	
2	Absolute reduction				576/25		14976/175	1587/10	359424/875	79488/125	
20	Max. feed velocity[1]	mm/s			5.8		1.6	0.8	0.3	0.2	
21	Max. feed force (continuous)[1]	N			472		733	899	1234	1350	
22	Max. feed force (intermittent)[1]	N			1174		1350	1350	1350	1350	
	Part numbers				363908		363914	363919	363924	363929	
1	Reduction				28:1		103:1	190:1	456:1	706:1	
2	Absolute reduction				138/5		3588/35	12167/64	89401/196	158171/224	
20	Max. feed velocity[1]	mm/s			4.8		1.3	0.7	0.3	0.2	
21	Max. feed force (continuous)[1]	N			504		778	955	1278	1350	
22	Max. feed force (intermittent)[1]	N			1253		1350	1350	1350	1350	
4	Number of stages		0	1	2	2	3	3	4	4	4
7	Max. efficiency gearhead incl. screw	%	27	22	20	20	19	19	16	16	16
8	Weight[1]	g	304	304	331	331	359	359	387	387	387
9	Average backlash no load	°	0.7	0.7	0.8	0.8	1.0	1.0	1.0	1.0	1.0
23	Mechanical positioning accuracy[1]	mm	0.033	0.033	0.033	0.033	0.034	0.034	0.034	0.034	0.034
10	Mass inertia gearhead incl. screw[1]	gcm²	43.3	3.0	0.9	0.9	0.7	0.7	0.7	0.7	0.7
11	Gearhead length L1	mm	51.0	51.0	57.7	57.7	64.4	64.4	71.1	71.1	71.1

[1] based on screw length 200.8 mm (standard length) [2] for reduction 1:1 = 5984 rpm



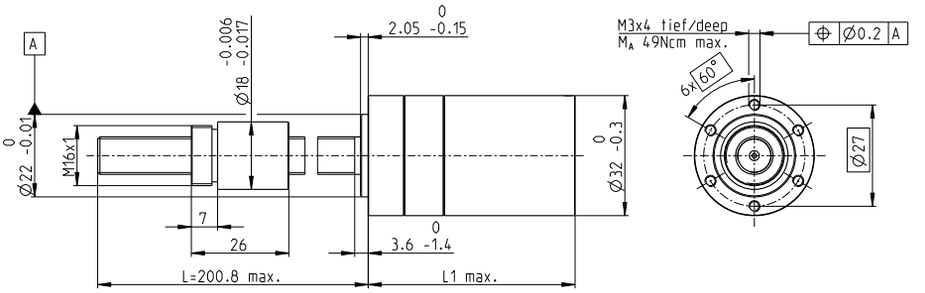


Modular system

+ Motor	Page	+ Sensor / Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts								
RE 25	156/158			105.6	105.6	112.3	112.3	119.0	119.0	125.7	125.7	125.7
RE 25	156/158	ENX 25 IMR	505	116.6	116.6	123.3	123.3	130	130	136.7	136.7	136.7
RE 25	156/158	HED_5540	535/537	126.4	126.4	133.1	133.1	139.8	139.8	146.5	146.5	146.5
RE 25	156/158	DCT 22	542	127.9	127.9	134.6	134.6	141.3	141.3	148.0	148.0	148.0
RE 25, 20 W	157			94.1	94.1	100.8	100.8	107.5	107.5	114.2	114.2	114.2
RE 25, 20 W	157	ENX 25 IMR	505	105.1	105.1	111.8	111.8	118.5	118.5	125.2	125.2	125.2
RE 25, 20 W	157	HED_5540	535/537	114.9	114.9	121.6	121.6	128.3	128.3	135.0	135.0	135.0
RE 25, 20 W	157	DCT 22	542	116.4	116.4	123.1	123.1	129.8	129.8	136.5	136.5	136.5
RE 25, 20 W	157	AB 28	587	128.2	128.2	134.9	134.9	141.6	141.6	148.3	148.3	148.3
RE 25, 20 W	157	HED_5540/AB 28	535/587	145.4	145.4	152.1	152.1	158.8	158.8	165.5	165.5	165.5
RE 25, 20 W	158	AB 28	587	139.7	139.7	146.4	146.4	153.1	153.1	159.8	159.8	159.8
RE 25, 20 W	158	HED_5540/AB 28	535/587	156.9	156.9	163.6	163.6	170.3	170.3	177.0	177.0	177.0
RE 30, 60 W	160			119.1	119.1	125.8	125.8	132.5	132.5	139.2	139.2	139.2
RE 30, 60 W	160	ENX 32 IMR	506	130.5	130.5	137.2	137.2	143.9	143.9	150.6	150.6	150.6
RE 30, 60 W	160	HED_5540	535/537	139.9	139.9	146.6	146.6	153.3	153.3	160.0	160.0	160.0

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Screw Drive GP 32 S ∅32 mm, metric lead screw



M 1:2

Technical data

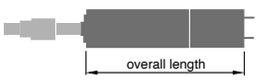
Screw	M10 x 1, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed[2]	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static)[1]	2700 N

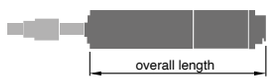
Number of stages	0	1	2	3	4
Max. radial load, 15 mm from flange	200 N	200 N	350 N	400 N	400 N

Stock program
Standard program
Special program (on request)

Part numbers

363900	363901	363904	363909	363910	363915	363920	363925	363930
	363902	363905		363911	363916	363921	363926	363931
	363903	363906		363912	363917	363922	363927	363932
		363907		363913	363918	363923	363928	
		363908		363914	363919	363924	363929	



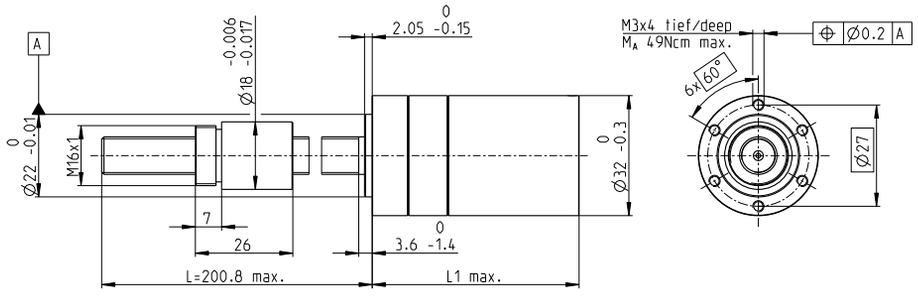


Modular system

+ Motor	Page	+ Sensor / Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts								
RE 35, 90 W	161			122.1	122.1	128.8	128.8	135.5	135.5	142.2	142.2	142.2
RE 35, 90 W	161	ENX 32 IMR	506	133.5	133.5	140.2	140.2	146.9	146.9	153.6	153.6	153.6
RE 35, 90 W	161	HED_5540	535/537	142.8	142.8	149.5	149.5	156.2	156.2	162.9	162.9	162.9
RE 35, 90 W	161	DCT 22	542	140.2	140.2	146.9	146.9	153.6	153.6	160.3	160.3	160.3
RE 35, 90 W	161	AB 28	587	158.2	158.2	164.9	164.9	171.6	171.6	178.3	178.3	178.3
RE 35, 90 W	161	HEDS 5540/AB 28	535/587	175.4	175.4	182.1	182.1	188.8	188.8	195.5	195.5	195.5
A-max 26	183–186			–	95.8	102.5	102.5	109.2	109.2	115.9	115.9	115.9
A-max 26	184–186	13 GAMA	498	–	102.9	109.6	109.6	116.3	116.3	123.0	123.0	123.0
A-max 26	184/186	ENX 25 IMR	505	–	104.6	111.3	111.3	118	118	124.7	124.7	124.7
A-max 26	184–186	HED_5540	536/538	–	114.2	120.9	120.9	127.6	127.6	134.3	134.3	134.3
A-max 32	187			–	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
A-max 32	188			–	112.6	119.3	119.3	126.0	126.0	132.7	132.7	132.7
A-max 32	188	ENX 32 IMR	506	–	123.8	130.5	130.5	137.2	137.2	143.9	143.9	143.9
A-max 32	188	HED_5540	535/537	–	133.4	140.1	140.1	146.8	146.8	153.5	153.5	153.5
EC 32, 80 W	271			111.1	111.1	117.8	117.8	124.5	124.5	131.2	131.2	131.2
EC 32, 80 W	271	Res 26	543	131.2	131.2	137.9	137.9	144.6	144.6	151.3	151.3	151.3
EC-max 22, 25 W	283			–	99.6	106.3	106.3	113.0	113.0	119.7	119.7	119.7
EC-max 22, 25 W	283	16 EASY/XT/Abs.	509–511	–	109.2	115.9	115.9	122.6	122.6	129.3	129.3	129.3
EC-max 22, 25 W	283	16 EASY Abs. XT	512	–	109.7	116.4	116.4	123.1	123.1	129.8	129.8	129.8
EC-max 22, 25 W	283	AB 20	584	–	135.2	141.9	141.9	148.6	148.6	155.3	155.3	155.3
EC-max 30, 40 W	284			–	93.1	99.8	99.8	106.5	106.5	113.2	113.2	113.2
EC-max 30, 40 W	284	16 EASY/XT/Abs.	509–511	–	104.2	110.9	110.9	117.6	117.6	124.3	124.3	124.3
EC-max 30, 40 W	284	16 EASY Abs. XT	512	–	104.7	111.4	111.4	118.1	118.1	124.8	124.8	124.8
EC-max 30, 40 W	284	HEDL 5540	539	–	113.7	120.4	120.4	127.1	127.1	133.8	133.8	133.8
EC-max 30, 40 W	284	AB 20	584	–	128.7	135.4	135.4	142.1	142.1	148.8	148.8	148.8
EC-max 30, 40 W	284	HEDL 5540/AB 20	539/584	–	149.3	156.0	156.0	162.7	162.7	169.4	169.4	169.4
EC-max 30, 60 W	285			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-max 30, 60 W	285	16 EASY/XT/Abs.	509–511	126.2	126.2	132.9	132.9	139.6	139.6	146.3	146.3	146.3
EC-max 30, 60 W	285	16 EASY Abs. XT	512	126.7	126.7	133.4	133.4	140.1	140.1	146.8	146.8	146.8
EC-max 30, 60 W	285	HEDL 5540	538	135.7	135.7	142.4	142.4	149.1	149.1	155.8	155.8	155.8
EC-max 30, 60 W	285	AB 20	584	150.7	150.7	157.4	157.4	164.1	164.1	170.8	170.8	170.8
EC-max 30, 60 W	285	HEDL 5540/AB 20	539/584	171.3	171.3	178.0	178.0	184.7	184.7	191.4	191.4	191.4
EC-4pole 22, 90 W	291			99.7	99.7	106.4	106.4	113.1	113.1	119.8	119.8	119.8
EC-4pole 22, 90 W	291	22 EMT	518	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-4pole 22, 90 W	291	16 EASY/XT/Abs.	509–511	111.9	111.9	118.6	118.6	125.3	125.3	132.0	132.0	132.0
EC-4pole 22, 90 W	291	16 EASY Abs. XT	512	112.4	112.4	119.1	119.1	125.8	125.8	132.5	132.5	132.5
EC-4pole 22, 90 W	291	16 RIO	519	110.4	110.4	117.1	117.1	123.8	123.8	130.5	130.5	130.5
EC-4pole 22, 120 W	292			117.1	117.1	123.8	123.8	130.5	130.5	137.2	137.2	137.2
EC-4pole 22, 120 W	292	22 EMT	518	142.9	142.9	149.6	149.6	156.3	156.3	163.0	163.0	163.0
EC-4pole 22, 120 W	292	16 EASY/XT/Abs.	509–511	129.3	129.3	136.0	136.0	142.7	142.7	149.4	149.4	149.4
EC-4pole 22, 120 W	292	16 EASY Abs. XT	512	129.8	129.8	136.5	136.5	143.2	143.2	149.9	149.9	149.9
EC-4pole 22, 120 W	292	16 RIO	519	127.8	127.8	134.5	134.5	141.2	141.2	147.9	147.9	147.9
EC-4pole 30, 100 W	293			98.1	98.1	104.8	104.8	111.5	111.5	118.2	118.2	118.2
EC-4pole 30, 100 W	293	16 EASY/XT/Abs.	509–511	112.0	112.0	118.7	118.7	125.4	125.4	132.1	132.1	132.1
EC-4pole 30, 100 W	293	16 EASY Abs. XT	512	112.5	112.5	119.2	119.2	125.9	125.9	132.6	132.6	132.6
EC-4pole 30, 100 W	293	22 EMT	518	126.0	126.0	132.7	132.7	139.4	139.4	146.1	146.1	146.1
EC-4pole 30, 100 W	293	16 RIO	519	110.5	110.5	117.2	117.2	123.9	123.9	130.6	130.6	130.6
EC-4pole 30, 100 W	293	AB 20	585	134.3	134.3	141.0	141.0	147.7	147.7	154.4	154.4	154.4
EC-4pole 30, 100 W	293	16 EASY/XT/Abs./AB 20	509/585	148.4	148.4	155.1	155.1	161.8	161.8	168.5	168.5	168.5
EC-4pole 30, 100 W	293	16 EASY Abs. XT/AB 20	512/585	148.9	148.9	155.6	155.6	162.3	162.3	169.0	169.0	169.0
EC-4pole 30, 100 W	293	22 EMT/AB 20	518/585	165.5	165.5	172.2	172.2	178.9	178.9	185.6	185.6	185.6
EC-4pole 30, 100 W	293	16 RIO/AB 20	519/585	146.9	146.9	153.6	153.6	160.3	160.3	167.0	167.0	167.0

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Screw Drive GP 32 S ∅32 mm, metric lead screw



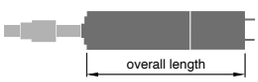
M 1:2

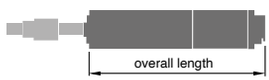
Technical data					
Screw	M10 x 1, stainless steel				
Standard length	200.8 mm				
Special length (5 mm steps)	max. 600 mm				
Nut (standard)	thread nut				
Material	bronze				
Axial play	< 0.008 mm				
Planetary gearhead	straight teeth				
Bearing	ball bearing/thrust roller bearing				
Radial play, 5 mm from flange	< 0.05 mm				
Axial play	preloaded				
Max. continuous input speed[2]	8000 rpm				
Recommended temperature range	-15...+80°C				
Max. axial load (static)[1]	2700 N				
Number of stages	0	1	2	3	4
Max. radial load, 15 mm from flange	200 N	200 N	350 N	400 N	400 N

Stock program
Standard program
Special program (on request)

Part numbers

363900	363901	363904	363909	363910	363915	363920	363925	363930
	363902	363905		363911	363916	363921	363926	363931
	363903	363906		363912	363917	363922	363927	363932
		363907		363913	363918	363923	363928	
		363908		363914	363919	363924	363929	



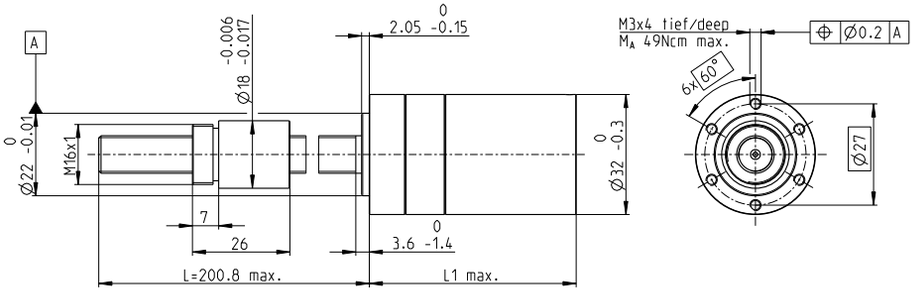


Modular system

+ Motor	Page	+ Sensor / Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts								
EC-4pole 30, 200 W	295			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-4pole 30, 200 W	295	16 EASY/XT/Abs.	509–511	129.0	129.0	135.7	135.7	142.4	142.4	149.1	149.1	149.1
EC-4pole 30, 200 W	295	16 EASY Abs. XT	512	129.5	129.5	136.2	136.2	142.9	142.9	149.6	149.6	149.6
EC-4pole 30, 200 W	295	22 EMT	518	143.0	143.0	149.7	149.7	156.4	156.4	163.1	163.1	163.1
EC-4pole 30, 200 W	295	16 RIO	519	127.5	127.5	134.2	134.2	140.9	140.9	147.6	147.6	147.6
EC-4pole 30, 200 W	295	AB 20	585	151.3	151.3	158.0	158.0	164.7	164.7	171.4	171.4	171.4
EC-4pole 30, 200 W	295	16 EASY/XT/Abs./AB 20	509/585	165.4	165.4	172.1	172.1	178.8	178.8	185.5	185.5	185.5
EC-4pole 30, 200 W	295	16 EASY Abs. XT/AB 20	512/585	165.9	165.9	172.6	172.6	179.3	179.3	186.0	186.0	186.0
EC-4pole 30, 200 W	295	22 EMT/AB 20	518/585	182.5	182.5	189.2	189.2	195.9	195.9	202.6	202.6	202.6
EC-4pole 30, 200 W	295	16 RIO/AB 20	519/585	163.9	163.9	170.6	170.6	177.3	177.3	184.0	184.0	184.0
EC-i 30, 30 W	302			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 30 W	302	22 EMT	518	121.3	121.3	128.0	128.0	134.7	134.7	141.4	141.4	141.4
EC-i 30, 30 W	302	16 EASY/Abs.	509–511	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 30 W	302	16 RIO	519	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 45 W	303			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 45 W	303	22 EMT	518	121.3	121.3	128.0	128.0	134.7	134.7	141.4	141.4	141.4
EC-i 30, 45 W	303	16 EASY/Abs.	509–511	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 45 W	303	16 RIO	519	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 50 W	304			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 50 W	304	22 EMT	518	143.3	143.3	150.0	150.0	156.7	156.7	163.4	163.4	163.4
EC-i 30, 50 W	304	16 EASY/Abs.	509–511	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 50 W	304	16 RIO	519	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 30, 75 W	305			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 75 W	305	22 EMT	518	143.3	143.3	150.0	150.0	156.7	156.7	163.4	163.4	163.4
EC-i 30, 75 W	305	16 EASY/Abs.	509–511	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 75 W	305	16 RIO	519	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 40, 50 W	306			82.7	82.7	89.4	89.4	96.1	96.1	102.8	102.8	102.8
EC-i 40, 50 W	306	22 EMT	518	110.7	110.7	117.4	117.4	124.1	124.1	130.8	130.8	130.8
EC-i 40, 50 W	306	TSX 40 MAG/RIO	526–527	94.4	82.7	89.4	89.4	96.1	96.1	102.8	102.8	102.8
EC-i 40, 50 W	306	16 EASY/Abs.	509–511	94.4	94.4	101.1	101.1	107.8	107.8	114.5	114.5	114.5
EC-i 40, 50 W	306	16 RIO	519	97.2	97.2	103.9	103.9	110.6	110.6	117.3	117.3	117.3
EC-i 40, 70 W	308			92.7	92.7	99.4	99.4	106.1	106.1	112.8	112.8	112.8
EC-i 40, 70 W	308	22 EMT	518	120.7	120.7	127.4	127.4	134.1	134.1	140.8	140.8	140.8
EC-i 40, 70 W	308	TSX 40 MAG/RIO	526–527	104.4	104.4	111.1	111.1	117.8	117.8	124.5	124.5	124.5
EC-i 40, 70 W	308	16 EASY/Abs.	509–511	104.4	104.4	111.1	111.1	117.8	117.8	124.5	124.5	124.5
EC-i 40, 70 W	308	16 RIO	519	107.2	107.2	113.9	113.9	120.6	120.6	127.3	127.3	127.3

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Screw Drive GP 32 S ∅32 mm, trapezoidal lead screw



M 1:2

Technical data	
Screw	TR10 x 2, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed[2]	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static)[1]	2700 N

Number of stages	0	1	2	3	4
Max. radial load, 15 mm from flange	200 N	200 N	350 N	400 N	400 N

Stock program
Standard program
Special program (on request)

			Part numbers								
			363936	363937	363940	363945	363946	363951	363956	363961	363966
Screw drive data											
1	Reduction		1:1	3.7:1	14:1	33:1	51:1	111:1	246:1	492:1	762:1
2	Absolute reduction		1/1	26/7	676/49	529/16	17576/343	13824/125	421824/1715	86112/175	19044/25
20	Max. feed velocity[1]	mm/s	186	72	19	8.1	5.2	2.4	1.1	0.5	0.3
21	Max. feed force (continuous)[1]	N	216	296	462	614	710	921	1200	1512	1530
22	Max. feed force (intermittent)[1]	N	528	723	1127	1500	1530	1530	1530	1530	1530
	Part numbers			363938	363941		363947	363952	363957	363962	363967
1	Reduction			4.8:1	18:1		66:1	123:1	295:1	531:1	913:1
2	Absolute reduction			24/5	624/35		16224/245	6877/56	101062/343	331776/625	36501/40
20	Max. feed velocity[1]	mm/s		56	15		4.0	2.2	0.9	0.5	0.3
21	Max. feed force (continuous)[1]	N		323	502		774	953	1275	1530	1530
22	Max. feed force (intermittent)[1]	N		789	1226		1530	1530	1530	1530	1530
	Part numbers			363939	363942		363948	363953	363958	363963	363968
1	Reduction			5.8:1	21:1		79:1	132:1	318:1	589:1	1093:1
2	Absolute reduction			23/4	299/14		3887/49	3312/25	389376/1225	20631/35	279841/256
20	Max. feed velocity[1]	mm/s		46	13		3.4	2.0	0.8	0.5	0.2
21	Max. feed force (continuous)[1]	N		344	529		822	975	1308	1530	1530
22	Max. feed force (intermittent)[1]	N		840	1291		1530	1530	1530	1530	1530
	Part numbers				363943		363949	363954	363959	363964	
1	Reduction				23:1		86:1	159:1	411:1	636:1	
2	Absolute reduction				576/25		14976/175	1587/10	359424/875	79488/125	
20	Max. feed velocity[1]	mm/s			12		3.1	1.7	0.6	0.4	
21	Max. feed force (continuous)[1]	N			545		846	1038	1424	1530	
22	Max. feed force (intermittent)[1]	N			1330		1530	1530	1530	1530	
	Part numbers				363944		363950	363955	363960	363965	
1	Reduction				28:1		103:1	190:1	456:1	706:1	
2	Absolute reduction				138/5		3588/35	12167/64	89401/196	158171/224	
20	Max. feed velocity[1]	mm/s			9.5		1.3	0.7	0.3	0.2	
21	Max. feed force (continuous)[1]	N			582		898	1101	1475	1530	
22	Max. feed force (intermittent)[1]	N			1420		1530	1530	1530	1530	
4	Number of stages		0	1	2	2	3	3	4	4	4
7	Max. efficiency gearhead incl. screw	%	47	38	35	35	33	33	28	28	28
8	Weight[1]	g	304	304	331	331	359	359	387	387	387
9	Average backlash no load	°	0.7	0.7	0.8	0.8	1.0	1.0	1.0	1.0	1.0
23	Mechanical positioning accuracy[1]	mm	0.035	0.035	0.035	0.035	0.037	0.037	0.037	0.037	0.037
10	Mass inertia gearhead incl. screw[1]	gcm²	42.3	2.4	0.9	0.9	1.0	1.0	1.0	1.0	1.0
11	Gearhead length L1	mm	51.0	51.0	57.7	57.7	64.4	64.4	71.1	71.1	71.1

[1] based on screw length 200.8 mm (standard length) [2] for reduction 1:1 = 5569 rpm

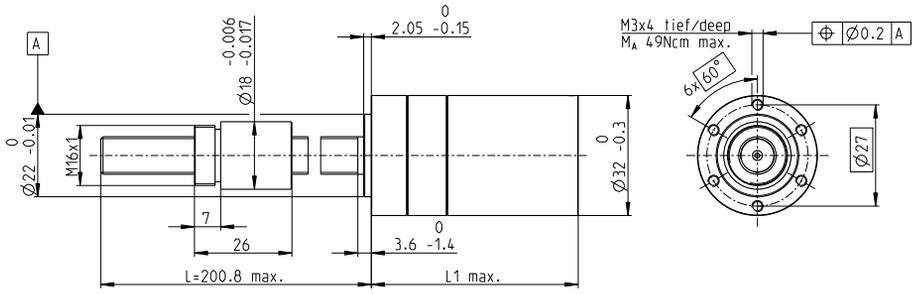


Modular system

+ Motor	Page	+ Sensor / Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts								
RE 25	156/158			105.6	105.6	112.3	112.3	119.0	119.0	125.7	125.7	125.7
RE 25	156/158	ENX 25 IMR	505	116.6	116.6	123.3	123.3	130	130	136.7	136.7	136.7
RE 25	156/158	HED_5540	535/537	126.4	126.4	133.1	133.1	139.8	139.8	146.5	146.5	146.5
RE 25	156/158	DCT 22	542	127.9	127.9	134.6	134.6	141.3	141.3	148.0	148.0	148.0
RE 25, 20 W	157			94.1	94.1	100.8	100.8	107.5	107.5	114.2	114.2	114.2
RE 25, 20 W	157	ENX 25 IMR	505	105.1	105.1	111.8	111.8	118.5	118.5	125.2	125.2	125.2
RE 25, 20 W	157	HED_5540	535/537	114.9	114.9	121.6	121.6	128.3	128.3	135.0	135.0	135.0
RE 25, 20 W	157	DCT 22	542	116.4	116.4	123.1	123.1	129.8	129.8	136.5	136.5	136.5
RE 25, 20 W	157	AB 28	587	128.2	128.2	134.9	134.9	141.6	141.6	148.3	148.3	148.3
RE 25, 20 W	157	HED_5540/AB 28	535/587	145.4	145.4	152.1	152.1	158.8	158.8	165.5	165.5	165.5
RE 25, 20 W	158	AB 28	587	139.7	139.7	146.4	146.4	153.1	153.1	159.8	159.8	159.8
RE 25, 20 W	158	HED_5540/AB 28	535/587	156.9	156.9	163.6	163.6	170.3	170.3	177.0	177.0	177.0
RE 30, 60 W	160			119.1	119.1	125.8	125.8	132.5	132.5	139.2	139.2	139.2
RE 30, 60 W	160	ENX 32 IMR	506	130.5	130.5	137.2	137.2	143.9	143.9	150.6	150.6	150.6
RE 30, 60 W	160	HED_5540	535/537	139.9	139.9	146.6	146.6	153.3	153.3	160.0	160.0	160.0

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Screw Drive GP 32 S ∅32 mm, trapezoidal lead screw



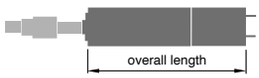
M 1:2

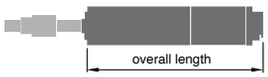
Technical data					
Screw					TR10 x 2, stainless steel
Standard length					200.8 mm
Special length (5 mm steps)					max. 600 mm
Nut (standard)					thread nut
Material					bronze
Axial play					< 0.008 mm
Planetary gearhead					straight teeth
Bearing					ball bearing/thrust roller bearing
Radial play, 5 mm from flange					< 0.05 mm
Axial play					preloaded
Max. continuous input speed[2]					8000 rpm
Recommended temperature range					-15...+80°C
Max. axial load (static)[1]					2700 N
Number of stages	0	1	2	3	4
Max. radial load, 15 mm from flange	200 N	200 N	350 N	400 N	400 N

Stock program
Standard program
Special program (on request)

Part numbers

363936	363937	363940	363945	363946	363951	363956	363961	363966
	363938	363941		363947	363952	363957	363962	363967
	363939	363942		363948	363953	363958	363963	363968
		363943		363949	363954	363959	363964	
		363944		363950	363955	363960	363965	



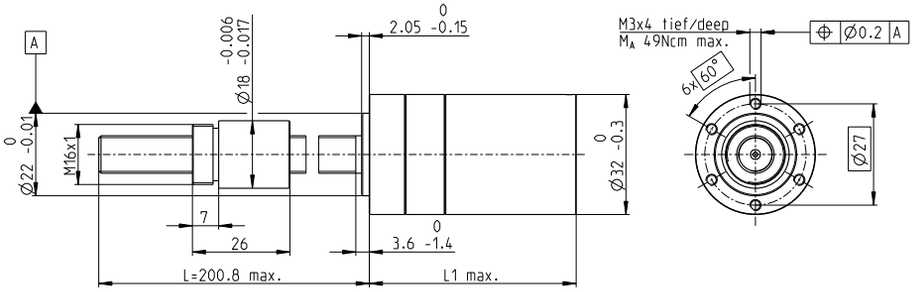


Modular system

+ Motor	Page	+ Sensor / Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (sensor/brake) + assembly parts								
RE 35, 90 W	161			122.1	122.1	128.8	128.8	135.5	135.5	142.2	142.2	142.2
RE 35, 90 W	161	ENX 32 IMR	506	133.5	133.5	140.2	140.2	146.9	146.9	153.6	153.6	153.6
RE 35, 90 W	161	HED_5540	535/537	142.8	142.8	149.5	149.5	156.2	156.2	162.9	162.9	162.9
RE 35, 90 W	161	DCT 22	542	140.2	140.2	146.9	146.9	153.6	153.6	160.3	160.3	160.3
RE 35, 90 W	161	AB 28	587	158.2	158.2	164.9	164.9	171.6	171.6	178.3	178.3	178.3
RE 35, 90 W	161	HEDS 5540/AB 28	535/587	175.4	175.4	182.1	182.1	188.8	188.8	195.5	195.5	195.5
A-max 26	183–186			–	95.8	102.5	102.5	109.2	109.2	115.9	115.9	115.9
A-max 26	184–186	13 GAMA	498	–	102.9	109.6	109.6	116.3	116.3	123.0	123.0	123.0
A-max 26	184/186	ENX 25 IMR	505	–	104.6	111.3	111.3	118	118	124.7	124.7	124.7
A-max 26	184–186	HED_5540	536/538	–	114.2	120.9	120.9	127.6	127.6	134.3	134.3	134.3
A-max 32	187			–	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
A-max 32	188			–	112.6	119.3	119.3	126.0	126.0	132.7	132.7	132.7
A-max 32	188	ENX 32 IMR	506	–	123.8	130.5	130.5	137.2	137.2	143.9	143.9	143.9
A-max 32	188	HED_5540	535/537	–	133.4	140.1	140.1	146.8	146.8	153.5	153.5	153.5
EC 32, 80 W	271	HED_5540	535/537	129.5	129.5	136.2	136.2	142.9	142.9	149.6	149.6	149.6
EC 32, 80 W	271	Res 26	543	131.2	131.2	137.9	137.9	144.6	144.6	151.3	151.3	151.3
EC-max 22, 25 W	283			–	99.6	106.3	106.3	113.0	113.0	119.7	119.7	119.7
EC-max 22, 25 W	283	16 EASY/XT/Abs.	509–511	–	109.2	115.9	115.9	122.6	122.6	129.3	129.3	129.3
EC-max 22, 25 W	283	16 EASY Abs. XT	512	–	109.7	116.4	116.4	123.1	123.1	129.8	129.8	129.8
EC-max 22, 25 W	283	AB 20	584	–	135.2	141.9	141.9	148.6	148.6	155.3	155.3	155.3
EC-max 30, 40 W	284			–	93.1	99.8	99.8	106.5	106.5	113.2	113.2	113.2
EC-max 30, 40 W	284	16 EASY/XT/Abs.	509–511	–	104.2	110.9	110.9	117.6	117.6	124.3	124.3	124.3
EC-max 30, 40 W	284	16 EASY Abs. XT	512	–	104.7	111.4	111.4	118.1	118.1	124.8	124.8	124.8
EC-max 30, 40 W	284	HEDL 5540	538	–	113.7	120.4	120.4	127.1	127.1	133.8	133.8	133.8
EC-max 30, 40 W	284	AB 20	584	–	128.7	135.4	135.4	142.1	142.1	148.8	148.8	148.8
EC-max 30, 40 W	284	HEDL 5540/AB 20	538/584	–	149.3	156.0	156.0	162.7	162.7	169.4	169.4	169.4
EC-max 30, 60 W	285			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-max 30, 60 W	285	16 EASY/XT/Abs.	509–511	126.2	126.2	132.9	132.9	139.6	139.6	146.3	146.3	146.3
EC-max 30, 60 W	285	16 EASY Abs. XT	512	126.7	126.7	133.4	133.4	140.1	140.1	146.8	146.8	146.8
EC-max 30, 60 W	285	HEDL 5540	538	135.7	135.7	142.4	142.4	149.1	149.1	155.8	155.8	155.8
EC-max 30, 60 W	285	AB 20	584	150.7	150.7	157.4	157.4	164.1	164.1	170.8	170.8	170.8
EC-max 30, 60 W	285	HEDL 5540/AB 20	539/584	171.3	171.3	178.0	178.0	184.7	184.7	191.4	191.4	191.4
EC-4pole 22, 90 W	291			99.7	99.7	106.4	106.4	113.1	113.1	119.8	119.8	119.8
EC-4pole 22, 90 W	291	22 EMT	518	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-4pole 22, 90 W	291	16 EASY/XT/Abs.	509–511	111.9	111.9	118.6	118.6	125.3	125.3	132.0	132.0	132.0
EC-4pole 22, 90 W	291	16 EASY Abs. XT	512	112.4	112.4	119.1	119.1	125.8	125.8	132.5	132.5	132.5
EC-4pole 22, 90 W	291	16 RIO	519	110.4	110.4	117.1	117.1	123.8	123.8	130.5	130.5	130.5
EC-4pole 22, 120 W	292			117.1	117.1	123.8	123.8	130.5	130.5	137.2	137.2	137.2
EC-4pole 22, 120 W	292	22 EMT	518	142.9	142.9	149.6	149.6	156.3	156.3	163.0	163.0	163.0
EC-4pole 22, 120 W	292	16 EASY/XT/Abs.	509–511	129.3	129.3	136.0	136.0	142.7	142.7	149.4	149.4	149.4
EC-4pole 22, 120 W	292	16 EASY Abs. XT	512	129.8	129.8	136.5	136.5	143.2	143.2	149.9	149.9	149.9
EC-4pole 22, 120 W	292	16 RIO	519	127.8	127.8	134.5	134.5	141.2	141.2	147.9	147.9	147.9
EC-4pole 30, 100 W	293			98.1	98.1	104.8	104.8	111.5	111.5	118.2	118.2	118.2
EC-4pole 30, 100 W	293	16 EASY/XT/Abs.	509-511	112.0	112.0	118.7	118.7	125.4	125.4	132.1	132.1	132.1
EC-4pole 30, 100 W	293	16 EASY Abs. XT	512	112.5	112.5	119.2	119.2	125.9	125.9	132.6	132.6	132.6
EC-4pole 30, 100 W	293	22 EMT	518	126.0	126.0	132.7	132.7	139.4	139.4	146.1	146.1	146.1
EC-4pole 30, 100 W	293	16 RIO	519	110.5	110.5	117.2	117.2	123.9	123.9	130.6	130.6	130.6
EC-4pole 30, 100 W	293	AB 20	585	134.3	134.3	141.0	141.0	147.7	147.7	154.4	154.4	154.4
EC-4pole 30, 100 W	293	16 EASY/XT/Abs./AB 20	509/585	148.4	148.4	155.1	155.1	161.8	161.8	168.5	168.5	168.5
EC-4pole 30, 100 W	293	16 EASY Abs. XT/AB 20	512/585	148.9	148.9	155.6	155.6	162.3	162.3	169.0	169.0	169.0
EC-4pole 30, 100 W	293	22 EMT/AB 20	518/585	165.5	165.5	172.2	172.2	178.9	178.9	185.6	185.6	185.6
EC-4pole 30, 100 W	293	16 RIO/AB 20	519/585	146.9	146.9	153.6	153.6	160.3	160.3	167.0	167.0	167.0

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Screw Drive GP 32 S ∅32 mm, trapezoidal lead screw



M 1:2

Technical data	
Screw	TR10 x 2, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed[2]	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static)[1]	2700 N

Number of stages	0	1	2	3	4
Max. radial load, 15 mm from flange	200 N	200 N	350 N	400 N	400 N

Stock program
Standard program
Special program (on request)

Part numbers

363936	363937	363940	363945	363946	363951	363956	363961	363966
	363938	363941		363947	363952	363957	363962	363967
	363939	363942		363948	363953	363958	363963	363968
		363943		363949	363954	363959	363964	
		363944		363950	363955	363960	363965	

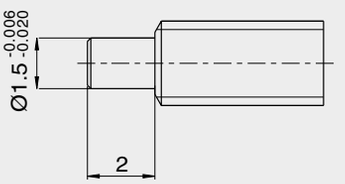
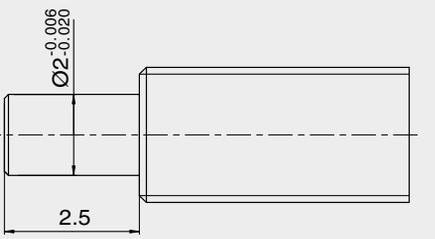
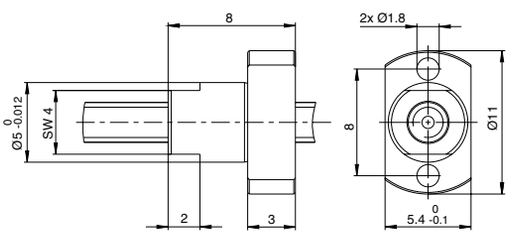
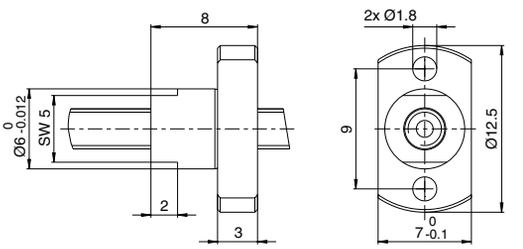
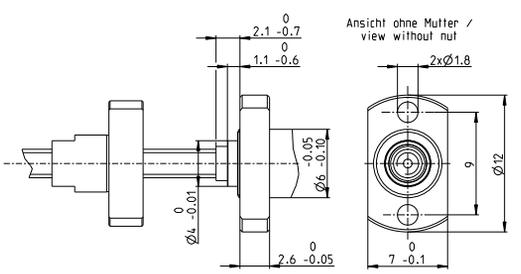
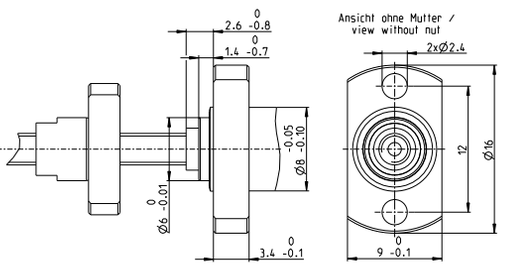


Modular system

+ Motor	Page	+ Sensor / Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts								
EC-4pole 30, 200 W	295			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-4pole 30, 200 W	295	16 EASY/XT/Abs.	509–511	129.0	129.0	135.7	135.7	142.4	142.4	149.1	149.1	149.1
EC-4pole 30, 200 W	295	16 EASY Abs. XT	512	129.5	129.5	136.2	136.2	142.9	142.9	149.6	149.6	149.6
EC-4pole 30, 200 W	295	22 EMT	518	143.0	143.0	149.7	149.7	156.4	156.4	163.1	163.1	163.1
EC-4pole 30, 200 W	295	16 RIO	519	127.5	127.5	134.2	134.2	140.9	140.9	147.6	147.6	147.6
EC-4pole 30, 200 W	295	AB 20	585	151.3	151.3	158.0	158.0	164.7	164.7	171.4	171.4	171.4
EC-4pole 30, 200 W	295	16 EASY/XT/Abs./AB 20	509/585	165.4	165.4	172.1	172.1	178.8	178.8	185.5	185.5	185.5
EC-4pole 30, 200 W	295	16 EASY Abs. XT/AB 20	512/585	165.9	165.9	172.6	172.6	179.3	179.3	186.0	186.0	186.0
EC-4pole 30, 200 W	295	22 EMT/AB 20	518/585	182.5	182.5	189.2	189.2	195.9	195.9	202.6	202.6	202.6
EC-4pole 30, 200 W	295	16 RIO/AB 20	512/585	163.9	163.9	170.6	170.6	177.3	177.3	184.0	184.0	184.0
EC-i 30, 30 W	302			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 30 W	302	22 EMT	518	121.3	121.3	128.0	128.0	134.7	134.7	141.4	141.4	141.4
EC-i 30, 30 W	302	16 EASY/Abs.	509–511	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 30 W	302	16 RIO	519	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 45 W	303			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 45 W	303	22 EMT	518	121.3	121.3	128.0	128.0	134.7	134.7	141.4	141.4	141.4
EC-i 30, 45 W	303	16 EASY/Abs.	509–511	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 45 W	303	16 RIO	519	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 50 W	304			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 50 W	304	22 EMT	518	143.3	143.3	150.0	150.0	156.7	156.7	163.4	163.4	163.4
EC-i 30, 50 W	304	16 EASY/Abs.	509–511	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 50 W	304	16 RIO	519	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 30, 75 W	305			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 75 W	305	22 EMT	518	143.3	143.3	150.0	150.0	156.7	156.7	163.4	163.4	163.4
EC-i 30, 75 W	305	16 EASY/Abs.	509–511	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 75 W	305	16 RIO	519	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 40, 50 W	306			82.7	82.7	89.4	89.4	96.1	96.1	102.8	102.8	102.8
EC-i 40, 50 W	306	22 EMT	518	110.7	110.7	117.4	117.4	124.1	124.1	130.8	130.8	130.8
EC-i 40, 50 W	306	TSX 40 MAG/RIO	526–527	94.4	82.7	89.4	89.4	96.1	96.1	102.8	102.8	102.8
EC-i 40, 50 W	306	16 EASY/Abs.	509–511	94.4	94.4	101.1	101.1	107.8	107.8	114.5	114.5	114.5
EC-i 40, 50 W	306	16 RIO	519	97.2	97.2	103.9	103.9	110.6	110.6	117.3	117.3	117.3
EC-i 40, 70 W	308			92.7	92.7	99.4	99.4	106.1	106.1	112.8	112.8	112.8
EC-i 40, 70 W	308	22 EMT	518	120.7	120.7	127.4	127.4	134.1	134.1	140.8	140.8	140.8
EC-i 40, 70 W	308	TSX 40 MAG/RIO	526–527	104.4	104.4	111.1	111.1	117.8	117.8	124.5	124.5	124.5
EC-i 40, 70 W	308	16 EASY/Abs.	509–511	104.4	104.4	111.1	111.1	117.8	117.8	124.5	124.5	124.5
EC-i 40, 70 W	308	16 RIO	519	107.2	107.2	113.9	113.9	120.6	120.6	127.3	127.3	127.3

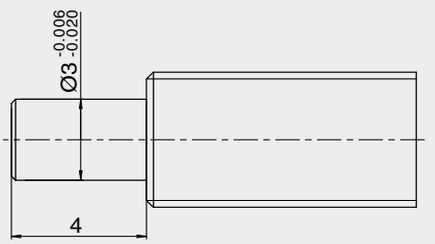
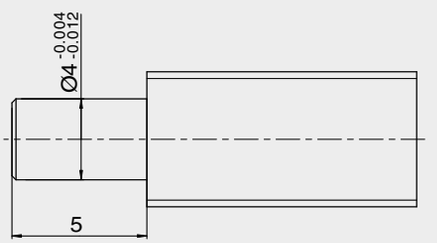
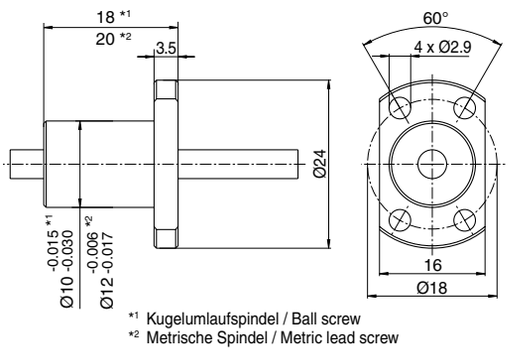
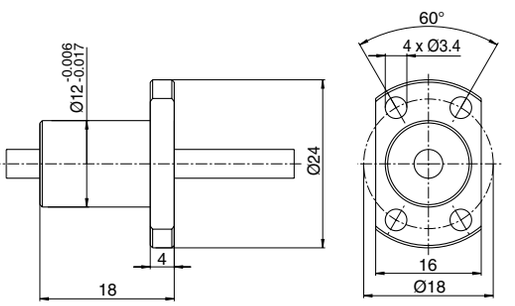
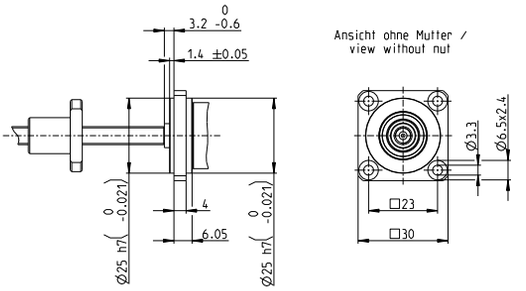
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Screw Drive Options

Option	to GP 6 S	to GP 8 S
Special length **Reference FLEX-GEAR-SPIN02/03**	Without specification, the screw is supplied in the standard length 45 mm. Special lengths can be ordered in 5 mm steps up to the stated maximum length.	Without specification, the screw is supplied in the standard length 56 mm. Special lengths can be ordered in 5 mm steps up to the stated maximum length.
FLEX-GEAR-SPIN04/05	Configurable length	Configurable length
Screw end **Reference FLEX-GEAR-SPIN06** In order to support the end of the screw by an additional bearing, it can be delivered according to the illustration. Customer specific screw ends on request.		
Flange nut **Reference FLEX-GEAR-SPIN08** Flange nut instead of the standard thread nut.		
Low backlash ball screw nut **Reference FLEX-GEAR-SPIN09**	Not available for GP 6 S.	Not available for GP 8 S.
Rectangular mounting flange **Reference FLEX-GEAR-SPIN10** Screw drive with rectangular mounting flange allows mounting from the gearhead side.		

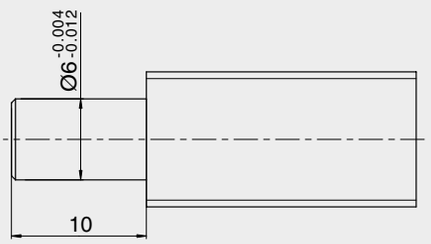
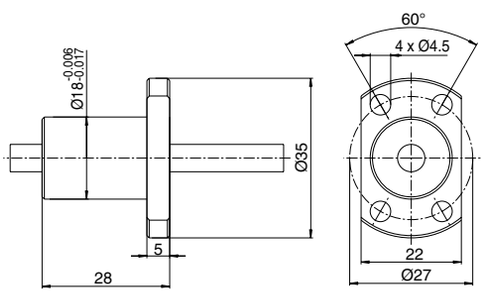
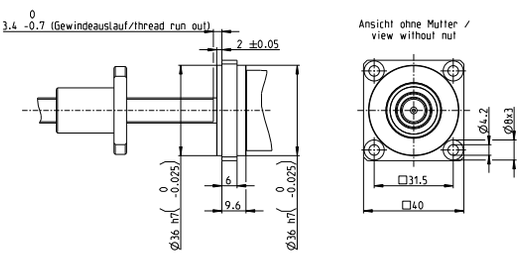
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Screw Drive Options

Option	to GP 16 S	to GP 22 S
Special length **Reference FLEX-GEAR-SPIN02/03**	Without specification, the screw is supplied in the standard length 102 mm. Special lengths can be ordered in 5 mm steps up to the stated maximum length.	Without specification, the screw is supplied in the standard length 151 mm. Special lengths can be ordered in 5 mm steps up to the stated maximum length.
FLEX-GEAR-SPIN04/05	Configurable length	Configurable length
Screw end **Reference FLEX-GEAR-SPIN06** In order to support the end of the screw by an additional bearing, it can be delivered according to the illustration. Customer specific screw ends on request.		
Flange nut **Reference FLEX-GEAR-SPIN08** Flange nut instead of the standard thread nut. If using a ball screw, the rectangular mounting flange (FLEX-GEAR-SPIN10) must be used.		
Low backlash ball screw nut **Reference FLEX-GEAR-SPIN09**	Not available for GP 16 S.	Axial play is almost eliminated through increased preloading of the ball screw nut. Although, the increased load can lead to greater wear.
Rectangular mounting flange **Reference FLEX-GEAR-SPIN10** Screw drive with rectangular mounting flange allows mounting from the gearhead side. If using a ball screw with flange nut, the rectangular assembly flange must be used for mounting.	On request.	

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Screw Drive Options

Option	to GP 32 S
Special length **Reference FLEX-GEAR-SPIN02/03**	Without specification, the screw is supplied in the standard length 200.8 mm. Special lengths can be ordered in 5 mm steps up to the stated maximum length.
FLEX-GEAR-SPIN04/05	Configurable length
Screw end **Reference FLEX-GEAR-SPIN06** In order to support the end of the screw by an additional bearing, it can be delivered according to the illustration. Customer specific screw ends on request.	
Flange nut **Reference FLEX-GEAR-SPIN08** Flange nut instead of the standard thread nut. If using a ball screw, the rectangular mounting flange (FLEX-GEAR-SPIN10) must be used.	
Low backlash ball screw nut **Reference FLEX-GEAR-SPIN09**	Axial play is almost eliminated through increased preloading of the ball screw nut. Although, the increased load can lead to greater wear.
Rectangular mounting flange **Reference FLEX-GEAR-SPIN10** Screw drive with rectangular mounting flange allows mounting from the gearhead side. If using a ball screw with flange nut, the rectangular assembly flange must be used for mounting.	

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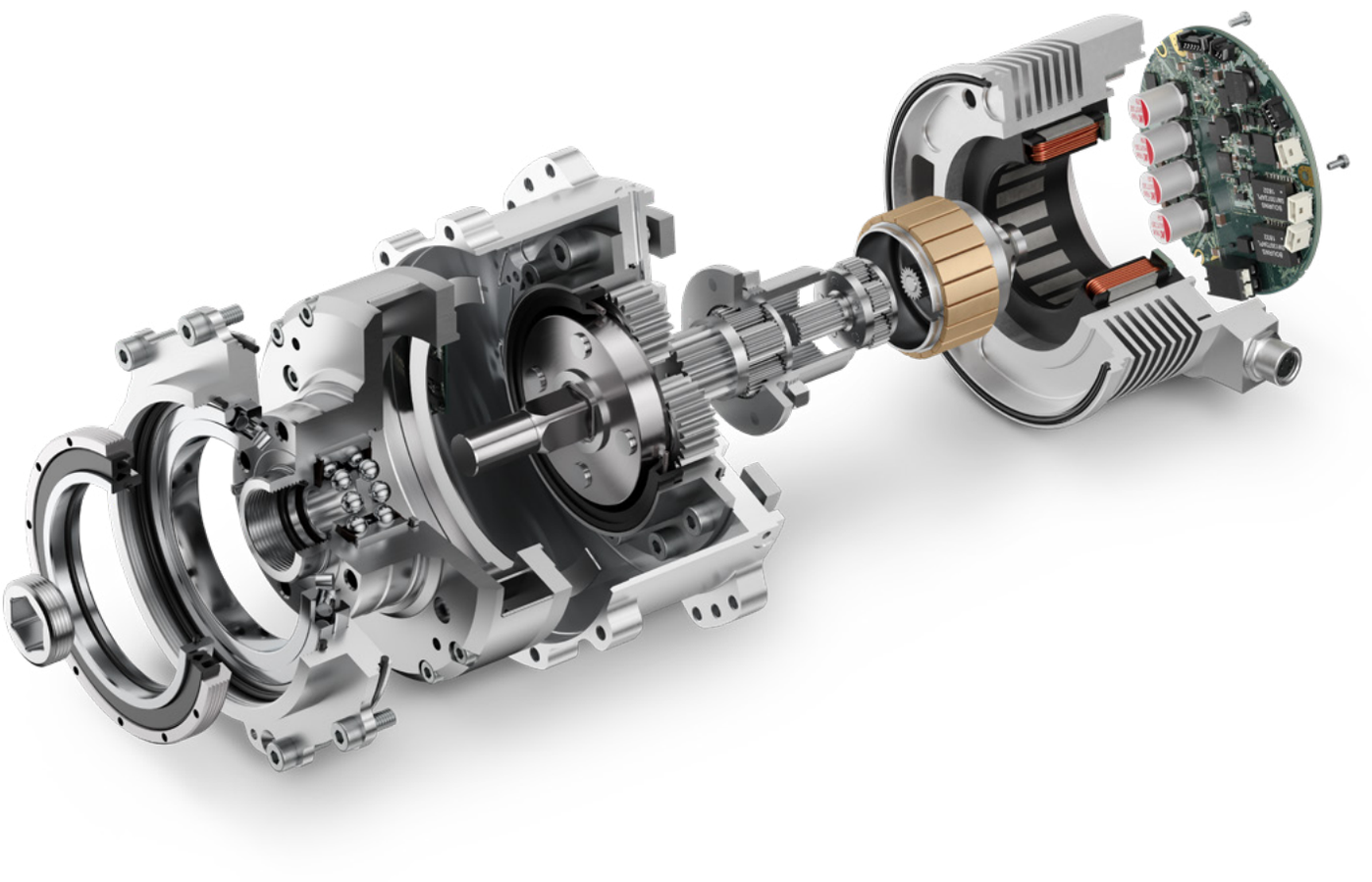
For your personal notes

Inductive, magnetic, and optical encoders, DC tachos and resolvers

Standard specification no. 103	91
ENX	490–519
TSX	522–527
sensor	530–543

We can change the game

Customized drive system

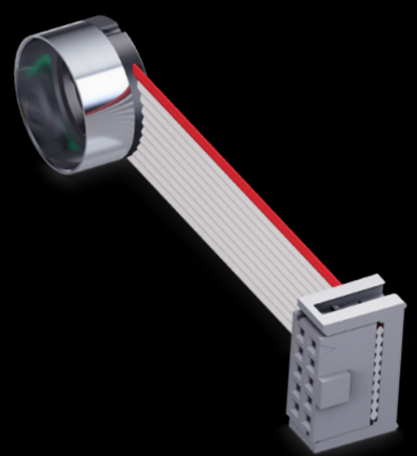


Precision Drive Systems

maxon

maxon ENX

Standard specification no. 103		91
Inductive encoders		490–491
ENX 22 MILE 1024 CPT, 2 channel		490
ENX 32 MILE 2048 CPT, 2 channel		491
ENX 42 MILE 2048 CPT, 2 channel		492
Magnetic encoders		493–518
ENX 4 MAG 1–256 CPT, 3 channel		493
ENX 6 MAG 1–256 CPT, 3 channel		494
ENX 8 MAG 1–256 CPT, 3 channel		495
ENX 10 MAG INT 1–256 CPT, 3 channel		496
ENX 10 GAMA 12 CPT, 2 channel		497
ENX 13 GAMA 16 CPT, 2 channel		498
ENX 8 IMR 100 CPT, 2 channel	NEW	499
ENX 10 IMR 64–256 CPT, 2 channel	NEW	500
ENX 13 IMR 64–256 CPT, 2 channel	NEW	501
ENX 16 IMR 128–512 CPT, 2/3 channel	NEW	502
ENX 19 IMR 128–512 CPT, 2/3 channel	NEW	503
ENX 22 IMR 128–512 CPT, 2/3 channel	NEW	504
ENX 25 IMR 128–1000 CPT, 3 channel	NEW	505
ENX 32 IMR 256–1024 CPT, 3 channel	NEW	506
ENX 10 EASY/QUAD 1–1024 CPT, 3/2 channel		507
ENX 10 EASY XT 1–1024 CPT, 3 channel		508
ENX 16 EASY 1–1024 CPT, 3 channel		509
ENX 16 EASY XT 1–1024 CPT, 3 channel		510
ENX 16 EASY Absolute 4096 steps per turn		511
ENX 16 EASY Absolute XT 4096 steps per turn		512
ENX 13 EASY INT 1–1024 CPT, 4096 steps per turn		513
ENX 16 EASY INT 1–1024 CPT, 4096 steps per turn		514
ENX 19 EASY INT 1–1024 CPT, 4096 steps per turn		515
ENX 22 EASY INT 1–1024 CPT, 4096 steps per turn		516–517
ENX 22 EMT 65 536 turns, Multi Turn		518
Optical Encoder		519
ENX 16 RIO 512–65 536 CPT, 3 channel		519

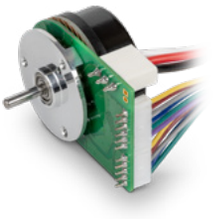


maxon ENX encoders make an impression with their robust design and high signal quality. The 3-channel encoders with differential signals guarantee interference-free function even under the very high load, and the optical RIO encoder delivers the highest resolution in a small space. maxon ENX encoders can be configured online and are ready for delivery within 11 working days.

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ENX 22 MILE Encoder ∅22 mm, 1024 CPT

Integrated into motor



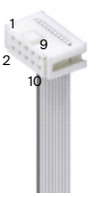
Key data		ENX 22 MILE incremental
Number of channels		2
Max. counts per turn		1024
Encoder length L	mm	1.2
Ambient temperature	°C	-40...+100
Weight	g	8

Selection criteria	ENX 22 MILE incremental
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

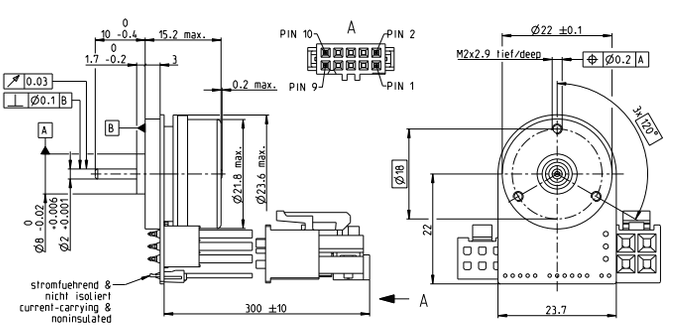
Specifications		ENX 22 MILE incremental
Supply voltage V_{CC}	V	5V ±10%
Typical current draw	mA	15
Max. operating frequency	kHz	1000
Max. speed	rpm	14000
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)

Pin 1 not connected
Pin 2 V_{CC}
Pin 3 GND
Pin 4 not connected
Pin 5 channel $\overline{A}$
Pin 6 channel A
Pin 7 channel $\overline{B}$
Pin 8 channel B
Pin 9 not connected
Pin 10 not connected



Modular system	Page
EC FLAT	
ECX FLAT 22 S	257
ECX FLAT 22 S High Torque	258
ECX FLAT 22 L High Torque	259

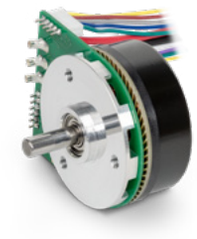
Dimensions standard version M 2:3



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ENX 32 MILE Encoder ∅32 mm, 2048 CPT

Integrated into motor



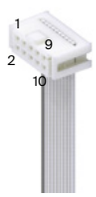
Key data		ENX 32 MILE incremental
Number of channels		2
Max. counts per turn		2048
Encoder length L	mm	1.1
Ambient temperature	°C	-40...+100
Weight	g	8

Selection criteria	ENX 32 MILE incremental
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

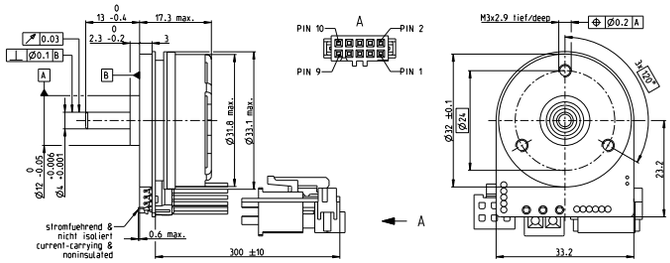
Specifications		ENX 32 MILE incremental
Supply voltage V_{CC}	V	5V ±10%
Typical current draw	mA	15
Max. operating frequency	kHz	1000
Max. speed	rpm	10 000
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)

Pin 1 not connected
Pin 2 V_{CC}
Pin 3 GND
Pin 4 not connected
Pin 5 channel $\overline{A}$
Pin 6 channel A
Pin 7 channel $\overline{B}$
Pin 8 channel B
Pin 9 not connected
Pin 10 not connected



Modular system	Page
EC motor	
ECX FLAT 32 S	260
ECX FLAT 32 S High Torque	261
ECX FLAT 32 L High Torque	262

Dimensions standard version M 1:2



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ENX 42 MILE Encoder ∅42 mm, 2048 CPT

Integrated into motor



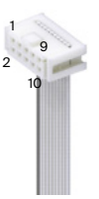
Key data		ENX 42 MILE incremental
Number of channels		2
Max. counts per turn		2048
Encoder length L	mm	1.1
Ambient temperature	°C	-40...+100
Weight	g	8

Selection criteria	ENX 42 MILE incremental
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

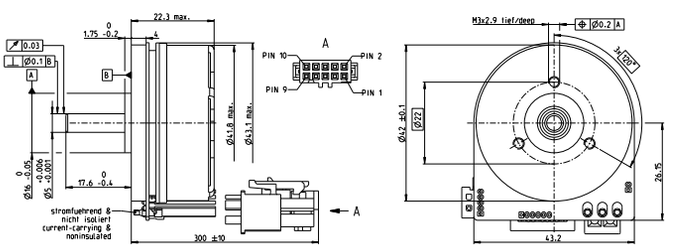
Specifications		ENX 42 MILE incremental
Supply voltage V_{cc}	V	5V ±10%
Typical current draw	mA	15
Max. operating frequency	kHz	1000
Max. speed	rpm	10 000
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)

Pin 1 not connected
Pin 2 V_{CC}
Pin 3 GND
Pin 4 not connected
Pin 5 channel $\overline{A}$
Pin 6 channel A
Pin 7 channel $\overline{B}$
Pin 8 channel B
Pin 9 not connected
Pin 10 not connected



Modular system	Page
EC motor	
ECX FLAT 42 S	263
ECX FLAT 42 S High Torque	264
ECX FLAT 42 M High Torque	265

Dimensions standard version M 1:2



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ENX 4 MAG Encoder ∅4 mm, 1...256 CPT



Key data		ENX 4 MAG incremental, commutation signal
Number of channels		3
Max. counts per turn		256
Additional length at motor	mm	2.7
Ambient temperature	°C	-40...+100
Weight	g	1

Selection criteria	ENX 4 MAG incremental, commutation signal
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	▲
Cost effective	■

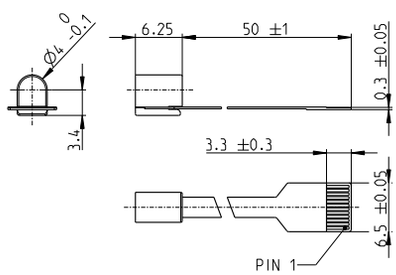
■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		ENX 4 MAG incremental, commutation signal
Supply voltage V_{cc}	V	3.0...3.6
Typical current draw	mA	13
Max. operating frequency	kHz	500
Max. speed	rpm	100 000
Connection[3]		FPC, 12 pole, pitch 0.5 mm Pin 1 W1 Pin 2 W2 Pin 3 W3 Pin 4 GND Pin 5 V_{cc} Pin 6 channel A Pin 7 channel B Pin 8 channel I Pin 9 H1 Pin 10 H2 Pin 11 H3 Pin 12 do not connect[1] Output signal: CMOS compatible Output current per channel: ±4 mA

Configuration	ENX 4 MAG incremental, commutation signal
Counts per turn[2]	1...256

Modular system	Page
EC motor	
ECX SPEED 4 M	193
ECX SPEED 4 L	194

Dimensions standard version M 1:1



Notes

[1] Applying voltage to these pins may destroy the encoder.
[2] maxon controllers require a resolution of at least 16 counts per turn.
[3] H1, index and angle zero are aligned with angle commutation zero (see p. 66).

Compatible connector:
Molex 52745-1297, TE 1-1734839-2
Adapter 498157 required for all maxon controllers

Please note: max. continuous current 0.5 A

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 6 MAG Encoder ∅6 mm, 1...256 CPT



Key data		ENX 6 MAG incremental	ENX 6 MAG incremental, commutation signal
Number of channels		3	3
Max. counts per turn		256	256
Additional length at motor[4]	mm	6.2	0.0...2.1
Ambient temperature	°C	-40...+100	-40...+100
Weight	g	1	1

Selection criteria	ENX 6 MAG incremental	ENX 6 MAG incremental, commutation signal
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	▲	▲
Cost effective	■	■

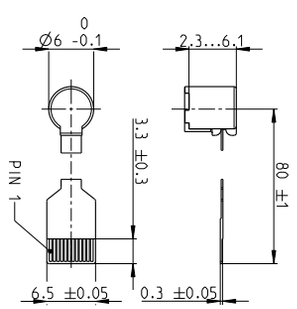
■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		ENX 6 MAG incremental	ENX 6 MAG incremental, commutation signal
Supply voltage V_{cc}	V	3.0...3.6	3.0...3.6
Typical current draw	mA	13	13
Max. operating frequency	kHz	500	500
Max. speed	rpm	100 000	100 000
Connection[3]		FPC, 12 pole, pitch 0.5 mm Pin 1 Motor+ Pin 2 Motor- Pin 3 not connected Pin 4 GND Pin 5 V_{cc} Pin 6 channel A Pin 7 channel B Pin 8 channel I Pin 9-12 do not connect[1] Output signal: CMOS compatible Output current per channel: ±4 mA	FPC, 12 pole, pitch 0.5 mm Pin 1 W1 Pin 2 W2 Pin 3 W3 Pin 4 GND Pin 5 V_{cc} Pin 6 channel A Pin 7 channel B Pin 8 channel I Pin 9 H1 Pin 10 H2 Pin 11 H3 Pin 12 do not connect[1] Output signal: CMOS compatible Output current per channel: ±4 mA

Configuration	ENX 6 MAG incremental	ENX 6 MAG incremental, commutation signal
Counts per turn[2]	1...256	1...256

Modular system	Page
DC motor	
DCX 6 M	97
EC motor	
ECX SPEED 6 M	195–196
ECX PRIME 6 M	235

Dimensions standard version M 1:1



Notes

[1] Applying voltage to these pins may destroy the encoder.
[2] maxon controllers require a resolution of at least 16 counts per turn.
[3] H1, index and angle zero are aligned with angle commutation zero (see p. 66).
[4] The additional length or total length of a motor-encoder combination can be found on the respective dimensional drawing.

Compatible connector:
Molex 52745-1297, TE 1-1734839-2
Adapter 498157 required for all maxon controllers

Please note: max. continuous current 0.5 A

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 8 MAG Encoder ∅8 mm, 1...256 CPT



Key data		ENX 8 MAG incremental	ENX 8 MAG incremental, commutation signal
Number of channels		3	3
Max. counts per turn		256	256
Additional length at motor	mm	7.0	1.0
Ambient temperature	°C	-40...+100	-40...+100
Weight	g	1	1

Selection criteria	ENX 8 MAG incremental	ENX 8 MAG incremental, commutation signal
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	▲	▲
Cost effective	■	■

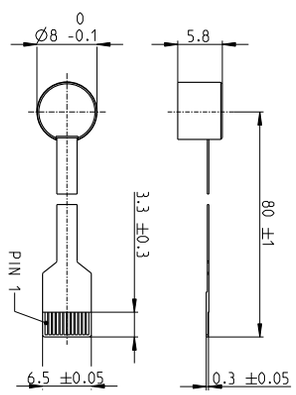
■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		ENX 8 MAG incremental	ENX 8 MAG incremental, commutation signal
Supply voltage V_{cc}	V	3.0...3.6	3.0...3.6
Typical current draw	mA	13	13
Max. operating frequency	kHz	500	500
Max. speed	rpm	100 000	100 000
Connection[3]		FPC, 12 pole, pitch 0.5 mm Pin 1 Motor+ Pin 2 Motor- Pin 3 not connected Pin 4 GND Pin 5 V_{cc} Pin 6 channel A Pin 7 channel B Pin 8 channel I Pin 9-12 do not connect[1] Output signal: CMOS compatible Output current per channel: ±4 mA	FPC, 12 pole, pitch 0.5 mm Pin 1 W1 Pin 2 W2 Pin 3 W3 Pin 4 GND Pin 5 V_{cc} Pin 6 channel A Pin 7 channel B Pin 8 channel I Pin 9 H1 Pin 10 H2 Pin 11 H3 Pin 12 do not connect[1] Output signal: CMOS compatible Output current per channel: ±4 mA

Configuration	ENX 8 MAG incremental	ENX 8 MAG incremental, commutation signal
Counts per turn[2]	1...256	1...256

Modular system	Page
DC motor	
DCX 8 M	98
EC motor	
ECX SPEED 8 M	197–198

Dimensions standard version M 1:1



Notes

[1] Applying voltage to these pins may destroy the encoder.
[2] maxon controllers require a resolution of at least 16 counts per turn.
[3] H1, index and angle zero are aligned with angle commutation zero (see p. 66).

Compatible connector:
Molex 52745-1297, TE 1-1734839-2
Adapter 498157 required for all maxon controllers

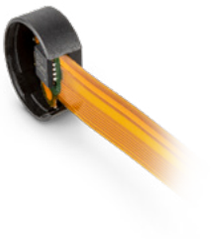
Please note: max. continuous current 0.5 A

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 10 MAG INT Encoder ∅10 mm, 1...256 CPT

Integrated into motor



Key data		ENX 10 MAG INT incremental, commutation signal
Number of channels		3
Max. counts per turn		256
Additional length at motor	mm	0 (integrated into motor)
Ambient temperature	°C	-40...+100
Weight	g	2

Selection criteria	ENX 10 MAG INT incremental, commutation signal
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	▲
Cost effective	■

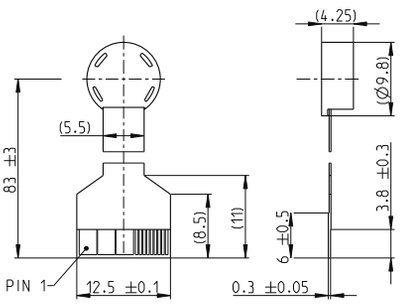
■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		ENX 10 MAG INT incremental, commutation signal
Supply voltage V_{cc}	V	3.3...6.0
Typical current draw	mA	13
Max. operating frequency	kHz	500
Max. speed	rpm	100 000
Connection[3]		FPC Pin 1 W1 Pin 2 W2 Pin 3 W3 Pin 4 GND Pin 5 V_{cc} Pin 6 channel A Pin 7 channel B Pin 8 channel I Pin 9 H1 Pin 10 H2 Pin 11 H3 Pin 12 do not connect[1] Output signal: CMOS compatible Output current per channel: ±4 mA

Configuration	ENX 10 MAG INT incremental, commutation signal
Counts per turn[2]	1...256

Modular system	Page
EC motor	
ECX SPEED 10 M	199
ECX SPEED 10 L	200

Dimensions standard version M 1:1



Notes

[1] Applying voltage to these pins may destroy the encoder.

[2] maxon controllers require a resolution of at least 16 counts per turn.

[3] H1, index and angle zero are aligned with angle commutation zero (see p. 66).

Maximum permissible continuous current in the flexprint cables to W1, W2, W3: 24-pole, 0.5 mm pitch, e.g., Molex 52435-2471

Adapter from flexprint cable to screw terminal, part no.: **804420**

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 10 GAMA Encoder ∅10 mm, 12 CPT

Radiation-resistant

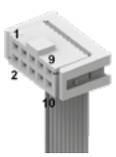


Key data		GAMA incremental
Number of channels		2
Counts per turn[1]		12
Encoder length L[2]	mm	8.0
Ambient temperature	°C	–20... +105
Weight	g	<5

Selection criteria	GAMA incremental
Speed and rotation direction detection	■
Speed and position control	▲
Compact and robust design	■
High resolution	▲
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		GAMA incremental
Supply voltage V_{cc}	V	5 ±0.5
Typical current draw	mA	9.5
Max. operating frequency	kHz	24
Max. speed	rpm	60 000
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 Motor + Pin 2 V_{cc} Pin 3 channel A Pin 4 channel B Pin 5 GND Pin 6 Motor – Pin 7 not connected Pin 8 not connected Pin 9 not connected Pin 10 not connected Output signal: TTL compatible, push-pull Output current per channel: ±10 mA



GAMA radiation resistance

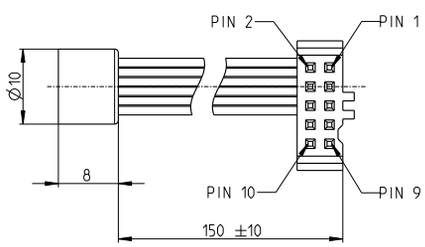
The GAMA encoder type is resistant to ionizing radiation

Tested with a Co60 radiation source (gamma radiation) at up to 18 krad/h and a maximum radiation dose (TID) of 500 krad.

Configurations		GAMA incremental
Connector		6-pin, 10-pin
Cable length	mm	50, 100, 150, 200, 300, 500

Modular system	Page
DC motor	
RE 10, 0.75 W	132
RE 10, 1.5 W	134

Dimensions standard version M 1:1



Notes

[1] maxon controllers require a resolution of at least 16 counts per turn.

[2] The length shown here refers only to the encoder. The additional length when mounted on a motor, or the effective length of a motor/encoder combination, can be found on the respective dimensional drawing.

Maximum permissible cable/plug continuous current: 1.2 A.

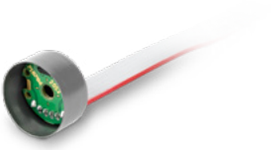
Ordering information: For motors that cannot be configured online, use the part number 714457 when ordering the ENX 10 GAMA.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 13 GAMA Encoder ∅13 mm, 16 CPT

Radiation-resistant



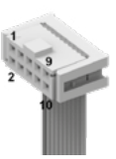
ENX

Key data		GAMA incremental
Number of channels		2
Counts per turn		16
Encoder length L[1]	mm	7.0...9.0
Ambient temperature	°C	–20...+105
Weight	g	<5

Selection criteria	GAMA incremental
Speed and rotation direction detection	■
Speed and position control	▲
Compact and robust design	■
High resolution	▲
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		GAMA incremental
Supply voltage V_{CC}	V	5 ±0.5
Typical current draw	mA	9.5
Max. operating frequency	kHz	24
Max. speed	rpm	60 000
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 Motor + Pin 2 V_{CC} Pin 3 channel A Pin 4 channel B Pin 5 GND Pin 6 Motor – Pin 7 not connected Pin 8 not connected Pin 9 not connected Pin 10 not connected Output signal: TTL compatible, push-pull Output current per channel: ±10 mA



GAMA Radiation resistance

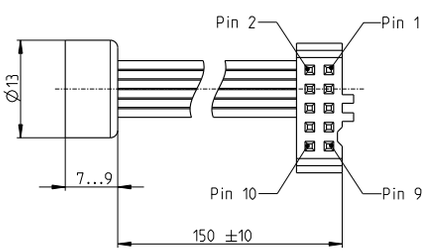
The GAMA encoder type is resistant to ionizing radiation

Tested with a Co60 radiation source (gamma radiation) at up to 18 krad/h and a maximum radiation dose (TID) of 500 krad.

Configurations		GAMA incremental
Connector		6-pin, 10-pin
Cable length	mm	50, 100, 150, 200, 300, 500

Modular system	Page
DC motor	
DC-max 16 S	121–122
DC-max 22 S	123–124
DC-max 26 S	125–126
RE 13	135–150
RE 16	151–155
A-max 16	171–174
A-max 19	175–178
A-max 22	179–182
A-max 26	183–186

Dimensions standard version M 1:1



Notes

[1] The length shown here refers only to the encoder. The additional length when mounted on a motor, or the effective length of a motor/encoder combination, can be found on the respective dimensional drawing.

Maximum permissible cable/plug continuous current: 1.2 A.

Ordering information: For motors that cannot be configured online, use the part number **714445** when ordering the ENX 13 GAMA.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 8 IMR Encoder ∅8 mm, 100 CPT

NEW



Key data		IMR 2 channel differential
Number of channels		2
Max. counts per turn		100
Encoder length L[1]	mm	5.9
Ambient temperature	°C	-20...+85
Weight	g	4

Selection criteria	IMR 2 channel differential
Speed and rotation direction detection	■
Speed and position control	▲
Compact and robust design	■
High resolution	▲
Cost effective	■

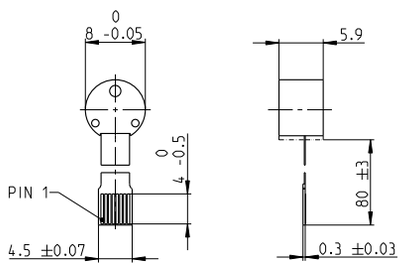
■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		IMR 2 channel differential
Supply voltage V_{CC}	V	5 ±0.5
Typical current draw	mA	10
Max. operating frequency	kHz	100
Max. speed	rpm	60 000
Connector		Flexprint cable FPC 8 pole, pitch 0.5 mm possible matching connector Molex 52745-0897 Pin 1 Motor + Pin 2 V_{CC} Pin 3 GND Pin 4 Motor – Pin 5 channel $\overline{A}$ Pin 6 channel A Pin 7 channel $\overline{B}$ Pin 8 channel B Output signal: EIA-Standard RS 422 Output current per channel: ±20 mA

Variants		IMR 2 channel differential
Part number		870711
Counts per turn		100
Cable length	mm	80

Modular system	Page
DC motor	
RE 8	130

Dimensions standard version M 1:1



Notes

[1]Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

Maximum permissible cable/plug continuous current: 0.5 A.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 10 IMR Encoder ∅10 mm, 64...256 CPT

NEW



ENX

Key data		IMR 2 channel differential
Number of channels		2
Max. counts per turn		256
Encoder length L[1]	mm	5.7
Ambient temperature	°C	-20...+85
Weight	g	5

Selection criteria	IMR 2 channel differential
Speed and rotation direction detection	■
Speed and position control	▲
Compact and robust design	■
High resolution	▲
Cost effective	■

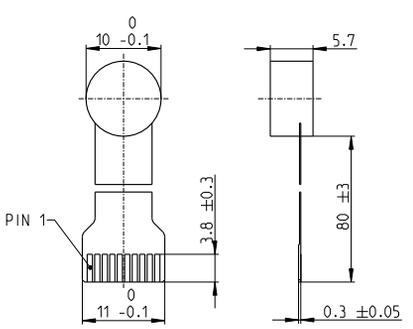
■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		IMR 2 channel differential
Supply voltage V_{CC}	V	5 ±0.5
Typical current draw	mA	10
Max. operating frequency	kHz	320
Max. speed	rpm	75000
Connector		Flexprint cable FPC 10 pole, pitch 1 mm possible matching connector Molex 52207-1033 Pin 1 Motor + Pin 2 V_{CC} Pin 3 GND Pin 4 Motor – Pin 5 channel $\overline{A}$ Pin 6 channel A Pin 7 channel $\overline{B}$ Pin 8 channel B Pin 9 not connected Pin 10 not connected Output signal: EIA-Standard RS 422 Output current per channel: ±20 mA

Variants		IMR 2 channel differential		
Part number		875558	875559	875560
Counts per turn		64	128	256
Cable length	mm	80	80	80

Modular system	Page
DC motor	
RE 10	132/134

Dimensions standard version M 1:1



Notes

[1]Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

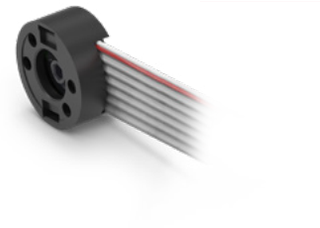
Maximum permissible cable/plug continuous current: 1.0 A.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 13 IMR Encoder ∅13 mm, 64...256 CPT

NEW

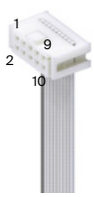


Key data		IMR 2 channel differential	IMR 2 channel single-ended
Number of channels		2	2
Max. counts per turn		256	256
Encoder length L[1]	mm	5.8	5.8
Ambient temperature	°C	-20...+85	-20...+85
Weight	g	6	7

Selection criteria	IMR 2 channel differential	IMR 2 channel single-ended
Speed and rotation direction detection	■	■
Speed and position control	▲	▲
Compact and robust design	■	■
High resolution	▲	▲
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		IMR 2 channel differential	IMR 2 channel single-ended
Supply voltage V_{CC}	V	5 ±0.5	5 ±0.5
Typical current draw	mA	10	10
Max. operating frequency	kHz	320	320
Max. speed	rpm	75 000	75 000
Connector		Flexprint cable FPC 10 pole, pitch 1 mm possible matching connector Molex 52207-1033 Pin 1 Motor + Pin 2 V_{CC} Pin 3 GND Pin 4 Motor – Pin 5 channel $\overline{A}$ Pin 6 channel A Pin 7 channel $\overline{B}$ Pin 8 channel B Pin 9 not connected Pin 10 not connected Output signal: EIA-Standard RS 422 Output current per channel: ±20 mA	10 pole 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 Motor + Pin 2 V_{CC} Pin 3 channel A Pin 4 channel B Pin 5 GND Pin 6 Motor - Pin 7 not connected Pin 8 not connected Pin 9 not connected Pin 10 not connected Output signal: CMOS compatible Output current per channel: ±5 mA



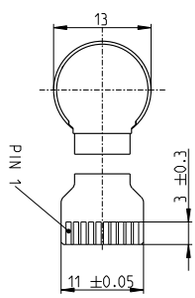
Variants		IMR 2 channel differential			IMR 2 channel single-ended		
Part number		870700	870701	870702	870696	870697	870699
Counts per turn		64	128	256	64	128	256
Cable length	mm	80	80	80	156	156	156

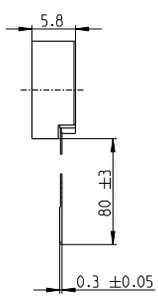
Modular system	Page	IMR 2 channel differential	IMR 2 channel single-ended	M 1:1
DC motor				
RE 13	137–150			

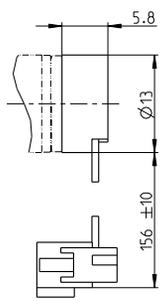
Notes

[1]Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

Maximum permissible cable/plug continuous current: 1.0 A.







Further technical details can be found in the product information in the online shop under Downloads.

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ENX 16 IMR Encoder ∅16 mm, 128...512 CPT

NEW

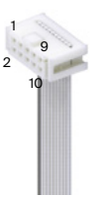


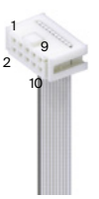
Key data		IMR 2-channel differential	IMR 3-channel differential
Number of channels		2	3
Max. counts per turn		512	512
Encoder length L[1]	mm	6.2...6.8	6.2...6.8
Ambient temperature	°C	-20...+85	-20...+85
Weight	g	7	7

Selection criteria	IMR 2-channel differential	IMR 3-channel differential
Speed and rotation direction detection	■	■
Speed and position control	▲	■
Compact and robust design	■	■
High resolution	▲	▲
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		IMR 2-channel differential	IMR 3-channel differential
Supply voltage V_{CC}	V	5 ±0.5	5 ±0.5
Typical current draw	mA	10	13
Max. operating frequency	kHz	320	320
Max. speed	rpm	37500	37500
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)
		Pin 1 Motor +	Pin 1 Motor +
		Pin 2 V_{CC}	Pin 2 V_{CC}
		Pin 3 GND	Pin 3 GND
		Pin 4 Motor –	Pin 4 Motor –
		Pin 5 channel $\overline{A}$	Pin 5 channel $\overline{A}$
		Pin 6 channel A	Pin 6 channel A
		Pin 7 channel $\overline{B}$	Pin 7 channel $\overline{B}$
		Pin 8 channel B	Pin 8 channel B
		Pin 9 not connected	Pin 9 channel $\overline{I}$
		Pin 10 not connected	Pin 10 channel I
		Output signal: EIA-Standard RS 422	Output signal: EIA-Standard RS 422
		Output current per channel: ±20 mA	Output current per channel: ±20 mA

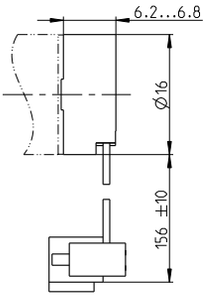




Variants		IMR 2-channel differential			IMR 3-channel differential		
Part number		870682	870685	870686	870688	870690	870691
Counts per turn		128	256	512	128	256	512
Cable length	mm	156	156	156	156	156	156

Modular system	Page
DC motor	
DC-max 16[2]	121–122
RE 16	151–155
A-max 16	171–174

Dimensions standard version M 1:1



Notes

[1]Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

[2]Can be ordered with DC-max as configurable units. Resolution and cable length can be configured.

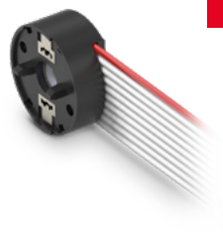
Maximum permissible cable/plug continuous current: 1.2 A.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 19 IMR Encoder ∅19 mm, 128...512 CPT

NEW

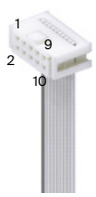


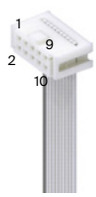
Key data		IMR 2-channel differential	IMR 3-channel differential
Number of channels		2	3
Max. counts per turn		512	512
Encoder length L[1]	mm	6.8	6.8
Ambient temperature	°C	-20...+85	-20...+85
Weight	g	8	8

Selection criteria	IMR 2-channel differential	IMR 3-channel differential
Speed and rotation direction detection	■	■
Speed and position control	▲	■
Compact and robust design	■	■
High resolution	▲	▲
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		IMR 2-channel differential	IMR 3-channel differential
Supply voltage V_{CC}	V	5 ±0.5	5 ±0.5
Typical current draw	mA	10	13
Max. operating frequency	kHz	320	320
Max. speed	rpm	37500	37500
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)
		Pin 1 Motor +	Pin 1 Motor +
		Pin 2 V_{CC}	Pin 2 V_{CC}
		Pin 3 GND	Pin 3 GND
		Pin 4 Motor –	Pin 4 Motor –
		Pin 5 channel $\overline{A}$	Pin 5 channel $\overline{A}$
		Pin 6 channel A	Pin 6 channel A
		Pin 7 channel $\overline{B}$	Pin 7 channel $\overline{B}$
		Pin 8 channel B	Pin 8 channel B
		Pin 9 not connected	Pin 9 channel $\overline{I}$
		Pin 10 not connected	Pin 10 channel I
		Output signal: EIA-Standard RS 422	Output signal: EIA-Standard RS 422
		Output current per channel: ±20 mA	Output current per channel: ±20 mA

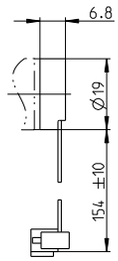




Variants		IMR 2-channel differential			IMR 3-channel differential		
Part number		875504	875505	875506	875511	875512	875513
Counts per turn		128	256	512	128	256	512
Cable length	mm	154	154	154	154	154	154

Modular system	Page
DC motor	
A-max 19	175–178

Dimensions standard version M 1:2



Notes

[1]Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

Maximum permissible cable/plug continuous current: 1.2 A.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 22 IMR Encoder ∅22 mm, 128...512 CPT

NEW



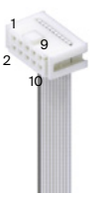
ENX

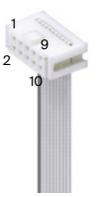
Key data		IMR 2-channel differential	IMR 3-channel differential
Number of channels		2	3
Max. counts per turn		512	512
Encoder length L[1]	mm	6.3	6.3
Ambient temperature	°C	-20...+85	-20...+85
Weight	g	9	9

Selection criteria	IMR 2-channel differential	IMR 3-channel differential
Speed and rotation direction detection	■	■
Speed and position control	▲	■
Compact and robust design	■	■
High resolution	▲	▲
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		IMR 2-channel differential	IMR 3-channel differential
Supply voltage V_{CC}	V	5 ±0.5	5 ±0.5
Typical current draw	mA	10	13
Max. operating frequency	kHz	320	320
Max. speed	rpm	37500	37500
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)
		Pin 1 Motor +	Pin 1 Motor +
		Pin 2 V_{CC}	Pin 2 V_{CC}
		Pin 3 GND	Pin 3 GND
		Pin 4 Motor –	Pin 4 Motor –
		Pin 5 channel $\overline{A}$	Pin 5 channel $\overline{A}$
		Pin 6 channel A	Pin 6 channel A
		Pin 7 channel $\overline{B}$	Pin 7 channel $\overline{B}$
		Pin 8 channel B	Pin 8 channel B
		Pin 9 not connected	Pin 9 channel $\overline{I}$
		Pin 10 not connected	Pin 10 channel I
		Output signal: EIA-Standard RS 422	Output signal: EIA-Standard RS 422
		Output current per channel: ±20 mA	Output current per channel: ±20 mA

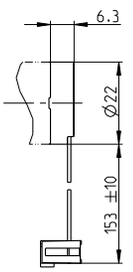




Variants		IMR 2-channel differential			IMR 3-channel differential		
Part number		875509	875515	875516	875518	875519	875520
Counts per turn		128	256	512	128	256	512
Cable length	mm	153	153	153	153	153	153

Modular system	Page
DC motor	
DC-max 22[2]	123–124
A-max 22	179–182

Dimensions standard version M 1:2



Notes

[1]Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

[2]Can be ordered with DC-max as configurable units. Resolution and cable length can be configured.

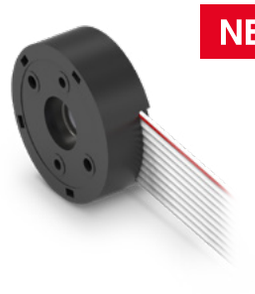
Maximum permissible cable/plug continuous current: 1.2 A.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 25 IMR Encoder ∅25 mm, 128...1000 CPT

NEW

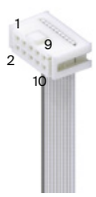


Key data		IMR 3-channel differential
Number of channels		3
Max. counts per turn		1000
Encoder length L[1]	mm	8.5
Ambient temperature	°C	-20...+85
Weight	g	10

Selection criteria	IMR 3-channel differential
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	▲
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

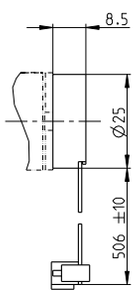
Specifications		IMR 3-channel differential
Supply voltage V_{CC}	V	5 ±0.5
Typical current draw	mA	13
Max. operating frequency	kHz	400
Max. speed	rpm	24 000
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 not connected Pin 2 V_{CC} Pin 3 GND Pin 4 not connected Pin 5 channel $\overline{A}$ Pin 6 channel A Pin 7 channel $\overline{B}$ Pin 8 channel B Pin 9 channel $\overline{I}$ Pin 10 channel I Output signal: EIA-Standard RS 422 Output current per channel: ±20 mA



Variants		IMR 3-channel differential				
Part number		870712	870713	870715	870714	870716
Counts per turn		128	256	500	512	1000
Cable length	mm	506	506	506	506	506

Modular system	Page
DC motor	
RE 25	156–158
A-max 26	183–186

Dimensions standard version M 1:2



Notes

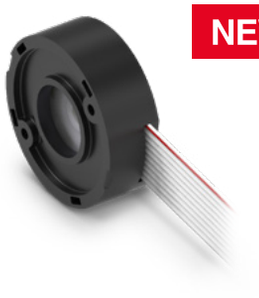
[1]Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 32 IMR Encoder ∅32 mm, 256...1024 CPT

NEW

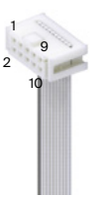


Key data		IMR 3-channel differential
Number of channels		3
Max. counts per turn		1024
Encoder length L[1]	mm	11
Ambient temperature	°C	-20...+85
Weight	g	12

Selection criteria	IMR 3-channel differential
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	▲
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

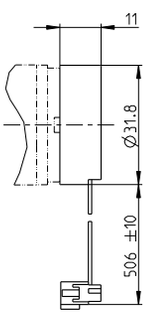
Specifications		IMR 3-channel differential
Supply voltage V_{CC}	V	5 ±0.5
Typical current draw	mA	13
Max. operating frequency	kHz	320
Max. speed	rpm	18750
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 not connected Pin 2 V_{CC} Pin 3 GND Pin 4 not connected Pin 5 channel $\overline{A}$ Pin 6 channel A Pin 7 channel $\overline{B}$ Pin 8 channel B Pin 9 channel $\overline{I}$ Pin 10 channel I Output signal: EIA-Standard RS 422 Output current per channel: ±20 mA



Variants		IMR 3-channel differential				
Part number		870722	870725	870723	870726	870724
Counts per turn		256	500	512	1000	1024
Cable length	mm	506	506	506	506	506

Modular system	Page
DC motor	
RE 30	159–160
RE 35	161
RE 40	162–163
A-max 32	187–188

Dimensions standard version M 1:2



Notes

[1]Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 10 EASY / QUAD Encoder ∅10 mm, 1...1024 CPT

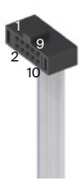


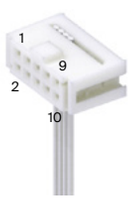
Key data		EASY incremental differential	QUAD incremental
Number of channels		3	2
Max. counts per turn		1024	1
Encoder length L[4]	mm	8.5	9.0
Ambient temperature	°C	-40...+100	-40...+100
Weight	g	<5	<5

Selection criteria	EASY incremental differential	QUAD incremental
Speed and rotation direction detection	■	■
Speed and position control	■	●
Compact and robust design	■	■
High resolution	■	●
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		EASY incremental differential	QUAD incremental
Supply voltage Vcc	V	5 ±0.5	3.3 – 24
Typical current draw	mA	22	5.5
Max. operating frequency	kHz	1600	2
Max. speed	rpm	30 000	30 000
Connector		10-pin 1.27 mm multipoint connector e.g. Samtec FFSD series Pin 1 do not connect[1] (BiSS-C Data) Pin 2 V_{cc} Pin 3 GND Pin 4 do not connect[1] (BiSS-C CLK) Pin 5 channel $\overline{A}$ Pin 6 channel A Pin 7 channel $\overline{B}$ Pin 8 channel B Pin 9 channel $\overline{I}$ Pin 10 channel I Output signal: EIA-Standard RS 422 Output current per channel: ±20 mA	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 not connected Pin 2 V_{cc} Pin 3 channel A Pin 4 channel B Pin 5 GND Pin 6 not connected Pin 7 not connected Pin 8 not connected Pin 9 not connected Pin 10 not connected Output signal: TTL compatible Output current per channel: +10 mA

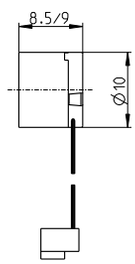




Configuration		EASY incremental differential	QUAD incremental
Counts per turn[2]		1...1024	1
Electrical connection		Flat band cable / flexible cable FFC[3]	Connector 6-pin, 10-pin
Cable length	mm	50, 100, 150, 200, 300, 500, 1000 / FFC[3]: 138 mm	50, 100, 150, 200, 300, 500, 1000
Alignment of cable outlet in relation to motor flange	°	15	15

Modular system			Page
DC motor		**EC motor**	
DCX 10 S	99	ECX PRIME 16 M	236
DCX 10 L	100	ECX PRIME 16 L[6]	237
DCX 12 S	101		
DCX 12 L	102		
DCX 14 L	103–104		
DCX 16 S	105–106		
DCX 16 L	107–108		
DCX 19 S	109–110		
DCX 22 S	111–112		
DCX 22 L	113–114		
DCX 26 L	115–116		
DCX 32 L	117		
DCX 35 L	118		
DC-max 16 S	121		
DC-max 22 S	123		
DC-max 26 S[5]	125–126		

Dimensions standard configuration M 1:1



Notes

[1] Applying voltage to these pins can destroy the encoder.
[2] maxon controllers require a resolution of at least 16 counts per turn.
[3] FFC cable: 0.5 mm pitch, possible matching connector Molex 52745-1097; adapter 506579 required for maxon controllers.
[4] For attachment to DCX motors: plus 2-4 mm thick intermediate plate.
[5] No combination with 10 EASY, see page 42.
[6] No combination with 10 QUAD, see page 46.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 10 EASY XT Encoder ∅10 mm, 1...1024 CPT

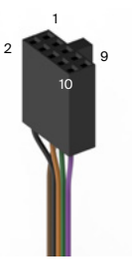


Key data		EASY incremental single-ended
Number of channels		3
Max. counts per turn		1024
Encoder length L[2]	mm	8.5
Ambient temperature	°C	-55...+125
Weight	g	<5

Selection criteria	EASY incremental single-ended
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	▲

■ suitable ▲ suitable to a limited extent ● not suitable

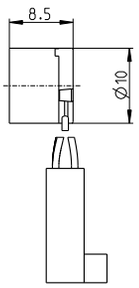
Specifications		EASY incremental single-ended
Supply voltage V_{cc}	V	5 ±0.5
Typical current draw	mA	22
Max. operating frequency	kHz	1600
Max. speed	rpm	30 000
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 not connected Pin 2 V_{cc} Pin 3 GND Pin 4 not connected Pin 5 not connected Pin 6 channel A Pin 7 not connected Pin 8 channel B Pin 9 not connected Pin 10 channel I Output signal: TTL compatible Output current per channel: +10 mA



Configuration		EASY incremental single-ended
Counts per turn[1]		1...024
Cable length	mm	300
Alignment of cable outlet in relation to motor flange	°	15

Modular system			Page
DC motor		**EC motor**	
DCX 10 S	99	ECX PRIME 16 M	236
DCX 10 L	100	ECX PRIME 16 L	237
DCX 12 S	101		
DCX 12 L	102		
DCX 14 L	103–104		
DCX 16 S	105–106		
DCX 16 L	107–108		
DCX 19 S	109–110		
DCX 22 S	111–112		
DCX 22 L	113–114		
DCX 26 L	115–116		
DCX 32 L	117		
DCX 35 L	118		

Dimensions standard configuration M 1:1



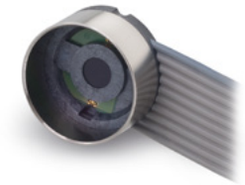
Notes

[1] maxon controllers require a resolution of at least 16 counts per turn.
[2] For attachment to DCX motors: plus 2-4 mm thick intermediate plate.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 16 EASY Encoder ∅16 mm, 1...1024 CPT

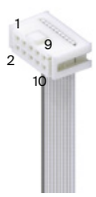


Key data		EASY incremental differential
Number of channels		3
Max. counts per turn		1024
Encoder length L[2]	mm	8.5
Ambient temperature	°C	–40...+100
Weight	g	7

Selection criteria	EASY incremental differential
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		EASY incremental differential
Supply voltage V_{CC}	V	5 ±0.5
Typical current draw	mA	22
Max. operating frequency	kHz	1600
Max. speed	rpm	30 000
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 not connected Pin 2 V_{CC} Pin 3 GND Pin 4 not connected Pin 5 channel $\overline{A}$ Pin 6 channel A Pin 7 channel $\overline{B}$ Pin 8 channel B Pin 9 channel $\overline{I}$ Pin 10 channel I Output signal: EIA-Standard RS 422 Output current per channel: ±20 mA

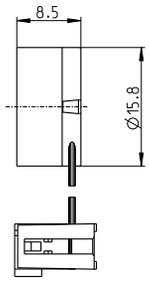


Variants	for configurable units	non-configurable units					
Part number	depends on configuration	499356	499357	499358	499359	499360	499361
Counts per turn[1]	1...1024	128	256	500	512	1000	1024
Cable length mm	50, 100, 150, 200, 300, 500, 1000	300	300	300	300	300	300
Alignment of cable outlet in relation to motor flange °	15 (pitch)	0	0	0	0	0	0

Modular system

DC motor	Page	EC motor	Page
DCX 16 S	105–106	EC-max 16	279/281
DCX 16 L	107–108	EC-max 22	282–283
DCX 19 S	109–110	EC-max 30	284–285
DCX 22 S	111–112	EC-max 40	286–287
DCX 22 L	113–114	EC-4pole 22	291–292
DCX 26 L	115–116	EC-4pole 30	293/295
DCX 32 L	117	EC-i 30	302–305
DCX 35 L	118	EC-i 40	306–311
DC-max 26 S	125–126	EC-i 52	312–315
		ECX PRIME 16 M	236
		ECX PRIME 16 L	237
		ECX PRIME 22 L	239

Dimensions standard version M 1:1



Notes

[1] maxon controllers require a resolution of at least 16 counts per turn.

[2] Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 16 EASY XT Encoder ∅16 mm, 1...1024 CPT

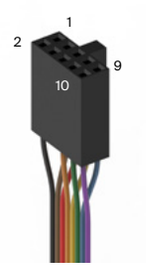


Key data		EASY incremental differential
Number of channels		3
Max. counts per turn		1024
Encoder length L[2]	mm	8.5
Ambient temperature	°C	–55...+125
Weight	g	7

Selection criteria	EASY incremental differential
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	▲

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		EASY incremental differential
Supply voltage V_{CC}	V	5 ±0.5
Typical current draw	mA	22
Max. operating frequency	kHz	1600
Max. speed	rpm	30 000
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 not connected Pin 2 V_{CC} Pin 3 GND Pin 4 not connected Pin 5 channel $\overline{A}$ Pin 6 channel A Pin 7 channel $\overline{B}$ Pin 8 channel B Pin 9 channel $\overline{I}$ Pin 10 channel I Output signal: EIA-Standard RS 422 Output current per channel: ±20 mA

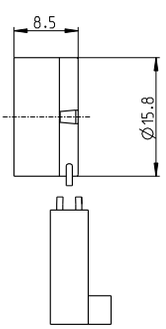


Variants	for configurable units	non-configurable units					
Part number	depends on configuration	584776	606052	577614	542079	577671	530965
Counts per turn[1]	1...1024	128	256	500	512	1000	1024
Cable length mm	500, 1000, 1500	500	500	500	500	500	500
Alignment of cable outlet in relation to motor flange °	15 (pitch)	0	0	0	0	0	0

Modular system

DC motor	Page	EC motor	Page
DCX 16 S	105–106	EC-max 16	279/281
DCX 16 L	107–108	EC-max 22	282–283
DCX 19 S	109–110	EC-max 30	284–285
DCX 22 S	111–112	EC-max 40	286–287
DCX 22 L	113–114	EC-4pole 22	291–292
DCX 26 L	115–116	EC-4pole 30	293/295
DCX 32 L	117	EC-i 30	302–305
DCX 35 L	118	EC-i 40	306–311
		EC-i 52	312–315
		ECX PRIME 16 M	236
		ECX PRIME 16 L	237
		ECX PRIME 22 L	239

Dimensions standard version M 1:1



Notes

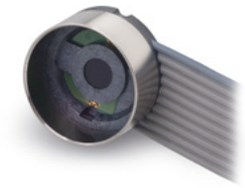
[1] maxon controllers require a resolution of at least 16 counts per turn.

[2] Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 16 EASY Absolute Encoder ∅16 mm, 4096 steps, Single Turn

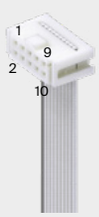


Key data		EASY absolute
Steps per turn		4096
Resolution (bit single turn)		12
Encoder length L[1]	mm	8.5
Ambient temperature	°C	–40...+100
Weight	g	7

Selection criteria	EASY absolute
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		EASY absolute
Supply voltage V_{CC}	V	5 ±0.5
Typical current draw	mA	17
Max. speed	rpm	25 000
Connector		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 Data Pin 2 V_{CC} Pin 3 GND Pin 4 CLK Pin 5 do not connect[2] ($\overline{A}$) Pin 6 do not connect[2] (A) Pin 7 do not connect[2] ($\overline{B}$) Pin 8 do not connect[2] (B) Pin 9 do not connect[2] ($\overline{I}$) Pin 10 do not connect[2] (I) Output signal: CMOS compatible Output current per channel +20 mA

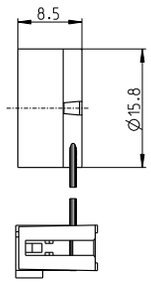


Variants		for configurable units	non-configurable units	
Part number		depending on configuration	488783	488782
Signal protocol		BiSS-C, SSI	BiSS-C	SSI
Cable length	mm	50, 100, 150, 200, 300, 500, 1000	300	300
Alignment of cable outlet in relation to motor flange	°	15 (pitch)	0	0

Modular system

DC motor	Page	EC motor	Page
DCX 16 S	105–106	EC-max 16	279/281
DCX 16 L	107–108	EC-max 22	282–283
DCX 19 S	109–110	EC-max 30	284–285
DCX 22 S	111–112	EC-max 40	286–287
DCX 22 L	113–114	EC-4pole 22	291–292
DCX 26 L	115–116	EC-4pole 30	293/295
DCX 32 L	117	EC-i 30	302–305
DCX 35 L	118	EC-i 40	306–311
DC-max 26 S	125–126	EC-i 52	312–315
		ECX PRIME 16 M	236
		ECX PRIME 16 L	237
		ECX PRIME 22 L	239

Dimensions standard version M 1:1



Notes

Adapter EASY Absolute 488167 (required for all maxon controllers).

[1] Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

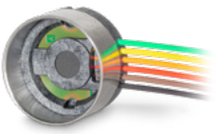
[2] Applying voltage to these pins may destroy the encoder.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 16 EASY Absolute XT Encoder ∅16 mm, 4096 steps, Single Turn

ENX

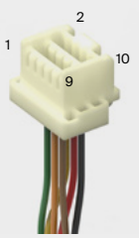


Key data		EASY absolute differential
Steps per turn		4096
Resolution (bit single turn)		12
Encoder length L[1]	mm	9.0
Ambient temperature	°C	–55...+125
Weight	g	7

Selection criteria	EASY absolute differential
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	▲

■ suitable ▲ suitable to a limited extent ● not suitable

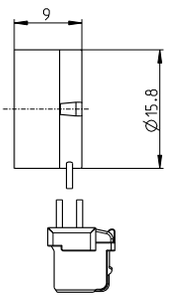
Specifications		EASY absolute differential
Supply voltage V_{CC}	V	5 ±0.25
Typical current draw	mA	22
Max. speed	rpm	30 000
Connector		10-pin 1.5 mm multipoint connector Molex Clik-Mate (503149) Pin 1 not connected Pin 2 not connected Pin 3 not connected Pin 4 not connected Pin 5 CLK Pin 6 CLK\ Pin 7 Data Pin 8 Data\ Pin 9 GND Pin 10 V_{CC} Output signal: EIA-Standard RS 422 Output current per channel: ±20 mA



Variants	for configurable units	non-configurable units	
Part number	depends on configuration	588632	588631
Signal protocol	BiSS-C, SSI	BiSS-C	SSI
Cable length mm	500, 1000	500	500
Alignment of cable outlet in relation to motor flange °	15 (pitch)	0	0

Modular system			
DC motor		**EC motor**	Page
DCX 16 S	105–106	EC-max 16	279/281
DCX 16 L	107–108	EC-max 22	282–283
DCX 19 S	109–110	EC-max 30	284–285
DCX 22 S	111–112	EC-max 40	286–287
DCX 22 L	113–114	EC-4pole 22	291–292
DCX 26 L	115–116	EC-4pole 30	293/295
DCX 32 L	117	EC-i 30	302–305
DCX 35 L	118	EC-i 40	306–311
		EC-i 52	312–315
		ECX PRIME 16 M	236
		ECX PRIME 16 L	237
		ECX PRIME 22 L	239

Dimensions standard version M 1:1



Notes

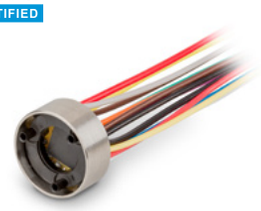
[1] Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 13 EASY INT Encoder ∅13 mm, 1...1024 CPT / 4096 steps, Single Turn

Sterilizable, integrated into motor



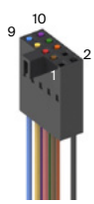
Key data		EASY incremental differential	EASY Absolute
Number of channels		3	
Max. counts per turn		1024	
Steps per turn			4096
Resolution (bit single turn)			12
Encoder length L	mm	0 (integrated into motor)	0 (integrated into motor)
Ambient temperature	°C	-40...+125	-40...+125
Weight	g	<5	<5

Selection criteria	EASY incremental differential	EASY Absolute
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	■	■
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		EASY incremental differential	EASY Absolute
Supply voltage V_{cc}	V	5 ±0.5	5 ±0.5
Typical current draw	mA	22	22
Max. operating frequency	kHz	4000	
Max. speed	rpm	200 000	200 000
Connector[2]		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN 41651) cable AWG 28	without connector

Pin 1 not connected
Pin 2 (black) V_{cc}
Pin 3 (brown) GND
Pin 4 not connected
Pin 5 (red) channel $\overline{A}$
Pin 6 (orange) channel A
Pin 7 (yellow) channel $\overline{B}$
Pin 8 (green) channel B
Pin 9 (blue) channel $\overline{I}$
Pin 10 (violet) channel I



Output signal: EIA-Standard RS 422
Output current per channel: ±20 mA

cable AWG 28
green Data
black V_{cc}
brown GND
yellow CLK



Output signal: CMOS compatible
Output current per channel: +20 mA

Configuration		EASY incremental differential	EASY Absolute
Counts per turn[1]		1...1024	
Signal protocol			BiSS-C, SSI
Cable length	mm	200, 500	200, 500
Electric connection			cable length/pin connection/connector

Modular system	Page
EC motor	
ECX SPEED 13 M	201–204
ECX SPEED 13 L	205–208

Sterilization information

135°C SS

Typically 1000 autoclave cycles

Sterilization with steam

Temperature	+134 ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

The connector is not sterilizable and needs to be removed first.

Notes

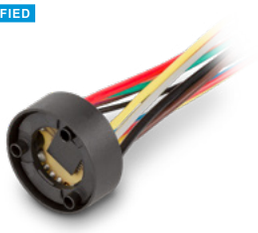
[1] maxon controllers require a resolution of at least 16 counts per turn and commutation signals.
[2] H1, index and angle zero are aligned with angle commutation zero (see p. 66).

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 16 EASY INT Encoder ∅16 mm, 1...1024 CPT / 4096 steps, Single Turn

Sterilizable, integrated into motor



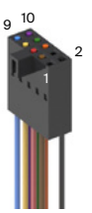
Key data		EASY incremental differential	EASY Absolute
Number of channels		3	
Max. counts per turn		1024	
Steps per turn			4096
Resolution (bit single turn)			12
Encoder length L	mm	-1 (integrated into motor)	-1 (integrated into motor)
Ambient temperature	°C	-40...+125	-40...+125
Weight	g	<5	<5

Selection criteria	EASY incremental differential	EASY Absolute
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	■	■
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		EASY incremental differential	EASY Absolute
Supply voltage Vcc	V	5 ±0.5	5 ±0.5
Typical current draw	mA	22	22
Max. operating frequency	kHz	4000	
Max. speed	rpm	200 000	200 000
Connector[2]		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) cable AWG 28	without connector

Pin 1 not connected
Pin 2 (black) V_{cc}
Pin 3 (brown) GND
Pin 4 not connected
Pin 5 (red) channel $\overline{A}$
Pin 6 (orange) channel A
Pin 7 (yellow) channel $\overline{B}$
Pin 8 (green) channel B
Pin 9 (blue) channel $\overline{I}$
Pin 10 (violet) channel I
Output signal: EIA-Standard RS 422
Output current per channel: ±20 mA



cable AWG 28
green Data
black V_{cc}
brown GND
yellow CLK
Output signal: CMOS compatible
Output current per channel +20 mA



Configuration		EASY incremental differential	EASY Absolute
Counts per turn[1]		1...1024	
Signalprotokoll			BiSS-C, SSI
Cable length	mm	200, 500	200, 500
Electric connection			cable length/pin connection/connector

Modular system	Page
EC motor	
ECX SPEED 16 M	209–212
ECX SPEED 16 L	213–216

Sterilization information

135°C SSS

Typically 1000 autoclave cycles

Sterilization with steam

Temperature	+134 ±4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

The connector is not sterilizable and needs to be removed first.

Notes

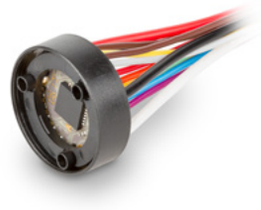
[1] maxon controllers require a resolution of at least 16 counts per turn and commutation signals.
[2] H1, index and angle zero are aligned with angle commutation zero (see p. 66).

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 19 EASY INT Encoder ∅19 mm, 1...1024 CPT / 4096 steps, Single Turn

Sterilizable, integrated into motor

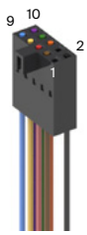


Key data		EASY incremental differential	EASY Absolute
Number of channels		3	
Max. counts per turn		1024	
Steps per turn			4096
Resolution (bit single turn)			12
Encoder length L	mm	-1.4 (integrated into motor)	-1.4 (integrated into motor)
Ambient temperature	°C	-40...+125	-40...+125
Weight	g	<5	<5

Selection criteria	EASY incremental differential	EASY Absolute
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	■	■
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		EASY incremental differential	EASY Absolute
Supply voltage V_{cc}	V	5 ±0.5	5 ±0.5
Typical current draw	mA	22	22
Max. operating frequency	kHz	4000	
Max. speed	rpm	200 000	200 000
Connector[2]		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) cable AWG 26 Pin 1 not connected Pin 2 (black) V_{cc} Pin 3 (brown) GND Pin 4 not connected Pin 5 (red) channel $\overline{A}$ Pin 6 (orange) channel A Pin 7 (yellow) channel $\overline{B}$ Pin 8 (green) channel B Pin 9 (blue) channel $\overline{I}$ Pin 10 (violet) channel I Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA	without connector cable AWG 26 green Data black V_{cc} brown GND yellow CLK Output signal: CMOS compatible Output current per channel + 20 mA





Configuration		EASY incremental differential	EASY Absolute
Counts per turn[1]		1...1024	
Signalprotokoll			BiSS-C, SSI
Cable length	mm	200, 500	200, 500
Electric connection			cable length/pin connection/connector

Modular system	Page
EC motor	
ECX SPEED 19 M	217–220
ECX SPEED 19 L	221–224

Sterilization information

135°C SSS

Typically 1000 autoclave cycles

Sterilization with steam

Temperature	+134 ± 4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

The connector is not sterilizable and needs to be removed first.

Notes

[1] maxon controllers require a resolution of at least 16 counts per turn and commutation signals.

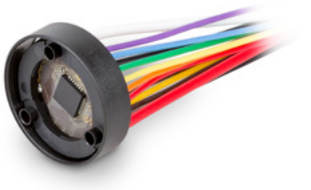
[2] H1, index and angle zero are aligned with angle commutation zero (see p. 66).

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 22 EASY INT Encoder ∅22 mm, 1...1024 CPT / 4096 steps, Single Turn

Sterilizable, integrated into motor

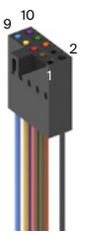


Key data		EASY incremental differential	EASY Absolute
Number of channels		3	
Max. counts per turn		1024	
Steps per turn			4096
Resolution (bit single turn)			12
Encoder length L	mm	-1.5 (integrated into motor)	-1.5 (integrated into motor)
Ambient temperature	°C	-40...+125	-40...+125
Weight	g	<5	<5

Selection criteria	EASY incremental differential	EASY Absolute
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	■	■
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		EASY incremental differential	EASY Absolute
Supply voltage V_{cc}	V	5 ±0.5	5 ±0.5
Typical current draw	mA	22	22
Max. operating frequency	kHz	4000	
Max. speed	rpm	200 000	200 000
Connector[2]		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) cable AWG 26 Pin 1 not connected Pin 2 (black) V_{cc} Pin 3 (brown) GND Pin 4 not connected Pin 5 (red) channel $\overline{A}$ Pin 6 (orange) channel A Pin 7 (yellow) channel $\overline{B}$ Pin 8 (green) channel B Pin 9 (blue) channel $\overline{I}$ Pin 10 (violet) channel I Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA	without connector cable AWG 26 green Data black V_{cc} brown GND yellow CLK Output signal: CMOS compatible Output current per channel + 20 mA





Configuration		EASY incremental differential	EASY Absolute
Counts per turn[1]		1...1024	
Signal protocol			BiSS-C, SSI
Cable length	mm	200, 500	200, 500
Electric connection			cable length/pin connection/connector

Modular system	Page
EC motor	
ECX SPEED 22 M	225–228
ECX SPEED 22 L	229–232
ECX TORQUE 22 M	243
ECX TORQUE 22 L	244
ECX TORQUE 22 XL	245

Sterilization information

135°C SSS

Typically 1000 autoclave cycles

Sterilization with steam

Temperature	+134 ± 4 °C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 minutes

The connector is not sterilizable and needs to be removed first.

Notes

[1] maxon controllers require a resolution of at least 16 counts per turn and commutation signals.

[2] H1, index and angle zero are aligned with angle commutation zero (see p. 66).

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 22 EASY INT Encoder ∅22 mm, 1024 CPT / 4096 steps, Single Turn

Integrated into motor

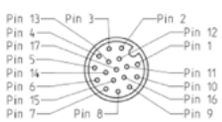


Key data		EASY incremental and absolute
Number of channels		3
Counts per turn		1024
Steps per turn		4096
Resolution (bit single turn)		12
Encoder length L	mm	0 (integrated into motor)
Ambient temperature	°C	-40...+125

Selection criteria	EASY incremental and absolute
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		EASY incremental and absolute
Supply voltage V_{cc}	V	5 ±0.5
Typical current draw	mA	22
Max. operating frequency	kHz	4000
Max. speed	rpm	200 000
Connector[1] M12, male, A-coded		Pin 1 GND (ground) Pin 2 Motor NTC Pin 3 $+V_{CC}$ Pin 4 channel A Pin 5 channel $\bar{I}$ Pin 6 channel $\bar{A}$ Pin 7 channel $\bar{B}$ Pin 8 channel I Pin 9 Motor NTC Pin 10 channel B Pin 11 Data_out- Pin 12 Data_out Pin 13 CLK_in Pin 14 CLK_in- Pin 15 Hall 3 Pin 16 Hall 1 Pin 17 Hall 2



Output signal: EIA-Standard RS 422
Output current per channel: ± 20 mA

Configuration	EASY incremental and absolute
Signal protocol	BiSS-C, SSI

Modular system	Page
EC motor	
IDX 56	249–251
IDX 70	252–254

Notes

[1]Connecting cables available in Online Configurator.

Further technical details can be found in the product information in the online shop under Downloads.

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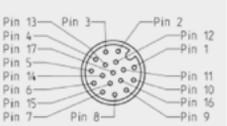
ENX 22 EMT Encoder ∅22 mm, 65 536 turns, Multi Turn 131 072 steps, Single Turn



Key data		EMT absolute differential
Multi-turn: max. no. of turns		65 536
Multi-turn: resolution	bits	16
Single-turn: steps per turns		131 072
Single-turn: resolution	bits	17
Encoder length L[1]	mm	22.7
Ambient temperature	°C	-40...+105
Weight	g	25

Selection criteria	EMT absolute differential
Multi-turn detection	■
Detection of speed and rotation direction	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Economical	▲

■ suitable ▲ suitable to a limited extent ● not suitable

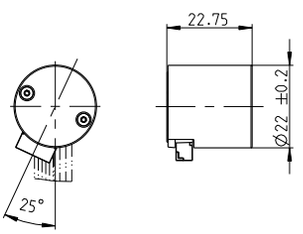
Specifications		EMT for DCX, EC-4pole, ECX PRIME and EC-i		EMT integrated into IDX	
Supply voltage V_{CC}	V	5 ±0.5		5 ±0.5	
Typical current draw	mA	90		90	
Max. speed	rpm	12 000		12 000	
Data encoding		Binary		Binary	
Min. clock frequency CLK	MHz	BiSS-C: 0.08	SSI: 0.3	BiSS-C: 0.08	SSI: 0.3
Max. clock frequency CLK	MHz	BiSS-C: 5	SSI: 1	BiSS-C: 5	SSI: 1
Timeout	µs	BiSS-C: 18	SSI: 7	BiSS-C: 18	SSI: 7
Setup time after Power On	s	Max. 0.1		Max. 0.1	
Moment of inertia of pulse disk	gcm²	≤1.55		≤1.55	
Plug manufacturer JST Plug type no. BM08B-NSHSS -TBT Matching connector type no. NSHR-08V-S		Pin 1 GND Pin 2 do not connect Pin 3 do not connect Pin 4 Data+ / SLO+ Pin 5 Data- / SLO- Pin 6 CLK- / MA- Pin 7 CLK+ / MA+ Pin 8 V_{CC} Output signals: EIA standard RS422 Output current per channel: ±20 mA		Pin 1 GND Pin 2 Motor NTC Pin 3 +V_{CC} Pin 9 Motor NTC Pin 11 Data- / SLO- Pin 12 Data+ / SLO+ Pin 13 CLK+ / MA+ Pin 14 CLK- / MA- Other pins not connected Output signals: EIA standard RS422 Output current per channel: ±20 mA	

Configuration	EMT absolute differential
Signal protocol	BiSS-C, SSI

Modular system	Page
DC motor	
DCX 22	111–114
DCX 26 L	115–116
DCX 32 L	117
DCX 35 L	118
EC motor	
IDX 56	249–251
IDX 70	252–254
EC-4pole 22	291–292
EC-4pole 30	293/295
EC-i 30	302–305
EC-i 40	306–311
EC-i 52	312–313
ECX PRIME 22 L	239

Dimensions of standard configuration M 1:2

Additional length: IDX 56 +20 mm
IDX 70 +39 mm



Connecting cable 300 mm for EMT to EPOS4 708590

Additional information

[1] The length shown here refers to the encoder. An additional intermediate plate is required for motor mounting. For more detailed information, see the combined dimensional drawing.

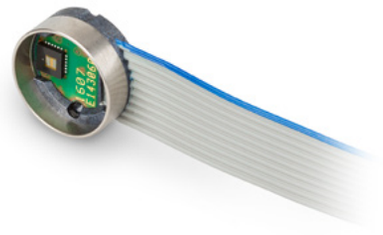
EC motors: The angle value 0 is calibrated to the commutation phase of coil 1 (equates to Hall signal 1 for motors with Hall sensors, block commutation), see p. 66.

Ordering information: For motors that cannot be configured online, the part numbers 711113 (BiSS-C) and 711112 (SSI) must be used when ordering.

Further technical details can be found in the product information in the online shop under Downloads.

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ENX 16 RIO Encoder ∅16 mm, 512...65 536 CPT

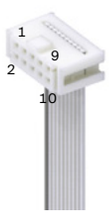


Key data		RIO incremental, optical
Number of channels		3
Max. counts per turn		65 536
Encoder length L[2]	mm	7.0
Ambient temperature	°C	-40...+100
Weight	g	15

Selection criteria	RIO incremental, optical
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

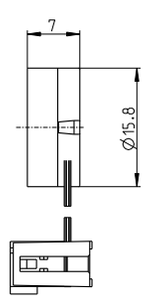
Specifications		RIO incremental, optical
Supply voltage V_{CC}	V	5 ±10%
Typical current draw	mA	50
Max. operating frequency	kHz	3125
Max. speed[1]	rpm	40 000
Connection		10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 not connected Pin 2 V_{CC} Pin 3 GND Pin 4 not connected Pin 5 channel $\overline{A}$ Pin 6 channel A Pin 7 channel $\overline{B}$ Pin 8 channel B Pin 9 channel $\overline{I}$ Pin 10 channel I Output signal: EIA-Standard RS 422 Output current per channel: ±20 mA



Variants	for configurable units	for non-configurable units				
Part number	depending on configuration	575826	575827	575828	575829	575830
Counts per turn	512...65 536 (in steps of 256)	1024	4096	8192	16 384	32 768
Cable length mm	50, 100, 150, 200, 300, 500, 1000	300	300	300	300	300
Alignment of cable outlet in relation to motor flange °	15 (pitch)	0	0	0	0	0

Modular system				Page
DC motor		**EC motor**		
DCX 16 S	105–106	EC-4pole 22		291–292
DCX 16 L	107–108	EC-4pole 30		293/295
DCX 19 S	109–110	EC-i 30		302–305
DCX 22 S	111–112	EC-i 40		306–311
DCX 22 L	113–114	EC-i 52		312–315
DCX 26 L	115–116	ECX PRIME 16 M		236
DCX 32 L	117	ECX PRIME 16 L		237
DCX 35 L	118	ECX PRIME 22 L		239

Dimensions standard version M 1:1



Notes

[1] For counts per turn >4096 per turn, the maximum speed is reduced, limited by the maximum count frequency.

[2] Length given excludes any intermediate plate for mounting on a motor. The effective total length of a motor-encoder combination can be found on the respective dimensional drawing.

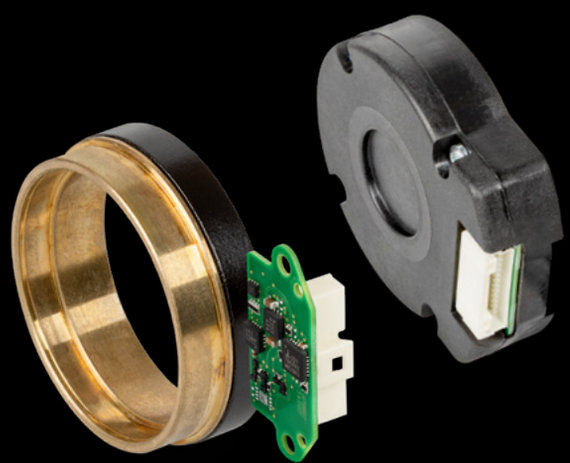
Further technical details can be found in the product information in the online shop under Downloads.

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For your personal notes

maxon TSX

Standard specification no. 103	91
Magnetic encoders	522–527
TSX 38 MAG 1792 CPT, 2 channel	522
TSX 50 MAG 2560 CPT, 2 channel	523
TSX 65 MAG 2560 CPT, 2 channel	524
TSX 85 MAG 2560 CPT, 2 channel	525
TSX 40 MAG 1792–2048 CPT, 2 channel	526
Optical Encoder	
TSX 40 RIO 1–524 288 CPT, 21 Bits, 3 channel	527



maxon off-axis TSX encoders are characterized by their robust design and high signal quality. This enables the use of through shafts and offers enormous design freedom. These devices have to be fitted to the motors at the supplying factory, as the installation process is fine-tuned to the respective motor.

enx.maxongroup.com

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TSX 38 MAG Encoder, 1792 CPT

Integrated into the motor EC frameless DT

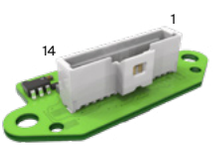


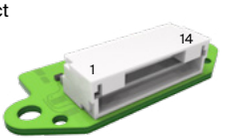
Key data		TSX 38 MAG incremental, commutation signal
Number of channels		2
Max. counts per turn		1792
Encoder length L (axial)	mm	8.55
Encoder length L (radial)	mm	7.65
Ambient temperature	°C	-40...+105
Weight	g	11

Selection criteria	TSX 38 MAG incremental, commutation signal
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	▲
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		TSX 38 MAG with a axial cable outlet	TSX 38 MAG with a radial cable outlet
Supply voltage V_{CC}	V	5V ±0.5	5V ±0.5
Typical current draw	mA	18	18
Max. operating frequency	kHz	500	500
Max elec. speed	rpm	14 000	14 000
Axial plug manufacturer	Molex	Pin 1 NTC-	Pin 1 V_{CC}
Axial plug	Part no. 501331-1407	Pin 2 NTC+	Pin 2 GND
Radial plug manufacturer	JST	Pin 3 N.C.	Pin 3 $\overline{A}$*
Radial plug	Part no. SM14B-NSHSS-TB	Pin 4 H3	Pin 4 A*
		Pin 5 H2	Pin 5 $\overline{B}$*
		Pin 6 H1	Pin 6 B*
		Pin 7 Not connect	Pin 7 Not connect
		Pin 8 Not connect	Pin 8 Not connect
		Pin 9 B*	Pin 9 H1
		Pin 10 $\overline{B}$*	Pin 10 H2
		Pin 11 A*	Pin 11 H3
		Pin 12 $\overline{A}$*	Pin 12 N.C.
		Pin 13 GND	Pin 13 NTC+
		Pin 14 V_{CC}	Pin 14 NTC-
		*Output signal: EIA-Standard RS 422/Output current per channel: ±20 mA	
300 mm compatible cable adaptor for		EPOS4: 708583 EPOS4 Disk: 865360 ESCON: 708584	EPOS4: 708586 EPOS4 Disk: 865359 ESCON: 708587

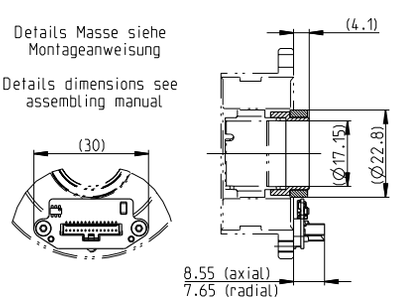




Variants	TSX 38 MAG with an axial cable outlet	TSX 38 MAG with an radial cable outlet
Part number	836549	836550

Modular system	Page
EC frameless	
DT 38 S	341
DT 38 M	342

Dimensions of standard configuration 1:2



Notice

H1 is calibrated to commutation angle zero, in accordance with page 66.
Rotor and stator are paired by maxon.
Mechanical dimensions availble in the EC frameless DT Installation Manual.

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TSX 50 MAG Encoder, 2560 CPT

Integrated into the motor EC frameless DT

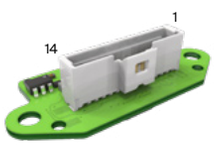


Key data		TSX 50 MAG incremental, commutation signal
Number of channels		2
Max. counts per turn		2560
Encoder length L (axial)	mm	8.55
Encoder length L (radial)	mm	7.65
Ambient temperature	°C	-40...+105
Weight	g	19

Selection criteria	TSX 50 MAG incremental, commutation signal
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	▲
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		TSX 50 MAG with a axial cable outlet	TSX 50 MAG with a radial cable outlet
Supply voltage V_{CC}	V	5V ±0.5	5V ±0.5
Typical current draw	mA	18	18
Max. operating frequency	kHz	500	500
Max. electrical speed	rpm	10 000	10 000
Axial connector manufacturer	Molex	Pin 1 NTC-	Pin 1 V_{CC}
Axial connector	part no. 501331-1407	Pin 2 NTC+	Pin 2 GND
Radial connector manufacturer	JST	Pin 3 N.C.	Pin 3 $\overline{A}$*
Radial connector	part no. SM14B-NSHSS-TB	Pin 4 H3	Pin 4 A*
		Pin 5 H2	Pin 5 $\overline{B}$*
		Pin 6 H1	Pin 6 B*
		Pin 7 Not connect	Pin 7 Not connect
		Pin 8 Not connect	Pin 8 Not connect
		Pin 9 B*	Pin 9 H1
		Pin 10 $\overline{B}$*	Pin 10 H2
		Pin 11 A*	Pin 11 H3
		Pin 12 $\overline{A}$*	Pin 12 N.C.
		Pin 13 GND	Pin 13 NTC+
		Pin 14 V_{CC}	Pin 14 NTC-
		*Output signal: EIA-Standard RS 422/Output current per channel: ±20 mA	
Additional 300 mm adapter cable for		EPOS4: 708583 EPOS4 Disk: 865360 ESCON: 708584	EPOS4: 708586 EPOS4 Disk: 865359 ESCON: 708587

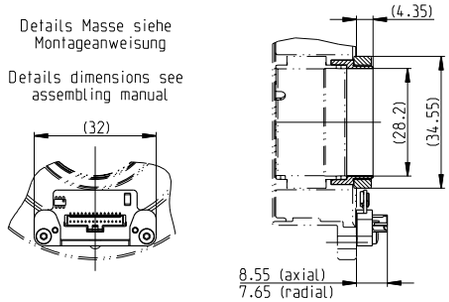




Variants	TSX 50 MAG with a axial cable outlet	TSX 50 MAG with a radial cable outlet
Part number	732076	723837

Modular system	Page
EC frameless	
DT 50 S	343
DT 50 M	344

Dimensions of standard configuration 1:2



Notice

H1 is calibrated to commutation angle zero, in accordance with page 66.
Rotor and stator are paired by maxon.
Mechanical dimensions available in the EC frameless DT assembly instruction.

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TSX 65 MAG Encoder, 2560 CPT

Integrated into the motor EC frameless DT

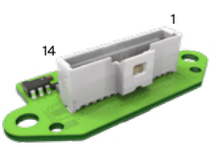


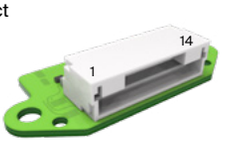
Key data		TSX 65 MAG incremental, commutation signal
Number of channels		2
Max. counts per turn		2560
Encoder length L (axial)	mm	8.55
Encoder length L (radial)	mm	7.65
Ambient temperature	°C	-40...+105
Weight	g	28

Selection criteria	TSX 65 MAG incremental, commutation signal
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	▲
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		TSX 65 MAG with a axial cable outlet	TSX 65 MAG with a radial cable outlet
Supply voltage V_{CC}	V	5V ± 0.5	5V ± 0.5
Typical current draw	mA	18	18
Max. operating frequency	kHz	500	500
Max. electrical speed	rpm	10 000	10 000
Axial connector manufacturer	Molex	Pin 1 NTC-	Pin 1 V_{CC}
Axial connector	part no. 501331-1407	Pin 2 NTC+	Pin 2 GND
Radial connector manufacturer	JST	Pin 3 N.C.	Pin 3 $\overline{A}$*
Radial connector	part no. SM14B-NSHSS-TB	Pin 4 H3	Pin 4 A*
		Pin 5 H2	Pin 5 $\overline{B}$*
		Pin 6 H1	Pin 6 B*
		Pin 7 Not connect	Pin 7 Not connect
		Pin 8 Not connect	Pin 8 Not connect
		Pin 9 B*	Pin 9 H1
		Pin 10 $\overline{B}$*	Pin 10 H2
		Pin 11 A*	Pin 11 H3
		Pin 12 $\overline{A}$*	Pin 12 N.C.
		Pin 13 GND	Pin 13 NTC+
		Pin 14 V_{CC}	Pin 14 NTC-
		*Output signal: EIA-Standard RS 422/Output current per channel: ± 20 mA	
Additional 300 mm adapter cable for		EPOS4: 708583 EPOS4 Disk: 865360 ESCON: 708584	EPOS4: 708586 EPOS4 Disk: 865359 ESCON: 708587

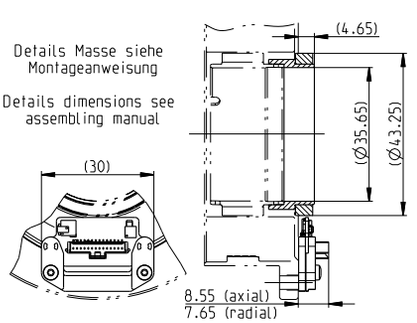




Variants	TSX 65 MAG with a axial cable outlet	TSX 65 MAG with a radial cable outlet
Part number	805430	805431

Modular system	Page
EC frameless	
DT 65 S	345
DT 65 M	346

Dimensions of standard configuration 1:2



Notice

H1 is calibrated to commutation angle zero, in accordance with page 66.
Rotor and stator are paired by maxon.
Mechanical dimensions available in the EC frameless DT assembly instruction.

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TSX 85 MAG Encoder, 2560 CPT

Integrated into the motor EC frameless DT

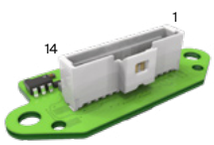


Key data		TSX 85 MAG incremental, commutation signal
Number of channels		2
Max. counts per turn		2560
Encoder length L (axial)	mm	8.55
Encoder length L (radial)	mm	7.65
Ambient temperature	°C	-40...+105
Weight	g	58

Selection criteria	TSX 85 MAG incremental, commutation signal
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	▲
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		TSX 85 MAG with a axial cable outlet	TSX 85 MAG with a radial cable outlet
Supply voltage V_{CC}	V	5V ±0.5	5V ±0.5
Typical current draw	mA	18	18
Max. operating frequency	kHz	500	500
Max. electrical speed	rpm	10 000	10 000
Axial connector manufacturer	Molex	Pin 1 NTC-	Pin 1 V_{CC}
Axial connector	part no. 501331-1407	Pin 2 NTC+	Pin 2 GND
Radial connector manufacturer	JST	Pin 3 N.C.	Pin 3 $\overline{A}$*
Radial connector	part no. SM14B-NSHSS-TB	Pin 4 H3	Pin 4 A*
		Pin 5 H2	Pin 5 $\overline{B}$*
		Pin 6 H1	Pin 6 B*
		Pin 7 Not connect	Pin 7 Not connect
		Pin 8 Not connect	Pin 8 Not connect
		Pin 9 B*	Pin 9 H1
		Pin 10 $\overline{B}$*	Pin 10 H2
		Pin 11 A*	Pin 11 H3
		Pin 12 $\overline{A}$*	Pin 12 N.C.
		Pin 13 GND	Pin 13 NTC+
		Pin 14 V_{CC}	Pin 14 NTC-
		*Output signal: EIA-Standard RS 422/Output current per channel: ± 20 mA	
Additional 300 mm adapter cable for		EPOS4/ESCON2: 708583 EPOS4 Disk: 865360 ESCON: 708584	EPOS4/ESCON2: 708586 EPOS4 Disk: 865359 ESCON: 708587

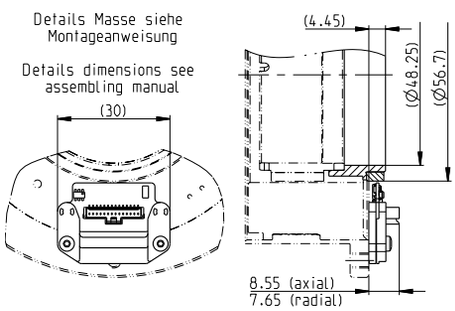




Variants	TSX 85 MAG with an axial cable outlet	TSX 85 MAG with an radial cable outlet
Part number	805434	805435

Modular system	Page
EC frameless	
DT 85 M	347
DT 85 L	348

Dimensions of standard configuration 1:2



Notice

H1 is calibrated to commutation angle zero, in accordance with page 66.
Rotor and stator are paired by maxon.
Mechanical dimensions available in the EC frameless DT assembly instruction.

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TSX 40 MAG Encoder ∅40 mm, 1792–2048 CPT

With closed/open housing

TSX

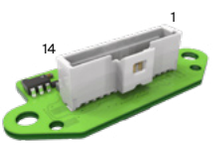


Key data		TSX MAG incremental, commutation signal
Number of channels		2
Max. counts per turn[1]		1792; 2048
Encoder length L	mm	11.7
Ambient temperature	°C	-40...+105
Weight	g	18

Selection criteria	TSX MAG incremental, commutation signal
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	▲
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		Axial cable outlet	Radial cable outlet
Supply voltage V_{CC}	V	5V ±0.5	5V ±0.5
Typical current draw	mA	18	18
Max. operating frequency	kHz	500	500
Max elec. speed	rpm	14 000/12 500 (for 7pp/8pp motors)	
Axial plug manufacturer	Molex	Pin 1 NTC-	Pin 1 V_{CC}
Axial plug	Part no. 501331-1407	Pin 2 NTC+	Pin 2 GND
Radial plug manufacturer	JST	Pin 3 N.C.	Pin 3 $\overline{A}$*
Radial plug	Part no. SM14B-NSHSS-TB	Pin 4 H3	Pin 4 A*
		Pin 5 H2	Pin 5 $\overline{B}$*
		Pin 6 H1	Pin 6 B*
		Pin 7 Not connect	Pin 7 Not connect
		Pin 8 Not connect	Pin 8 Not connect
		Pin 9 B*	Pin 9 H1
		Pin 10 $\overline{B}$*	Pin 10 H2
		Pin 11 A*	Pin 11 H3
		Pin 12 $\overline{A}$*	Pin 12 N.C.
		Pin 13 GND	Pin 13 NTC+
		Pin 14 V_{CC}	Pin 14 NTC-
		*Output signal: EIA-Standard RS 422/Output current per channel: ±20 mA	
300 mm compatible cable adaptor for		EPOS4/ESCON2: 708583 EPOS4 Disk: 865360 ESCON: 708584	EPOS4/ESCON2: 708586 EPOS4 Disk: 865359 ESCON: 708587



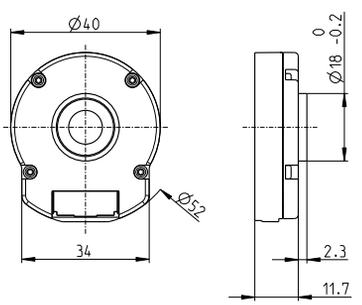


Variants		Axial cable outlet				Radial cable outlet			
Part number		850477	858467	850476	858465	732071	858466	687759	858464
Housing		closed	open	closed	open	closed	open	closed	open
Cable outlet		axial		axial		radial		radial	
Counts per turn	CPT	1792		2048		1792		2048	
For use with motors		EC-i 40		EC-i 40[2]; EC-i 52		EC-i 40		EC-i 40[2]; EC-i 52	

Modular system	Page
EC motor	
EC-i 40	306–311
EC-i 52	312–313

Dimensions of standard configuration 1:2

Open housing



Notice

H1 is calibrated to commutation angle zero, in accordance with page 66.

[1] 1792 counts for 7pp motors and 2048 counts for 8pp motors.

[2] Only for EC-i 40 130 W.

You can find more information in the maxon online shop under Downloads.

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TSX 40 RIO Encoder, ∅40 mm, 1...524 288 counts/21 bit

Optical – ensure clean environment

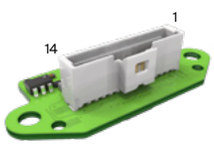


Key data		TSX RIO incremental and absolute
Number of channels		3
Max. counts per turn	CPT	1...524 288
Steps per turn		1...2 097 152
Resolution (bit single turn)		1...21
Encoder length	mm	11.7
Ambient temperature	°C	-40...+105
Weight	g	16
Protection class		not protected

Selection criteria	TSX RIO incremental and absolute
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	▲

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		Axial cable outlet	Radial cable outlet
Supply voltage V_{CC}	V	5V ±0.5	5V ±0.5
Typical current draw	mA	60	60
Max. operating frequency	MHz	6.67	6.67
Max. electrical speed	rpm	1500...42 000	1500...42 000
Axial connector manufacturer	Molex	Pin 1 NTC-	Pin 1 V_{CC}
Axial connector	part no. 501331-1407	Pin 2 NTC+	Pin 2 GND
Radial connector manufacturer	JST	Pin 3 DATA/ (SLO/)	Pin 3 $\overline{A}$
Radial connector	part no. SM14B-NSHSS-TB	Pin 4 DATA (SLO)	Pin 4 A
		Pin 5 CLK/ (MA/)	Pin 5 $\overline{B}$
		Pin 6 CLK (MA)	Pin 6 B
		Pin 7 I	Pin 7 $\overline{I}$
		Pin 8 $\overline{I}$	Pin 8 I
		Pin 9 B	Pin 9 CLK (MA)
		Pin 10 $\overline{B}$	Pin 10 CLK/ (MA/)
		Pin 11 A	Pin 11 DATA (SLO)
		Pin 12 $\overline{A}$	Pin 12 DATA/ (SLO/)
		Pin 13 GND	Pin 13 NTC+
		Pin 14 V_{CC}	Pin 14 NTC-
		Output signal: EIA-Standard RS 422	Output signal: EIA-Standard RS 422
		Output current per channel: ±20 mA	Output current per channel: ±20 mA
Additional 300 mm adapter cable for		EPOS4: 708582 EPOS4 Disk: 865363	EPOS4: 708585 EPOS4 Disk: 865362

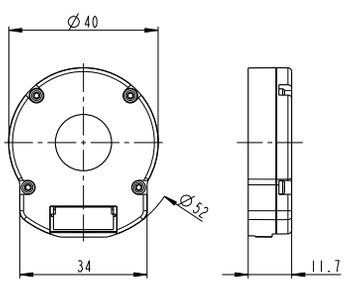




Variants		Axial cable outlet		Radial cable outlet	
Part number		850587	850586	779667	746421
Cable outlet		axial	axial	radial	radial
Max. counts per turn[1]	CPT	32768	32768	32768	32768
Resolution (bit single turn)[1]		19	19	19	19
Signal protocol		BiSS-C	SSI	BiSS-C	SSI

modular system	Page
EC motor	
EC-i 40	306–311
EC-i 52	312–313

Dimensions of standard configuration 1:2



Notice

The angle “zero” and the index are aligned with commutation angle zero in accordance with page 66.
Wiring diagram for Hall sensors see page 67.
[1]With resolutions higher than 19-bit or 32768 counts per turn, the encoder is no longer «noise-free». See product information.
Other resolutions available upon request.

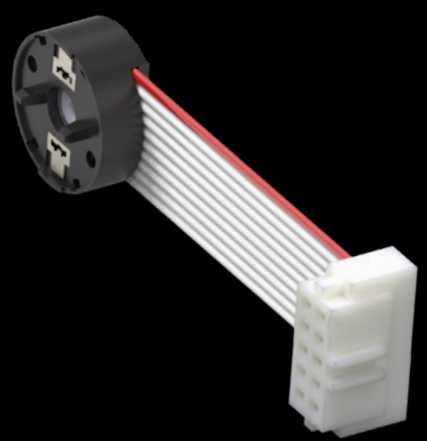
You can find more information in the maxon online shop under Downloads.

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For your personal notes

maxon sensor

Standard specification no. 103	91
Inductive Encoders	530–531
Encoder MILE 512–4096 CPT, 2 channel	530
Encoder MILE 512–6400 CPT, 2 channel	531
Magnetic Encoders	532–533
Encoder MR 16–32 CPT, 2 channel	532–533
Optical Encoders	534–541
Encoder 8 OPT 50 CPT, 2 channel	534
Encoder HEDS 5540 500 CPT, 3 channel	535–536
Encoder HEDL 5540 500 CPT, 3 channel	537–539
Encoder HEDL 9140 500 CPT, 3 channel	540–541
DC Tacho/Resolver	542–543
DC-Tacho DCT 22 0.52 V	542
Resolver Res 26 10 V	543

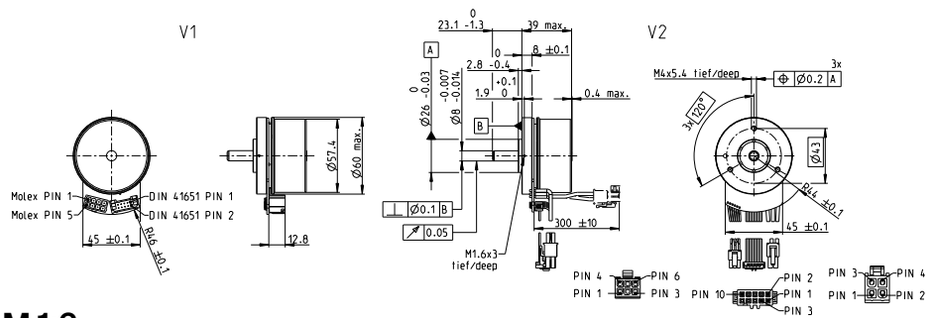


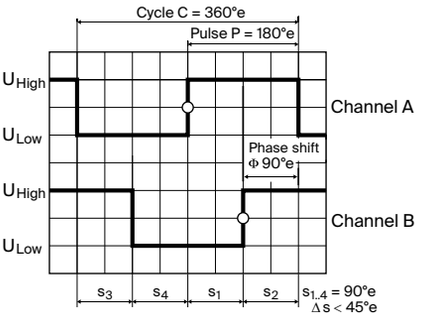
Robust encoders, DC tachometers, and resolvers with high accuracy and high signal resolution. Due to resonance, these are mainly mounted on motors with a continuous shaft. The assembly requires adjustment to the motors and may only be done in the delivery plant.

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Encoder MILE 512–4096 CPT, 2 channels, with line driver

Integrated into motor



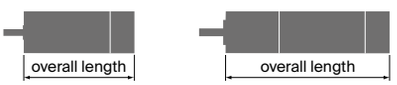


M 1:6

Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

	Part numbers			
V1 with connector	651156	651163	651166	651168
V2 with cable and connector	421985	421986	421987	421988
Type				
Counts per turn	512	1024	2048	4096
Number of channels	2	2	2	2
Max. operating frequency (kHz)	1000	1000	1000	1000
Max. speed (rpm)	6000	6000	6000	6000



Modular system

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length L1 max. [mm] / • see Gearhead			
EC 60 flat, 100 W	321					39.0	39.0	39.0	39.0
EC 60 flat, 100 W	321	GP 52, 4 - 30 Nm	444			•	•	•	•
EC 60 flat, 100 W	321	GB 80	458			•	•	•	•
EC 60 flat, 150 W	322					39.0	39.0	39.0	39.0
EC 60 flat, 150 W	322	GP 52, 4 - 30 Nm	444			•	•	•	•
EC 60 flat, 150 W	322	GB 80	458			•	•	•	•
EC 60 flat, 200 W	323					46.5	46.5	46.5	46.5
EC 60 flat, 200 W	323	GP 52, 4 - 30 Nm	444			•	•	•	•
EC 60 flat, 200 W	323	GB 80	458			•	•	•	•

Technical data

Supply voltage V_{CC}	5 V ±10%
Typical current draw	15 mA
Output signal	CMOS compatible
Signal rise time (typically, at C_L = 25 pF, R_L = 1 kΩ, 25 °C)	100 ns
Signal fall time (typically, at C_L = 25 pF, R_L = 1 kΩ, 25 °C)	100 ns
Operating temperature range	-40...+100 °C
Moment of inertia of code wheel	≤ 13 gcm²
Output current per channel	max. 4 mA
Open collector output of the Hall sensors with integrated pull-up resistor	10 kΩ ±20%
Wiring diagram for Hall sensors see p. 69	

Additional information can be found under 'Downloads' in the maxon online shop.

Pin allocation

Connection V1
Motor + Sensors
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 V_{Hall} 4.5...18 VDC
Pin 4 Motor winding 3
Pin 5 Hall sensor 3
Pin 6 GND
Pin 7 Motor winding 1
Pin 8 Motor winding 2

Encoder
Pin 1 N.C.
Pin 2 V_{CC}
Pin 3 GND
Pin 4 N.C.
Pin 5 Channel $\overline{A}$
Pin 6 Channel A
Pin 7 Channel $\overline{B}$
Pin 8 Channel B
Pin 9 Do not connect
Pin 10 Do not connect

Pin type:
46015-0806 Molex
DIN 41651/EN 60603-13

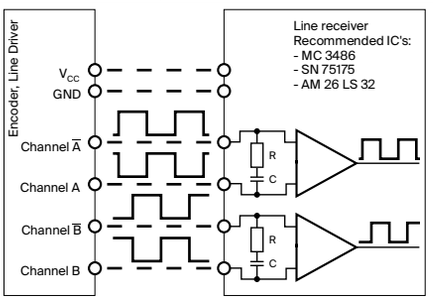
Connection V2
Sensors (AWG 28)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 4.5...18 VDC
Pin 6 N.C.

Motor (AWG 18)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 Not connected

Encoder (AWG 28)
Pin 1 N.C.
Pin 2 V_{CC}
Pin 3 GND
Pin 4 N.C.
Pin 5 Channel $\overline{A}$
Pin 6 Channel A
Pin 7 Channel $\overline{B}$
Pin 8 Channel B
Pin 9 Do not connect
Pin 10 Do not connect

43025-600 Molex
39-01-2040 Molex
DIN 41651/EN 60603-13

Connection example

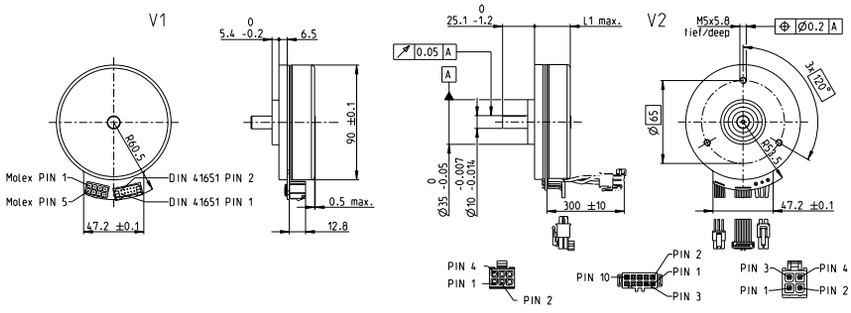


Opt. terminal resistance R = typical 120 Ω
Capacitor C ≥ 0.1 nF per m line length

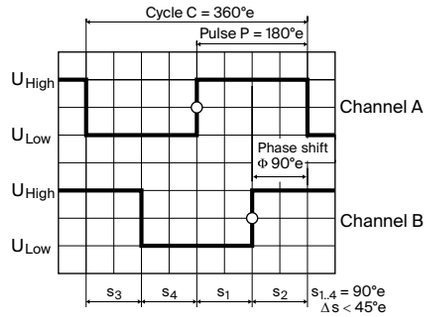
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Encoder MILE 512–6400 CPT, 2 channels, with line driver

Integrated into motor



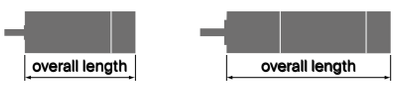
M 1:6



Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

	Part numbers							
V1 with connector	621796	621789	621795	621790	621794	621791	621793	621792
V2 with cable and connector	607517	607510	607516	607511	607515	607512	607514	607513
Type								
Counts per turn	512	800	1024	1600	2048	3200	4096	6400
Number of channels	2	2	2	2	2	2	2	2
Max. operating frequency (kHz)	1000	1000	1000	1000	1000	1000	1000	1000
Max. speed (rpm)	5000	5000	5000	5000	5000	5000	5000	5000



Modular system

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length L1 max. [mm] / ● see Gearhead							
EC 90 flat, 160 W	324					28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
EC 90 flat, 160 W	324	GP 52, 4.0 - 30.0 Nm	444			●	●	●	●	●	●	●	●
EC 90 flat, 160 W	324	GB 80/12/9/65, 6.0 - 120.0 Nm	458–461			●	●	●	●	●	●	●	●
EC 90 flat, 220 W	325					28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
EC 90 flat, 220 W	325	GP 52, 4.0 - 30.0 Nm	444			●	●	●	●	●	●	●	●
EC 90 flat, 220 W	325	GB 80/12/9/65, 6.0 - 120.0 Nm	458–461			●	●	●	●	●	●	●	●
EC 90 flat, 360 W	326					40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5
EC 90 flat, 360 W	326	GP 52, 4.0 - 30.0 Nm	444			●	●	●	●	●	●	●	●
EC 90 flat, 360 W	326	GB 80/12/9/65, 6.0 - 120.0 Nm	458–461			●	●	●	●	●	●	●	●
EC 90 flat, 260 W	327					40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5
EC 90 flat, 260 W	327	GP 52, 4.0 - 30.0 Nm	444			●	●	●	●	●	●	●	●
EC 90 flat, 260 W	327	GB 80/12/9/65, 6.0 - 120.0 Nm	458–461			●	●	●	●	●	●	●	●
EC 90 flat, 400 W	328					40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5
EC 90 flat, 400 W	328	GP 52, 4.0 - 30.0 Nm	444			●	●	●	●	●	●	●	●
EC 90 flat, 400 W	328	GB 80/12/9/65, 6.0 - 120.0 Nm	458–461			●	●	●	●	●	●	●	●
EC 90 flat, 600 W	329					53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0
EC 90 flat, 600 W	329	GP 52, 4.0 - 30.0 Nm	444			●	●	●	●	●	●	●	●
EC 90 flat, 600 W	329	GB 80/12/9/65, 6.0 - 120.0 Nm	458–461			●	●	●	●	●	●	●	●

Technical data

Supply voltage V_{CC}	5 V ±10%
Typical current draw	15 mA
Output signal driver used:	CMOS compatible
Signal rise and fall times (typically, at C_L = 25 pF, R_L = 1 kΩ, 25 °C)	100 ns
Operating temperature range	-40...+100 °C
Moment of inertia of code wheel	≤ 65 gcm²
Output current per channel	max. 4 mA
Open collector output of the Hall sensors with integrated pull-up resistor	10 kΩ ±20%
Wiring diagram for Hall sensors see p. 69	

Additional information can be found under 'Downloads' in the maxon online shop.

Pin allocation

Connection V1
Motor + Sensors
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 V_{Hall} 3.5...18 VDC
Pin 4 Motor winding 3
Pin 5 Hall sensor 3
Pin 6 GND
Pin 7 Motor winding 1
Pin 8 Motor winding 2

Encoder
Pin 1 N.C.
Pin 2 V_{CC}
Pin 3 GND
Pin 4 N.C.
Pin 5 Channel $\overline{A}$
Pin 6 Channel A
Pin 7 Channel $\overline{B}$
Pin 8 Channel B
Pin 9 Do not connect
Pin 10 Do not connect

Pin type:
46015-0806 Molex
DIN 41651/EN 60603-13

Connection V2
Sensors (AWG 24)
Pin 1 Hall sensor 1
Pin 2 Hall sensor 2
Pin 3 Hall sensor 3
Pin 4 GND
Pin 5 V_{Hall} 3.5...18 VDC
Pin 6 NTC*

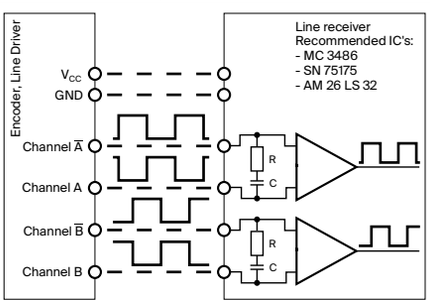
Motor (AWG 16)
Pin 1 Motor winding 1
Pin 2 Motor winding 2
Pin 3 Motor winding 3
Pin 4 Not connected

Encoder (AWG 28)
Pin 1 N.C.
Pin 2 V_{CC}
Pin 3 GND
Pin 4 N.C.
Pin 5 Channel $\overline{A}$
Pin 6 Channel A
Pin 7 Channel $\overline{B}$
Pin 8 Channel B
Pin 9 Do not connect
Pin 10 Do not connect

43025-0600 Molex
39-01-2040 Molex
DIN 41651/EN 60603-13

*NTC resistance 25°C: 5 kΩ ± 1%, beta (25-85°C): 3490 K

Connection example

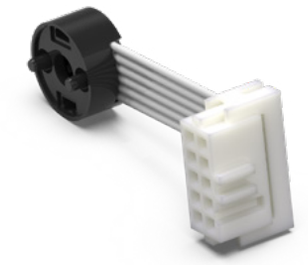


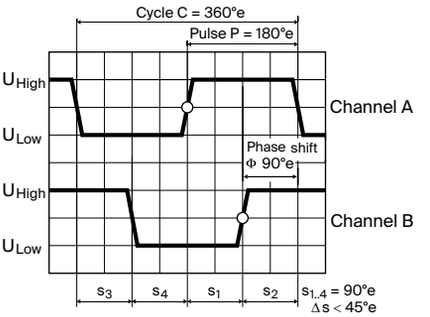
Warning: This motor with temperature sensor must **not** be connected directly to the Hall sensor matching connector of a maxon controller. The contact of the NTC would have to be removed from the Hall sensor in this case.

Opt. terminal resistance R = typical 120 Ω
Capacitor C ≥ 0.1 nF per m line length

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Encoder MR Type S, 16 CPT, 2 channels

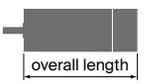


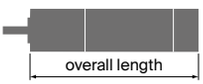


Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

Part numbers	201933	224702
Type		
Counts per turn	16	16
Number of channels	2	2
Max. operating frequency (kHz)	8	8
Max. speed (rpm)	30 000	30 000





Modular system

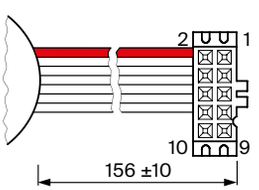
+ Motor	Page	+ Gearhead	Page	∅ Enc [mm]	Overall length [mm] / • see Gearhead	
RE 10, 0.75 W	132			10	22.8	
RE 10, 0.75 W	132	GP 10, 0.01 - 0.15 Nm	414	10	•	
RE 10, 1.5 W	134			10	30.4	
RE 10, 1.5 W	134	GP 10, 0.01 - 0.15 Nm	414	10	•	
RE 13, 0.75 W	137			13		26.3
RE 13, 0.75 W	138			13		28.7
RE 13, 0.75 W	138	GP 13, 0.2 - 0.35 Nm	415	13		•
RE 13, 2 W	141			13		38.5
RE 13, 2 W	142			13		40.9
RE 13, 2 W	142	GP 13, 0.2 - 0.35 Nm	415	13		•
RE 13, 1.5 W	145			13		28.4
RE 13, 1.5 W	146			13		30.8
RE 13, 1.5 W	146	GP 13, 0.2 - 0.35 Nm	415	13		•
RE 13, 3 W	149			13		40.6
RE 13, 3 W	150			13		43.0
RE 13, 3 W	150	GP 13, 0.2 - 0.35 Nm	415	13		•
A-max 12, 0.5 W	170			12	25.3	
A-max 12, 0.5 W	170	GP 10, 0.01 - 0.15 Nm	414	12	•	
A-max 12, 0.5 W	170	GS 12, 0.01 - 0.03 Nm	448	12	•	
A-max 12, 0.5 W	170	GP 13, 0.2 - 0.35 Nm	415	12	•	

Technical data

Supply voltage V_{CC}	2.7 - 5.5 V
Typical current draw	7 mA
Output signal V_{CC} = 5 VDC	TTL compatible
Phase shift Φ	90°e ± 45°e
Operating temperature range[1]	-40...+85 °C
Moment of inertia of code wheel	≤ 0.005 gcm²
Output current per channel	max. 5 mA

[1]Connecting cable: -20...+85 °C

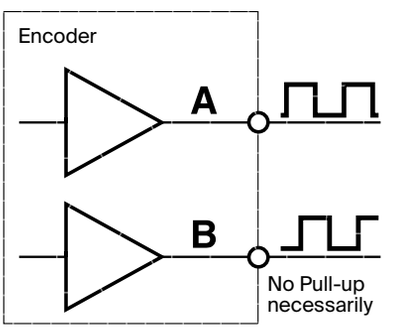
Pin allocation



1 Motor +
2 V_{CC}
3 Channel A
4 Channel B
5 GND
6 Motor –

DIN Connector 41651/
EN 60603-13
flat band cable AWG 28

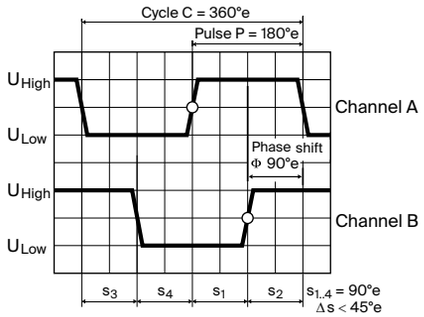
Connection example



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Encoder MR Type M, 32 CPT, 2 channels

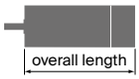


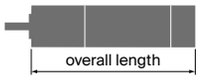


Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

Part numbers	
	201935
Type	
Counts per turn	32
Number of channels	2
Max. operating frequency (kHz)	8
Max. speed (rpm)	15 000





Modular system

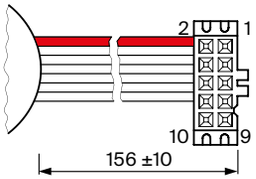
+ Motor	Page	+ Gearhead	Page	∅ Enc [mm]	Overall length [mm] / • see Gearhead
RE 16, 2 W	151			16	28.0
RE 16, 2 W	151	GP 16, 0.1 - 0.6 Nm	416/417	16	•
RE 16, 2 W	151	GP 16 S	469-471	16	•
RE 16, 3.2 W	153			16	45.4
RE 16, 3.2 W	153	GP 16, 0.1 - 0.6 Nm	416/417	16	•
RE 16, 3.2 W	153	GP 16 S	469-471	16	•
RE 16, 4.5 W	155			16	48.4
RE 16, 4.5 W	155	GP 16, 0.1 - 0.6 Nm	416/417	16	•
RE 16, 4.5 W	155	GP 16 S	469-471	16	•
A-max 16	172/174			16	30.4
A-max 16	172/174	GS 16, 0.015 - 0.1 Nm	449-451	16	•
A-max 16	172/174	GP 16, 0.1 - 0.3 Nm	416	16	•
A-max 16	172/174	GP 16 S	469-471	16	•
A-max 19, 1.5 W	176			19	34.0
A-max 19, 1.5 W	176	GP 19, 0.1 - 0.3 Nm	418	19	•
A-max 19, 1.5 W	176	GP 22, 0.5 - 2.0 Nm	421	19	•
A-max 19, 1.5 W	176	GS 24, 0.1 Nm	452	19	•
A-max 19, 1.5 W	176	GP 22 S	472/473	19	•
A-max 19, 2.5 W	178			19	35.8
A-max 19, 2.5 W	178	GP 19, 0.1 - 0.3 Nm	418	19	•
A-max 19, 2.5 W	178	GP 22, 0.5 - 2.0 Nm	421	19	•
A-max 19, 2.5 W	178	GS 24, 0.1 Nm	452	19	•
A-max 19, 2.5 W	178	GP 22 S	472/473	19	•
A-max 22	180/182			22	36.9
A-max 22	180/182	GP 22, 0.1 - 0.3 Nm	419	22	•
A-max 22	180/182	GP 22, 0.5 - 2.0 Nm	419-421	22	•
A-max 22	180/182	GS 24, 0.1 Nm	452	22	•
A-max 22	180/182	GP 22 S	472/473	22	•

Technical data

Supply voltage V_{CC}	2.7 – 5.5 V
Typical current draw 2 channel	6 mA
Output signal V_{CC} = 5 VDC	TTL compatible
Phase shift Φ	90°e ± 45°e
Operating temperature range[1]	-40...+85 °C
Moment of inertia of code wheel	≤ 0.09 gcm²
Output current per channel	max. 5 mA

[1]Connecting cable: -20...+85 °C

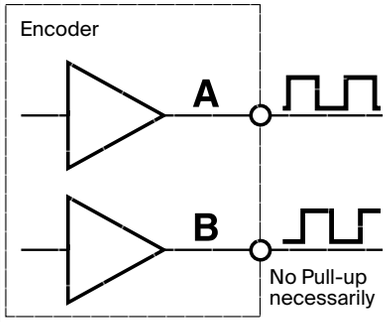
Pin allocation



1 Motor +
2 V_{CC}
3 Channel A
4 Channel B
5 GND
6 Motor –

DIN Connector 41651/
EN 60603-13
flat band cable AWG 28

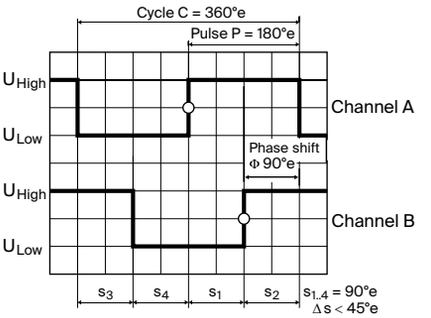
Connection example



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Encoder 8 OPT 50 CPT, 2 channels

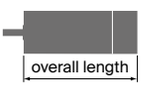


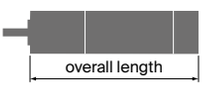


Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

	Part numbers
	473594
Type (provisional)	
Counts per turn	50
Number of channels	2
Max. operating frequency (kHz)	15
Max. speed (rpm)	18000





Modular system

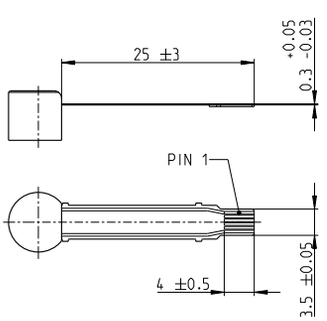
+ Motor	Page	+ Gearhead	Page	∅ Enc [mm]	Overall length [mm] / ● see Gearhead
RE 8, 0.5 W, A	130			8	24.2
RE 8, 0.5 W, A	130	GP 8, 0.01 - 0.1 Nm	413	8	●
RE 8, 0.5 W, A	130	GP 8 S	467–468	8	●

Technical data

Supply voltage V_{CC}[1]	2.6 – 3.0 V
Typical current draw	12 mA
Phase shift Φ	90°e ±45°e
Operating temperature range	-20...+85 °C
Moment of inertia of code wheel	≤ 0.001 gcm²
Output current per channel	min. -1 mA, max. 8 mA
Optionally available:	
Flexprint length 80 mm, 12-pole, pitch 0.5 mm	
Matching connector, e.g. Molex 52745-1297	

[1]Not in combination with maxon controllers.

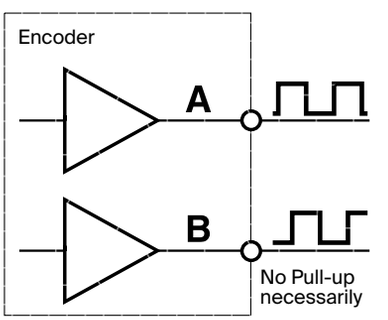
Pin allocation



Compatible connector:
Molex 52745-0697

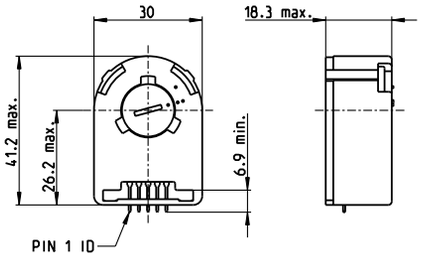
1	Motor +
2	V_{CC}
3	Channel A
4	Channel B
5	GND
6	Motor –

Connection example

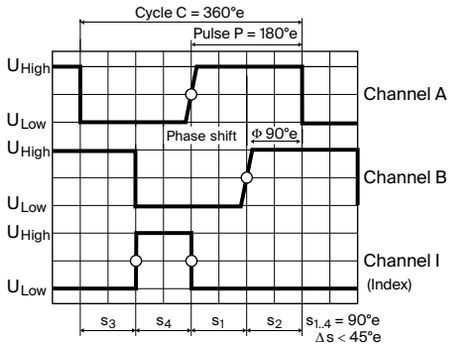


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Encoder HEDS 5540 500 CPT, 3 channels



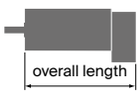


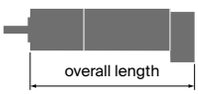


Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

Part numbers	110511	110513	110515	110517
Type				
Counts per turn	500	500	500	500
Number of channels	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8





Modular system

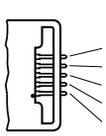
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / • see Gearhead				
RE 25	156/158					75.3				
RE 25	156/158	GP 26, 0.75 - 4.5 Nm	425			•				
RE 25	156/158	GP 32, 0.75 - 6.0 Nm	426-429			•				
RE 25	156/158	KD 32, 1.0 - 4.5 Nm	435			•				
RE 25	156/158	GP 32 S	474-482			•				
RE 25, 20 W	157					63.8				
RE 25, 20 W	157	GP 26/GP 32	425/426			•				
RE 25, 20 W	157	GP 32, 0.75 - 6.0 Nm	427/429			•				
RE 25, 20 W	157	KD 32, 1.0 - 4.5 Nm	435			•				
RE 25, 20 W	157	GP 32 S	474-482			•				
RE 25, 20 W	157			AB 28	587	94.3				
RE 25, 20 W	157	GP 22, 0.5 Nm	419			•				
RE 25, 20 W	157	GP 26, 0.75 - 4.5 Nm	425	AB 28	587	•				
RE 25, 20 W	157	GP 32, 0.75 - 4.5 Nm	426	AB 28	587	•				
RE 25, 20 W	157	GP 32, 0.75 - 6.0 Nm	427/429	AB 28	587	•				
RE 25, 20 W	157	KD 32, 1.0 - 4.5 Nm	435	AB 28	587	•				
RE 25, 20 W	157	GP 32 S	474-482	AB 28	587	•				
RE 25, 20 W	158			AB 28	587	105.8				
RE 25, 20 W	158	GP 26, 0.75 - 4.5 Nm	425	AB 28	587	•				
RE 25, 20 W	158	GP 32, 0.75 - 6.0 Nm	426-429	AB 28	587	•				
RE 25, 20 W	158	KD 32, 1.0 - 4.5 Nm	435	AB 28	587	•				
RE 25, 20 W	158	GP 32 S	474-482	AB 28	587	•				
RE 30, 15 W	159					88.8				
RE 30, 15 W	159	GP 32, 0.75 - 4.5 Nm	427			•				
RE 30, 60 W	160					•				
RE 30, 60 W	160	GP 32, 0.75 - 6.0 Nm	426-431			•				
RE 30, 60 W	160	KD 32, 1.0 - 4.5 Nm	435			•				
RE 30, 60 W	160	GP 32 S	474-482			•				
RE 35, 90 W	161						91.7			
RE 35, 90 W	161	GP 32, 0.75 - 8.0 Nm	426-432				•			
RE 35, 90 W	161	GP 42, 3.0 - 15 Nm	439				•			
RE 35, 90 W	161	GP 32 S	474-482				•			
RE 35, 90 W	161			AB 28	587	124.3				
RE 35, 90 W	161	GP 32, 0.75 - 8.0 Nm	426-432	AB 28	587	•				
RE 35, 90 W	161	GP 42, 3.0 - 15 Nm	439	AB 28	587	•				
RE 35, 90 W	161	GP 32 S	474-482	AB 28	587	•				

Technical data

Supply voltage V_{CC}	5 V ±10%
Typical current draw	55 mA
Output signal	TTL compatible
Phase shift Φ	90°e ±45°e
Signal rise time (typically, at C_L = 25 pF, R_L = 2.7 kΩ, 25 °C)	180 ns
Signal fall time (typically, at C_L = 25 pF, R_L = 2.7 kΩ, 25 °C)	40 ns
Index pulse width (nominal)	90°e
Operating temperature range	-40...+100 °C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. angular acceleration	250 000 rad s^{-2}
Output current per channel	min. -1 mA, max. 5 mA

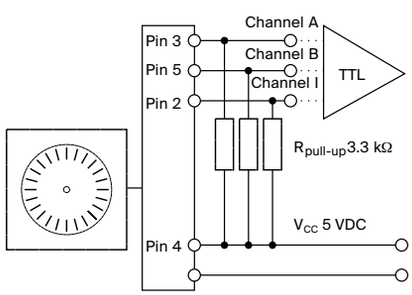
The index signal I is synchronized with channel A or B.

Pin allocation



Encoder	Description	Pin no. from 3409.506
Pin 5	Channel B	1
Pin 4	V_{CC}	2
Pin 3	Channel A	3
Pin 2	Channel I	4
Pin 1	GND	5

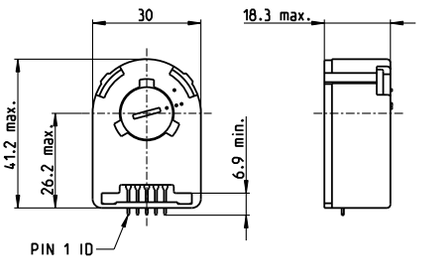
Connection example



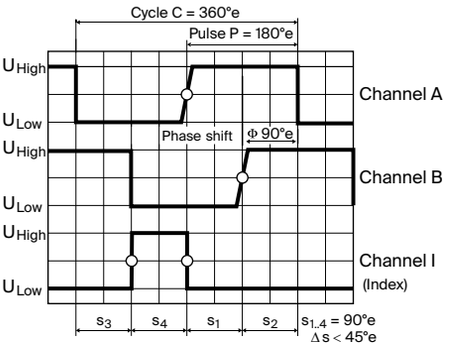
Ambient temperature range ϑ_U = 25 °C

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Encoder HEDS 5540 500 CPT, 3 channels







Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

Part numbers	110511	110513	110515	110517
Type				
Counts per turn	500	500	500	500
Number of channels	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8

Modular system

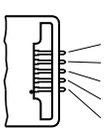
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead			
RE 40, 25 W	162						91.7		
RE 40, 150 W	163						●		
RE 40, 150 W	163	GP 42, 3.0 - 15 Nm	439				●		
RE 40, 150 W	163	GP 52, 4.0 - 30 Nm	443				●		
RE 40, 150 W	163			AB 28	587	124.3			
RE 40, 150 W	163	GP 42, 3.0 - 15 Nm	439	AB 28	587	●			
RE 40, 150 W	163	GP 52, 4.0 - 30 Nm	443	AB 28	587	●			
RE 50, 200 W	164								128.7
RE 50, 200 W	164	GP 52, 4 - 30 Nm	443						●
RE 50, 200 W	164	GP 62, 6.2 - 38.5 Nm	445						●
RE 65, 250 W	165								157.3
RE 65, 250 W	165	GP 81, 15.4 - 92.3 Nm	446						●
A-max 26	183-186					63.5			
A-max 26	183-186	GP 26, 0.75 - 4.5 Nm	425			●			
A-max 26	183-186	GP 32, 0.75 - 4.5 Nm	426			●			
A-max 26	183-186	GP 32, 0.75 - 6.0 Nm	428/429			●			
A-max 26	183-186	GP 32 S	474-482			●			
A-max 32	188						82.3		
A-max 32	188	GP 32, 0.75 - 6.0 Nm	426-431				●		
A-max 32	188	GP 32 S	474-482				●		
EC 32, 80 W	271						78.4		
EC 32, 80 W	271	GP 32, 0.75 - 6.0 Nm	426-431				●		
EC 32, 80 W	271	GP 32 S	474-482				●		
EC 40, 170 W	272							103.4	
EC 40, 170 W	272	GP 42, 3.0 - 15 Nm	439					●	
EC 40, 170 W	272	GP 52, 4.0 - 30 Nm	443					●	
EC 40, 170 W	272			AB 32	587			141.1	
EC 40, 170 W	272	GP 42, 3.0 - 15 Nm	439	AB 32	587			●	
EC 40, 170 W	272	GP 52, 4.0 - 30 Nm	443	AB 32	587			●	

Technical data

Supply voltage V_{CC}	5 V ±10%
Typical current draw	55 mA
Output signal	TTL compatible
Phase shift Φ	90°e ±45°e
Signal rise time (typically, at C_L = 25 pF, R_L = 2.7 kΩ, 25 °C)	180 ns
Signal fall time (typically, at C_L = 25 pF, R_L = 2.7 kΩ, 25 °C)	40 ns
Index pulse width	90°e
Operating temperature range	-40...+100 °C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. angular acceleration	250000 rad s^{-2}
Output current per channel	min. -1 mA, max. 5 mA

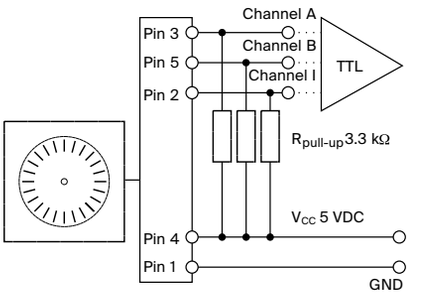
The index signal I is synchronized with channel A or B.

Pin allocation



Encoder	Description	Pin no. from 3409.506
Pin 5	Channel B	1
Pin 4	V_{CC}	2
Pin 3	Channel A	3
Pin 2	Channel I	4
Pin 1	GND	5

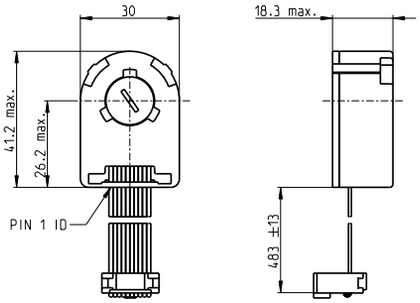
Connection example



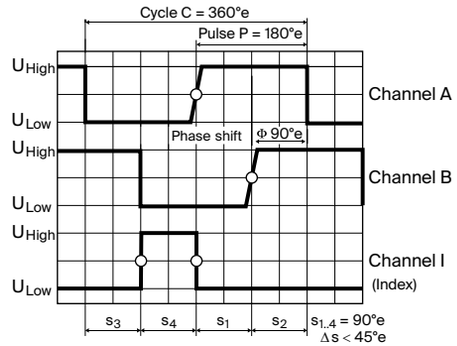
Ambient temperature range ϑ_U = 25 °C

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Encoder HEDL 5540 500 CPT, 3 channels, with line driver RS 422







Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

Part numbers	110512	110514	110516	110518
Type				
Counts per turn	500	500	500	500
Number of channels	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8

Modular system

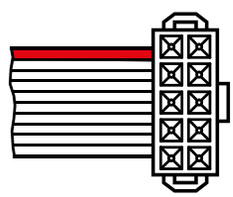
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead				
RE 25	156/158					75.3				
RE 25	156/158	GP 26/GP 32	425/426			●				
RE 25	156/158	KD 32, 1.0 - 4.5 Nm	435			●				
RE 25	156/158	GP 32, 0.75 - 6.0 Nm	427/429			●				
RE 25	156/158	GP 32 S	474–482			●				
RE 25, 20 W	157					63.8				
RE 25, 20 W	157	GP 22, 0.5 Nm	419			●				
RE 25, 20 W	157	GP 26/GP 32	425/426			●				
RE 25, 20 W	157	KD 32, 1.0 - 4.5 Nm	435			●				
RE 25, 20 W	157	GP 32, 0.75 - 6.0 Nm	427/429			●				
RE 25, 20 W	157	GP 32 S	474–482			●				
RE 25, 20 W	157			AB 28	587	94.3				
RE 25, 20 W	157	GP 26/GP 32	425/426	AB 28	587	●				
RE 25, 20 W	157	KD 32, 1.0 - 4.5 Nm	435	AB 28	587	●				
RE 25, 20 W	157	GP 32, 0.75 - 6.0 Nm	427/429	AB 28	587	●				
RE 25, 20 W	157	GP 32 S	474–482	AB 28	587	●				
RE 25, 20 W	158			AB 28	587	105.8				
RE 25, 20 W	158	GP 26/GP 32	425/426	AB 28	587	●				
RE 25, 20 W	158	KD 32, 1.0 - 4.5 Nm	435	AB 28	587	●				
RE 25, 20 W	158	GP 32, 0.75 - 6.0 Nm	427/429	AB 28	587	●				
RE 25, 20 W	158	GP 32 S	474–482	AB 28	587	●				
RE 30, 15 W	159					88.8				
RE 30, 15 W	159	GP 32, 0.75 - 4.5 Nm	427			●				
RE 30, 60 W	160					88.8				
RE 30, 60 W	160	GP 32, 0.75 - 6.0 Nm	426–431			●				
RE 30, 60 W	160	KD 32, 1.0 - 4.5 Nm	435			●				
RE 30, 60 W	160	GP 32 S	474–482			●				
RE 35, 90 W	161						91.7			
RE 35, 90 W	161	GP 32, 0.75 - 8.0 Nm	426–433				●			
RE 35, 90 W	161	GP 42, 3.0 - 15.0 Nm	439				●			
RE 35, 90 W	161	GP 32 S	474–482				●			
RE 35, 90 W	161			AB 28	587	124.3				
RE 35, 90 W	161	GP 32, 0.75 - 8.0 Nm	426–433	AB 28	587	●				
RE 35, 90 W	161	GP 42, 3.0 - 15.0 Nm	439	AB 28	587	●				
RE 35, 90 W	161	GP 32 S	475–482	AB 28	587	●				

Technical data

Supply voltage V_{CC}	5 V ±10%
Typical current draw	55 mA
Output signal	EIA Standard RS 422
driver used:	DS26LS31
Phase shift Φ	90°e ±45°e
Signal rise time (typically, at C_L = 25 pF, R_L = 2.7 kΩ, 25 °C)	180 ns
Signal fall time (typically, at C_L = 25 pF, R_L = 2.7 kΩ, 25 °C)	40 ns
Index pulse width	90°e
Operating temperature range	-40...+100 °C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. angular acceleration	250000 rad s^{-2}
Output current per channel	±20 mA

The index signal I is synchronized with channel A or B.

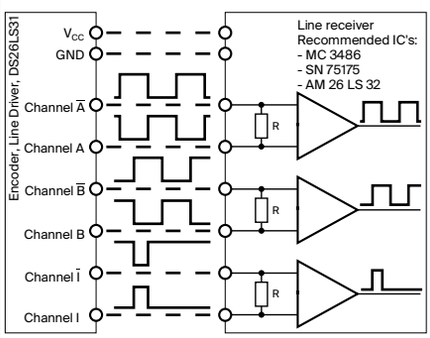
Pin allocation



1 N.C.
2 V_{CC}
3 GND
4 N.C.
5 Channel $\overline{A}$
6 Channel A
7 Channel $\overline{B}$
8 Channel B
9 Channel $\overline{I}$ (Index)
10 Channel I (Index)

Pin type DIN 41651/
EN 60603-13
flat band cable AWG 28

Connection example

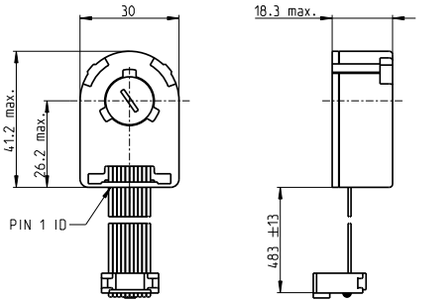


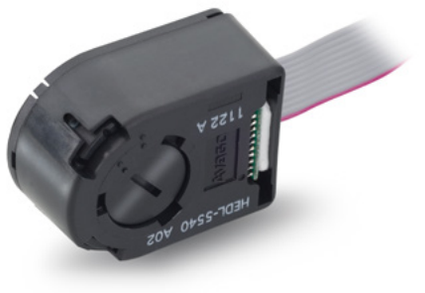
Terminal resistance R = typical 120 Ω

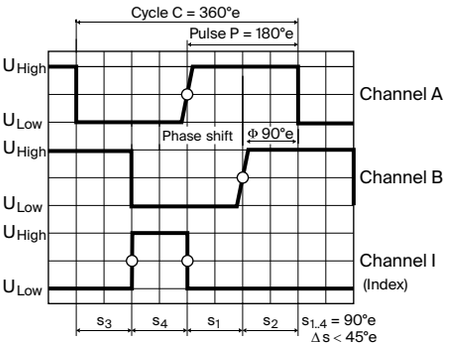
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Encoder HEDL 5540 500 CPT, 3 channels, with line driver RS 422

sensor







Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

Part numbers	110512	110514	110516	110518
Type				
Counts per turn	500	500	500	500
Number of channels	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8



Modular system

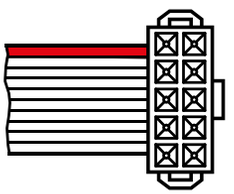
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead			
RE 40, 25 W	162						91.7		
RE 40, 150 W	163						91.7		
RE 40, 150 W	163	GP 42, 3.0 - 15.0 Nm	439				●		
RE 40, 150 W	163	GP 52, 4.0 - 30.0 Nm	443				●		
RE 40, 150 W	163			AB 28	587	124.3			
RE 40, 150 W	163	GP 42, 3.0 - 15.0 Nm	439	AB 28	587	●			
RE 40, 150 W	163	GP 52, 4.0 - 30.0 Nm	443	AB 28	587	●			
RE 50, 200 W	164								128.7
RE 50, 200 W	164	GP 52, 4.0 - 30.0 Nm	443						●
RE 50, 200 W	164	GP 62, 6.2 - 38.5 Nm	445						●
RE 65, 250 W	165								157.3
RE 65, 250 W	165	GP 81, 15.4 - 92.3 Nm	446						●
A-max 26	183-186					63.5			
A-max 26	183-186	GP 26, 0.75 - 4.5 Nm	425			●			
A-max 26	183-186	GP 32, 0.75 - 6.0 Nm	428/429			●			
A-max 26	183-186	GP 32 S	474–482			●			
A-max 32	188						82.3		
A-max 32	188	GP 32, 0.75 - 6.0 Nm	426–429				●		
A-max 32	188	GP 32 S	474–482				●		
EC 32, 80 W	271						78.4		
EC 32, 80 W	271	GP 32, 0.75 - 6.0 Nm	426–431				●		
EC 32, 80 W	271	GP 32 S	474–482				●		
EC 40, 170 W	272							103.4	
EC 40, 170 W	272	GP 42, 3.0 - 15.0 Nm	439					●	
EC 40, 170 W	272	GP 52, 4.0 - 30.0 Nm	443					●	
EC 40, 170 W	272			AB 32	587			141.1	
EC 40, 170 W	272	GP 42, 3.0 - 15.0 Nm	439	AB 32	587			●	
EC 40, 170 W	272	GP 52, 4.0 - 30.0 Nm	443	AB 32	587			●	

Technical data

Supply voltage V_{CC}	5 V ±10%
Typical current draw	55 mA
Output signal	EIA Standard RS 422
driver used:	DS26LS31
Phase shift Φ	90°e ±45°e
Signal rise time (typically, at C_L = 25 pF, R_L = 2.7 kΩ, 25 °C)	180 ns
Signal fall time (typically, at C_L = 25 pF, R_L = 2.7 kΩ, 25 °C)	40 ns
Index pulse width	90°e
Operating temperature range	-40...+100 °C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. angular acceleration	250000 rad s^{-2}
Output current per channel	±20 mA

The index signal I is synchronized with channel A or B.

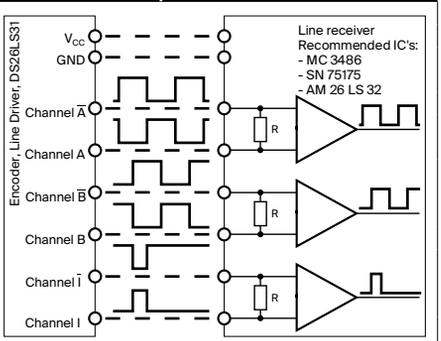
Pin allocation



1 N.C.
2 V_{CC}
3 GND
4 N.C.
5 Channel $\overline{A}$
6 Channel A
7 Channel $\overline{B}$
8 Channel B
9 Channel $\overline{I}$ (Index)
10 Channel I (Index)

Pin type DIN 41651/
EN 60603-13
flat band cable AWG 28

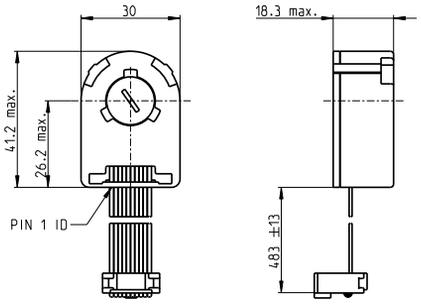
Connection example



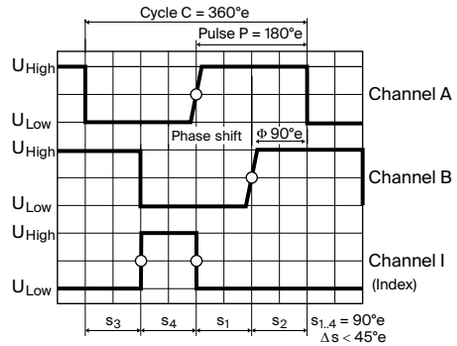
Terminal resistance R = typical 120 Ω

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Encoder HEDL 5540 500 CPT, 3 channels, with line driver RS 422



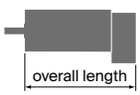


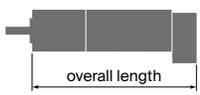


Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

Part numbers	110512	110514	110516	110518
Type				
Counts per turn	500	500	500	500
Number of channels	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8





Modular system

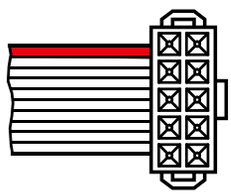
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead			
EC-max 30, 40 W	284					62.7			
EC-max 30, 40 W	284	GP 32, 0.75 - 4.5 Nm	428			●			
EC-max 30, 40 W	284	GP 32, 1.0 - 8.0 Nm	430/432			●			
EC-max 30, 40 W	284	KD 32, 1.0 - 4.5 Nm	435			●			
EC-max 30, 40 W	284	GP 32 S	474–482			●			
EC-max 30, 40 W	284			AB 20	584	98.2			
EC-max 30, 40 W	284	GP 32, 0.75 - 4.5 Nm	428	AB 20	584	●			
EC-max 30, 40 W	284	GP 32, 1.0 - 8.0 Nm	430/432	AB 20	584	●			
EC-max 30, 40 W	284	KD 32, 1.0 - 4.5 Nm	435	AB 20	584	●			
EC-max 30, 40 W	284	GP 32 S	474–482	AB 20	584	●			
EC-max 30, 60 W	285					84.7			
EC-max 30, 60 W	285	GP 32, 0.75 - 4.5 Nm	428			●			
EC-max 30, 60 W	285	GP 32, 1.0 - 8.0 Nm	430/432			●			
EC-max 30, 60 W	285	KD 32, 1.0 - 4.5 Nm	435			●			
EC-max 30, 60 W	285	GP 42, 3.0 - 15.0 Nm	440			●			
EC-max 30, 60 W	285	GP 32 S	474–482			●			
EC-max 30, 60 W	285			AB 20	584	120.2			
EC-max 30, 60 W	285	GP 32, 0.75 - 4.5 Nm	428	AB 20	584	●			
EC-max 30, 60 W	285	GP 32, 1.0 - 8.0 Nm	430/432	AB 20	584	●			
EC-max 30, 60 W	285	KD 32, 1.0 - 4.5 Nm	435	AB 20	584	●			
EC-max 30, 60 W	285	GP 42, 3.0 - 15.0 Nm	440	AB 20	584	●			
EC-max 30, 60 W	285	GP 32 S	474–482	AB 20	584	●			
EC-max 40, 70 W	286						81.4		
EC-max 40, 70 W	286	GP 42, 3.0 - 15.0 Nm	440				●		
EC-max 40, 70 W	286			AB 28	586		110.7		
EC-max 40, 70 W	286	GP 42, 3.0 - 15.0 Nm	440	AB 28	586		●		
EC-max 40, 120 W	287						111.4		
EC-max 40, 120 W	287	GP 42, 3.0 - 15.0 Nm	440				●		
EC-max 40, 120 W	287	GP 52, 4.0 - 30.0 Nm	444				●		
EC-max 40, 120 W	287			AB 28	586		140.7		
EC-max 40, 120 W	287	GP 42, 3.0 - 15.0 Nm	440	AB 28	586		●		
EC-max 40, 120 W	287	GP 52, 4.0 - 30.0 Nm	444	AB 28	586		●		

Technical data

Supply voltage V_{CC}	5 V ±10%
Typical current draw	55 mA
Output signal	EIA Standard RS 422
driver used:	DS26LS31
Phase shift Φ	90°e ±45°e
Signal rise time (typically, at C_L = 25 pF, R_L = 2.7 kΩ, 25 °C)	180 ns
Signal fall time (typically, at C_L = 25 pF, R_L = 2.7 kΩ, 25 °C)	40 ns
Index pulse width	90°e
Operating temperature range	-40...+100 °C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. angular acceleration	250000 rad s^{-2}
Output current per channel	±20 mA

The index signal I is synchronized with channel A or B.

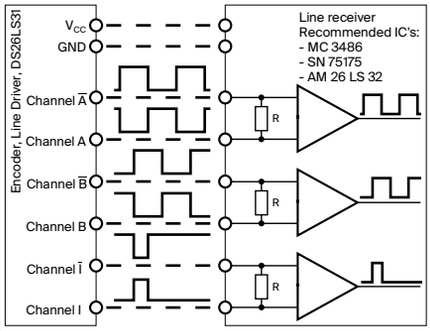
Pin allocation



1 N.C.
2 V_{CC}
3 GND
4 N.C.
5 Channel $\overline{A}$
6 Channel A
7 Channel $\overline{B}$
8 Channel B
9 Channel $\overline{I}$ (Index)
10 Channel I (Index)

Pin type DIN 41651/
EN 60603-13
flat band cable AWG 28

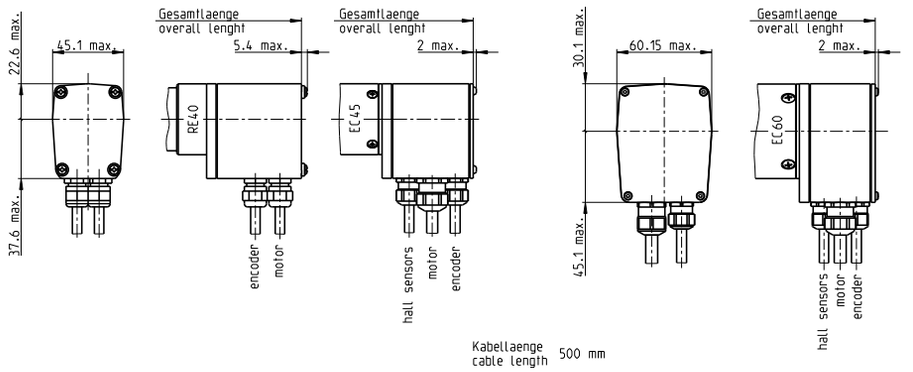
Connection example

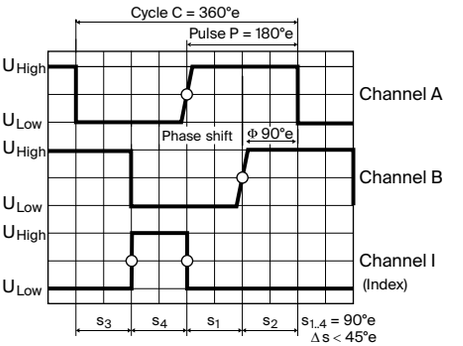


Terminal resistance R = typical 120 Ω

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Encoder HEDL 9140 500 CPT, 3 channels, with line driver RS 422

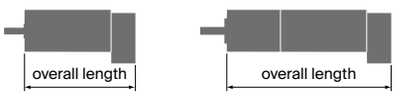




Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

Part numbers	
	137959
Type	
Counts per turn	500
Number of channels	3
Max. operating frequency (kHz)	100
Max. speed (rpm)	12000



Modular system

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / • see Gearhead
RE 40, 150 W	163					125.1
RE 40, 150 W	163	GP 42, 3 - 15 Nm	439			•
RE 40, 150 W	163	GP 52, 4 - 30 Nm	443			•
RE 40, 150 W	163			AB 28	587-588	135.6
RE 40, 150 W	163	GP 42, 3 - 15 Nm	439	AB 28	587-588	•
RE 40, 150 W	163	GP 52, 4 - 30 Nm	443	AB 28	587-588	•
EC 45, 150 W	273					126.8
EC 45, 150 W	273	GP 42, 3 - 15 Nm	439			•
EC 45, 150 W	273	GP 52, 4 - 30 Nm	443			•
EC 45, 150 W	273			AB 28	588	135.6
EC 45, 150 W	273	GP 42, 3 - 15 Nm	439	AB 28	588	•
EC 45, 150 W	273	GP 52, 4 - 30 Nm	443	AB 28	588	•
EC 45, 250 W	274					159.6
EC 45, 250 W	274	GP 42, 3 - 15 Nm	439			•
EC 45, 250 W	274	GP 52, 4 - 30 Nm	443-444			•
EC 45, 250 W	274	GP 62, 6.2 - 38.5 Nm	445			•
EC 45, 250 W	274			AB 28	588	168.4
EC 45, 250 W	274	GP 42, 3 - 15 Nm	439	AB 28	588	•
EC 45, 250 W	274	GP 52, 4 - 30 Nm	443-444	AB 28	588	•
EC 45, 250 W	274	GP 62, 6.2 - 38.5 Nm	445	AB 28	588	•
EC 60, 400 W	275					177.3
EC 60, 400 W	275	GP 81, 15.4 - 92.3 Nm	446			•
EC 60, 400 W	275			AB 41	590	214.9
EC 60, 400 W	275	GP 81, 15.4 - 92.3 Nm	446	AB 41	590	•

Technical data

Supply voltage V_{CC}	5 V ± 10%
Typical current draw	55 mA
Output signal	EIA Standard RS 422
driver used:	DS26LS31
Phase shift Φ	90°e ± 45°e
Signal rise time (typically, at C_L = 25 pF, R_L = 11 kΩ, 25 °C)	180 ns
Signal fall time (typically, at C_L = 25 pF, R_L = 11 kΩ, 25 °C)	40 ns
Index pulse width	90°e
Operating temperature range	-40...+85 °C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. angular acceleration	250000 rad s^{-2}
Output current per channel	± 20 mA

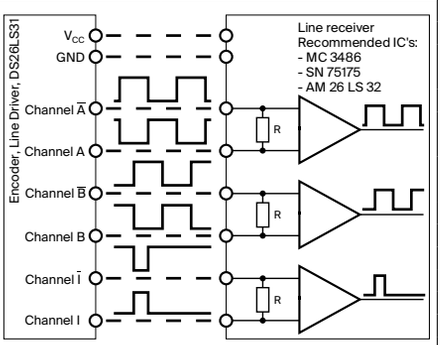
The index signal I is synchronized with channel A or B.

Pin allocation

Cable white = 2 V_{CC} 5 VDC
Cable brown = 3 GND
Cable green = 5 Channel $\overline{A}$
Cable yellow = 6 Channel A
Cable grey = 7 Channel $\overline{B}$
Cable pink = 8 Channel B
Cable blue = 9 Channel $\overline{I}$ (Index)
Cable red = 10 Channel I (Index)

Cable size 8 × 0.25 mm²

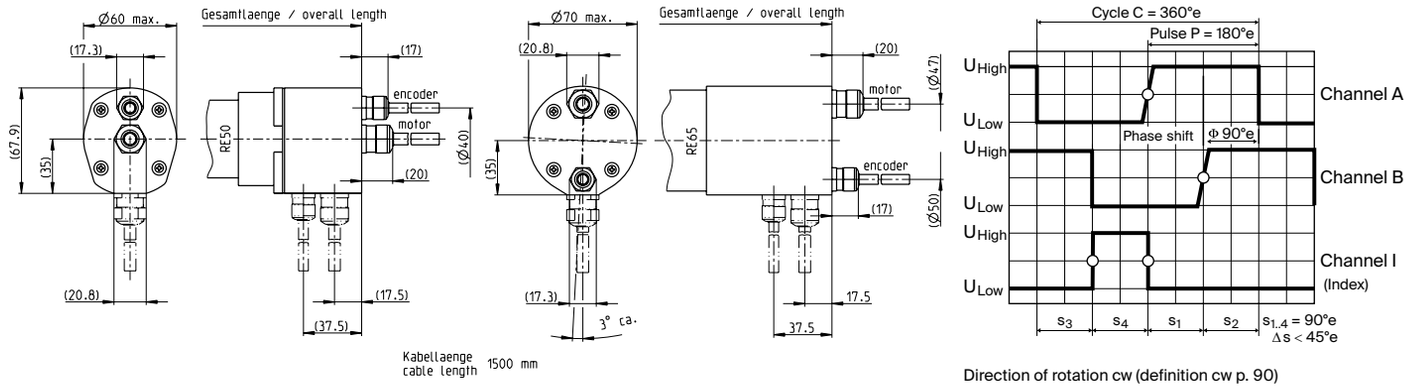
Connection example



Terminal resistance R = typical 120 Ω

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Encoder HEDL 9140 500 CPT, 3 channels, with line driver RS 422

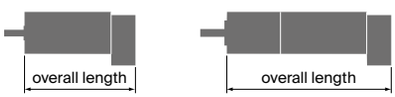


Direction of rotation cw (definition cw p. 90)

Stock program
Standard program
Special program (on request)

Part numbers		
cable outlet axial	386051	386001
cable outlet radial	386053	386002

Type		
Counts per turn	500	500
Number of channels	3	3
Max. operating frequency (kHz)	100	100
Max. speed (rpm)	12000	12000



Modular system

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead	
RE 50, 200 W	164					170.4	
RE 50, 200 W	164	GP 52, 4 - 30 Nm	443			●	
RE 50, 200 W	164	GP 62, 6.2 - 38.5 Nm	445			●	
RE 50, 200 W	164			AB 44	591	183.4	
RE 50, 200 W	164	GP 52, 4 - 30 Nm	443	AB 44	591	●	
RE 50, 200 W	164	GP 62, 6.2 - 38.5 Nm	445	AB 44	591	●	
RE 65, 250 W	165						187.5
RE 65, 250 W	165	GP 81, 15.4 - 92.3 Nm	446				●
RE 65, 250 W	165			AB 44	591		205.5
RE 65, 250 W	165	GP 81, 15.4 - 92.3 Nm	446	AB 44	591		●

Technical data	
Supply voltage V_{CC}	5 V ± 10%
Typical current draw	55 mA
Output signal	EIA Standard RS 422
driver used:	DS26LS31
Phase shift Φ	90°e ± 45°e
Signal rise time (typically, at C_L = 25 pF, R_L = 11 kΩ, 25 °C)	180 ns
Signal fall time (typically, at C_L = 25 pF, R_L = 11 kΩ, 25 °C)	40 ns
Index pulse width	90°e
Operating temperature range	-40...+85 °C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. angular acceleration	250 000 rad s^{-2}
Output current per channel	± 20 mA
Protection to	IP54

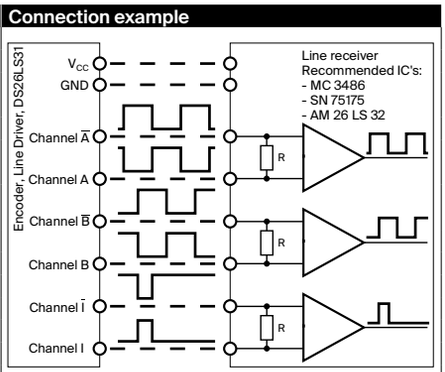
The index signal I is synchronized with channel A or B.

Pin allocation

Encoder
Cable white = V_{CC} 5 VDC
Cable brown = GND
Cable green = Channel $\overline{A}$
Cable yellow = Channel A
Cable grey = Channel $\overline{B}$
Cable pink = Channel B
Cable blue = Channel $\overline{I}$ (Index)
Cable red = Channel I (Index)
Cable size 8 × 0.25 mm²

Motor
Cable white = Motor +
Cable brown = Motor -
Cable size 2 × 1.0 mm²

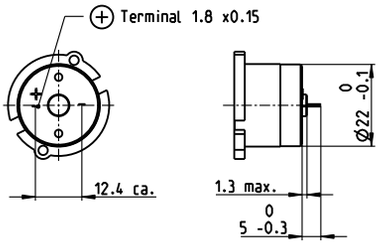
Connection example



Terminal resistance R = typical 120 Ω

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DC Tacho DCT 22 0.52 Volt



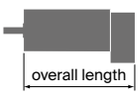


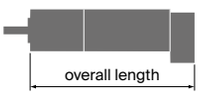
Important information

- Tacho with moving coil, maxon system.
- Tacho with precious metal commutation.
- To establish total inertia add motor and tacho inertias.
- With the output shaft turning CW as seen from the mounting surface, the tacho output voltage will be positive at the + terminal.
- A high impedance load is recommended at tacho terminals.
- The tacho current should be kept low.
- The indicated resonance frequency refers to the motor-tacho rotor system.

Stock program
Standard program
Special program (on request)

Type	Part numbers	
	118909	118910
Shaft diameter (mm)	3	4





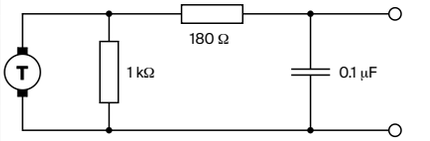
Modular system

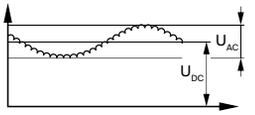
+ Motor	Page	+ Gearhead	Page	Overall length [mm] / • see Gearhead	
RE 25	156/158			76.8	
RE 25	156/158	GP 26, 0.75 - 4.5 Nm	425	•	
RE 25	156/158	GP 32, 0.75 - 4.5 Nm	426/427	•	
RE 25	156/158	GP 32, 1.0 - 6.0 Nm	429	•	
RE 25	156/158	KD 32, 1.0 - 4.5 Nm	435	•	
RE 25	156/158	GP 32 S	474-482	•	
RE 25, 20 W	157			65.3	
RE 25, 20 W	157	GP 22, 0.5 - 1.0 Nm	420	•	
RE 25, 20 W	157	GP 26, 0.75 - 4.5 Nm	425	•	
RE 25, 20 W	157	GP 32, 0.75 - 4.5 Nm	426/427	•	
RE 25, 20 W	157	GP 32, 0.75 - 6.0 Nm	429	•	
RE 25, 20 W	157	KD 32, 1.0 - 4.5 Nm	435	•	
RE 25, 20 W	157	GP 32 S	474-482	•	
RE 35, 90 W	161				89.1
RE 35, 90 W	161	GP 32, 0.75 - 6.0 Nm	426-431		•
RE 35, 90 W	161	GP 32, 4.0 - 8.0 Nm	432		•
RE 35, 90 W	161	GP 42, 3.0 - 15 Nm	439		•
RE 35, 90 W	161	GP 32 S	474-482		•

Technical data

Output voltage per 1000 rpm	0.52 V	Max. current	10 mA
Terminal resistance tacho	37.7 Ω	Tolerance of the output voltage	±15%
Typical peak to peak ripple	≤ 6%	Rotor inertia (tacho only)	< 3 gcm²
Ripple frequency per turn	14	Resonance frequency with motors on p. 156–158	> 2 kHz
Linear voltage tolerance, 500 to 5000 rpm	±0.2%	with motors on p. 161	> 4.5 kHz
Linear voltage tolerance with 10 kΩ load resistance	±0.7%	Temperature range	-20 ... +65°C
Polarity error	±0.1%		
Temperature coefficient of EMF (magnet)	-0.02% /°C	Option: Pigtails in place of solder terminals.	
Temperature coefficient of coil resistance	+0.4% /°C		

Connection example

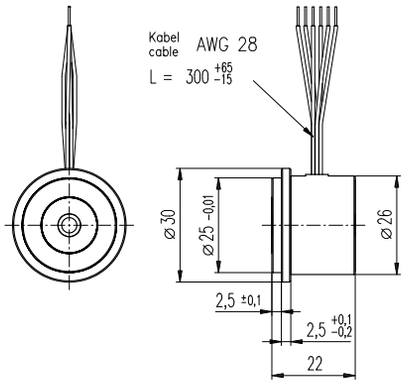


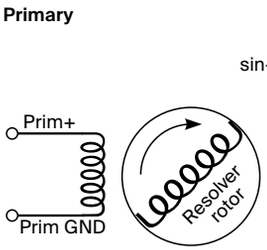


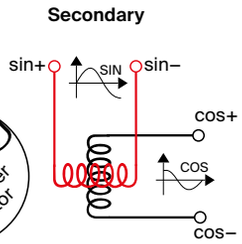
Resonance frequency Motor winding-Tacho winding $f_R \geq 4$ kHz

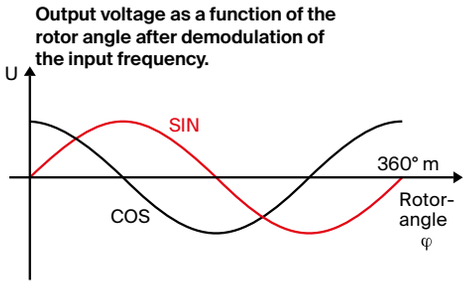
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Resolver Res 26 10 Volt



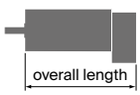


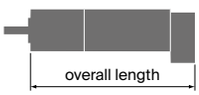




Stock program
Standard program
Special program (on request)

Part numbers	166488	133405	268912	199287
Type				
Shaft diameter (mm)	4	6	6	6
Max. speed (rpm)	10000	10000	10000	10000





Modular system

+ Motor	Page	+ Gearhead	Page	Overall length [mm] / ● see Gearhead				
EC 32, 80 W	271			80.1				
EC 32, 80 W	271	GP 32, 0.75 - 6.0 Nm	426	●				
EC 32, 80 W	271	GP 32 S	474–482	●				
EC 40, 170 W	272				107.2			
EC 40, 170 W	272	GP 42, 3.0 - 15 Nm	439		●			
EC 40, 170 W	272	GP 52, 4.0 - 30 Nm	443		●			
EC 45, 150 W	273					111.2		
EC 45, 150 W	273	GP 42, 3.0 - 15 Nm	439			●		
EC 45, 150 W	273	GP 52, 4.0 - 30 Nm	443			●		
EC 45, 250 W	274					144.0		
EC 45, 250 W	274	GP 42, 3.0 - 15 Nm	439			●		
EC 45, 250 W	274	GP 52, 4.0 - 30 Nm	443–444			●		
EC 45, 250 W	274	GP 62, 6.2 - 38.5 Nm	445			●		
EC 60, 400 W	275						177.3	
EC 60, 400 W	275	GP 81, 15.4 - 92.3 Nm	446				●	

Technical data	
Input voltage	10 V peak, 10 kHz
Transmission ratio	0.5
Electrical error	±10 minutes
Rotor inertia	6 gcm²
Weight	40 g
Operating temperature range	-55...+155°C

Pin allocation

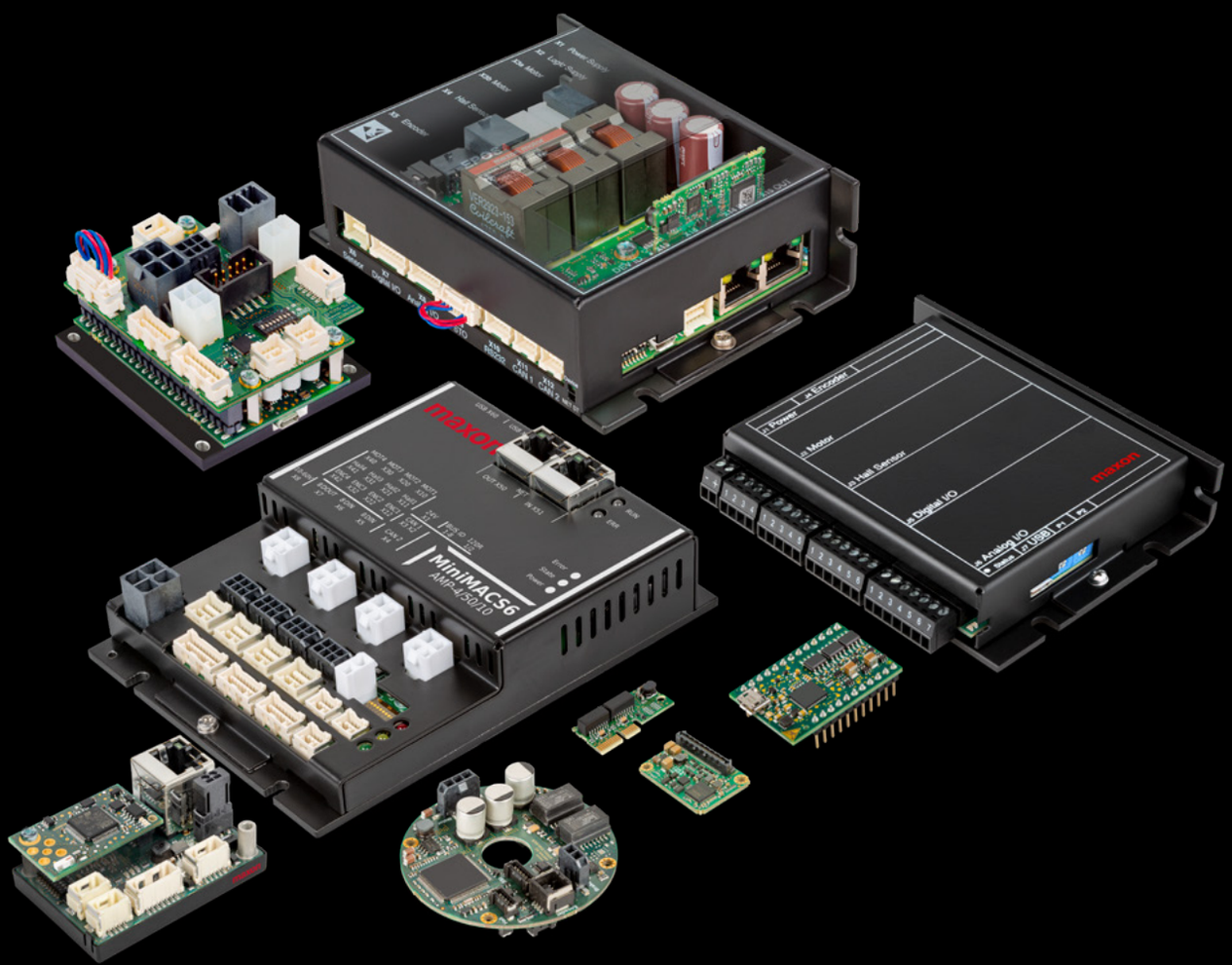
	EC 32/EC 40	EC 45/EC 60
Prim +	red/white	white
Prim GND	yellow/white	brown
cos +	red	green
sin +	yellow	yellow
cos –	schwarz	grey
sin –	blue	pink

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For your personal notes

maxon motor & motion control

1-Q-EC servoamplifier		546–547
ESCON servo controllers		548–553
ESCON2 servo controllers	NEW	554–557
Positioning control units EPOS4		560–571
MACS Motion Controller		572–577
Summary motor control		579
Summary motor control Accessories		580–581
Summary motor control		582



Various 4-quadrant PWM servo controllers for permanent magnet-activated brushed DC motors and brushless EC motors meet all requirements in terms of performance and functionality. Thanks to the fast current controller and dynamic speed controller, outstanding control characteristics are achieved. Combined with maxon high-dynamic motors and Master Controllers, the positioning controllers constitute complete solutions for highly demanding Motion Control applications.

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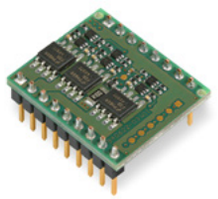
1-Q-EC Amplifier Summary

The basic function of EC motors electronics is the electronic commutation of the motor winding.

Simple speed controls are possible with Hall sensors. A further distinction is made between open or closed loop speed control.

1-Q amplifier functions in motor operation. Direction reverse via digital signal.

DEC Module 24/2 1-Q-EC Amplifier



The DEC Module 24/2 (Digital EC Controller) is a 1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 48 watts.
Technical data page 547.

Operating modes
Digital speed control or open loop speed control operation can be preset by a digital signal.

Excellent price-performance ratio
Reasonably priced 1-Q-EC amplifier optimized for OEM applications in small appliances.

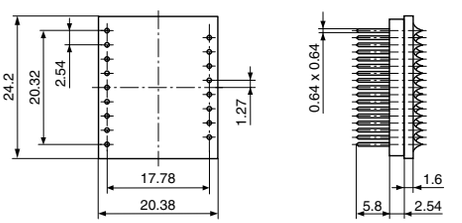
OEM Module
Miniaturized open electronics board. Two connector arrays arranged in a 2.54 mm (0.1“) pattern support easy connectivity and integration into the motherboard.

Functionality
Direction of rotation preset by a digital signal. The motor shaft can be enabled or disabled. Adjustable maximum current limitation. Set value speed input through external analog voltage. Status indicator with “Ready”-Output.

Protection circuit
The power amplifier is protected against thermal overload and the control inputs against overvoltage.

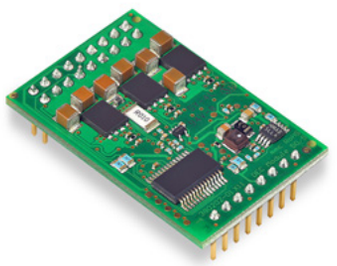
DEC Module 24/2

Connections	
Male header	8 + 9 = 17 poles
Pitch	2.54 mm
DEC Module 24/2	**367661**



Dimensions in [mm]

DEC Module 50/5 1-Q-EC Amplifier



The DEC Module 50/5 (Digital EC Controller) is a 1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 250 watts.
Technical data page 547.

Operating modes
Digital speed control or open loop speed control operation can be preset by a digital signal.

Excellent price-performance ratio
Reasonably priced 1-Q-EC amplifier optimised for OEM applications in small appliances.

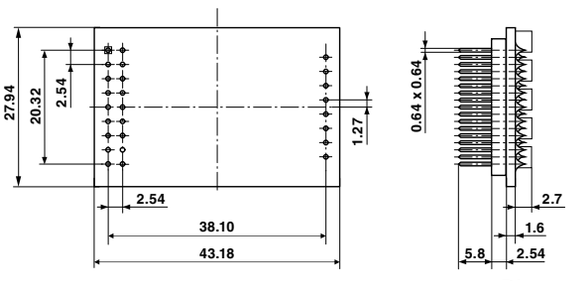
OEM Module
Miniaturized open electronics board. Connector arrays arranged in a 2.54 mm (0.1“) pattern support easy connectivity and integration into the motherboard.

Functionality
Direction of rotation preset by a digital signal. The motor shaft can be enabled or disabled. Adjustable maximum current limitation. Set value speed input through external analog voltage. Speed can be monitored through the speed monitor output. Status indicator with “Ready”-Output.

Protection circuit
The power amplifier is protected against thermal overload and the control inputs against overvoltage.

DEC Module 50/5

Connections	
Male header 1	2 rows, 2 x 9 poles
Male header 2	1 row, 8 poles
Pitch	2.54 mm
DEC Module 50/5	**380200**



Dimensions in [mm]

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1-Q-EC Amplifier Data





DEC Module 24/2 1-Q-EC Amplifier
1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 48 watts.

DEC Module 50/5 1-Q-EC Amplifier
1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 250 watts.

	DEC Module 24/2	DEC Module 50/5
EC motors up to (continuous / maximum)	48 W / 72 W	250 W / 500 W
Sensors		
	Digital Hall Sensors	Digital Hall Sensors
Operating mode		
	Speed controller (closed and open loop)	Speed controller (closed and open loop)
Electrical data		
Operating voltage V_{CC}	8 - 24 VDC (optional 5.0 VDC)	6 - 50 VDC (optional 5.0 VDC)
Max. output voltage	V_{CC}	0.95 x V_{CC}
Max. output current I_{max}	3 A	10 A
Continuous output current I_{cont}	2 A	5 A
Switching frequency of power stage	46.8 kHz	46.8 kHz
Max. speed (1 pole pair)	80 000 rpm	80 000 rpm
Input		
Set value	“Speed” 0...5 V (1024 steps)	“Speed” 0...5 V (1024 steps)
Current limit	“Current Limit” external resistor against GND	“Current Limit” external resistor against GND
Enable	“Enable” 2.4...24 V	“Enable” 2.4...50 V
Direction	“Direction” 2.4...24 V	“Direction” 2.4...50 V
Output		
Monitor		“Monitor n”, digital (5 V)
Status reading “Ready”	“Ready”, digital (5 V)	“Ready”, digital (5 V)
Voltage outputs		
Hall sensors supply voltage V_{CC} Hall	5 VDC, max. 35 mA	5 VDC, max. 35 mA
Possible adjustments	Input “Mode 0” and “Mode 1”	Input “Mode 0” and “Mode 1”
Protective functions		
Blockage protection	Motor current limitation if motor shaft is blocked for longer than 1.5 s	Motor current limitation if motor shaft is blocked for longer than 1.5 s
Thermal protection of power stage	T > 95 °C	T > 100 °C
Under- / Overvoltage protection	Switches off when V_{CC} < 6.5 V or V_{CC} > 30 V	Switches off when V_{CC} < 6 V or V_{CC} > 56 V
Ambient temperature and humidity range		
Operation	-10...+45 °C	-10...+45 °C
Storage	-40...+85 °C	-40...+85 °C
No condensation	20...80%	20...80%
Mechanical data		
Weight	Approx. 4 g	Approx. 9 g
Dimensions (L x W x H)	24.2 x 20.38 x 12.7 mm (see page 546)	43.18 x 27.94 x 12.7 mm (see page 546)
Mounting	mountable on socket terminal strips pitch 2.54 mm	mountable on socket terminal strips pitch 2.54 mm
Connections	See page 546	See page 546
Part numbers		
	367661 DEC Module 24/2 1-Q-EC Amplifier	380200 DEC Module 50/5 1-Q-EC Amplifier
Accessories		
	370652 DEC Module Eva-Board	370652 DEC Module Eva-Board

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ESCON servo controller Overview

The ESCON servo controllers are small-sized, powerful 4-quadrant PWM servo controller for the highly efficient control of permanent magnet-activated DC motors.

The featured operating modes – speed control (closed loop), speed control (open loop), and current control – meet the highest requirements. The ESCON servo controllers are designed being commanded by an analog set value and features extensive analog and digital I/O functionality and are being configured via USB interface using the graphical user interface "ESCON Studio".

ESCON Module 24/2
466023



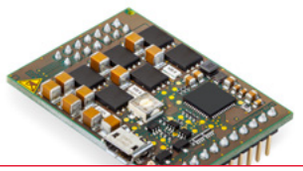
ESCON 36/2 DC
403112



ESCON 36/3 EC
414533



ESCON Module 50/4 EC-S
446925



ESCON Module 50/5
438725



ESCON 50/5
409510



ESCON Module 50/8 HE
532872
586137



ESCON 70/10
422969



Depending on the ESCON variant, the following **motor types** can be operated
- DC motor: Permanent-magnet DC motor
- EC motor: Brushless, electronically commutated permanent-magnet DC motor (BLDC) with and without Hall sensors.

Various **operating modes** allow an adaptable use in a wide range of drive systems
- Current controller: The current controller compares the actual motor current (torque) with the applied set value. In case of deviation, the motor current is dynamically readjusted.
- Speed controller (closed loop): The closed loop speed controller compares the actual speed signal with the applied set value. In case of deviation, the speed is dynamically readjusted.
- Speed controller (open loop): The open loop speed controller feeds the motor with a voltage proportional to the applied speed set value. Changes in load are compensated using the IxR methodology.

Speed measurement by
- Digital incremental encoder: The encoders deliver simple square signals for further processing. Their impulses are counted to determine the speed. Channels A and B are phase-shifted signals, which are being compared to determine the direction of rotation.
- DC tacho: The DC tacho delivers a speed-proportional analog voltage.
- Available Hall sensors: The Hall sensors deliver six different combinations of switching impulses per electrical turn which are counted to determine speed. They also deliver phase-shifted signals that are being compared to determine the direction of rotation.
- Sensorless EC: The speed is determined by the progression of the induced voltage. The electronics evaluates the zero crossing of the induced voltage (EMF).

To the numerous **inputs** and **outputs,** various functionalities can be assigned to.

Set value (speed or current), **current limitation,** as well as **offset** can be assigned as follows.
- Analog value: The value is defined by an analog voltage set via external or internal potentiometer.
- PWM value: The value is defined by fixed frequency and amplitude. The desired change is achieved by variation of the duty cycle of 10...90%.
- RC Servo Value: The value is set with a signal pulse with a duration of 1.0...2.0 ms.
- Fixed value: The value is defined by a fixed preset value.
- 2 fixed values: Value 1 is defined by a fixed preset value 1. Value 2 is defined by a fixed preset value 2. A digital input is used to switch between the two preset values.

Various functionalities are available to **enable** the power stage.
- Enable: Enables or disables the power stage.
- Enable & Direction: Enables or disables the power stage and determines the motor shaft's direction of rotation.

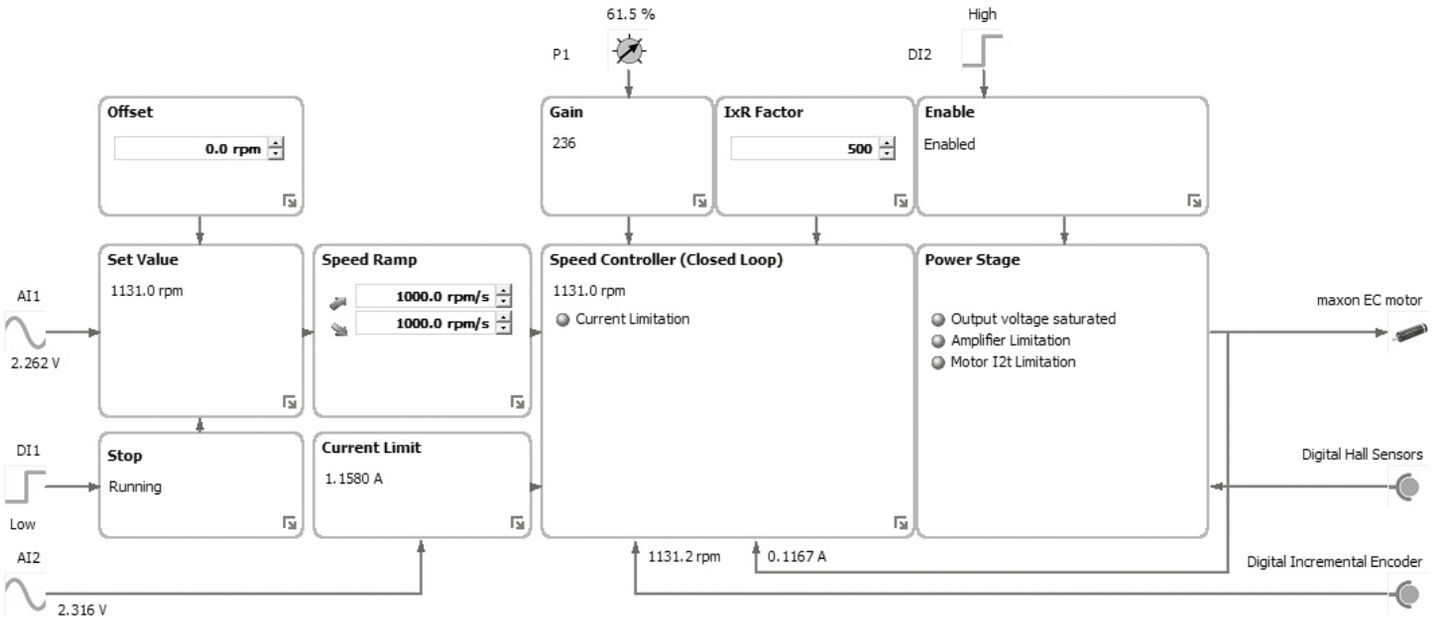
Software
Installation Program: ESCON Setup
Graphical User Interface: ESCON Studio
✓ Startup Wizard
✓ Regulation Tuning
✓ Diagnostic
✓ Firmware Update
✓ Controller Monitor
✓ Parameters
✓ Data Recording
✓ Online Help
Language: German, English, French, Italian, Spanish, Japanese, Chinese
Operating System: Windows 10, Windows 8, Windows 7, Windows XP SP3
Communication interface: USB 2.0/3.0 (full speed)

Easy startup
Startup and parameterization are performed using the intuitive graphical user interface "ESCON Studio" with the help of simple to use, menu-guided wizards. The following wizards are available: Startup, Regulation Tuning, Firmware Update, Controller Monitor, Parameters, Data Recording, and Diagnostics.

Protective equipment
The servo controller has protective circuits against overcurrent, excess temperature, under- and overvoltage, against voltage transients, and against short-circuits in the motor cable. Furthermore it is equipped with protected digital inputs and outputs and an adjustable current limitation for protecting the motor and the load. The motor current and the actual speed of the motor shaft can be monitored by means of the analog output voltage.

Comprehensive documentation
Using the "Feature Comparison Chart", the suitable ESCON servo controller can easily be determined. The "Hardware Reference" comprises the specifications of the hardware in detail. The documents "Firmware Version" and "Release Notes" describe changes and improvements of firmware and software. In addition, the graphical user interface "ESCON Studio" features a comprehensive online help.

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ESCON Studio (Controller Monitor)

– Enable CW: Enables or disables the power stage in direction of rotation-dependent sense. The rotor can only turn clockwise (CW).
– Enable CCW: Enables or disables the power stage in direction of rotation-dependent sense. The rotor can only turn counterclockwise (CCW).
– Enable CW & CCW: Enables or disables the power stage in direction of rotation-dependent sense. The rotor can only turn in defined direction. The signals are interlocked against each other.

The **ramp function** permits controlled acceleration/deceleration of the motor shaft in both, open loop and closed loop speed controller mode.
– Analog ramp: The ramp is defined by a variable analog value.
– Fixed ramp: The ramp is defined by a fixed preset value.

Stop: The motor shaft decelerates with preset speed ramp until complete standstill.

Ready: The Ready signal can be used to transmit the operational status (respectively fault) to a superior control.

Speed and Current Comparator: The digital output is set depending on the actual value.
– Limit: The digital output is set as soon as the preset value is reached. It remains set as long as the value is exceeded.
– Range: The digital output is set as soon as the preset value range is reached. It remains set as long as the value remains in range.
– Deviation: The digital output is set as soon as the preset value deviation (based on the set value) is in range.

With the integrated **potentiometers** the additional following functions can be adjusted
– Current Gain: Adjustment of the current controller gain.
– Speed Gain: Adjustment of the speed controller gain.
– IxR Factor: The voltage drop caused by terminal resistance will be compensated in the range of [0...1000...2000].

Analog outputs allow monitoring of
– Actual current: Actually measured motor winding current.
– Actual current averaged: Actually measured motor winding current filtered by first order digital low-pass filter with a cut-off frequency of 5 Hz.
– Actual speed: Actually measured motor speed.
– Actual speed averaged: Actually measured motor speed filtered by 1st order digital low-pass filter with a cut-off frequency of 5 Hz.
– Demand Current: Demanded motor winding current.
– Demand Speed: Demanded motor speed.
– Temperature Power Stage: Actually measured power stage temperature.
– Fixed value: The output voltage is said fixed to the preset value.

Accessories ESCON (not included in delivery)		466023 Module 24/2	403112 36/2 DC	414533 36/3 EC	446925 Module 50/4 EC-S	438725 Module 50/5	532872 Module 50/8	586137 Module 50/8 HE	409510 50/5	422969 70/10
404404	ESCON 36/2 DC Connector Set		✓							
425255	ESCON 36/3 EC Connector Set			✓						
403962	DC Motor Cable		✓							
403964	I/O Cable 7core (analog I/O's)		✓	✓						
403965	I/O Cable 6core (digital I/O's)		✓	✓						
275934	Encoder Cable		✓						✓	✓
403957	Power Cable		✓	✓						
403968	USB Type A - micro B Cable	✓	✓	✓	✓	✓	✓	✓	✓	✓
418719	Adapter BLACK FPC11poles			✓						
418723	Adapter BLUE FPC8poles			✓						
418721	Adapter GREEN FPC8poles			✓						
486400	ESCON Module 24/2 Motherboard	✓								
438779	ESCON Module Motherboard					✓				
586048	ESCON Module 50/8 Motherboard						✓	✓		
450237	ESCON Module Motherboard Sensorless				✓					
586142	ESCON Module 50/8 Thermal Pad						✓			

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ESCON Data





	ESCON Module 24/2	ESCON 36/2 DC
DC motors up to (continuous / maximum)	48 W / 144 W	72 W / 144 W
EC motors up to (continuous / maximum)	48 W / 144 W	–
Sensors		
	Digital Incremental Encoder (2 channel with or without Line Driver)	Digital Incremental Encoder (2 channel with or without Line Driver)
	DC Tacho	DC Tacho
	Without sensor (DC motors)	Without sensor (DC motors)
	Digital Hall Sensors (EC motors)	–
Operating mode		
	Current controller (torque control), Speed controller (closed and open loop)	Current controller (torque control), Speed controller (closed and open loop)
Electrical data		
Nominal operating voltage V_{CC}	10 - 24 VDC	10 - 36 VDC
Max. output voltage	0.98 x V_{CC}	0.98 x V_{CC}
Max. output current	6 A (<4 s)	4 A (<60 s)
Continuous output current	2 A	2 A
Pulse width modulation frequency	53.6 kHz	53.6 kHz
Sampling rate PI current controller	53.6 kHz	53.6 kHz
Sampling rate PI speed controller	5.36 kHz	5.36 kHz
Max. efficiency	92%	95%
Max. speed (DC)	limited by max. speed (motor) and max. output voltage (controller)	limited by max. speed (motor) and max. output voltage (controller)
Max. speed (EC; 1 pole pair)	150 000 rpm	–
Built-in motor choke	–	300 µH / 2 A
Inputs/Outputs		
Hall sensor signals	H1, H2, H3	–
Encoder signals	A, A\, B, B\	A, A\, B, B\
Max. encoder input frequency differential (single-ended)	1 MHz (100 kHz)	1 MHz (100 kHz)
Potentiometers	–	1
Digital inputs	2	2
Digital inputs/outputs	2	2
Analog inputs	2	2
Resolution, Range, Circuit	12-bit, -10...+10 V, differential	12-bit, -10...+10 V, differential
Analog outputs	2	2
Resolution, Range, Max. output current	12-bit, -4...+4 V, 1 mA	12-bit, -4...+4 V, 1 mA
Auxiliary voltage output	5 VDC (IL ≤10 mA)	5 VDC (IL ≤10 mA)
Hall sensor supply voltage	5 VDC (IL ≤30 mA)	–
Encoder supply voltage	5 VDC (IL ≤70 mA)	5 VDC (IL ≤70 mA)
Status Indicators	Operation: green LED / Error: red LED	Operation: green LED / Error: red LED
Environmental conditions		
Temperature – Operation	-30...+60 °C	-30...+45 °C
Temperature – Extended range	60...80 °C; Derating: -0.100 A/°C	45...81 °C; Derating: -0.056 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	Approx. 7 g	Approx. 30 g
Dimensions (L x W x H)	35.6 x 26.7 x 12.7 mm	55.0 x 40.0 x 16.1 mm
Mounting holes	Plugable (socket headers with 2.54 mm pitch)	for screws M2.5
Part numbers		
	466023 ESCON Module 24/2	403112 ESCON 36/2 DC
	Order accessories separately, from page 549	Order accessories separately, from page 549

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ESCON Data







ESCON 36/3 EC	ESCON Module 50/4 EC-S	ESCON Module 50/5
	–	250 W / 750 W
97 W / 324 W	200 W / 600 W	250 W / 750 W
Sensors		
–	–	Digital Incremental Encoder (2 channel with or without Line Driver)
–	–	DC Tacho
–	Without sensor (EC motors)	Without sensor (DC motors)
Digital Hall Sensors (EC motors)	–	Digital Hall Sensors (EC motors)
Operating mode		
Current controller (torque control), Speed controller (closed and open loop)	Speed controller (closed and open loop)	Current controller (torque control), Speed controller (closed and open loop)
Electrical data		
10 - 36 VDC	10 - 50 VDC	10 - 50 VDC
0.98 x V_{CC}	0.96 x V_{CC}	0.98 x V_{CC}
9 A (<4 s)	12 A (<30 s)	15 A (<20 s)
2.7 A	4 A	5 A
53.6 kHz	53.6 kHz	53.6 kHz
53.6 kHz	–	53.6 kHz
5.36 kHz	5.36 kHz	5.36 kHz
95%	97%	98%
–	–	limited by max. speed (motor) and max. output voltage (controller)
150 000 rpm	120 000 rpm	150 000 rpm
3 x 47 µH / 2.7 A	–	–
Inputs/Outputs		
H1, H2, H3	–	H1, H2, H3
–	–	A, A\, B, B\
–	–	1 MHz (100 kHz)
1	1	1
2	2	2
2	2	2
2	2	2
12-bit, -10...+10 V, differential	12-bit, -10...+10 V, differential	12-bit, -10...+10 V, differential
2	2	2
12-bit, -4...+4 V, 1 mA	12-bit, -4...+4 V, 1 mA	12-bit, -4...+4 V, 1 mA
5 VDC (IL ≤10 mA)	5 VDC (IL ≤110 mA)	5 VDC (IL ≤10 mA)
5 VDC (IL ≤30 mA)	–	5 VDC (IL ≤30 mA)
–	–	5 VDC (IL ≤70 mA)
Operation: green LED / Error: red LED	Operation: green LED / Error: red LED	Operation: green LED / Error: red LED
Environmental conditions		
-30...+45 °C	-30...+45 °C	-30...+45 °C
45...78 °C; Derating: -0.082 A/°C	45...65 °C; Derating: -0.200 A/°C	45...75 °C; Derating: -0.167 A/°C
-40...+85 °C	-40...+85 °C	-40...+85 °C
5...90%	5...90%	5...90%
Mechanical data		
Approx. 36 g	Approx. 11 g	Approx. 12 g
55.0 x 40.0 x 19.8 mm	43.2 x 31.8 x 12.7 mm	43.2 x 31.8 x 12.7 mm
for screws M2.5	Plugable (socket headers with 2.54 mm pitch)	Plugable (socket headers with 2.54 mm pitch)
Part numbers		
414533 ESCON 36/3 EC	**446925** ESCON Module 50/4 EC-S	**438725** ESCON Module 50/5
Order accessories separately, from page 549	Order accessories separately, from page 549	Order accessories separately, from page 549

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ESCON Data





	ESCON Module 50/8	ESCON Module 50/8 HE
DC motors up to (continuous / maximum)	400 W / 750 W	400 W / 750 W
EC motors up to (continuous / maximum)	400 W / 750 W	400 W / 750 W
Sensors		
	Digital Incremental Encoder (2 channel with or without Line Driver)	Digital Incremental Encoder (2 channel with or without Line Driver)
	DC Tacho	DC Tacho
	Without sensor (DC motors)	Without sensor (DC motors)
	Digital Hall Sensors (EC motors)	Digital Hall Sensors (EC motors)
Operating mode		
	Current controller (torque control), Speed controller (closed and open loop)	Current controller (torque control), Speed controller (closed and open loop)
Electrical data		
Nominal operating voltage V_{CC}	10 - 50 VDC	10 - 50 VDC
Max. output voltage	0.98 x V_{CC}	0.98 x V_{CC}
Max. output current	15 A (<20 s)	15 A (<20 s)
Continuous output current	8 A	8 A
Pulse width modulation frequency	53.6 kHz	53.6 kHz
Sampling rate PI current controller	53.6 kHz	53.6 kHz
Sampling rate PI speed controller	5.36 kHz	5.36 kHz
Max. efficiency	99%	99%
Max. speed (DC)	limited by max. speed (motor) and max. output voltage (controller)	limited by max. speed (motor) and max. output voltage (controller)
Max. speed (EC; 1 pole pair)	150 000 rpm	150 000 rpm
Built-in motor choke	–	–
Inputs/Outputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\	A, A\, B, B\
Max. encoder input frequency differential (single-ended)	1 MHz (100 kHz)	1 MHz (100 kHz)
Potentiometers	–	–
Digital inputs	2	2
Digital inputs/outputs	2	2
Analog inputs	2	2
Resolution, Range, Circuit	12-bit, -10...+10 V, differential	12-bit, -10...+10 V, differential
Analog outputs	2	2
Resolution, Range, Max. output current	12-bit, -4...+4 V, 1 mA	12-bit, -4...+4 V, 1 mA
Auxiliary voltage output	5 VDC (IL ≤10 mA)	5 VDC (IL ≤10 mA)
Hall sensor supply voltage	5 VDC (IL ≤30 mA)	5 VDC (IL ≤30 mA)
Encoder supply voltage	5 VDC (IL ≤70 mA)	5 VDC (IL ≤70 mA)
Status Indicators	Operation: green LED / Error: red LED	Operation: green LED / Error: red LED
Environmental conditions		
Temperature – Operation	-40...+45 °C	-40...+65 °C
Temperature – Extended range	45...85 °C; Derating: see device reference	65...92 °C; Derating: see device reference
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	Approx. 16 g	Approx. 84 g
Dimensions (L x W x H)	53.3 x 37.5 x 14.5 mm	53.3 x 37.5 x 30.6 mm
Mounting holes	Plugable (socket headers with 2.54 mm pitch)	Plugable (socket headers with 2.54 mm pitch)
Part numbers		
	532872 ESCON Module 50/8	586137 ESCON Module 50/8 HE
	Order accessories separately, from page 549	Order accessories separately, from page 549

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ESCON Data





	ESCON 50/5	ESCON 70/10
DC motors up to (continuous / maximum)	250 W / 750 W	700 W / 2100 W
EC motors up to (continuous / maximum)	250 W / 750 W	700 W / 2100 W
Sensors		
	Digital Incremental Encoder (2 channel with or without Line Driver)	Digital Incremental Encoder (2 channel with or without Line Driver)
	DC Tacho	DC Tacho
	Without sensor (DC motors)	Without sensor (DC motors)
	Digital Hall Sensors (EC motors)	Digital Hall Sensors (EC motors)
Operating mode		
	Current controller (torque control), Speed controller (closed and open loop)	Current controller (torque control), Speed controller (closed and open loop)
Electrical data		
Nominal operating voltage V_{CC}	10 - 50 VDC	10 - 70 VDC
Max. output voltage	0.98 x V_{CC}	0.95 x V_{CC}
Max. output current	15 A (<20 s)	30 A (<20 s)
Continuous output current	5 A	10 A
Pulse width modulation frequency	53.6 kHz	53.6 kHz
Sampling rate PI current controller	53.6 kHz	53.6 kHz
Sampling rate PI speed controller	5.36 kHz	5.36 kHz
Max. efficiency	95%	98%
Max. speed (DC)	limited by max. speed (motor) and max. output voltage (controller)	limited by max. speed (motor) and max. output voltage (controller)
Max. speed (EC; 1 pole pair)	150 000 rpm	150 000 rpm
Built-in motor choke	3 x 30 µH / 5 A	3 x 15 µH / 10 A
Inputs/Outputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\	A, A\, B, B\
Max. encoder input frequency differential (single-ended)	1 MHz (100 kHz)	1 MHz (100 kHz)
Potentiometers	2	2
Digital inputs	2	2
Digital inputs/outputs	2	2
Analog inputs	2	2
Resolution, Range, Circuit	12-bit, -10...+10 V, differential	12-bit, -10...+10 V, differential
Analog outputs	2	2
Resolution, Range, Max. output current	12-bit, -4...+4 V, 1 mA	12-bit, -4...+4 V, 1 mA
Auxiliary voltage output	5 VDC (IL ≤10 mA)	5 VDC (IL ≤10 mA)
Hall sensor supply voltage	5 VDC (IL ≤30 mA)	5 VDC (IL ≤30 mA)
Encoder supply voltage	5 VDC (IL ≤70 mA)	5 VDC (IL ≤70 mA)
Status Indicators	Operation: green LED / Error: red LED	Operation: green LED / Error: red LED
Environmental conditions		
Temperature – Operation	-30...+45 °C	-30...+45 °C
Temperature – Extended range	45...85 °C; Derating: -0.111 A/°C	45...82 °C; Derating: -0.270 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	Approx. 204 g	Approx. 259 g
Dimensions (L x W x H)	115 x 75.5 x 24 mm	125 x 78.5 x 27 mm
Mounting holes	for screws M4	for screws M4
Part numbers		
	409510 ESCON 50/5	422969 ESCON 70/10
	Order accessories separately, from page 549	Order accessories separately, from page 549

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ESCON2 servo controller Overview

Modules

Nano

ESCON2 Nano 24/2 **NEW**



Micro

ESCON2 Micro 60/5 **NEW**



Module

ESCON2 Module 60/12 **NEW**



ESCON2 Module 60/30



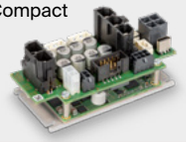
Ready-to-connect units

Compact

ESCON2 Compact 60/12 **NEW**



ESCON2 Compact 60/30



Easy-to-use

Efficient

Powerful

Graphical User Interface

GUI

The ESCON2 product line from maxon consists of compact, powerful 4-quadrant PWM servo controllers. Their high power density provides flexibility for use with brushed DC motors and brushless EC motors (BLDC) up to 1,800 W continuous power with various feedback options, such as Hall sensors, incremental encoders, and absolute encoders in a variety of drive applications. The ESCON2 servo controllers are specially designed for commanding and controlling on the basis of analog and digital set values and for use as slave nodes in a CANopen network. They also boast extensive analog and digital I/O functionality. The latest technologies, such as field-oriented control (FOC) and feed-forward acceleration/velocity control in combination with the highest cycle rates, enable sophisticated yet user-friendly motion control, even if the position sensor resolution is limited. The Motion Studio graphical user interface, available free of charge, enables fast configuration, convenient monitoring and analysis, and automated tuning of all drive systems.

Modules
Robotic, analysis, and handing systems require compact integration of a large number of energy-efficient drives, combined with highly dynamic controllers and a linked bus system. With the ESCON2 Modules, Micro and Nano, modular multi-axis systems can be set-up using CANopen without needing high investment in development.

Ready-to-connect units
A variety of ready-to-connect controllers in various power classes and designs of the ESCON2 product line provide attractive economical options for easy integration in mechanical and equipment engineering.

Motion Studio software
The Motion Studio software is available free of charge and provides intuitive tools and wizards that make commissioning easy. It provides a basic overview of the functionality of ESCON2 servo controllers and offers a wide range of configuration and command options. The package is rounded out by analysis tools, such as Data Recorder or I/O Monitor.

I/O functionality
ESCON2 features a comprehensive set of analog and digital inputs and outputs for process control in standalone mode. For example, set values and offsets for current and speed can be used as switchable fixed values, PWM values, or analog values in command operations. Control signals for activation, direction, stop, ramps, and limit switches can also be incorporated, as can feedback signals (analog/digital) for current, speed, and the actual device status.

I/O current mode (IOCM)
The configured inputs deliver the set value current and the target torque. The current control loop runs on the ESCON2.

I/O velocity mode (IOVM)
The configured inputs deliver the velocity demand value. The speed controller with inner current control loop runs on the ESCON2.

CANopen
As a standardized motion control slave, ESCON2 can easily be integrated into the system manager tools and motion libraries of various PLC manufacturers. The data exchange and command functions make use of the CiA® 402 protocol (Device Profile for Drives and Motion Control).

Cyclic Synchronous Torque (CST)
The master executes the path planning and sends the target torque cyclically and synchronously to the ESCON2 via the network. The torque/current control loop runs on the ESCON2. The ESCON2 sends the sensor measurements for the actual speed and current values to the master.

Cyclic Synchronous Velocity (CSV)
The master executes the path planning and sends the target speed cyclically and synchronously via the network to the ESCON2 on which

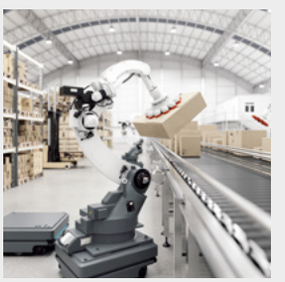
ESCON2 features
- Very high power density
- Optimized efficiency
- Extensive I/O functionality
- Sinusoidal commutation (FOC)
- Current and velocity controller with high performance even if the position sensor resolution is limited
- Configurable protective functions for controller and drive
- I/O standalone mode or CANopen slave in accordance with CiA 301, 402, 305; alternatively, can be configured and receive commands via USB or serial interface (RS232)
- Easy to configure and commission with Motion Studio GUI
- All software components are available for free
- Full documentation and outstanding support











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ESCON2 Overview

Accessories ESCON2 (not included in delivery)	809635 ESCON2 Nano 24/2	809631 ESCON2 Micro 60/5	854796 ESCON2 Module 60/12	783722 ESCON2 Module 60/30	854801 ESCON2 Compact 60/12	783734 ESCON2 Compact 60/30
854800 ESCON2 CB 60/12		✓				
783729 ESCON2 CB 60/30				✓		
809646 ESCON2 EB Micro		✓				
834838 ESCON2 EB Nano	✓					
841890 ESCON2 Micro 60/5 Thermal Accessory Kit		✓				
902315 ESCON2 Module 60/12 Heat Spreader			✓			
902308 ESCON2 Module 60/12 Thermal Accessory Kit			✓			
816161 ESCON2 Module 60/30 Heat Spreader				✓		
802197 ESCON2 Module 60/30 Thermal Pad				✓		
876085 ESCON2 Nano 24/2 Thermal Accessory Kit	✓					
520858 CAN-CAN Cable				✓	✓	✓
520857 CAN-COM Cable				✓	✓	
275934 Encoder Cable				✓	✓	
275878 Hall Sensor Cable				✓	✓	
846645 Motion Connector Set Highest Current					✓	
846644 Motion Connector Set				✓		
520851 Motor Cable High Current					✓	
710930 Motor Cable High Current				✓		
838460 Motor Cable Highest Current					✓	
847301 NTC Cable				✓	✓	
275829 Power Cable				✓ (a)	✓ (a)	
710929 Power Cable High Current				✓		
838459 Power Cable Highest Current					✓	
520854 Signal Cable 7core				✓	✓	
520853 Signal Cable 8core				✓	✓	
262359 and 354046 Terminal Adapter and Ribbon Cable				✓	✓	
838461 USB Type A–Type C cable				✓	✓	
845854 USB Type C–Type C cable				✓	✓	

(a) optional for separate logic supply

the speed control loop is running. The ESCON2 sends the sensor measurements for the actual speed and current values to the master.

Profile velocity mode (PVM)
In profile velocity mode, the drive is moved with a defined set speed and ramp profiles. It keeps the speed constant until a new target speed is set.

Sinusoidal commutation (FOC)
The signals from the Hall sensors or encoders are used in the ESCON2 to generate sinusoidal motor currents using field-oriented control (FOC). As a result, the motor runs smoothly and precisely.

Feed-forward speed control
The combination of feedback and feed forward control provides ideal motion behavior. Feed forward control reduces control error. The ESCON2 supports feed-forward acceleration and speed control.

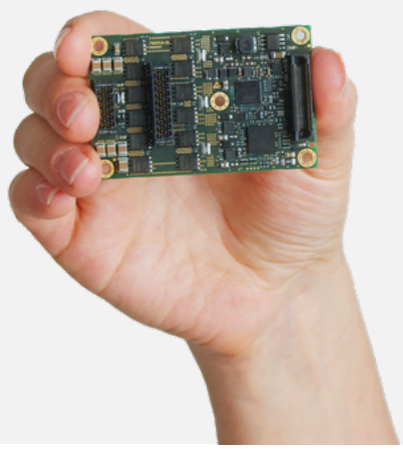
Custom persistent memory
Four objects are available for saving application-specific values. For example, axis number or identification.

Protection
The ESCON2 has extensive, configurable protective circuits against overcurrent, excess temperature, under- and overvoltage, voltage transients, short-circuits in the motor cable, as well as protection in the event of feedback signal loss. An adjustable current limitation protects the motor and load.

Motor temperature sensor (NTC)[1]
A temperature sensor can be connected directly to the ESCON2 and incorporated into the system as motor protection.

Control of holding brakes[1]
The control of holding brakes can be integrated in the device status management. Delay times for switching on and off can be individually configured.

[1]In preparation



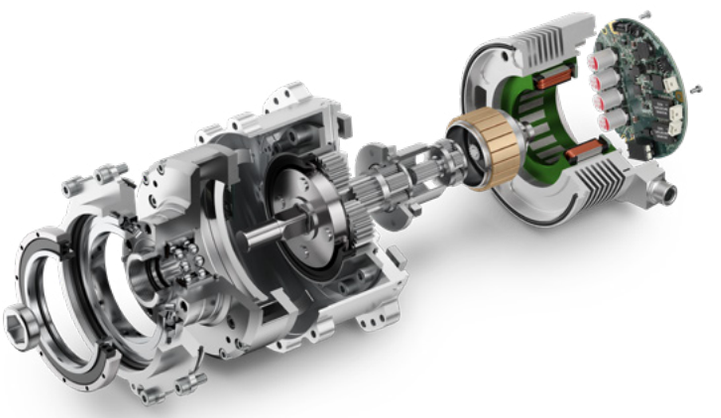
Scan to
learn more.

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ESCON2 Application

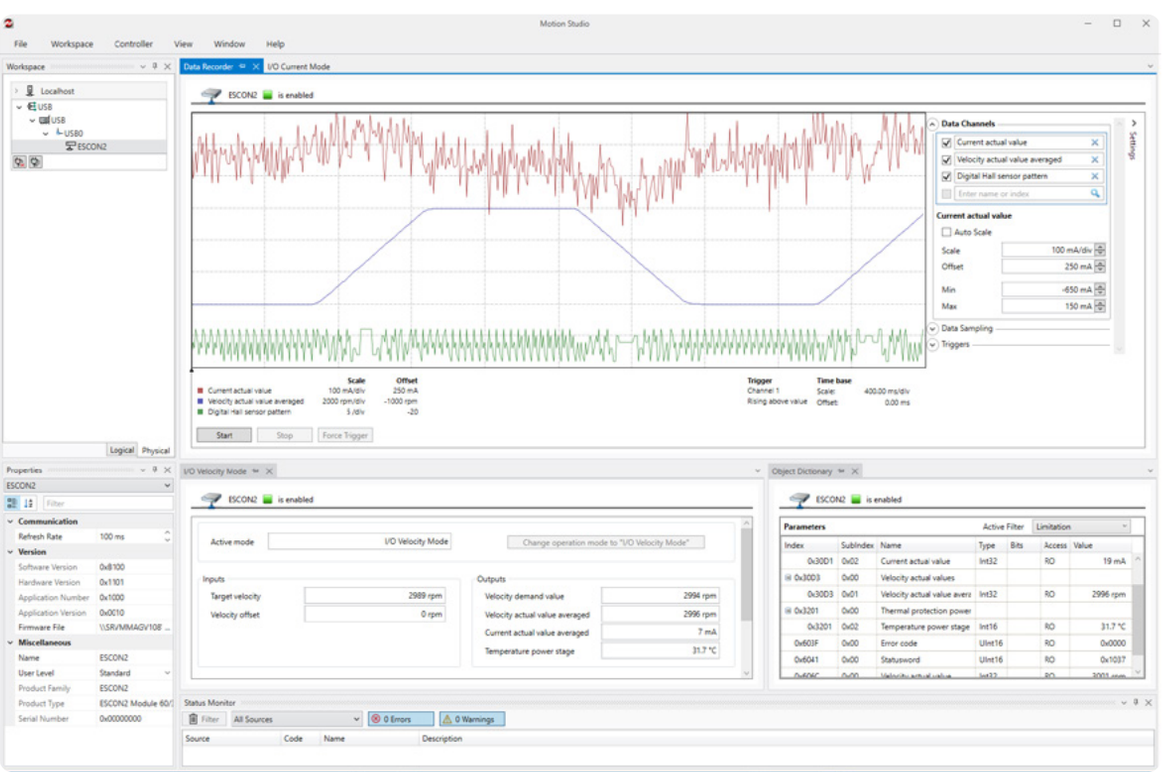
- Intuitive configuration and commissioning
- Auto tuning and system optimization
- Monitoring and analysis
- Help

Motion Studio



Precision Drive Systems

maxon



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ESCON2 Data

CANopen I/O

USB SCI GUI

NEW



NEW



	ESCON2 Nano 24/2	ESCON2 Micro 60/5
Controller version		
	Commands via I/O or CANopen Slave	**Commands via I/O or CANopen Slave**
Electrical data		
Operating voltage V_{CC}	5 - 24 VDC	10 - 60 VDC
Logic supply voltage V_C (optional)	–	10 - 60 VDC
Max. output voltage	0.9 x V_{CC}	0.95 x V_{CC}
Max. output current I_{max}	6 A (<6.5 s)	15 A (<4 s)
Continuous output current I_{cont}	2 A	5 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	50 kHz (20 µs)	50 kHz (20 µs)
Sampling rate of PI speed controller	10 kHz (100 µs)	10 kHz (100 µs)
Max. speed (1 pole pair)	120 000 rpm (sinusoidal)	120 000 rpm (sinusoidal)
Built-in motor choke per phase	–	–
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, B (max. 6.25 MHz)	A, A\, B, B\ (max. 6.67 MHz)
Sensor signals	Clock[1], Data[1]	Clock[1], Data[1]
Digital inputs	4	4
Digital inputs “High-speed”	4	4
Analog inputs	2 (12-bit resolution, 0...+5 V)	2 (12-bit resolution, -10...+10 V)
CAN ID	configurable with external wiring	configurable with external wiring
Outputs		
Digital outputs	2	2
Digital outputs “High-speed”	1	1
Analog outputs	2 (12-bit resolution, 0...+3.3 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output Hall sensor voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Auxiliary voltage output	3.3 VDC, max. 20 mA	3.3 VDC, max. 20 mA
Communication interfaces		
CAN	yes (ext. transceiver)	yes
SCI (RS232 ext. transceiver)	yes	yes
USB	yes	yes
Indicator		
LED green = READY, red= ERROR	External LEDs required	External LEDs required
Environmental conditions		
Temperatrue – Operation	-30...+45 °C	-30...+50 °C
Temperature – Extended Range	45...70 °C; Derating: -0.077 A/°C	50...70 °C; Derating: -0.227 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 2.5 g	approx. 6 g
Dimensions (L x W x H)	23.0 x 16.0 x 4.5 mm	36.8 x 23.8 x 6.5 mm
Mounting	Pluggable and M2 screws	Pluggable and M2 screws
Part numbers		
	809635 ESCON2 Nano 24/2	809631 ESCON2 Micro 60/5
Accessories		
	309687 DSR 50/5 Shunt regulator	235811 DSR 70/30 Shunt regulator
	Order accessories separately, see page 555	Order accessories separately, see page 555

[1]in preparation

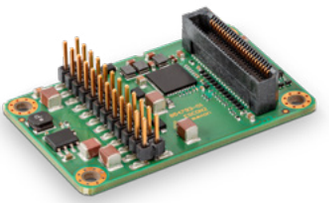
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ESCON2 Data

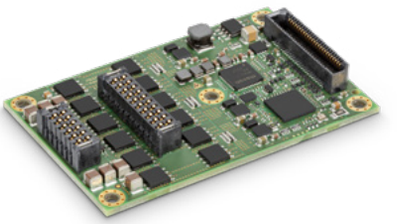
CANopen I/O

USB SCI GUI

NEW



ESCON2 Module 60/12



ESCON2 Module 60/30

Controller version		
	Commands via I/O or CANopen Slave	**Commands via I/O or CANopen Slave**
Electrical data		
Operating voltage V_{CC}	10 - 60 VDC	10 - 60 VDC
Logic supply voltage V_C (optional)	10 - 60 VDC	10 - 60 VDC
Max. output voltage	0.90 x V_{CC}	0.95 x V_{CC}
Max. output current I_{max}	24 A (<5 s)	60 A (<4 s)
Continuous output current I_{cont}	12 A	30 A
Switching frequency of power stage	100 kHz	50 kHz
Sampling rate of PI current controller	50 kHz (20 µs)	50 kHz (20 µs)
Sampling rate of PI speed controller	10 kHz (100 µs)	10 kHz (100 µs)
Max. speed (1 pole pair)	120 000 rpm (sinusoidal)	120 000 rpm (sinusoidal)
Built-in motor choke per phase	–	–
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\ (max. 6.67 MHz)	A, A\, B, B\ (max. 6.67 MHz)
Sensor signals	Clock[1], Data[1]	Clock[1], Data[1]
Digital inputs	4	4
Digital inputs “High-speed”	4	4
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID	configurable with external wiring	configurable with external wiring
Outputs		
Digital outputs	2	2
Digital outputs “High-speed”	1	1
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output Hall sensor voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Auxiliary voltage output	3.3 VDC, max. 20 mA	3.3 VDC, max. 20 mA
Communication interfaces		
CAN	yes	yes
SCI (RS232 ext. transceiver)	yes	yes
USB	yes	yes
Indicator		
LED green = READY, red= ERROR	External LEDs required	External LEDs required
Environmental conditions		
Temperatrue – Operation	-30...+50 °C	-30...+25 °C
Temperature – Extended Range	50...80 °C; Derating: -0.4 A/°C	25...75 °C; Derating: -0.506 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 12 g	approx. 19 g
Dimensions (L x W x H)	49.5 x 31 x 12.4 mm	67.0 x 43.0 x 7.8 mm
Mounting	Pluggable and M2.5 screws	Pluggable and M2.5 screws
Part numbers		
	854796 ESCON2 Module 60/12	**783722** ESCON2 Module 60/30
Accessories		
	235811 DSR 70/30 Shunt regulator	**235811** DSR 70/30 Shunt regulator
	Order accessories separately, see page 555	Order accessories separately, see page 555

[1]in preparation

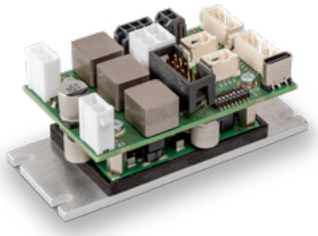
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ESCON2 Data

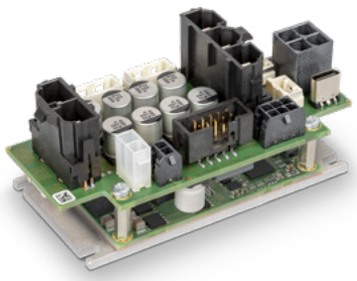
CANopen I/O

USB GUI

NEW



ESCON2 Compact 60/12



ESCON2 Compact 60/30

Controller version		
	Commands via I/O or CANopen Slave	**Commands via I/O or CANopen Slave**
Electrical data		
Operating voltage V_{CC}	10 - 60 VDC	10 - 60 VDC
Logic supply voltage V_C (optional)	10 - 60 VDC	10 - 60 VDC
Max. output voltage	0.90 x V_{CC}	0.95 x V_{CC}
Max. output current I_{max}	24 A (<5 s)	60 A (<4 s)
Continuous output current I_{cont}	12 A	30 A
Switching frequency of power stage	100 kHz	50 kHz
Sampling rate of PI current controller	50 kHz (20 µs)	50 kHz (20 µs)
Sampling rate of PI speed controller	10 kHz (100 µs)	10 kHz (100 µs)
Max. speed (1 pole pair)	120 000 rpm (sinusoidal)	120 000 rpm (sinusoidal)
Built-in motor choke per phase	4.7 µH / 12 A	0.47 µH / 30 A
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\ (max. 6.67 MHz)	A, A\, B, B\ (max. 6.67 MHz)
Sensor signals	Clock[1], Data[1]	Clock[1], Data[1]
Digital inputs	4	4
Digital inputs “High-speed”	4	4
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
Digital outputs	2	2
Digital outputs “High-speed”	1	1
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output Hall sensor voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Auxiliary voltage output	–	–
Communication interfaces		
CAN	yes	yes
SCI (RS232 ext. transceiver)	–	–
USB	yes	yes
Indicator		
LED green = READY, red= ERROR	yes	yes
Environmental conditions		
Temperatrue – Operation	-30...+50 °C	-30...+25 °C
Temperature – Extended Range	50...80 °C; Derating: -0.4 A/°C	25...75 °C; Derating: -0.506 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 90 g	approx. 128 g
Dimensions (L x W x H)	81 × 41 × 33.5 mm	93.5 x 46.0 x 41.0 mm
Mounting	M3 screws	M3 screws
Part numbers		
	854801 ESCON2 Compact 60/12	**783734** ESCON2 Compact 60/30
Accessories		
	235811 DSR 70/30 Shunt regulator	**235811** DSR 70/30 Shunt regulator
	Order accessories separately, see page 555	Order accessories separately, see page 555

[1]in preparation

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EPOS4 Positioning Controllers Overview

Modules

Micro

EPOS4 Micro 24/5 CAN



EPOS4 Micro 24/5 EtherCAT



Module

EPOS4 Module 24/1.5



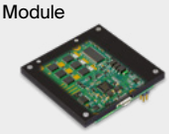
EPOS4 Module 50/5



EPOS4 Module 50/8



EPOS4 Module 50/15



Ready-to-connect units

Compact CAN

EPOS4 Compact 24/1.5 CAN



EPOS4 Compact 50/5 CAN



EPOS4 Compact 50/8 CAN



EPOS4 Compact 50/15 CAN



Compact EtherCAT

EPOS4 Compact 24/1.5 EtherCAT



EPOS4 Compact 50/5 EtherCAT



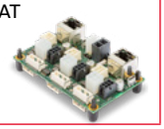
EPOS4 Compact 50/8 EtherCAT



EPOS4 Compact 50/15 EtherCAT



EPOS4 Compact 24/5 EtherCAT 3-axes



Encased housing / Disk

EPOS4 50/5



EPOS4 70/15



EPOS4 Disk 60/8 CAN



EPOS4 Disk 60/8 EtherCAT



EPOS4 Disk 60/12 CAN



EPOS4 Disk 60/12 EtherCAT



maxon EPOS4 products are small, completely digital, intelligent positioning controllers. Their high power density provides high flexibility for use with brushed DC and brushless EC (BLDC) motors up to approx. 1050 W with various feedback options such as Hall sensors, incremental encoders and absolute encoders, in a variety of drive applications.

Modules
Robotic, analysis and handing systems require compact integration of a large number of energy-efficient drives, combined with highly dynamic controllers and a linked bus system.
With the established EPOS4 Module and Micro, modular multi-axis systems can be set up using CANopen or EtherCAT, without needing high investment in development.

Ready-to-connect units
For prototypes and small batches, the large variety of ready-to-connect controllers, available in various power classes and designs, provide attractive, economical options for using EPOS4 products in your application.

EPOS Studio
The EPOS Studio software, which is available free of charge, includes intuitive tools and wizards that make commissioning easy. It provides a basic overview of the EPOS4 functions and a command option. Analysis tools such as the Data Recorder or Command Analyzer supplement the features in Motion Studio.

CANopen / EtherCAT
As a standardized motion control slave, EPOS4 can easily be integrated into the system manager tools and motion libraries of various PLC manufacturers. The data exchange and command functions make use of the CiA® 402 protocol (Device Profile for Drives and Motion Control).

Cyclic Synchronuous Position (CSP)
The master executes the path planning and sends the target position cyclically and synchronously to the EPOS4 via the network. The position control loop runs on the EPOS4. The EPOS4 sends the measured actual position, speed and current values to the master.

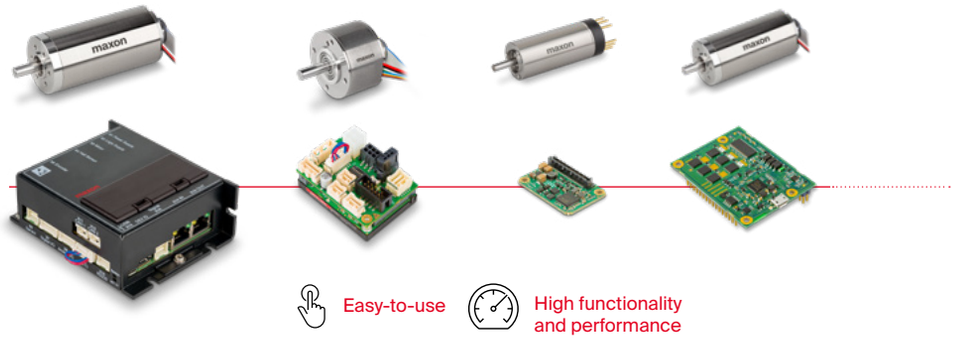
Cyclic Synchronuous Velocity (CSV)
The master executes the path planning and sends the target speed cyclically and synchronously to the EPOS4 via the network. The speed control loop runs on the EPOS4. The EPOS4 sends the measured actual position, speed and current values to the master. The CSV mode is commonly used if a PI position control loop is closed via the master.

Cyclic Synchronuous Torque (CST)
The master executes the path planning and sends the target torque cyclically and synchronously to the EPOS4 via the network. The torque (current) control loop runs on the EPOS4. The EPOS4 sends the measured actual position, speed and current values to the master. The CST mode is commonly used if a PID position control loop is closed via the master.

Point-to-point
The “Profile Position Mode” moves the position of the motor axis from point A to point B. Positioning is in relation to the axis Home position (absolute) or the actual axis position (relative).

Position and velocity control with feed forward
The combination of feedback and feed forward control provides ideal motion behavior. Feed forward control reduces control error. EPOS4 supports feed forward acceleration and speed control.

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Speed control
In the Profile Velocity Mode, the motor axis is moved with a defined set speed. The motor axis keeps the speed constant until a new speed set value is given.

Homing
The Homing Mode is used for referencing to a specific mechanical position. There is a wide variety of methods available.

Feedback options and dual loop
Two different encoder signals can be evaluated simultaneously. This allows dual-loop control, which can be tuned automatically to compensate for mechanical backlash and elasticity. A wide range of sensors is permitted: digital incremental encoders, analog incremental encoders (sin/cos), and SSI absolute encoders.

Protection
The positioning controller has protective circuits against overcurrent, excess temperature, under- and overvoltage, voltage transients, short-circuits in the motor cable, and against feedback signal loss. An adjustable current limitation protects the motor and load.

Safe Torque Off (STO)
With this safety feature based on IEC61800-5-2 (not certified), the drive can be brought to a safe state at any time from two independent digital inputs. The supply of torque-generating power is interrupted.
The state can be monitored via an additional digital output. The inputs and outputs are optically isolated.

Capture Inputs (Touch Probe)
The digital inputs can be configured so that the actual position value is stored whenever a positive or negative edge occurs at an input.

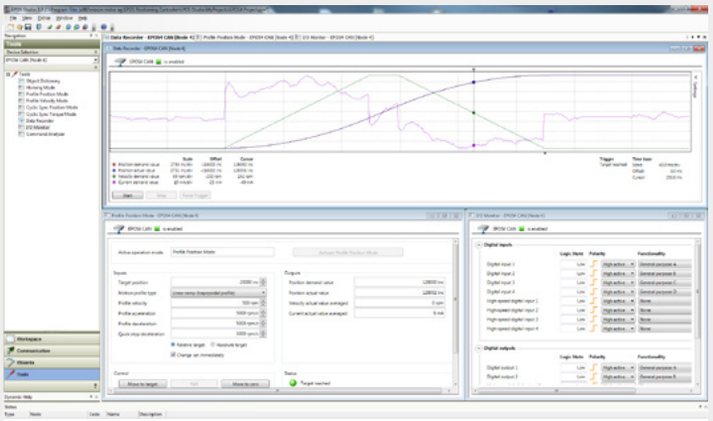
Control of Holding Brakes
Control of holding brakes can be integrated in the device status management. The delay times can be individually configured for switching on and off.

Supplementary information for technical data page 563–569.

Operating modes/Control
Cyclic Synchronous Position (CSP)
Cyclic Synchronous Velocity (CSV)
Cyclic Synchronous Torque (CST)
Profile Position, Profile Velocity and Homing Mode
Speed and Acceleration Feed Forward
Sinusoidal or Block Commutation for EC motors
Alternative set value input via analog commands
Dual-loop Position and Speed Control
Communication/Configuration
Communication via CANopen and/or USB 2.0/3.0 and/or RS232
EtherCAT (CoE)
USB to CAN and RS232 to CAN gateway
Inputs/Outputs
STO (Safe Torque Off) inputs and outputs, optically isolated, not certified
Free digital inputs, configurable e.g. for limit/reference switches
Free digital outputs, configurable e.g. for brake
Free analog inputs, configurable
Free analog ouputs, configurable
Available software
EPOS Studio
Windows DLL (32-/64-bit) with programming examples
Linux shared object library (X86 32-/64-bit, ARMv6/v7/v8 32-bit, ARMv8 64-bit for Raspberry Pi and BeagleBone) with programming examples
Firmware
Available documentation
Feature Chart
Hardware Reference
Firmware Specification
Communication Guide
Application Notes

EPOS4 performance characteristics
- Maximum power density.
- Convincing control performance even with highly dynamic motors.
- Comprehensive feedback options.
- Diverse I/O connection options for peripherals.
- Uncompromising protective features for controller and drive.
- Configuration and communication via CANopen (CiA 301, 402, 305), RS232, USB, or EtherCAT. IEC 61158 type 12 EtherCAT slave: CoE (CAN application layer over EtherCAT) compliant with IEC 61800-7 profile type 1 (CiA 402). Easy integration into existing EtherCAT systems. Can be connected to a network of other EtherCAT units.
- Easy commissioning via EPOS Studio GUI and intuitive tools.
- Libraries and programming examples for efficient integration in a wide variety of systems.
- All software components are freely available at any time.
- Full documentation and outstanding support.

The complete package for your motion control solution with added value.



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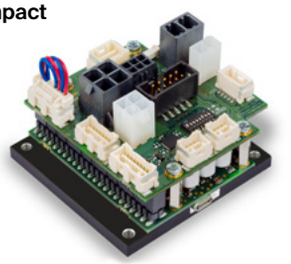
EPOS4 Positioning Controllers Overview

EtherCAT CANopen

USB RS232 GUI

Module + Connector Board = Compact





Accessories EPOS4 Module & Micro (not included in delivery)	638328 Micro 24/5 CAN	654731 Micro 24/5 EtherCAT	536630 Module 24/1.5	534130 Module 50/5	504384 Module 50/8	504383 Module 50/15
403968 USB Type A - micro B Cable			✓	✓	✓	✓
536997 EPOS4 CB 24/1.5 CAN			✓			
620048 EPOS4 CB 24/1.5 EtherCAT			✓			
534133 EPOS4 CB 50/5 CAN				✓		
620044 EPOS4 CB 50/5 EtherCAT				✓		
520884 EPOS4 CB Power CAN					✓	✓
604594 EPOS4 CB Power EtherCAT					✓	✓
581245 EPOS4 EtherCAT Card			✓ (a)	✓ (a)	✓ (a)	✓ (a)
638677 EPOS4 EB Micro	✓	✓				
659508 EPOS4 MB Micro EtherCAT 3-axes		✓				
590738 EPOS4 Module SMT socket 2 x 23 poles			✓	✓		
677324 EPOS4 Micro SMT socket 2 x 40 poles	✓	✓				

(a) with matching motherboard

Accessories EPOS4 Compact & Encased housing (not included in delivery)	684519 Compact 24/5 EtherCAT 3-axes	546714 Compact 24/1.5 CAN	628092 Compact 24/1.5 EtherCAT	541718 Compact 50/5 CAN	628094 Compact 50/5 EtherCAT	520885 Compact 50/8 CAN	605298 Compact 50/8 EtherCAT	520886 Compact 50/15 CAN	605299 Compact 50/15 EtherCAT	546047 50/5	594385 70/15
520858 CAN-CAN Cable		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
520857 CAN-COM Cable		✓		✓	✓	✓	✓	✓	✓	✓	✓
275934 Encoder Cable		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
520859 EPOS4 Connector Set		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
581245 EPOS4 EtherCAT Card									✓	✓	✓
691408 EPOS4 MB 3-axes Conn. Set	✓										
422827 Ethernet Cable	✓		✓		✓	✓	✓	✓	✓	✓	
275878 Hall Sensor Cable	✓			✓	✓	✓	✓	✓	✓	✓	
275851 Motor Cable	✓			✓	✓	✓	✓	✓	✓	✓	
520851 Motor Cable High Current							✓	✓		✓	
275829 Power Cable	✓ (b)				✓ (b)	✓ (b)	✓ (b)	✓ (b)	✓	✓ (b)	
520850 Power Cable High Current	✓ (c)				✓ (c)	✓ (c)	✓ (c)	✓ (c)		✓ (c)	
520856 RS232-COM Cable		✓		✓		✓	✓		✓	✓	
520852 Sensor Cable 5 x 2core	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
520854 Signal Cable 7core	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
520853 Signal Cable 8core	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
520860 STO Idle Connector X9		✓ (i)	✓ (i)	✓ (i)	✓ (i)	✓ (i)	✓ (i)	✓ (i)	✓ (i)	✓ (i)	
403968 USB Type A - micro B Cable	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

(b) optional for separate logic supply (c) mandatory for supply of power stage (i) included

Accessories EPOS4 Disk (not included in delivery)	688770 Disk 60/8 CAN	688772 Disk 60/8 EtherCAT	688775 Disk 60/12 CAN	709859 Disk 60/12 CAN SSC	688777 Disk 60/12 EtherCAT	709862 Disk 60/12 EtherCAT SSC
710928 Brake Cable	✓	✓	✓	✓	✓	✓
710931 CAN-CAN Cable	✓		✓	✓		
710932 CAN-COM Cable	✓		✓	✓		
751388 CAN ix Industrial Type B Plug	✓		✓	✓		
696285 Encoder Cable	✓	✓	✓	✓	✓	✓
710926 EPOS4 Disk Connector Set	✓	✓	✓	✓	✓	✓
710934 EtherCAT-COM Cable		✓		✓	✓	✓
710933 EtherCAT-EtherCAT Cable		✓		✓	✓	✓
748166 EtherCAT ix Industrial Type A Plug		✓		✓	✓	✓
275878 Hall Sensor Cable			✓	✓	✓	✓
696284 Hall Sensor Cable	✓	✓	✓	✓	✓	✓
710930 Motor Cable High Current			✓	✓	✓	✓
696283 Power & Motor Cable	✓	✓				
710929 Power Cable High Current			✓	✓	✓	✓
696286 Sensor Cable 3x2core	✓	✓	✓	✓	✓	✓
520852 Sensor Cable 5x2core			✓	✓	✓	✓
696288 Signal Cable 7core	✓	✓	✓	✓	✓	✓
696287 Signal Cable 8core	✓	✓	✓	✓	✓	✓
696289 USB Type A - Micro-Lock Cable	✓	✓	✓	✓	✓	✓

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EPOS4 Positioning Controllers Data





	EPOS4 Micro 24/5 CAN Miniaturized OEM positioning controller module, designed for use with brushed DC motors with encoders and brushless EC motors (BLDC) with Hall sensors and encoders up to 120 W/360 W.	**EPOS4 Micro 24/5 EtherCAT** Miniaturized OEM positioning controller module, designed for use with brushed DC motors with encoders and brushless EC motors (BLDC) with Hall sensors and encoders up to 120 W/360 W.
Controller version		
	CANopen Slave	**EtherCAT Slave**
Electrical data		
Operating voltage V_{CC}	10 - 24 VDC	10 - 24 VDC
Logic supply voltage V_C (optional)	10 - 24 VDC	10 - 24 VDC
Max. output voltage	0.9 x V_{CC}	0.9 x V_{CC}
Max. output current I_{max}	15 A (<10 s)	15 A (<10 s)
Continuous output current I_{cont}	5 A	5 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	–	–
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	Clock, Data	Clock, Data
Digital inputs	4 (logic level)	4 (logic level)
Digital inputs “High-speed”	1	1
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with external wiring	–
Outputs		
Digital outputs	2	2
Digital outputs “High-speed”	1	1
Analog outputs	1 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 115 mA	5 VDC, max. 115 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	–	–
Communication interfaces		
CAN	high; low (max. 1 Mbit/s)	–
EtherCAT	–	100 Mbit/s (Full Duplex)
RS232	RxD; TxD (max. 115 200 bit/s)	–
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature – Operation	-30...+45 °C	-30...+40 °C
Temperature – Extended Range	45...70 °C; Derating: -0.200 A/°C	40...60 °C; Derating: -0.25 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 6 g	approx. 7 g
Dimensions (L x W x H)	32.0 x 22.0 x 7.0 mm	36.5 x 27.0 x 7.0 mm
Mounting	M2 screws	M2 screws
Part numbers		
	638328 EPOS4 Micro 24/5 CAN	**654731** EPOS4 Micro 24/5 EtherCAT
Accessories		
	309687 DSR 50/5 Shunt regulator	**309687** DSR 50/5 Shunt regulator
	Order accessories separately, see page 562	Order accessories separately, see page 562

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EPOS4 Positioning Controllers Data

EtherCAT CANopen

USB RS232 GUI





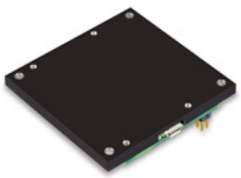
	EPOS4 Module 24/1.5 OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 36/108 Watt.	**EPOS4 Module 50/5** OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.
Controller version		
	CANopen Slave with EtherCAT option	**CANopen Slave with EtherCAT option**
Electrical data		
Operating voltage V_{CC}	10 - 24 VDC	10 - 50 VDC
Logic supply voltage V_C (optional)	10 - 24 VDC	10 - 50 VDC
Max. output voltage	0.9 x V_{CC}	0.9 x V_{CC}
Max. output current I_{max}	4.5 A (<30 s)	15 A (<3 s)
Continuous output current I_{cont}	1.5 A	5 A
Switching frequency of power stage	100 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	–	–
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
Digital inputs	4 (logic level)	4 (logic level)
Digital inputs “High-speed”	4, differential	4, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with external wiring	configurable with external wiring
Outputs		
Digital outputs	2	2
Digital outputs “High-speed”	1, differential	1, differential
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 70 mA	5 VDC, max. 70 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
CAN	high; low (max. 1 Mbit/s)	high; low (max. 1 Mbit/s)
EtherCAT	Optional 581245 EPOS4 EtherCAT Card available	Optional 581245 EPOS4 EtherCAT Card available
RS232	RxD; TxD (max. 115 200 bit/s)	RxD; TxD (max. 115 200 bit/s)
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature – Operation	-30...+60 °C	-30...+45 °C
Temperature – Extended Range	60...73 °C; Derating: -0.115 A/°C	45...75 °C; Derating: -0.167 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 17 g	approx. 17 g
Dimensions (L x W x H)	53.8 x 38.8 x 11.1 mm	53.8 x 38.8 x 11.1 mm
Mounting	Socket header 1.27 mm or M2.5 screws	Socket header 1.27 mm or M2.5 screws
Part numbers		
	536630 EPOS4 Module 24/1.5	534130 EPOS4 Module 50/5
Accessories		
	309687 DSR 50/5 Shunt regulator Order accessories separately, see page 562	309687 DSR 50/5 Shunt regulator Order accessories separately, see page 562

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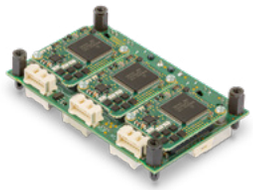
EPOS4 Positioning Controllers Data



EPOS4 Module 50/8
OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 400/1500 Watt.



EPOS4 Module 50/15
OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 750/1500 Watt.



EPOS4 Compact 24/5 EtherCAT 3-axes
Ready-to-install 3-axis compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 120/360 W per axis.

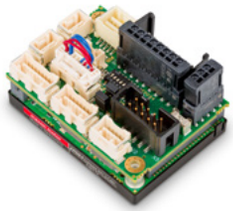
Controller version		
CANopen Slave with EtherCAT option	**CANopen Slave with EtherCAT option**	**EtherCAT Slave**
Electrical data		
10 - 50 VDC	10 - 50 VDC	10 - 24 VDC
10 - 50 VDC	10 - 50 VDC	10 - 24 VDC
0.9 x V_{CC}	0.9 x V_{CC}	0.9 x V_{CC}
30 A (<5 s)	30 A (<60 s)	15 A (<10 s) per axis
8 A	15 A	5 A per axis
50 kHz	50 kHz	50 kHz
25 kHz (40 µs)	25 kHz (40 µs)	25 kHz (40 µs)
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)
50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
–	–	–
Inputs		
H1, H2, H3	H1, H2, H3	H1, H2, H3 per axis
A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)	
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\ per axis
4 (logic level)	4 (logic level)	4 (level switchable: logic/PLC) per axis
4, differential	4, differential	–
2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V) per axis
configurable with external wiring	configurable with external wiring	–
Outputs		
2	2	2 per axis
1, differential	1, differential	–
2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA) per axis
5 VDC, max. 70 mA	5 VDC, max. 70 mA	5 VDC, max. 100 mA per axis
5 VDC, max. 30 mA	5 VDC, max. 30 mA	5 VDC, max. 30 mA per axis
5 VDC, max. 145 mA	5 VDC, max. 145 mA	
Communication interfaces		
high; low (max. 1 Mbit/s)	high; low (max. 1 Mbit/s)	–
Optional 581245 EPOS4 EtherCAT Card available	Optional 581245 EPOS4 EtherCAT Card available	100 Mbit/s (Full Duplex)
RxD; TxD (max. 115 200 bit/s)	RxD; TxD (max. 115 200 bit/s)	–
Data+; Data- (Full Speed)	Data+; Data- (Full Speed)	Data+; Data- (Full Speed) per axis
Indicator		
Green LED, red LED	Green LED, red LED	Green LED, red LED
Environmental conditions		
-30...+45 °C	-30...+25 °C	-30...+25 °C
45...77 °C; Derating: -0.250 A/°C	25...77 °C; Derating: -0.288 A/°C	25...50 °C; Derating: -0.200 A/°C
-40...+85 °C	-40...+85 °C	-40...+85 °C
5...90%	5...90%	5...90%
Mechanical data		
approx. 23 g	approx. 70 g	approx. 85 g
59.5 x 46.0 x 14.1 mm	59.5 x 62.0 x 16.4 mm	90.0 x 56.0 x 29.0 mm
Socket header 2.54 mm or M2.5 screws	Socket header 2.54 mm or M3 screws	M2.5 screws
Part numbers		
504384 EPOS4 Module 50/8	504383 EPOS4 Module 50/15	684519 EPOS4 Compact 24/5 EtherCAT 3-axes
Accessories		
235811 DSR 70/30 Shunt regulator	235811 DSR 70/30 Shunt regulator	235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 562	Order accessories separately, see page 562	Order accessories separately, see page 562

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EPOS4 Positioning Controllers Data

EtherCAT CANopen

USB RS232 GUI





EPOS4 Compact 24/1.5 CAN
Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 36/108 Watt.

EPOS4 Compact 24/1.5 EtherCAT
Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 36/108 Watt.

Controller version		
	CANopen Slave	**EtherCAT Slave**
Electrical data		
Operating voltage V_{CC}	10 - 24 VDC	10 - 24 VDC
Logic supply voltage V_C (optional)	10 - 24 VDC	10 - 24 VDC
Max. output voltage	0.9 x V_{CC}	0.9 x V_{CC}
Max. output current I_{max}	4.5 A (<30 s)	4.5 A (<30 s)
Continuous output current I_{cont}	1.5 A	1.5 A
Switching frequency of power stage	100 kHz	100 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	94 µH / 1.5 A	100 µH / 1.5 A
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
Digital inputs	4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)
Digital inputs “High-speed”	4, differential	4, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
Digital outputs	2	2
Digital outputs “High-speed”	1, differential	1, differential
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 70 mA	5 VDC, max. 70 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
CAN	high; low (max. 1 Mbit/s)	–
EtherCAT	–	100 Mbit/s (Full Duplex)
RS232	RxD; TxD (max. 115 200 bit/s)	–
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature – Operation	-30...+45 °C	-30...+45 °C
Temperature – Extended Range	45...70 °C; Derating: -0.060 A/°C	45...70 °C; Derating: -0.060 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 58 g	approx. 78 g
Dimensions (L x W x H)	55.0 x 40.0 x 31.1 mm	55.0 x 56.5 x 31.7 mm
Mounting	M2.5 screws	M2.5 screws
Part numbers		
	546714 EPOS4 Compact 24/1.5 CAN	628092 EPOS4 Compact 24/1.5 EtherCAT
Accessories		
	309687 DSR 50/5 Shunt regulator Order accessories separately, see page 562	309687 DSR 50/5 Shunt regulator Order accessories separately, see page 562

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EPOS4 Positioning Controllers Data



EPOS4 Compact 50/5 CAN
Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.



EPOS4 Compact 50/5 EtherCAT
Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.



EPOS4 Compact 50/8 CAN
Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 400/1500 Watt.

Controller version		
CANopen Slave	**EtherCAT Slave**	**CANopen Slave**
Electrical data		
10 - 50 VDC	10 - 50 VDC	10 - 50 VDC
10 - 50 VDC	10 - 50 VDC	10 - 50 VDC
0.9 x V_{CC}	0.9 x V_{CC}	0.9 x V_{CC}
15 A (<3 s)	15 A (<3 s)	30 A (<5 s)
5 A	5 A	8 A
50 kHz	50 kHz	50 kHz
25 kHz (40 µs)	25 kHz (40 µs)	25 kHz (40 µs)
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)
50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
9.4 µH / 5 A	10 µH / 5 A	2.2 µH / 15 A
Inputs		
H1, H2, H3	H1, H2, H3	H1, H2, H3
A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)
4, differential	4, differential	4, differential
2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
configurable with DIP switch 1...5	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
2	2	2
1, differential	1, differential	1, differential
2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 70 mA	5 VDC, max. 70 mA	5 VDC, max. 70 mA
5 VDC, max. 30 mA	5 VDC, max. 30 mA	5 VDC, max. 30 mA
5 VDC, max. 145 mA	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
high; low (max. 1 Mbit/s)	–	high; low (max. 1 Mbit/s)
–	100 Mbit/s (Full Duplex)	–
RxD; TxD (max. 115 200 bit/s)	–	RxD; TxD (max. 115 200 bit/s)
Data+; Data- (Full Speed)	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
Green LED, red LED	Green LED, red LED	Green LED, red LED
Environmental conditions		
-30...+25 °C	-30...+25 °C	-30...+45 °C
25...70 °C; Derating: -0.111 A/°C	25...70 °C; Derating: -0.111 A/°C	45...77 °C; Derating: -0.250 A/°C
-40...+85 °C	-40...+85 °C	-40...+85 °C
5...90%	5...90%	5...90%
Mechanical data		
approx. 58 g	approx. 76 g	approx. 86 g
55.0 x 40.0 x 31.1 mm	55.0 x 56.5 x 31.7 mm	59.5 x 58.5 x 33.0 mm
M2.5 screws	M2.5 screws	M2.5 screws
Part numbers		
541718 EPOS4 Compact 50/5 CAN	**628094** EPOS4 Compact 50/5 EtherCAT	**520885** EPOS4 Compact 50/8 CAN
Accessories		
309687 DSR 50/5 Shunt regulator	**309687** DSR 50/5 Shunt regulator	**235811** DSR 70/30 Shunt regulator
Order accessories separately, see page 562	Order accessories separately, see page 562	Order accessories separately, see page 562

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EPOS4 Positioning Controllers Data

EtherCAT CANopen

USB RS232 GUI





EPOS4 Compact 50/8 EtherCAT
Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 400/1500 Watt.

EPOS4 Compact 50/15 CAN
Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 750/1500 Watt.

Controller version		
	EtherCAT Slave	**CANopen Slave**
Electrical data		
Operating voltage V_{CC}	10 - 50 VDC	10 - 50 VDC
Logic supply voltage V_C (optional)	10 - 50 VDC	10 - 50 VDC
Max. output voltage	0.9 x V_{CC}	0.9 x V_{CC}
Max. output current I_{max}	30 A (<5 s)	30 A (<60 s)
Continuous output current I_{cont}	8 A	15 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	2.2 µH / 15 A	2.2 µH / 15 A
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
Digital inputs	4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)
Digital inputs “High-speed”	4, differential	4, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
Digital outputs	2	2
Digital outputs “High-speed”	1, differential	1, differential
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 70 mA	5 VDC, max. 70 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
CAN	–	high; low (max. 1 Mbit/s)
EtherCAT	100 Mbit/s (Full Duplex)	–
RS232	–	RxD; TxD (max. 115 200 bit/s)
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature – Operation	-30...+45 °C	-30...+25 °C
Temperature – Extended Range	45...77 °C; Derating: -0.250 A/°C	25...77 °C; Derating: -0.288 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 100 g	approx. 126 g
Dimensions (L x W x H)	59.5 x 79.5 x 35.7 mm	59.5 x 65.5 x 35.1 mm
Mounting	M2.5 screws	M3 screws
Part numbers		
	605298 EPOS4 Compact 50/8 EtherCAT	520886 EPOS4 Compact 50/15 CAN
Accessories		
	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 562	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 562

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EPOS4 Positioning Controllers Data



EPOS4 Compact 50/15 EtherCAT
Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 750/1500 Watt.



EPOS4 50/5
Positioning controller in a robust housing, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.



EPOS4 70/15
Positioning controller in a robust housing, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 1050/2100 Watt.

Controller version		
EtherCAT Slave	**CANopen Slave with EtherCAT option**	**CANopen Slave with EtherCAT option**
Electrical data		
10 - 50 VDC	10 - 50 VDC	10 - 70 VDC
10 - 50 VDC	10 - 50 VDC	10 - 70 VDC
0.9 x V_{CC}	0.9 x V_{CC}	0.9 x V_{CC}
30 A (<60 s)	15 A (<15 s)	30 A (<60 s)
15 A	5 A	15 A
50 kHz	50 kHz	50 kHz
25 kHz (40 µs)	25 kHz (40 µs)	25 kHz (40 µs)
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)
50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
2.2 µH / 15 A	15 µH / 5 A	15 µH / 15 A
Inputs		
H1, H2, H3	H1, H2, H3	H1, H2, H3
A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)
4, differential	4, differential	4, differential
2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
configurable with DIP switch 1...5	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
2	2	2
1, differential	1, differential	1, differential
2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
5 VDC, max. 70 mA	5 VDC, max. 70 mA	5 VDC, max. 70 mA
5 VDC, max. 30 mA	5 VDC, max. 30 mA	5 VDC, max. 30 mA
5 VDC, max. 145 mA	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
–	high; low (max. 1 Mbit/s)	high; low (max. 1 Mbit/s)
100 Mbit/s (Full Duplex)	Optional 581245 EPOS4 EtherCAT Card available	Optional 581245 EPOS4 EtherCAT Card available
–	RxD; TxD (max. 115 200 bit/s)	RxD; TxD (max. 115 200 bit/s)
Data+; Data- (Full Speed)	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
Green LED, red LED	Green LED, red LED	Green LED, red LED
Environmental conditions		
-30...+25 °C	-30...+50 °C	-30...+50 °C
25...77 °C; Derating: -0.288 A/°C	50...80 °C; Derating: -0.167 A/°C	50...85 °C; Derating: -0.429 A/°C
-40...+85 °C	-40...+85 °C	-40...+85 °C
5...90%	5...90%	5...90%
Mechanical data		
approx. 140 g	approx. 206 g	approx. 372 g
59.5 x 79.5 x 37.8 mm	105.0 x 83.0 x 38.7 mm	125.0 x 94.5 x 38.7 mm
M3 screws	Flange for M4-screws	Flange for M4-screws
Part numbers		
605299 EPOS4 Compact 50/15 EtherCAT	546047 EPOS4 50/5	594385 EPOS4 70/15
Accessories		
235811 DSR 70/30 Shunt regulator	309687 DSR 50/5 Shunt regulator	235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 562	Order accessories separately, see page 562	Order accessories separately, see page 562

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EPOS4 Positioning Controllers Data

EtherCAT CANopen

USB RS232 GUI





	EPOS4 Disk 60/8 CAN Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 480/1440 Watt.	**EPOS4 Disk 60/8 EtherCAT** Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 480/1440 Watt.
Controller version		
	CANopen Slave	**EtherCAT Slave**
Electrical data		
Operating voltage V_{CC}	12 - 60 VDC	12 - 60 VDC
Logic supply voltage V_C (optional)	12 - 60 VDC	12 - 60 VDC
Max. output voltage	0.9 x V_{CC}	0.9 x V_{CC}
Max. output current I_{max}	24 A (<10 s)	24 A (<10 s)
Continuous output current I_{cont}	8 A	8 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	–	–
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	Clock, Clock\, Data, Data\	Clock, Clock\, Data, Data\
Digital inputs	4 (logic level)	4 (logic level)
Digital inputs “High-speed”	1, differential	1, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	Configurable with DIP switch 1...4	Configurable with DIP switch 1...4
Outputs		
Digital outputs	2	2
Digital outputs “High-speed”	1, differential	1, differential
Analog outputs	1 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 70 mA	5 VDC, max. 70 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
CAN	high; low (max. 1 Mbit/s)	–
EtherCAT	–	100 Mbit/s (Full Duplex)
RS232	–	–
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature – Operation	-30...+45 °C	-30...+35 °C
Temperature – Extended Range	45...75 °C; Derating: -0.267 A/°C	35...65 °C; Derating: -0.267 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 24 g	approx. 26 g
Dimensions (L x W x H)	60.0 x 60.0 x 22.0 mm	60.0 x 60.0 x 22.0 mm
Mounting	M2 screws	M2 screws
Part numbers		
	688770 EPOS4 Disk 60/8 CAN	688772 EPOS4 Disk 60/8 EtherCAT
Accessories		
	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 562	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 562

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EPOS4 Positioning Controllers Data





	EPOS4 Disk 60/12 CAN Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 720/2160 Watt.	**EPOS4 Disk 60/12 EtherCAT** Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 720/2160 Watt.
Controller version		
	CANopen Slave	**EtherCAT Slave**
Electrical data		
Operating voltage V_{CC}	12 - 60 VDC	12 - 60 VDC
Logic supply voltage V_C (optional)	12 - 60 VDC	12 - 60 VDC
Max. output voltage	0.9 x V_{CC}	0.9 x V_{CC}
Max. output current I_{max}	36 A (<5 s)	36 A (<5 s)
Continuous output current I_{cont}	12 A	12 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	–	–
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	Clock, Clock\, Data, Data\	Clock, Clock\, Data, Data\
Digital inputs	4 (logic level)	4 (logic level)
Digital inputs “High-speed”	1, differential	1, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	Configurable with DIP switch 1...4	Configurable with DIP switch 1...4
Outputs		
Digital outputs	2	2
Digital outputs “High-speed”	1, differential	1, differential
Analog outputs	1 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	5 VDC, max. 70 mA	5 VDC, max. 70 mA
Hall sensor voltage output	5 VDC, max. 30 mA	5 VDC, max. 30 mA
Auxiliary voltage output	5 VDC, max. 145 mA	5 VDC, max. 145 mA
Communication interfaces		
CAN	high; low (max. 1 Mbit/s)	–
EtherCAT	–	100 Mbit/s (Full Duplex)
RS232	–	–
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperature – Operation	-30...+50 °C	-30...+45 °C
Temperature – Extended Range	50...75 °C; Derating: -0.480 A/ °C	45...70 °C; Derating: -0.480 A/ °C
Temperature – Storage	-40...+85 °C	-40...+85 °C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 43 g	approx. 45 g
Dimensions (L x W x H)	90.0 x 90.0 x 27.6 mm	90.0 x 90.0 x 27.6 mm
Mounting	M3 screws	M3 screws
Part numbers		
	688775 EPOS4 60/12 CAN 709859 EPOS4 60/12 CAN SSC	688777 Disk 60/12 EtherCAT 709862 Disk 60/12 EtherCAT SSC
Accessories		
	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 562	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 562

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Multi-Axis Motion Controller Summary

	 MicroMACS6	NEW  MicroMACS6 Module	 MiniMACS6-AMP4	 MiniMACS6-AMP4-IF1	 MiniMACS6-AMP4 OEM	 MasterMACS
Fully programmable	✓	✓	✓	✓	✓	✓
Integrated power stage	No	No	✓	✓	✓	No
Number of axes	6	6	6 (4)	6 (4)	6 (4)	32
CANopen	✓	✓	✓	✓	✓	✓
Ethernet interfaces	✓	✓	No	✓	No	✓
EtherCat slave	No	No	No	✓	No	✓
EtherCat master	No	No	No	No	No	✓
Bluetooth	on request	on request	No	No	No	No

Solutions optimized for less complex or cost-sensitive applications:

- MicroMACS6
- MicroMACS6 Module
- MiniMACS6-AMP-4/50/10

Solutions for high flexibility:

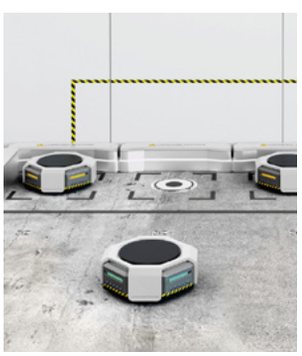
- MiniMACS6-AMP-4/50/10-IF1

– Variants with integrated amplifiers (50 V/up to 10 A/30 A) and various encoder inputs (also absolute)

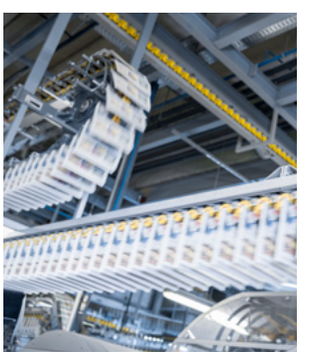
Solutions for highest performance:

- MasterMACS

– Most powerful Motion Controller
– Synchronization of up to 32 axes
– Various fieldbus interfaces







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MiniMACS6-AMP-4/50/10-IF1 Data
Programmable Motion Controller



MiniMACS6-AMP-4/50/10 OEM
Freely programmable, compact multi-axis motion controller with integrated high-performance power stages, without housing.



MiniMACS6-AMP-4/50/10
Freely programmable, compact multi-axis motion controller with integrated high-performance power stages.



MiniMACS6-AMP-4/50/10-IF1
Freely programmable, compact multi-axis motion controller with integrated high-performance power stages and a network option card (Ethernet/EtherCAT/ProfiNet in planning).

Controller versions	
	CANopen Master/Slave, EtherCAT Slave optional, Ethernet optional, Standalone with APOSS® win
Features	
Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	1 kHz (1 ms)
Maximum number of axes	6
Web server (visualization)	optional
Expandable memory	yes (datalogging on USB stick)
Electrical data	
Logic supply voltage V_C	18 - 30 VDC
Inputs	
Digital inputs	16 (PLC level, 4 latch capable)
Analog inputs	2 (12-bit resolution, 0...10 V)
Hall sensor signals	4 x (H1, H2, H3)
CAN-ID (CAN node identification)	configurable with DIP switch
Output	
Digital output	8 (max. 100 mA per output)
Analog output	–
Encoder voltage output	5 VDC, max. 200 mA per output, total 1 A
Interfaces	
EtherCAT-Master / Profinet	on request
CAN	2 (max. 1 Mbit/s)
RS232 / RS485	–
EtherCAT-Slave	1
Ethernet	1
USB 2.0	1 Data+; Data- (High Speed)
Encoder inputs	4
Digital incremental	4 (differential, max. 6.25 MHz)
SSI absolute	4 (39 kHz...5 MHz)
Analog incremental (sin/cos)	4 (differential, max. 150 kHz)
Hiperface/EnDat	–
Encoder outputs	
Encoder TTL outputs	–
Indicator	
LEDs	3 (status) / EtherCAT
Display	–
Environmental conditions	
Temperature – Operation	-30...+70 °C
Temperature – Storage	-30...+85 °C
Humidity (condensation not permitted)	5...90%
Mechanical data	
Weight	ca. 600 g
Dimensions (L x W x H)	141 x 110 x 34 mm
Mounting	Metal compact housing / OEM without housing
Ordering Information: Please contact your maxon sales engineer	

Amplifier
Operating voltage V_{CC}: 12 - 60 VDC
6 DC / 4 EC (BLDC) / 3 stepper motors / Twin Mode / Chopper
Max. output voltage: 0.9 x V_{CC}
Max. output current (per axis) I_{cont}: 10 A I_{max}: 30 A
Switching frequency of power stage: 48 kHz
Sampling rate of PI current controller: 24 kHz (41 µs)
Sampling rate of PI speed controller: 8 kHz (125 µs)
Sampling rate of PID positioning controller: 1 kHz (1 ms)

Product variants
Order no. 001755 MiniMACS6-AMP-4/50/10
Order no. 001756 MiniMACS6-AMP-4/50/10 OEM
Order no. 001757 MiniMACS6-AMP-4/50/ 10-IF1 EtherCAT
Order no. 001784 MiniMACS6-AMP-4/50/10-IF1 Ethernet

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MicroMACS6 Data
Programmable Motion Controller



MicroMACS6
Compact, freely programmable multi-axis controller with optional BLE (Bluetooth Low Energy) interface.

Controller versions	
	CANopen Master/Slave, Ethernet, Standalone with APOSS® win
Features	
Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	–
Maximum number of axes	6
Web server (visualization)	–
Expandable memory	–
Electrical data	
Logic supply voltage V_C	8 - 28 VDC
Inputs	
Digital inputs	6 (PLC 9...30 VDC or Logic 2...30 VDC)
Analog inputs	2 (12-bit resolution, 0...10 V, 1 kHz)
Hall sensor signals	–
CAN-ID (CAN node identification)	configurable with DIP switch
Output	
Digital output	4 (24 VDC, 100 mA, max. 25 kHz PWM)
Analog output	–
Encoder voltage output	–
Interfaces	
Profinet	–
CAN	2 (max. 1 Mbit/s)
BLE (Bluetooth Low Energy)	optional
EtherCAT-Master / EtherCAT-Slave	–
Ethernet	1 (TCP/IP, max. 100 Mbit/s)
USB 2.0	1
Encoder inputs	
Digital incremental	–
SSI absolute	–
Analog incremental (sin/cos)	–
Hiperface/EnDat	–
Encoder outputs	
Encoder TTL outputs	–
Indicator	
LEDs	3 (status) / Ethernet
Display	–
Environmental conditions	
Temperature – Operation	-30...+55 °C
Temperature – Storage	-40...+85 °C
Humidity (condensation not permitted)	5...90%
Mechanical data	
Weight	ca. 80 g
Dimensions (L x W x H)	55 x 40 x 21 mm
Mounting	M2.5 screws

Ordering Information: Please contact your maxon sales engineer

001794 MicroMACS6

MicroMACS6
Compact and powerful

The MicroMACS6 is a high-performance, ultra-compact, freely programmable multi-axis controller without power output stages.
One Ethernet and two independent CAN interfaces are available for commanding up to 6 power stages. The axes can be set up individually or as a kinematics group. Four PWM outputs are available for use with ESCON controllers.
An optional BLE (Bluetooth Low Energy) board expands the controller, making it possible to communicate with the controller via a smartphone app. Note: BLE option on request.

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MicroMACS6 Module Data
Programmable Motion Controller

NEW



MicroMACS6 Module
Compact, programmable multi-axis controller as plug-in option for integration into custom motherboards.

Controller versions	
	CANopen Master/Slave, Ethernet, Standalone with APOSS® win
Features	
Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	–
Maximum number of axes	6
Web server (visualization)	–
Expandable memory	–
Electrical data	
Logic supply voltage V_C	8 - 28 VDC
Inputs	
Digital inputs	6 (PLC 9...30 VDC or Logic 2...30 VDC)
Analog inputs	2 (12-bit resolution, 0...10 V, 1 kHz)
Hall sensor signals	–
CAN-ID (CAN node identification)	configurable
Output	
Digital output	4 (24 VDC, 100 mA, max. 25 kHz PWM)
Analog output	–
Encoder voltage output	–
Interfaces	
Profinet	–
CAN	2 (max. 1 Mbit/s)
BLE (Bluetooth Low Energy)	optional
EtherCAT-Master / EtherCAT-Slave	–
Ethernet	1 (TCP/IP, max. 100 Mbit/s)
USB 2.0	1
Encoder inputs	
Digital incremental	–
SSI absolute	–
Analog incremental (sin/cos)	–
Hiperface/EnDat	–
Encoder outputs	
Encoder TTL outputs	–
Indicator	
LEDs	3 (status) / Ethernet
Display	–
Environmental conditions	
Temperature – Operation	-30...+55 °C
Temperature – Storage	-40...+85 °C
Humidity (condensation not permitted)	5...90%
Mechanical data	
Weight	ca. 9 g
Dimensions (L x W x H)	45 x 30 x 9.8 mm
Mounting	M2 screws

Ordering Information: Please contact your maxon sales engineer

001822 MicroMACS6 Module

MicroMACS6 Module
Flexible and compact

The MicroMACS6 Module is designed for flexibility and can be integrated into custom motherboards. The MicroMACS6 Module, with its small size and focused functions (similar to the MicroMACS6), is an excellent choice for users looking for a more affordable alternative to high-performance master motion controllers. For initial commissioning, the MicroMACS6 with identical functionality can be used as a fully integrated and ready-to-use solution. This simplifies the setup process.

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MasterMACS Data
Programmable Motion Controller



MasterMACS
Rounds off the Motion Controller portfolio with the highest computing power and multiple integrated bus interfaces as standard.

Controller versions	
	CANopen Master/Slave, EtherCAT Master, EtherCAT Slave, Ethernet, Standalone with APOSS® win
Features	
Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	1 kHz (1 ms)
Maximum number of axes	32
Web server (visualization)	yes
Expandable memory	SD-Card
Electrical data	
Logic supply voltage V_C	18 - 30 VDC
Inputs	
Digital inputs	10 (PLC level)
Analog inputs	–
Hall sensor signals	–
CAN-ID (CAN node identification)	configurable with DIP switch
Output	
Digital output	4 (max. 100 mA per output)
Analog output	–
Encoder voltage output	5 VDC, max. 200 mA
Profinet	on request
Interfaces	
CAN	2 high; low (max. 1 Mbit/s)
RS232 / RS485	1 x RxD; TxD / 1 x Data+; Data-
EtherCAT-Master / EtherCAT-Slave	1 / 1
Ethernet	1
USB 2.0	1 Data+; Data- (Full Speed)
Encoder inputs	1
Digital incremental	1 (differential, max. 5 MHz)
Hiperface/EnDat	–
Encoder outputs	
Encoder TTL outputs	–
Indicator	
LEDs	10 (status, USB, EtherCAT)
Display	Option
Environmental conditions	
Temperature – Operation	0...40 °C
Temperature – Storage	-20...+85 °C
Humidity (condensation not permitted)	20...80%
Mechanical data	
Weight	500 / 300 g (DIN/compact housing)
Dimensions (L x W x H)	108 x 108 x 67 / 125 (108) x 98 x 42 mm
Mounting	DIN mounting / compact housing

Ordering Information: Please contact your maxon sales engineer

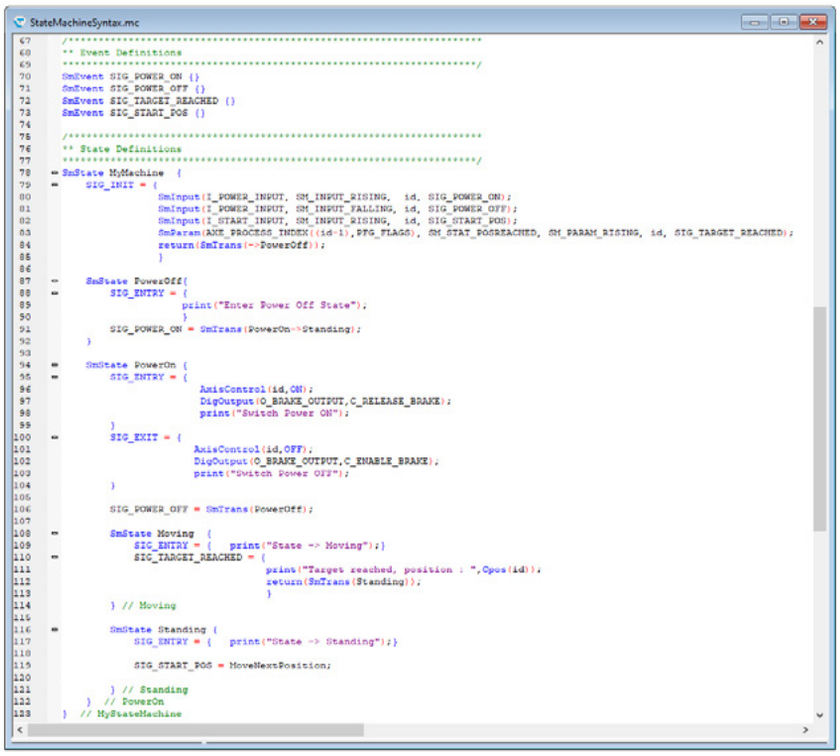
001725 MasterMACS DIN 32 ax
001728 MasterMACS compact housing 32ax

Data logger/web server
For development and analysis purposes, it is frequently helpful to collect, prepare and output data on drive systems.
Our MACS controllers provide easy options for high-performance data storage, be it on an internal SD card or via a connected PC tool. Relevant data can be recorded on a per-event basis or for long-term observation.
This data can be read out and analyzed at a later time. This flexibility makes it possible to use the MasterMACS purely as data collectors. An integrated web server provides the option of performing analysis and configuration via remote diagnostics.

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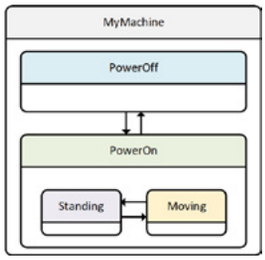
Programmable Motion Controllers
Application development

APOSS® win
APOSS® enables simplified implementation of complex motion control applications. The programming is performed in the high-level languages C, which has been supplemented with very powerful, specific motion control commands.



APOSS® IDE – Application Engineering

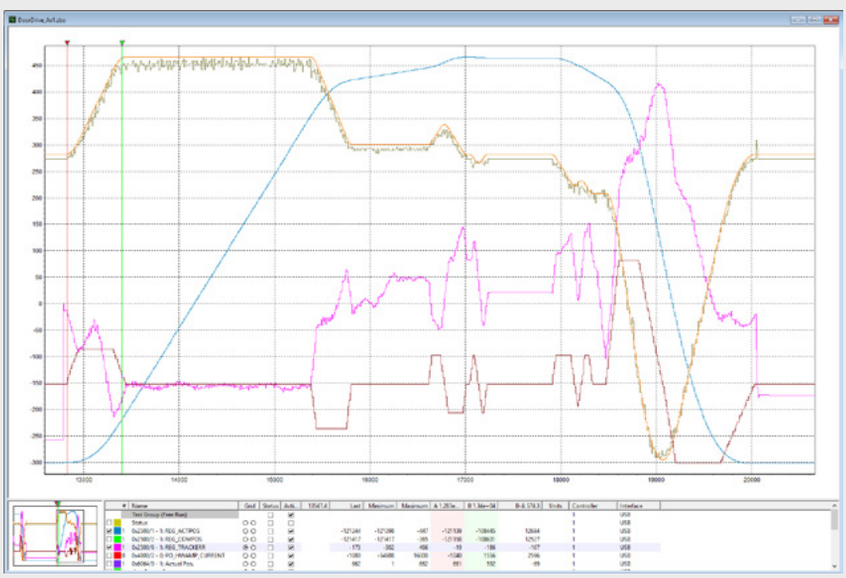
State machines
The development of extensive software systems requires a structured and modular procedure. It is essential to have an appropriate system architecture, including its components and the interfaces to the subsystems and system environment.



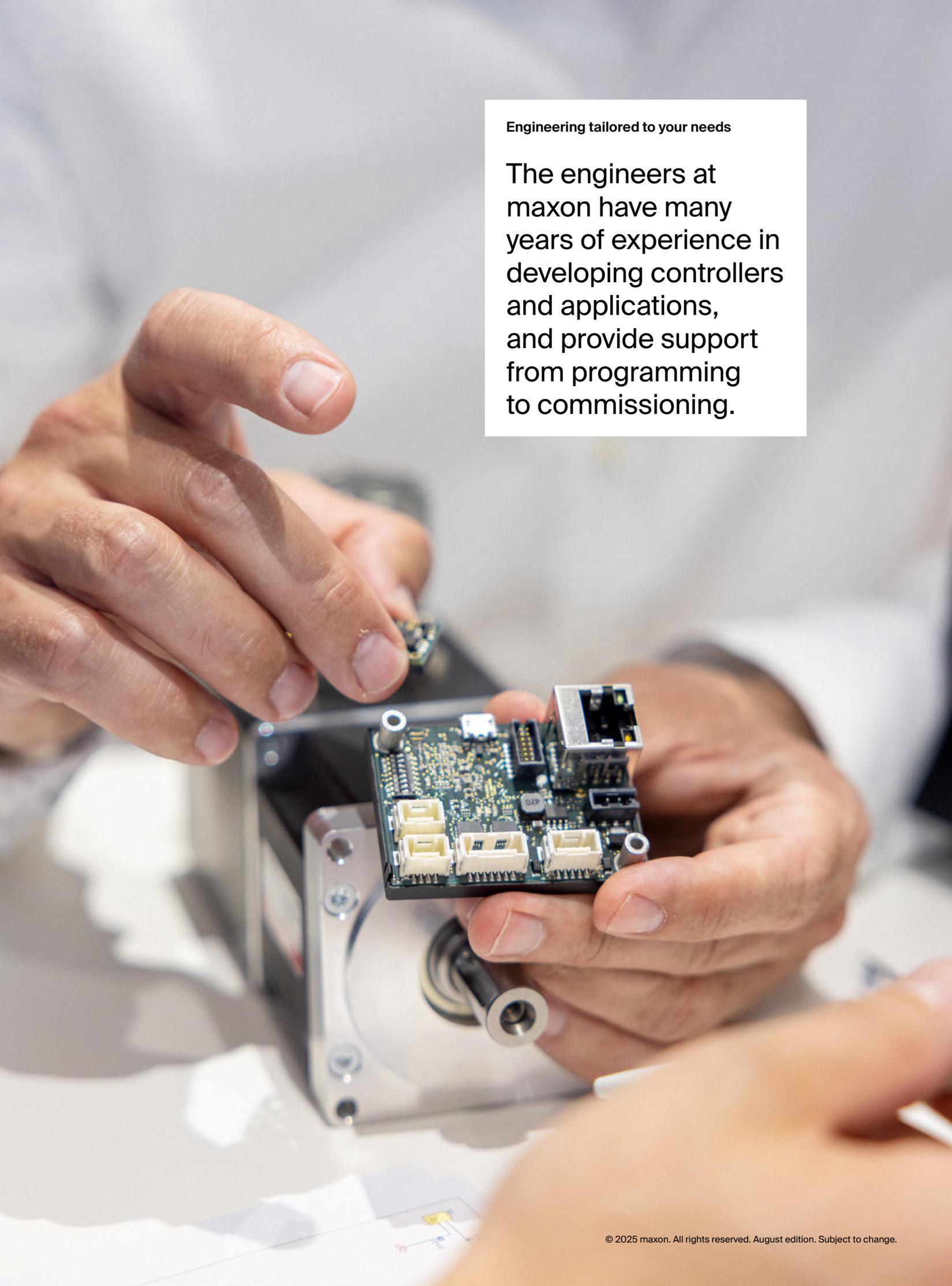
APOSS® makes it possible to create programs by means of hierarchical state machines. Thus comprehensive applications can be structured and developed in a transparent and serviceable way. Several state machines can be called up and processed in parallel.

Motion control functions
Comprehensive positioning and synchronization tasks are initiated with APOSS® using simple commands [e.g. AxisPosAbsStart(); AxisPosRelStart(); SyncPos(); SyncVel();] and processed independently in the background.

- **Jerk-limited positioning**
  Profile motion with limited jerking. Jerk limiting can be individually defined for all four acceleration phases. Jerk-limited motion can be changed dynamically during the motion.
- **CAM profiles**
  Each axis can travel along an own CAM profile. CAM profiles can be combined in any way desired and dynamically calculated. CAM segments can be splines, polynomials up to the fifth order or straight lines.
- **Path motion**
  Path motion can be performed with constant or with maximum path speed, for any number of axes.
- **Synchronization tasks**
  Axis motion synchronized with a master axis, position synchronization, speed synchronization or position synchronization with marker correction. Each axis can be synchronized with another master.
- **Kinematics**
  Synchronization of several axes in a 2- or 3-dimensional Cartesian coordinate system. Various kinematic models are available, for example a SCARA or DELTA model.


APOSS® Oscilloscope

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Engineering tailored to your needs

The engineers at maxon have many years of experience in developing controllers and applications, and provide support from programming to commissioning.

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Summary motor control

4-Q Servocontroller				Page
ESCON		466023	ESCON Module 24/2, for DC/EC motors, speed control (open loop/closed loop), current control, 2/6 A, 10–24 VDC	550
		403112	ESCON 36/2 DC, for DC motors, speed control (open loop/closed loop), current control, 2/4 A, 10–36 VDC	550
		414533	ESCON 36/3 EC, for EC motors, speed control (open loop/closed loop), current control, 2.7/9 A, 10–36 VDC	551
		446925	ESCON Module 50/4 EC-S, for sensorless EC motors, speed control (open loop/closed loop), 4/12 A, 10–50 VDC	551
		438725	ESCON Module 50/5, for DC/EC motors, speed control (open loop/closed loop), current control, 5/15 A, 10–50 VDC	551
		532872	ESCON Module 50/8, for DC/EC motors, speed control (open loop/closed loop), current control, 8/15 A, 10–50 VDC	552
		586137	ESCON Module 50/8 HE, for DC/EC motors, speed control (open loop/closed loop), current control, 8/15 A, 10–50 VDC	552
		409510	ESCON 50/5, for DC/EC motors, speed control (open loop/closed loop), current control, 5/15 A, 10–50 VDC	553
		422969	ESCON 70/10, for DC/EC motors, speed control (open loop/closed loop), current control, 10/30 A, 10–70 VDC	553
ESCON2	NEW	809635	ESCON2 Nano 24/2, for DC/EC motors, servo controller, 2/6 A, 5–24 VDC	557
	NEW	809631	ESCON2 Micro 60/5, for DC/EC motors, servo controller, 5/15 A, 10–60 VDC	557
	NEW	854796	ESCON2 Module 60/12, for DC/EC motors, servo controller, 12/30 A, 1060 VDC	558
	NEW	854801	ESCON2 Compact 60/12, for DC/EC motors, servo controller, 12/30 A, 10–60 VDC	559
		783722	ESCON2 Module 60/30, for DC/EC motors, servo controller, 30/60 A, 10–60 VDC	558
		783734	ESCON2 Compact 60/30, for DC/EC motors, servo controller, 30/60 A, 10–60 VDC	559

4-Q-DC Servoamplifier				
LSC	NRND	250521	LSC 30/2, linear 4-Q-Servoamplifier 30 V/2 A in module housing	

1-Q-EC Amplifier				
DEC		367661	DEC Module 24/2, digital 1-Q-EC Amplifier 24 V/2 A, speed control, OEM module	547
		380200	DEC Module 50/5, digital 1-Q-EC Amplifier 50 V/5 A, speed control, OEM module	547
	NRND	230572	DEC 50/5, digital 1-Q-EC Amplifier 50 V/5 A, speed control, current control, PWM operation	

4-Q-EC Servoamplifier				
DES	NRND	205679	DES 50/5, digital 4-Q-EC Servoamplifier 50 V/5 A, sinusoidal commutation	

Positioning control units				
EPOS4		638328	EPOS4 Micro 24/5 CAN, digital positioning controller, 5 A, 10–24 VDC	563
		654731	EPOS4 Micro 24/5 EtherCAT, digital positioning controller, 5 A, 10–24 VDC	563
		536630	EPOS4 Module 24/1.5, digital positioning controller, 1.5 A, 10–24 VDC	564
		534130	EPOS4 Module 50/5, digital positioning controller, 5 A, 10–50 VDC	564
		504384	EPOS4 Module 50/8, digital positioning controller, 8 A, 10–50 VDC	565
		504383	EPOS4 Module 50/15, digital positioning controller, 15 A, 10–50 VDC	565
		684519	EPOS4 Compact 24/5 EtherCAT 3-axes, digital positioning controller, 3 x 5 A, 10–24 VDC	565
		546714	EPOS4 Compact 24/1.5 CAN, digital positioning controller, 1.5 A, 10–24 VDC	566
		628092	EPOS4 Compact 24/1.5 EtherCAT, digital positioning controller, 1.5 A, 10–24 VDC	566
		541718	EPOS4 Compact 50/5 CAN, digital positioning controller, 5 A, 10–50 VDC	567
		628094	EPOS4 Compact 50/5 EtherCAT, digital positioning controller, 5 A, 10–50 VDC	567
		520885	EPOS4 Compact 50/8 CAN, digital positioning controller, 8 A, 10–50 VDC	567
		605298	EPOS4 Compact 50/8 EtherCAT, digital positioning controller, 8 A, 10–50 VDC	567
		520886	EPOS4 Compact 50/15 CAN, digital positioning controller, 15 A, 10–50 VDC	568
		605299	EPOS4 Compact 50/15 EtherCAT, digital positioning controller, 15 A, 10–50 VDC	569
		546047	EPOS4 50/5, digital positioning controller, 5 A, 10–50 VDC	569
		594385	EPOS4 70/15, digital positioning controller, 15 A, 10–70 VDC	569
		688770	EPOS4 Disk 60/8 CAN, digital positioning controller, 8 A, 12–60 VDC	570
		688772	EPOS4 Disk 60/8 EtherCAT, digital positioning controller, 8 A, 12–60 VDC	570
		688775	EPOS4 Disk 60/12 CAN, digital positioning controller, 12 A, 12–60 VDC	571
		709859	EPOS4 Disk 60/12 CAN SSC, digital positioning controller, 12 A, 12–60 VDC	571
		688777	EPOS4 Disk 60/12 EtherCAT, digital positioning controller, 12 A, 12–60 VDC	571
		709862	EPOS4 Disk 60/12 EtherCAT SSC, digital positioning controller, 12 A, 12–60 VDC	571
EPOS2	NRND	380264	EPOS2 24/2 for EC motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	390003	EPOS2 24/2 for DC/EC motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	390438	EPOS2 24/2 for DC motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	530239	EPOS2 24/2 for DC(X) motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	360665	EPOS2 Module 36/2 OEM positioning controller plug-in module, 2 A, 11–36 VDC	
	NRND	392159	EPOS2 Module 24/3 OEM positioning controller plug-in module, 3 A, 11–24 VDC	
	NRND	367676	EPOS2 24/5, digital positioning controller, 5 A, 11–24 VDC	
	NRND	347717	EPOS2 50/5, digital positioning controller, 5 A, 11–50 VDC	
	NRND	375711	EPOS2 70/10, digital positioning controller, 10 A, 11–70 VDC	
MAXPOS	NRND	447293	MAXPOS 50/5, digital positioning controller, 5 A, 10–50 VDC	

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Summary motor control Accessories

Cable		
	710928	Brake Cable (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
NRND	275926	CAN-CAN Cable (length 3 m) to 347717, 361435, 367676, 375711, 390003
	520858	CAN-CAN Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 783734
	710931	CAN-CAN Cable (length 3 m) to 688770, 688775, 709859
NRND	275908	CAN-COM Cable (length 3 m) to 347717, 361435, 367676, 375711, 390003
	520857	CAN-COM Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 783734
	710932	CAN-COM Cable (length 3 m) to 688770, 688775, 709859
NRND	319471	CAN-Y Cable (length 3 m) to 390003
	403962	DC Motor Cable (length 1.5 m) to 403112
NRND	303490	DC Motor Cable (length 3 m) to 390003
	275934	Encoder Cable (length 3 m) to 347717, 361435, 367676, 375711, 380264, 390003, 390438, 403112, 409510, 422969, 438779, 447293, 486400, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 783734
	696285	Encoder Cable (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	710934	EtherCAT-COM Cable (length 3 m) to 688772, 688777, 709862
	710933	EtherCAT-EtherCAT Cable (length 3 m) to 688772, 688777, 709862
	422827	Ethernet Cable (length 2 m) to 001755, 001756, 001757, 001784, 447293, 546047, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519
	275878	Hall Sensor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 447293, 520884, 520885, 520886, 534133, 541718, 546047, 594385, 604594, 605298, 605299, 620044, 628094, 684519, 688775, 709859, 688777, 709862, 783734
	696284	Hall Sensor Cable (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	403965	I/O Cable 6core (length 1.5 m) for digital I/Os to 403112, 414533
	403964	I/O Cable 7core (length 1.5 m) for analog I/Os to 403112, 414533
	275851	Motor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 447293, 520885, 520886, 534133, 541718, 546047, 594385, 604594, 605298, 605299, 620044, 628094, 684519
	520851	Motor Cable High Current (length 3 m) to 520884, 520886, 594385, 604594, 605299, 783734
	710930	Motor Cable High Current (length 3 m) to 688775, 709859, 688777, 709862
	838460	Motor Cable Highest Current (length 3 m) to 783734
NRND	302948	Motor/Hall Sensor Cable (length 3 m) to 390003
	847301	NTC Cable (length 3 m) to 783734
	696283	Power & Motor Cable (length 3 m) to 688770, 688772
	403957	Power Cable (length 1.5 m) to 403112, 414533
	275829	Power Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 447293, 520884, 520885, 520886, 546047, 594385, 604594, 605298, 605299, 684519, 783734
	520850	Power Cable High Current (length 3 m) to 520884, 520885, 520886, 594385, 604594, 605298, 605299, 684519
	710929	Power Cable High Current (length 3 m) to 688775, 709859, 688777, 709862
	838459	Power Cable Highest Current (length 3 m) to 783734
NRND	275900	RS232-COM Cable (length 3 m) to 347717, 361435, 367676, 375711, 390003
	520856	RS232-COM Cable (length 3 m) to 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 783734
	696286	Sensor Cable 3x2core (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
NRND	451290	Sensor Cable 5x2core (length 3 m) to 447293
	520852	Sensor Cable 5x2core (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536907, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 688775, 709859, 688777, 709862, 783734
NRND	451291	Signal Cable 12core (length 3 m) to 447293
NRND	275932	Signal Cable 16core (length 3 m) to 347717, 361435, 367676, 375711, 390003
NRND	378173	Signal Cable 3x2core (length 3m) to 375711
NRND	350390	Signal Cable 4x2core (length 3 m) to 347717
NRND	300586	Signal Cable 6x2core (length 3 m) to 347717, 375711
	520854	Signal Cable 7core (length 3 m) for analog I/Os with 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 783734
	696288	Signal Cable 7core (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	520853	Signal Cable 8core (length 3 m) for digital I/Os and STO with 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 783734
NRND	451292	Signal Cable 8core (length 3 m) to 447293
	696287	Signal Cable 8core (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
NRND	350392	USB Type A - B Cable (length 3 m) to 347717, 361435
	403968	USB Type A - micro B Cable (length 1.5 m) to 001755, 001756, 001757, 001784, 403112, 409510, 414533, 422969, 438725, 446925, 447293, 466023, 504383, 504384, 520885, 520886, 534130, 536630, 541718, 546047, 546714, 594385, 605298, 605299, 628092, 628094, 684519
	696289	USB Type A - Micro-Lock Cable (length 1.5 m) to 688770, 688772, 688775, 709859, 688777, 709862
NRND	370513	USB Type A - mini B Cable (length 3 m) to 367676, 375711, 390438, 380264, 390003
	838461	USB Type A - Type C Cable (length 1.5 m) to 783734
	845854	USB Type C - Type C Cable (length 1.5 m) to 783734

Motor choke		
	347919	Choke module, 3 x 0.1 mH, 10.0 A, L x W x H (90 x 70 x 49.7 mm) with screw type terminal block

Extension Cards		
EPOS4	581245	EPOS4 EtherCAT Card for use with 536630, 546047, 534130, 504384, 504383, 594385

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Summary motor control Accessories

Connector Set			
	NRND	303807	EPOS2 24/2 Connector Set to 390003
	NRND	384915	EPOS2 24/5 Connector Set to 367676
	NRND	351061	EPOS2 50/5 Connector Set to 347717
	NRND	381405	EPOS2 70/10 Connector Set to 375711
		520859	EPOS4 Connector Set to 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094
		710926	EPOS4 Disk Connector Set to 688770, 688772, 688775, 709859, 688777, 709862
		691408	EPOS4 MB Micro EtherCAT 3-axes Connector Set to 659508, 684519
		404404	ESCON 36/2 DC Connector Set to 403112
		425255	ESCON 36/3 EC Connector Set to 414533
	NRND	451746	MAXPOS 50/5 Connector Set to 447293
	NEW	846644	Motion Connector Set to 809646, 834838, 854801
		846645	Motion Connector Set Highest Current to 783734, 783729
Adapter			
		220310	Adapter 4-pole flexprint connector to 4-pole screw terminal, for use with EC micro motors without Hall sensors
		473103	Adapter 6-pole flexprint connector to 6-pole screw terminal, for use with encoder 8 OPT
		425931	Adapter 8-pole flexprint connector to 8-pole screw terminal, for use with motors ECX 6, ECX 8, EC 9.2 flat
		506579	Adapter 10-pole flexprint connector to pin header (DIN 41651), for use with ENX 10 EASY with FFC cable
		220300	Adapter 11-pole flexprint connector to 8-pole screw terminal, for use with motors EC 10/13, ECX 10, EC 20/32/45 flat
		804420	Adapter 24-pole flexprint connector to screw terminal, for use with encoder ENX 10 MAG INT
		498157	Adapter Micromotor for use with motors DCX 6/8 and ECX 4/6/8 with encoder (flexprint connector) or cable version
		223774	Adapter 10-pole spring contact strip (DIN 41651) to 8-pole screw terminal
		262359	Adapter 10-pole pin header (DIN 41651) to 10-pole screw terminal
		459875	Adapter encoder connector 2.54 mm pitch to 2.54 mm pitch (DIN 41651) with spring terminal for motor connections
		405120	Adapter encoder connector 1.27 mm pitch to 2.54 mm pitch (DIN 41651) with spring terminal for motor connections
		549609	Adapter encoder connector 1.27 mm pitch to 2.54 mm pitch (DIN 41651)
		488167	Adapter EASY Absolute to 6-pole screw terminal for use with encoder ENX 10/16 EASY Absolute
		418719	Adapter BLACK FPC11poles, for use with motors ECX 10, EC 10/13, EC 20/32/45 flat with 380264 and 414533
		418723	Adapter BLUE FPC8poles, for use with motors ECX 6, ECX 8, EC 9.2 flat with 380264 and 414533
		693573	Adapter Cable Encoder CLIK-Mate to DIN 41651 for use with 659508, 684519
Accessories			
		751388	EPOS4 Disk CAN ix Industrial Type B plug, for use with 688770, 688775, 709859
		748166	EPOS4 Disk EtherCAT ix Industrial Type A plug, for use with 688772, 688777, 709862
		677324	EPOS4 Micro SMT socket 2 x 40 poles, matching connector for PCB designs suitable for 638328, 654731
		590738	EPOS4 Module SMT socket 2 x 23 poles, matching connector for PCB designs suitable for 536630, 534130
		586142	ESCON Module 50/8 Thermal Pad
	NEW	841890	ESCON2 Micro 60/5 Thermal Accessory Kit
	NEW	902315	ESCON2 Module 60/12 Heat Spreader
		802201	ESCON2 Module 60/30 Heat Spreader
	NEW	902308	ESCON2 Module 60/12 Thermal Accessory Kit
	NEW	802197	ESCON2 Module 60/30 Thermal Pad
	NEW	876085	ESCON2 Nano 24/2 Thermal Accessory Kit
Shunt regulators			
		309687	DSR 50/5, shunt regulator 27 VDC and 56 VDC (selectable), P_{max} 300 W, P_{cont} 10 W
		235811	DSR 70/30, shunt regulator 12–75 VDC (adjustable), P_{max} 475 W, P_{cont} 25 W, module housing 180 x 103 x 26 mm
Starter kits, Eva boards, motherboards, Connector boards			
DEC		370652	DEC Module Evaluation Board, with switch, LED, potentiometer etc., for use with 367661 and 380200
ESCON		486400	ESCON Module 24/2 Motherboard with pluggable screw terminal block, for use with 466023
		438779	ESCON Module Motherboard with pluggable screw terminal block, for use with 438725
		586048	ESCON Module 50/8 Motherboard with pluggable screw terminal block, for use with 532872, 586137
		450237	ESCON Module Motherboard Sensorless with pluggable screw terminal block, for use with 446925
ESCON2	NEW	854800	ESCON2 CB 60/12, connector board compatible with 854796
		783729	ESCON2 CB 60/30, connector board compatible with 783722
	NEW	809646	ESCON2 EB Micro, evaluation board compatible with 809631
	NEW	834838	ESCON2 EB Nano, evaluation board compatible with 809635
EPOS2	NRND	363407	EPOS2 Module 36/2 Starter Kit, consisting of 361435, 360665, 275829, 275851, 275878, 275934, 275932, 350392
	NRND	361435	EPOS2 Module Evaluation Board, 1-axis (with switch, LED, potentiometer and connector) for use with 360665
EPOS4		604594	EPOS4 CB Power EtherCAT, connector board including STO Idle Connector, compatible with 504383 and 504384
		520884	EPOS4 CB Power CAN, connector board including STO Idle Connector, compatible with 504383 and 504384
		620044	EPOS4 CB 50/5 EtherCAT, connector board including STO Idle Connector, compatible with 534130
		534133	EPOS4 CB 50/5 CAN, connector board including STO Idle Connector, compatible with 534130
		620048	EPOS4 CB 24/1.5 EtherCAT, connector board including STO Idle Connector, compatible with 536630
		536997	EPOS4 CB 24/1.5 CAN, connector board including STO Idle Connector, compatible with 536630
		638677	EPOS4 EB Micro, evaluation board compatible with 638328, 654731
		659508	EPOS4 MB Micro EtherCAT 3-axes, Motherboard compatible with 654731

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Summary motion control

Multi-axis controllers or multi-axis motion controllers			
MasterMACS		001563	MasterMACS DIN 4ax for high-precision synchronization of several axes, 200 mA, 24 VDC
		001716	MasterMACS DIN 10ax for high-precision synchronization of several axes, 200 mA, 24 VDC
		001724	MasterMACS DIN 20ax for high-precision synchronization of several axes, 200 mA, 24 VDC
		001725	MasterMACS DIN 32ax for high-precision synchronization of several axes, 200 mA, 24 VDC
		001565	MasterMACS compact housing 4ax for high-precision synchronization of several axes, 200 mA, 24 VDC
		001726	MasterMACS compact housing 10ax for high-precision synchronization of several axes, 200 mA, 24 VDC
		001727	MasterMACS compact housing 20ax for high-precision synchronization of several axes, 200 mA, 24 VDC
		001728	MasterMACS compact housing 32ax for high-precision synchronization of several axes, 200 mA, 24 VDC
MiniMACS6-AMP-4/50/10		001755	MiniMACS6-AMP-4/50/10 motion controller with integrated high-power amplifiers, 12...60 VDC, 4 x 10 Arms
		001756	MiniMACS6-AMP-4/50/10 OEM motion controller with integrated high-power amplifiers, 12...60 VDC, 4 x 10 Arms
		001757	MiniMACS6-AMP-4/50/10-IF1 EtherCAT motion controller with integrated high-power amplifiers, 12...60 VDC, 4 x 10 Arms
		001784	MiniMACS6-AMP-4/50/10-IF1 Ethernet motion controller with integrated high-power amplifiers, 12...60 VDC, 4 x 10 Arms
MicroMACS6		001794	MicroMACS6 freely programmable and ultra-compact motion controller, 8–28 VDC
	NEW	001809	MicroMACS6 freely programmable and ultra-compact motion controller with BLE interface, 8–28 VDC
	NEW	001822	MicroMACS6 Module: freely programmable and compact motion controller as plug-in option for integration into motherboards

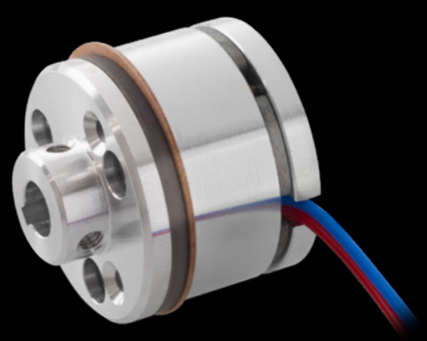
Accessories			
		001610	MasterMACS connector set for 001563, 001716, 001724, 001725, 001565, 001726, 001727, 001728
	NEW	786794	MicroMACS6 connector set for 001794, 001809
		001611	MiniMACS connector set for 001607, 001586
		001772	MiniMACS6-AMP-4/50/10 connector set for 001755, 001756, 001757, 001784

Cable			
		275829	Power Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 407582, 447293, 520884, 520885, 520886, 546047, 594385, 604594, 605298, 605299, 684519, 783734
		520857	CAN-COM Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 783734
		520858	CAN-CAN Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 783734
	NEW	786774	Signal cable, 5core, for 001794, 001809
		520853	Signal Cable 8core (length 3 m) for digital I/Os and STO with 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 783734
		696837	Signal cable, 10core, for 001755, 001756, 001757, 001784
		699485	Power cable, high current, for 001755, 001756, 001757, 001784
		275851	Motor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 407582, 447293, 520885, 520886, 534133, 541718, 546047, 594385, 604594, 605298, 605299, 620044, 628094, 684519
		275878	Hall Sensor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 407582, 447293, 520884, 520885, 520886, 534133, 541718, 546047, 594385, 604594, 605298, 605299, 620044, 628094, 684519, 688775, 709859, 688777, 709862, 783734
		520852	Sensor Cable 5x2core (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536907, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 688775, 709859, 688777, 709862, 783734
		422827	Ethernet Cable (length 2 m) to 001755, 001756, 001757, 001784, 447293, 546047, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519
		403968	USB Type A - micro B Cable (length 1.5 m) to 001755, 001756, 001757, 001784, 403112, 409510, 414533, 422969, 438725, 446925, 447293, 466023, 504383, 504384, 520885, 520886, 534130, 536630, 541718, 546047, 546714, 594385, 605298, 605299, 628092, 628094, 684519

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maxon accessories

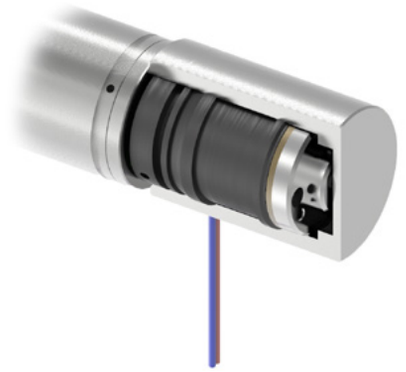
Brake AB 20 24 VDC, 0.1 Nm	584–585
Brake AB 28 24 VDC, 0.4 Nm	586–588
Brake AB 32 24 VDC, 0.4 Nm	589
Brake AB 41 24 VDC, 2.0 Nm	590
Brake AB 42 S 24 VDC, 1.4 Nm	592
Brake AB 44 24 VDC, 2.5 Nm	591
Brake AB 60 S 24 VDC, 5.0 Nm	593
End caps	594
ECX 13 Connection cable	595
ECX 16 Connection cable	596
ECX 19 Connection cable	597
ECX 22 Connection cable	598



Useful parts complete maxon's full range of drive technology products. Brakes may only be assembled with motors in the delivery plant.

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Brake AB 20 24 VDC, 0.1 Nm



Important information

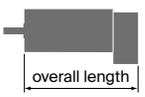
- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- Schematic image: does not necessarily reflect the delivery state.

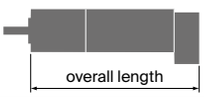
Stock program
Standard program
Special program (on request)

Part numbers

301212	301213

Type





Modular system

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	∅ AB [mm]	Overall length [mm] / • see Gearhead	
EC-max 22, 12 W	282					22	67.6	
EC-max 22, 12 W	282	GP 22, 0.5 - 1.0 Nm	420			22	•	
EC-max 22, 12 W	282	GP 22, 0.5 - 3.4 Nm	422–423			22	•	
EC-max 22, 12 W	282	KD 32, 1.0 - 4.5 Nm	435			22	•	
EC-max 22, 12 W	282	GP 22 S	472/473			22	•	
EC-max 22, 25 W	283					22	84.1	
EC-max 22, 25 W	283	GP 22, 0.5 - 1.0 Nm	420			22	•	
EC-max 22, 25 W	283	GP 22, 0.5 - 2.0 Nm	422			22	•	
EC-max 22, 25 W	283	GP 22, 0.5 - 3.4 Nm	423			22	•	
EC-max 22, 25 W	283	GP 32, 1.0 - 6.0 Nm	429–430			22	•	
EC-max 22, 25 W	283	KD 32, 1.0 - 4.5 Nm	435			22	•	
EC-max 22, 25 W	283	GP 22 S	472/473			22	•	
EC-max 22, 25 W	283	GP 32 S	474–482			22	•	
EC-max 30, 40 W	284					30		77.6
EC-max 30, 40 W	284	GP 32, 0.75 - 4.5 Nm	428			30		•
EC-max 30, 40 W	284	GP 32, 1.0 - 8.0 Nm	431/432			30		•
EC-max 30, 40 W	284	KD 32, 1.0 - 4.5 Nm	435			30		•
EC-max 30, 40 W	284	GP 32 S	474–482			30		•
EC-max 30, 40 W	284			HEDL 5540	537–539	30		98.2
EC-max 30, 40 W	284	GP 32, 0.75 - 4.5 Nm	428	HEDL 5540	537–539	30		•
EC-max 30, 40 W	284	GP 32, 1.0 - 8.0 Nm	430/432	HEDL 5540	537–539	30		•
EC-max 30, 40 W	284	KD 32, 1.0 - 4.5 Nm	435	HEDL 5540	537–539	30		•
EC-max 30, 40 W	284	GP 32 S	474–482	HEDL 5540	537–539	30		•
EC-max 30, 60 W	285					30		99.6
EC-max 30, 60 W	285	GP 32, 0.75 - 4.5 Nm	428			30		•
EC-max 30, 60 W	285	GP 32, 1.0 - 8.0 Nm	430/432			30		•
EC-max 30, 60 W	285	KD 32, 1.0 - 4.5 Nm	435			30		•
EC-max 30, 60 W	285	GP 42, 3.0 - 15.0 Nm	440			30		•
EC-max 30, 60 W	285	GP 32 S	474–482			30		•
EC-max 30, 60 W	285			HEDL 5540	537–539	30		120.2
EC-max 30, 60 W	285	GP 32, 0.75 - 4.5 Nm	428	HEDL 5540	537–539	30		•
EC-max 30, 60 W	285	GP 32, 1.0 - 8.0 Nm	430/432	HEDL 5540	537–539	30		•
EC-max 30, 60 W	285	KD 32, 1.0 - 4.5 Nm	435	HEDL 5540	537–539	30		•
EC-max 30, 60 W	285	GP 42, 3.0 - 15.0 Nm	440	HEDL 5540	537–539	30		•
EC-max 30, 60 W	285	GP 32 S	474–482	HEDL 5540	537–539	30		•
EC-4pole 30, 100 W	293					30		83.2
EC-4pole 30, 100 W	293	GP 32, 1.0 - 6.0 Nm	430			30		•
EC-4pole 30, 100 W	293	GP 32, 4.0 - 8.0 Nm	432			30		•
EC-4pole 30, 100 W	293	GP 42, 3.0 - 15.0 Nm	440			30		•
EC-4pole 30, 100 W	293	GP 32 S	474–482			30		•
EC-4pole 30, 100 W	293			22 EMT	518	30		114.4
EC-4pole 30, 100 W	293	GP 32, 1.0 - 6.0 Nm	430	22 EMT	518	30		•
EC-4pole 30, 100 W	293	GP 32, 4.0 -8.0 Nm	432	22 EMT	518	30		•
EC-4pole 30, 100 W	293	GP 42, 3.0 - 15.0	440	22 EMT	518	30		•
EC-4pole 30, 100 W	293	GP 32 S	474–482	22 EMT	518	30		•

Technical data

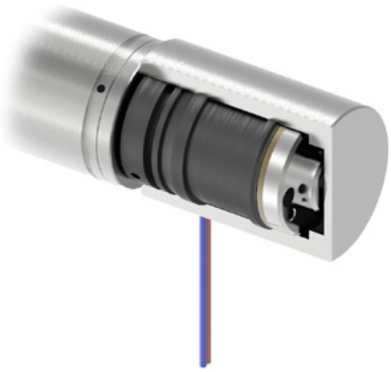
Holding torque	0.1 Nm	Nominal voltage, smoothed		24 VDC ±10%
Mass inertia	1.8 gcm²	Resistance		R_{20} = 227 Ω ±6%
Max. speed	49 000 rpm	Duty cycle		100%
Weight	29 g	Reaction time	– Coupling	≤ 12 ms
Ambient temperature range	-40...+100°C		– Opening	≤ 16 ms

Pin allocation

Cable (AWG 26)	Designation
red	U_{Brake} + 24 VDC
blue	U_{Brake} GND
Min. cable length	350 mm

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Brake AB 20 24 VDC, 0.1 Nm



Important information

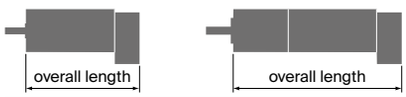
- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- Schematic image: does not necessarily reflect the delivery state.

Stock program
Standard program
Special program (on request)

Part numbers

301212 301213

Type



Modular system

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	∅ AB [mm]	Overall length [mm] / • see Gearhead
EC-4pole 30, 100 W	293			16 EASY/XT/Abs.	509–511	30	97.3
EC-4pole 30, 100 W	293	GP 32, 1.0 - 6.0 Nm	430	16 EASY/XT/Abs.	509–511	30	•
EC-4pole 30, 100 W	293	GP 32, 4.0 - 8.0 Nm	432	16 EASY/XT/Abs.	509–511	30	•
EC-4pole 30, 100 W	293	GP 42, 3.0 - 15.0 Nm	440–441	16 EASY/XT/Abs.	509–511	30	•
EC-4pole 30, 100 W	293	GP 32 S	474–482	16 EASY/XT/Abs.	509–511	30	•
EC-4pole 30, 100 W	293			16 EASY Abs. XT	512	30	97.8
EC-4pole 30, 100 W	293	GP 32, 1.0 - 6.0 Nm	430	16 EASY Abs. XT	512	30	•
EC-4pole 30, 100 W	293	GP 32, 4.0 - 8.0 Nm	432	16 EASY Abs. XT	512	30	•
EC-4pole 30, 100 W	293	GP 42, 3.0 - 15.0 Nm	440–441	16 EASY Abs. XT	512	30	•
EC-4pole 30, 100 W	293	GP 32 S	474–482	16 EASY Abs. XT	512	30	•
EC-4pole 30, 100 W	293			16 RIO	519	30	95.8
EC-4pole 30, 100 W	293	GP 32, 1.0 - 6.0 Nm	430	16 RIO	519	30	•
EC-4pole 30, 100 W	293	GP 32, 4.0 - 8.0 Nm	432	16 RIO	519	30	•
EC-4pole 30, 100 W	293	GP 42, 3.0 - 15.0 Nm	440–441	16 RIO	519	30	•
EC-4pole 30, 100 W	293	GP 32 S	474–482	16 RIO	519	30	•
EC-4pole 30, 200 W	295					30	100.2
EC-4pole 30, 200 W	295	GP 32, 1.0 - 6.0 Nm	430			30	•
EC-4pole 30, 200 W	295	GP 32, 4.0 - 8.0 Nm	433			30	•
EC-4pole 30, 200 W	295	GP 42, 3.0 - 15.0 Nm	440–441			30	•
EC-4pole 30, 200 W	295	GP 32 S	474–482			30	•
EC-4pole 30, 200 W	295			22 EMT	518	30	131.4
EC-4pole 30, 200 W	295	GP 32, 1.0 - 6.0 Nm	430	22 EMT	518	30	•
EC-4pole 30, 200 W	295	GP 32, 4.0 - 8.0 Nm	433	22 EMT	518	30	•
EC-4pole 30, 200 W	295	GP 42, 3.0 - 15.0 Nm	440–441	22 EMT	518	30	•
EC-4pole 30, 200 W	295	GP 32 S	474–482	22 EMT	518	30	•
EC-4pole 30, 200 W	295			16 EASY/XT/Abs.	509–511	30	114.3
EC-4pole 30, 200 W	295	GP 32, 1.0 - 6.0 Nm	430	16 EASY/XT/Abs.	509–511	30	•
EC-4pole 30, 200 W	295	GP 32, 4.0 - 8.0 Nm	433	16 EASY/XT/Abs.	509–511	30	•
EC-4pole 30, 200 W	295	GP 42, 3.0 - 15.0 Nm	440–441	16 EASY/XT/Abs.	509–511	30	•
EC-4pole 30, 200 W	295	GP 32 S	474–482	16 EASY/XT/Abs.	509–511	30	•
EC-4pole 30, 200 W	295			16 EASY Abs. XT	512	30	114.8
EC-4pole 30, 200 W	295	GP 32, 1.0 - 6.0 Nm	430	16 EASY Abs. XT	512	30	•
EC-4pole 30, 200 W	295	GP 32, 4.0 - 8.0 Nm	433	16 EASY Abs. XT	512	30	•
EC-4pole 30, 200 W	295	GP 42, 3.0 - 15.0 Nm	440–441	16 EASY Abs. XT	512	30	•
EC-4pole 30, 200 W	295	GP 32 S	474–482	16 EASY Abs. XT	512	30	•
EC-4pole 30, 200 W	295			16 RIO	519	30	112.8
EC-4pole 30, 200 W	295	GP 32, 1.0 - 6.0 Nm	430	16 RIO	519	30	•
EC-4pole 30, 200 W	295	GP 32, 4.0 - 8.0 Nm	433	16 RIO	519	30	•
EC-4pole 30, 200 W	295	GP 42, 3.0 - 15.0 Nm	440–441	16 RIO	519	30	•
EC-4pole 30, 200 W	295	GP 32 S	474–482	16 RIO	519	30	•

Technical data

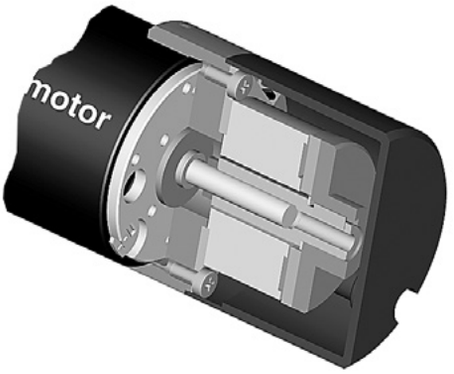
Holding torque	0.1 Nm	Nominal voltage, smoothed		24 VDC ±10%	
Mass inertia	1.8 gcm²	Resistance		R_{20} = 227 Ω ±6%	
Max. speed	49 000 rpm	Duty cycle		100%	
Weight	29 g	Reaction time	– Coupling	≤ 12 ms	
Ambient temperature range	-40...+100°C		– Opening	≤ 16 ms	

Pin allocation

Cable (AWG 26)	Designation
red	U_{Brake} + 24 VDC
blue	U_{Brake} GND
Min. cable length	350 mm

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Brake AB 28 24 VDC, 0.4 Nm



Important information

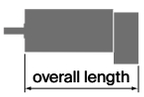
- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- It is possible to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.
- Schematic image: does not necessarily reflect the delivery state.

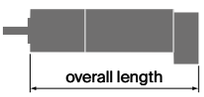
Stock program
Standard program
Special program (on request)

Part numbers

301215

Type





Modular system

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	∅ AB [mm]	Overall length [mm] / • see Gearhead
EC-max 40, 70 W	286					40	92.4
EC-max 40, 70 W	286	GP 42, 3 - 15 Nm	440–441			40	•
EC-max 40, 70 W	286			HEDL 5540	539	40	110.7
EC-max 40, 70 W	286	GP 42, 3 - 15 Nm	440–441	HEDL 5540	539	40	•
EC-max 40, 120 W	287					40	122.4
EC-max 40, 120 W	287	GP 42, 3.0 - 15.0 Nm	440–441			40	•
EC-max 40, 120 W	287	GP 52, 4 - 30 Nm	444			40	•
EC-max 40, 120 W	287			HEDL 5540	539	40	140.7
EC-max 40, 120 W	287	GP 42, 3.0 - 15.0 Nm	440–441	HEDL 5540	539	40	•
EC-max 40, 120 W	287	GP 52, 4 - 30 Nm	444	HEDL 5540	539	40	•

Technical data

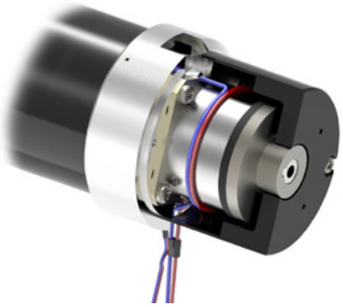
Holding torque	0.4 Nm	Nominal voltage, smoothed		24 VDC ±10%
Mass inertia	10 gcm²	Resistance		R_{20} = 92.5 Ω ±6%
Max. speed	16 000 rpm	Duty cycle		100%
Weight	0.05 kg	Reaction time	– Coupling	≤13 ms
Ambient temperature range	-5...+85°C		– Opening	≤27 ms

Pin allocation

Cable (AWG 26)	Designation
red	U_{Brake} +24 VDC
blue	U_{Brake} GND
Min. cable length	350 mm

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Brake AB 28 24 VDC, 0.4 Nm



Important information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- It is possible to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.
- Schematic image: does not necessarily reflect the delivery state.

Stock program
Standard program
Special program (on request)

Part numbers

228384 | 228387

Type



Modular system

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	∅ AB [mm]	Overall length [mm] / • see Gearhead	
RE 25, 20 W	157					40	77.1	
RE 25, 20 W	157	GP 26, 0.75 - 4.5 Nm	425			40	•	
RE 25, 20 W	157	GP 32, 0.75 - 4.5 Nm	426			40	•	
RE 25, 20 W	157	GP 32, 0.75 - 4.5 Nm	427–428			40	•	
RE 25, 20 W	157	GP 32, 1.0 - 6.0 Nm	429/435			40	•	
RE 25, 20 W	157	GP 32 S	474–482			40	•	
RE 25, 20 W	157			HED_5540	535/537	40		94.3
RE 25, 20 W	157	GP 26, 0.75 - 4.5 Nm	425	HED_5540	535/537	40		•
RE 25, 20 W	157	GP 32, 0.75 - 4.5 Nm	426	HED_5540	535/537	40		•
RE 25, 20 W	157	GP 32, 0.75 - 4.5 Nm	427–428	HED_5540	535/537	40		•
RE 25, 20 W	157	GP 32, 1.0 - 6.0 Nm	429/435	HED_5540	535/537	40		•
RE 25, 20 W	157	GP 32 S	474–482	HED_5540	535/537	40		•
RE 25, 20 W	158					40	88.6	
RE 25, 20 W	158	GP 26, 0.75 - 4.5 Nm	425			40	•	
RE 25, 20 W	158	GP 32, 0.75 - 4.5 Nm	426			40	•	
RE 25, 20 W	158	GP 32, 0.75 - 4.5 Nm	427–428			40	•	
RE 25, 20 W	158	GP 32, 1.0 - 6.0 Nm	429/435			40	•	
RE 25, 20 W	158	GP 32 S	474–482			40	•	
RE 25, 20 W	158			HED_5540	535/537	40		105.8
RE 25, 20 W	158	GP 26, 0.75 - 4.5 Nm	425	HED_5540	535/537	40		•
RE 25, 20 W	158	GP 32, 0.4 - 2.0 Nm	426	HED_5540	535/537	40		•
RE 25, 20 W	158	GP 32, 0.75 - 4.5 Nm	427–428	HED_5540	535/537	40		•
RE 25, 20 W	158	GP 32, 1.0 - 6.0 Nm	429/435	HED_5540	535/537	40		•
RE 25, 20 W	158	GP 32 S	474–482	HED_5540	535/537	40		•
RE 35, 90 W	161					40	107.1	
RE 35, 90 W	161	GP 32, 0.75 - 6.0 Nm	426–431			40	•	
RE 35, 90 W	161	GP 32, 4.0 - 8.0 Nm	432–433			40	•	
RE 35, 90 W	161	GP 42, 3 - 15 Nm	439–441			40	•	
RE 35, 90 W	161			HED_5540	535/537	40		124.3
RE 35, 90 W	161	GP 32, 0.75 - 6.0 Nm	426–431	HED_5540	535/537	40		•
RE 35, 90 W	161	GP 32, 4.0 - 8.0 Nm	432–433	HED_5540	535/537	40		•
RE 35, 90 W	161	GP 42, 3 - 15 Nm	439–441	HED_5540	535/537	40		•
RE 35, 90 W	161	GP 32 S	474–482			40	•	
RE 35, 90 W	161	GP 32 S	474–482	HED_5540	535/537	40		•
RE 40, 150 W	163					45	107.1	
RE 40, 150 W	163	GP 42, 3 - 15 Nm	439–441			45	•	
RE 40, 150 W	163	GP 52, 4 - 30 Nm	443–444			45	•	
RE 40, 150 W	163			HED_5540	535/538	45		124.3
RE 40, 150 W	163	GP 42, 3 - 15 Nm	439–441	HED_5540	535/538	45		•
RE 40, 150 W	163	GP 52, 4 - 30 Nm	443–444	HED_5540	535/538	45		•

Technical data

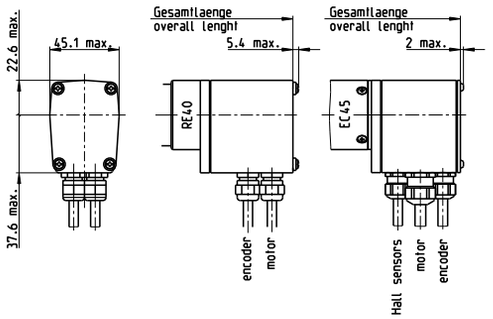
Holding torque	0.4 Nm	Nominal voltage, smoothed		24 VDC ±10%
Mass inertia	10 gcm²	Resistance		R_{20} = 92.5 Ω ±6%
Max. speed	16 000 rpm	Duty cycle		100%
Weight	0.05 kg	Reaction time	– Coupling	≤13 ms
Ambient temperature range	-5...+85°C		– Opening	≤27 ms

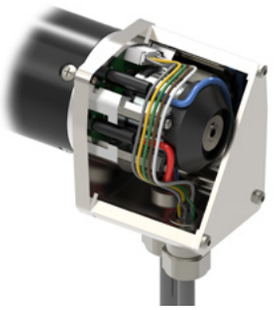
Pin allocation

Cable (AWG 24)	Designation
red	U_{Brake} +24 VDC
blue	U_{Brake} GND
red	Motor+
black	Motor-
Min. cable length	350 mm

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Brake AB 28 24 VDC, 0.4 Nm





Important information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- It is possible to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.
- Schematic image: does not necessarily reflect the delivery state.

Stock program
Standard program
Special program (on request)

Part numbers

228389	228390

Type



Modular system

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead	
RE 40, 150 W	163					115.1	
RE 40, 150 W	163	GP 42, 3 - 15 Nm	439–441			•	
RE 40, 150 W	163	GP 52, 4 - 30 Nm	443–444			•	
RE 40, 150 W	163			HEDL 9140	540–541	135.6	
RE 40, 150 W	163	GP 42, 3 - 15 Nm	439–441	HEDL 9140	540–541	•	
RE 40, 150 W	163	GP 52, 4 - 30 Nm	443–444	HEDL 9140	540–541	•	
EC 45, 150 W	273						118.6
EC 45, 150 W	273	GP 42, 3 - 15 Nm	439–441				•
EC 45, 150 W	273	GP 52, 4 - 30 Nm	443–444				•
EC 45, 150 W	273			HEDL 9140	540–541		135.6
EC 45, 150 W	273	GP 42, 3 - 15 Nm	439–441	HEDL 9140	540–541		•
EC 45, 150 W	273	GP 52, 4 - 30 Nm	443–444	HEDL 9140	540–541		•
EC 45, 250 W	274						151.4
EC 45, 250 W	274	GP 42, 3 - 15 Nm	440–441				•
EC 45, 250 W	274	GP 52, 4 - 30 Nm	443–444				•
EC 45, 250 W	274	GP 62, 6.2 - 38.5 Nm	445				•
EC 45, 250 W	274			HEDL 9140	540–541		168.4
EC 45, 250 W	274	GP 42, 3 - 15 Nm	440–441	HEDL 9140	540–541		•
EC 45, 250 W	274	GP 52, 4 - 30 Nm	443–444	HEDL 9140	540–541		•
EC 45, 250 W	274	GP 62, 6.2 - 38.5 Nm	445	HEDL 9140	540–541		•

Technical data

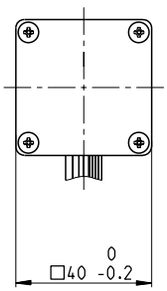
Holding torque	0.4 Nm	Nominal voltage, smoothed		24 VDC ±10%
Mass inertia	10 gcm²	Resistance		R_{20} = 92.5 Ω ±6%
Max. speed	16 000 rpm	Duty cycle		100%
Weight	0.05 kg	Reaction time	– Coupling	≤ 13 ms
Ambient temperature range	-5...+85°C		– Opening	≤ 27 ms

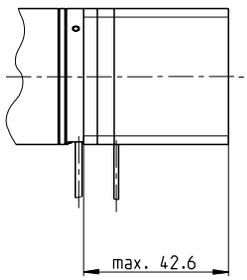
Pin allocation

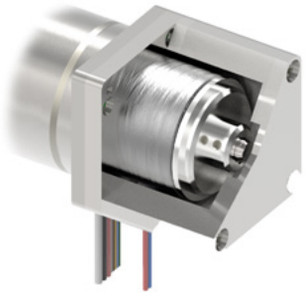
		from motor clamp Designation	
		RE 40	
Cable	green	(AWG 20)	U_{Brake} + 24 VDC
Cable	yellow	(AWG 20)	U_{Brake} GND
		EC 45	
Cable	No 4	(AWG 18)	U_{Brake} + 24 VDC
Cable	No 5	(AWG 18)	U_{Brake} GND
Min. cable length			500 mm

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Brake AB 32 24 VDC, 0.4 Nm







Important information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- It is possible to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.

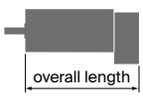
accessories

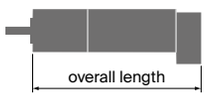
Stock program
Standard program
Special program (on request)

Part numbers

392335

Type





Modular system

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
EC 40, 170 W	272					122.7
EC 40, 170 W	272	GP 42, 3 - 15 Nm	439–441			•
EC 40, 170 W	272	GP 52, 4 - 30 Nm	443–444			•
EC 40, 170 W	272			HED_5540	536/538	141.1
EC 40, 170 W	272	GP 42, 3 - 15 Nm	439–440	HED_5540	536/538	•
EC 40, 170 W	272	GP 52, 4 - 30 Nm	443–444	HED_5540	536/538	•

Technical data

Holding torque	0.4 Nm	Nominal voltage, smoothed		24 VDC ±10%
Mass inertia	19 gcm²	Resistance		R_{20} = 100 Ω ±7%
Max. speed	10 000 rpm	Duty cycle		100%
Weight	0.1 kg	Reaction time	– Coupling	≤ 13 ms
Ambient temperature range	-40...+100°C		– Opening	≤ 24 ms

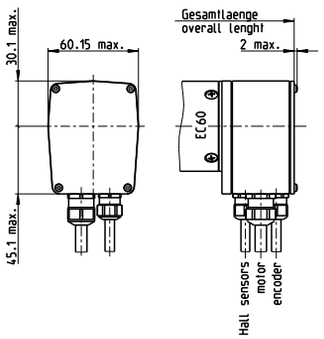
Pin allocation

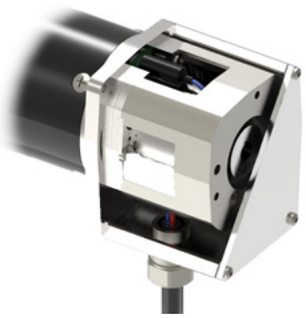
Cable (AWG 24)	Designation
red	U_{Brake} + 24 VDC
blue	U_{Brake} GND
Min. cable length	350 mm

Accessories

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Brake AB 41 24 VDC, 2.0 Nm





Important information

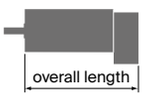
- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.

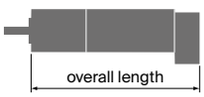
Stock program
Standard program
Special program (on request)

Part numbers

228998

Type





Modular system

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
EC 60, 400 W	275					190.9
EC 60, 400 W	275	GP 81, 15.4 - 92.3 Nm	446			•
EC 60, 400 W	275			HEDL 9140	540	214.9
EC 60, 400 W	275	GP 81, 15.4 - 92.3 Nm	446	HEDL 9140	540	•

Technical data

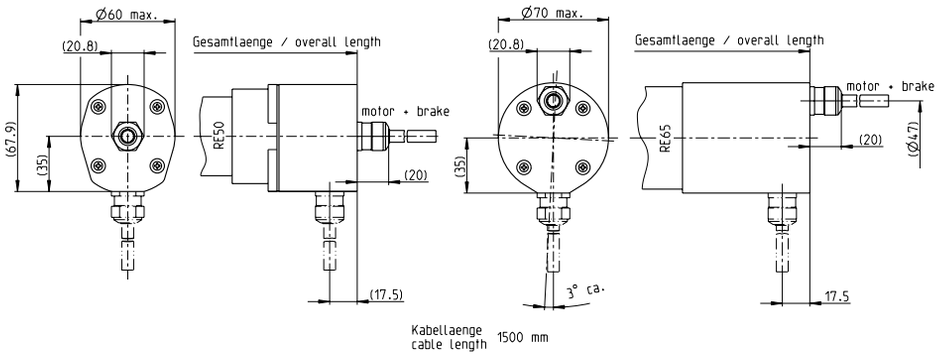
Holding torque	2.0 Nm	Nominal voltage, smoothed	24 VDC -10 ... +6%
Mass inertia	45 gcm²	Resistance	R_{20} = 72 Ω ±7%
Max. speed	10 000 rpm	Duty cycle	100%
Weight	0.18 kg	Reaction time – Coupling	≤ 2 ms
Ambient temperature range	-5...+85°C	– Opening	≤ 25 ms

Pin allocation

		from motor clamp	Designation
Cable	red	No 4 (AWG 16)	U_{Brake} + 24 VDC
Cable	black	No 5 (AWG 16)	U_{Brake} GND
Min. cable length			500 mm

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Brake AB 44 24 VDC, 2.5 Nm



Important information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- It is possible to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.
- Protection: IP54

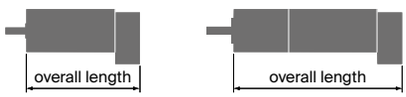
accessories

Stock program
Standard program
Special program (on request)

Part numbers

Cable output axial	386052	385999
Cable output radial	386054	386000

Type



Modular system

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead	
RE 50, 200 W	164					170.4	
RE 50, 200 W	164	GP 52, 4 - 30 Nm	443-444			•	
RE 50, 200 W	164	GP 62, 6.2 - 38.5 Nm	445			•	
RE 50, 200 W	164			HEDL 9140	541	183.4	
RE 50, 200 W	164	GP 52, 4 - 30 Nm	443-444	HEDL 9140	541	•	
RE 50, 200 W	164	GP 62, 6.2 - 38.5 Nm	445	HEDL 9140	541	•	
RE 65, 250 W	165						187.5
RE 65, 250 W	165	GP 81, 15.4 - 92.3 Nm	446				•
RE 65, 250 W	165			HEDL 9140	541		205.5
RE 65, 250 W	165	GP 81, 15.4 - 92.3 Nm	446	HEDL 9140	541		•

Technical data

Holding torque	2.5 Nm	Nominal voltage, smoothed		24 VDC ±10%	
Mass inertia	90 gcm²	Resistance		R_{20} = 64 Ω ±7%	
Max. speed	10 000 rpm	Duty cycle		100%	
Weight	0.19 kg	Reaction time	– Coupling	≤ 20 ms	
Ambient temperature range	-40...+100°C		– Opening	≤ 35 ms	

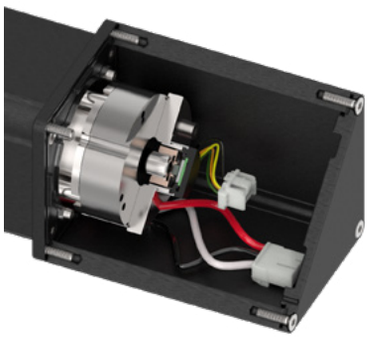
Pin allocation

Cable (AWG 18)	Designation
white	Motor+
brown	Motor-
green	U_{Brake} + 24 VDC
yellow	U_{Brake} GND
Min. cable length	1490 mm

Accessories

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Brake AB 42 S 24 VDC, 1.4 Nm



Important information

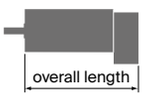
- Spring-loaded brake – single-disc brake with two friction surfaces for direct current. Braked in unpowered condition (dry operation).
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- Not backlash-free (±1° max.).
- Additional length:
  +20 mm with ENC or ENX 22 EASY INT Sensor
  +34 mm with EMT or ENX 22 EASY EMT Sensor

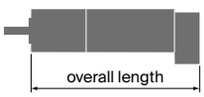
Stock program
Standard program
Special program (on request)

Part numbers

x drives

Type





Modular system

+ Drive	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
IDX 56 S	353					online
IDX 56 S	353	GPX 52	406-407			online
IDX 56 S	353	GB 80	458			online
IDX 56 S	353	GB 12	459			online
IDX 56 M	354					online
IDX 56 M	354	GPX 52	406-407			online
IDX 56 M	354	GB 80	458			online
IDX 56 M	354	GB 12	459			online
IDX 56 L	355					online
IDX 56 L	355	GPX 52	406-407			online
IDX 56 L	355	GB 80	458			online
IDX 56 L	355	GB 12	459			online

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
IDX 56 S	249					online
IDX 56 S	249	GPX 52	406-407			online
IDX 56 S	249	GB 80	458			online
IDX 56 S	249	GB 12	459			online
IDX 56 M	250					online
IDX 56 M	250	GPX 52	406-407			online
IDX 56 M	250	GB 80	458			online
IDX 56 M	250	GB 12	459			online
IDX 56 L	251					online
IDX 56 L	251	GPX 52	406-407			online
IDX 56 L	251	GB 80	458			online
IDX 56 L	251	GB 12	459			online

Technical data

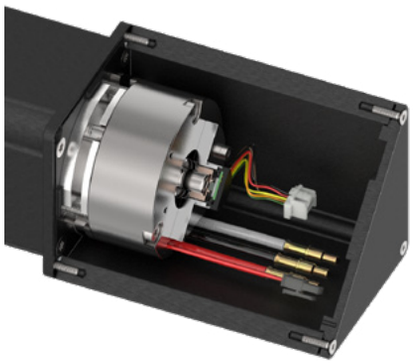
Holding torque	1.4 Nm	Nominal voltage, smoothed		24 VDC -10 ... +5%
Mass inertia	6.1 gcm²	Resistance		R_{20} = 82.6 Ω +10%
Max. speed	8000 rpm	Duty cycle		100%
Weight	0.14 kg	Reaction time	– Coupling	≤ 30 ms
Ambient temperature range	-40...+120°C		– Opening	≤ 85 ms

Pin allocation

online

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Brake AB 60 S 24 VDC, 5.0 Nm



Important information

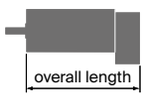
- Spring-loaded brake – single-disc brake with two friction surfaces for direct current. Braked in unpowered condition (dry operation).
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- Not backlash-free (±1° max.).
- Additional length:
  +39 mm with ENC, EMT, ENX EASY 22 INT or ENX 22 EMT INT Sensor

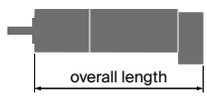
Stock program
Standard program
Special program (on request)

Part numbers

x drives

Type





Modular system

+ Drive	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
IDX 70 S	356					online
IDX 70 S	356	GPX 70	408–409			online
IDX 70 S	356	GB 12	459			online
IDX 70 S	356	GB 9	460			online
IDX 70 S	356	GB 65	461			online
IDX 70 M	357					online
IDX 70 M	357	GPX 70	408–409			online
IDX 70 M	357	GB 12	459			online
IDX 70 M	357	GB 9	460			online
IDX 70 M	357	GB 65	461			online
IDX 70 L	358					online
IDX 70 L	358	GB 9	460			online
IDX 70 L	358	GB 65	461			online

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
IDX 70 S	252					online
IDX 70 S	252	GPX 70	408–409			online
IDX 70 S	252	GB 12	459			online
IDX 70 S	252	GB 9	460			online
IDX 70 S	252	GB 65	461			online
IDX 70 M	253					online
IDX 70 M	253	GPX 70	408–409			online
IDX 70 M	253	GB 12	459			online
IDX 70 M	253	GB 9	460			online
IDX 70 M	253	GB 65	461			online
IDX 70 L	254					online
IDX 70 L	254	GB 9	460			online
IDX 70 L	254	GB 65	461			online

Technical data

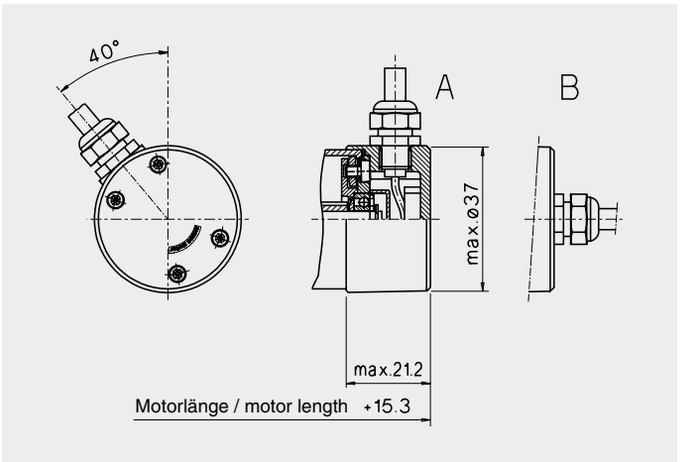
Holding torque	5 Nm	Nominal voltage, smoothed	24 VDC -10...+5%
Mass inertia	25 gcm²	Resistance	R_{20} = 41.16 Ω 0...+10%
Max. speed	8800 rpm	Duty cycle	100%
Weight	480 g	Reaction time – Coupling	≤ 75 ms
Ambient temperature range	-40...+120°C	– Opening	≤ 75 ms

Pin allocation

online

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End Caps



End cap for maxon DC motor RE 35

Details for motor see page 161

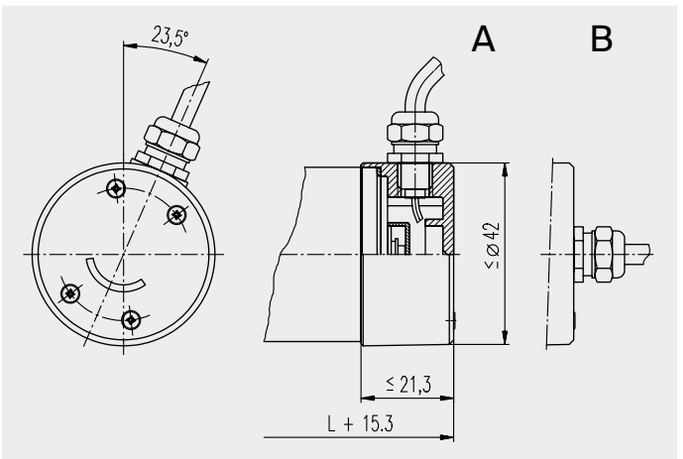
- Plastic housing
- Protection to IP54
- With 500 mm cable, AWG 20 (2 × 0.5 mm²) other lengths on request!
- Radial or axial cable outlet
- Assembly only by maxon. The shaft must be shortened.

Pin Allocation

Cable No.	Color	Motor
1	black	+ Pol
2	black	– Pol

Part Numbers

137235	**A**	End cap with radial cable outlet (500 mm)
137234	**B**	End cap with axial cable outlet (500 mm)



End cap for maxon DC motor RE 40

Details for motor see page 163

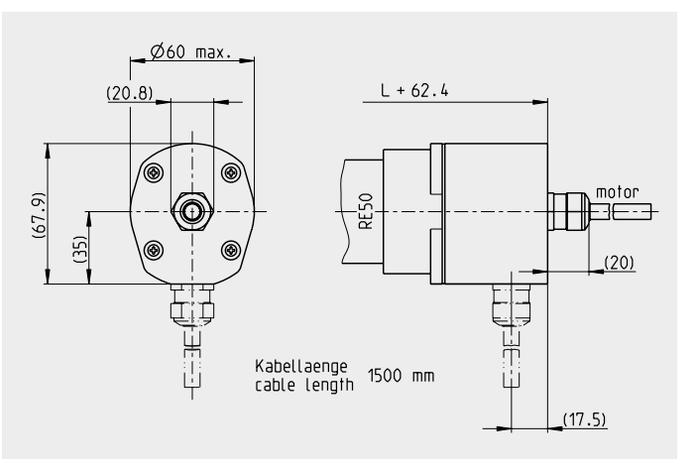
- Plastic housing
- Protection to IP54
- With 500 mm cable, AWG 20 (2 × 0.5 mm²) other lengths on request!
- Radial or axial cable outlet
- Assembly only by maxon motor. The shaft must be shortened.

Pin Allocation

Cable No.	Color	Motor
1	black	+ Pol
2	black	– Pol

Part Numbers

232341	**A**	End cap with radial cable outlet (500 mm)
232343	**B**	End cap with axial cable outlet (500 mm)



End cap for maxon DC motor RE 50

Details for motor see page 164

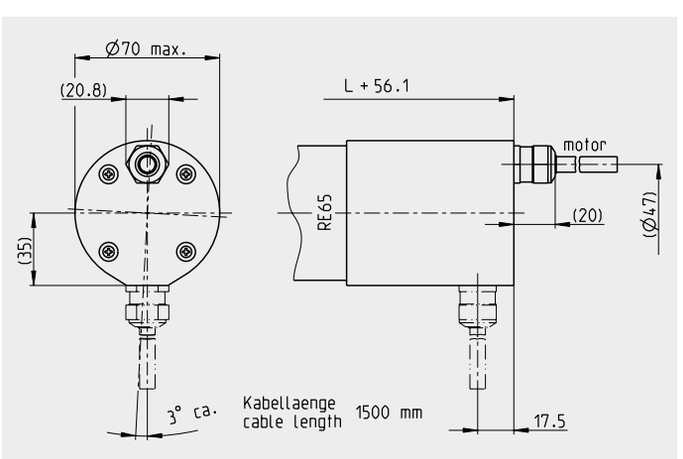
- Aluminium housing
- Protection to IP54
- With 1500 mm cable, AWG 18 (2 × 1.0 mm²) other lengths on request!
- Radial or axial cable outlet
- Assembly only by maxon motor.

Pin Allocation

Cable No.	Color	Motor
1	white	+ Pol
2	brown	– Pol

Part Numbers

386056	**A**	End cap with radial cable outlet (1500 mm)
386055	**B**	End cap with axial cable outlet (1500 mm)



End cap for maxon DC motor RE 65

Details for motor see page 165

- Aluminium housing
- Protection to IP54
- With 1500 mm cable, AWG 18 (2 × 1.0 mm²) other lengths on request!
- Radial or axial cable outlet
- Assembly only by maxon motor.

Pin Allocation

Cable No.	Color	Motor
1	white	+ Pol
2	brown	– Pol

Part Numbers

386004	**A**	End cap with radial cable outlet (1500 mm)
386003	**B**	End cap with axial cable outlet (1500 mm)

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ECX SPEED 13 connecting cable

ECX SPEED 13 connecting cable

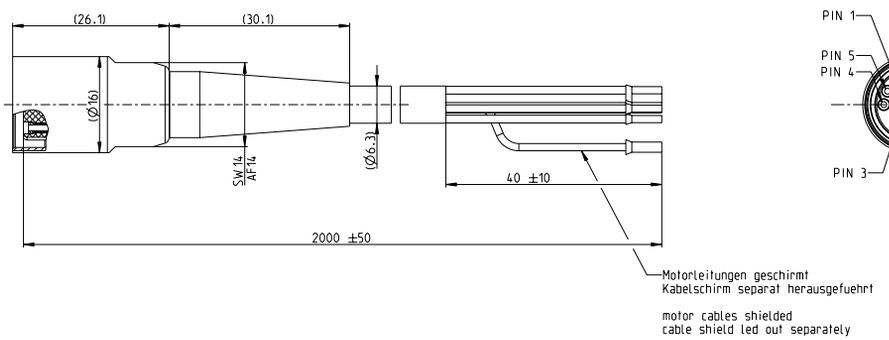
The connecting cable fits ECX SPEED 13 that are configured with a pin and external thread. Details about the motor can be found on pages 201–208 and online at www.maxongroup.com.

Characteristics:

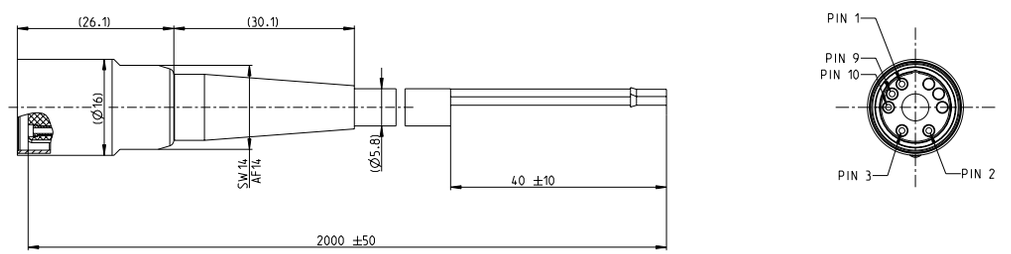
- Steel housing
- Withstands 1000 sterilization cycles in the autoclave
- Silicone outer shell
- PTFE cable insulation
- Electrical conductors with cable end sleeves
- A motor cables shielded. The shielding is fitted with heat shrink tubing and cable end sleeve.

Part number	Cable version
585750	ECX 13 connecting cable, type **A:** for motors with Hall sensors or for versions with encoders
592191	ECX 13 connecting cable, type **B:** for motors without Hall sensors and without encoders
595698	ECX 13 connector set (without cable)

A



B



Cable and pin assignment, type A

	Color	Pin	Assignment
AWG 22	red	1	Winding 1
	black	2	Winding 2
	white	3	Winding 3
AWG 26	orange	4	V_{CC}
	blue	5	GND
	yellow	6	H1/-
	brown	7	H2/Data
	grey	8	H3/CLK
	pink	no pin	-
	purple	no pin	-
	green	no pin	-

Cable and pin assignment, type B

	Color	Pin	Assignment
AWG 22	red	1	Winding 1
	black	2	Winding 2
	white	3	Winding 3
AWG 26	pink	9	-
	purple	10	-

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ECX SPEED 16 connecting cable

ECX SPEED 16 connecting cable

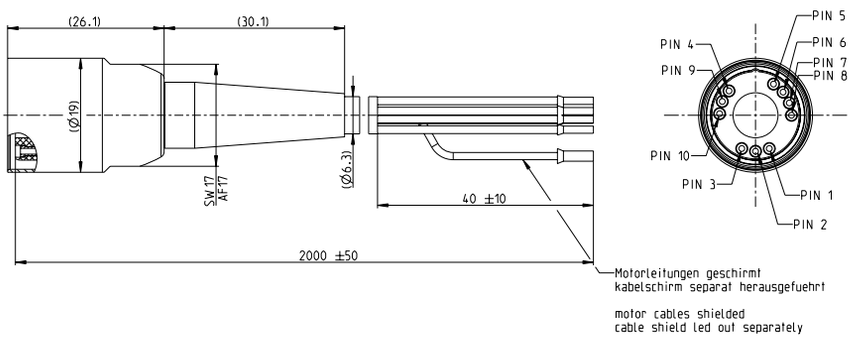
The connecting cable fits ECX SPEED 16 that are configured with a pin and external thread. Details about the motor can be found on pages 209–216 and online at www.maxongroup.com.

Characteristics:

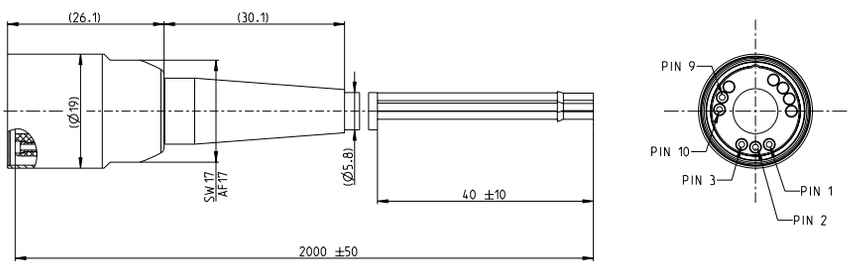
- Steel housing
- Withstands 1000 sterilization cycles in the autoclave
- Silicone outer shell
- PTFE cable insulation
- Electrical conductors with cable end sleeves
- A motor cables shielded. The shielding is fitted with heat shrink tubing and cable end sleeve.

Part number	Cable version
584532	ECX 16 connecting cable, type **A:** for motors with Hall sensors or for versions with encoders
592194	ECX 16 connecting cable, type **B:** for motors without Hall sensors and without encoders
595697	ECX 16 connector set (without cable)

A



B



Cable and pin assignment, type A

	Color	Pin	Assignment
AWG 22	red	1	Winding 1
	black	2	Winding 2
	white	3	Winding 3
AWG 26	orange	4	V_{CC}
	blue	5	GND
	yellow	6	H1/-
	brown	7	H2/-
	grey	8	H3/-
	pink	9	NTC/Data
	purple	10	NTC/CLK
	green	no pin	-

Cable and pin assignment, type B

	Color	Pin	Assignment
AWG 22	red	1	Winding 1
	black	2	Winding 2
	white	3	Winding 3
AWG 26	pink	9	-
	purple	10	-

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ECX SPEED 19 connecting cable

ECX SPEED 19 connecting cable

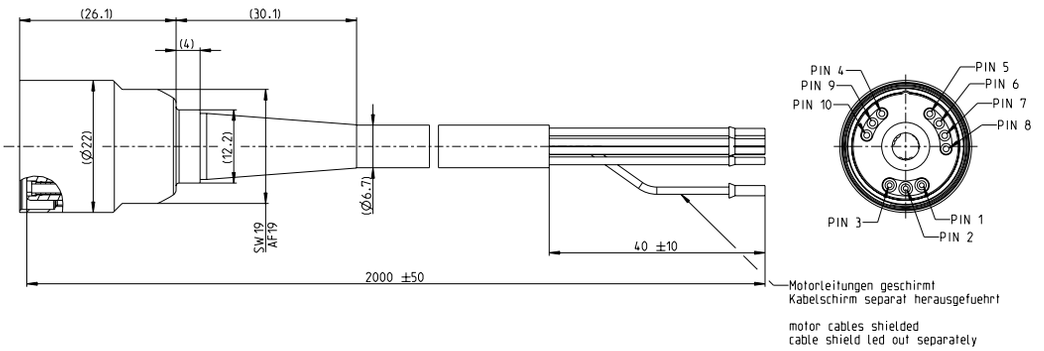
The connecting cable fits ECX SPEED 19 that are configured with a pin and external thread. Details about the motor can be found on pages 217–224 and online at www.maxongroup.com.

Characteristics:

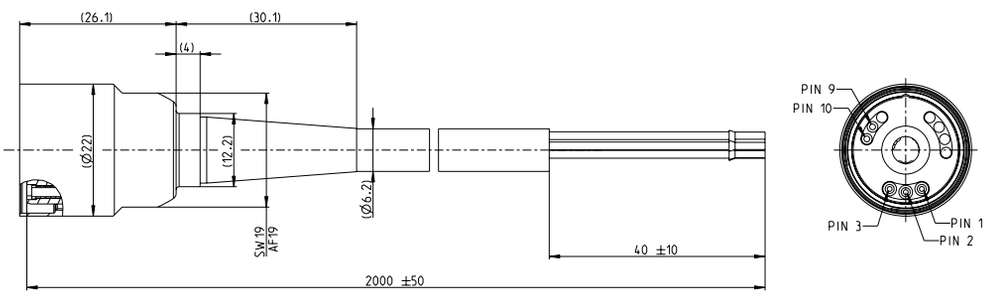
- Steel housing
- Withstands 1000 sterilization cycles in the autoclave
- Silicone outer shell
- PTFE cable insulation
- Electrical conductors with cable end sleeves
- A motor cables shielded. The shielding is fitted with heat shrink tubing and cable end sleeve.

Part number	Cable version
589852	ECX 19 connecting cable, type **A:** for motors with Hall sensors or for versions with encoders
589892	ECX 19 connecting cable, type **B:** for motors without Hall sensors and without encoders
551012	ECX 19 connector set (without cable)

A



B



Cable and pin assignment, type A

	Color	Pin	Assignment
AWG 20	red	1	Winding 1
	black	2	Winding 2
	white	3	Winding 3
AWG 26	orange	4	V_{CC}
	blue	5	GND
	yellow	6	H1/-
	brown	7	H2/-
	grey	8	H3/-
	pink	9	NTC/Data
	purple	10	NTC/CLK
	green	no pin	-

Cable and pin assignment, type B

	Color	Pin	Assignment
AWG 20	red	1	Winding 1
	black	2	Winding 2
	white	3	Winding 3
AWG 26	pink	9	-
	purple	10	-

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ECX SPEED 22 connecting cable

ECX SPEED 22 connecting cable

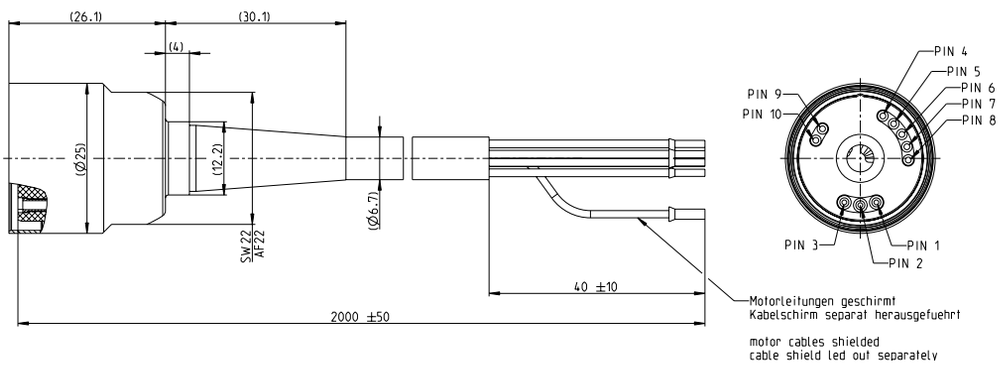
The connecting cable fits ECX SPEED 22 and ECX TORQUE 22 that are configured with a pin and external thread. Details about the motor can be found on pages 225–232 und online auf www.maxongroup.com.

Characteristics:

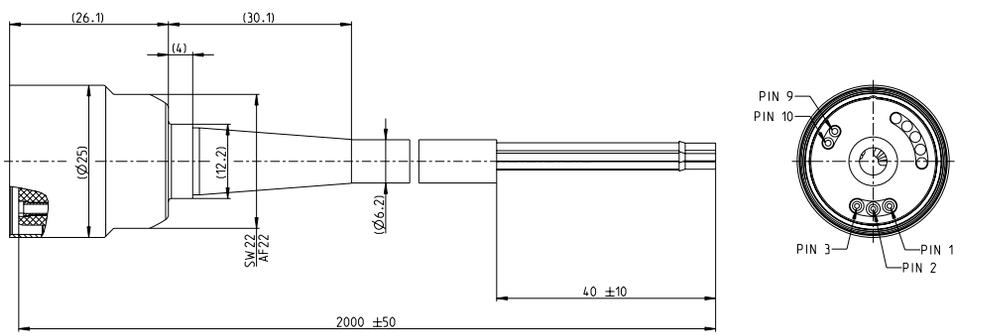
- Steel housing
- Withstands 1000 sterilization cycles in the autoclave
- Silicone outer shell
- PTFE cable insulation
- Electrical conductors with cable end sleeves
- A motor cables shielded. The shielding is fitted with heat shrink tubing and cable end sleeve.

Part number	Cable version
574625	ECX 22 connecting cable, type **A:** for motors with Hall sensors or for versions with encoders
592061	ECX 22 connecting cable, type **B:** for motors without Hall sensors and without encoders
595696	ECX 22 connector set (without cable)

A



B



Cable and pin assignment, type A

	Color	Pin	Assignment
AWG 20	red	1	Winding 1
	black	2	Winding 2
	white	3	Winding 3
AWG 26	orange	4	V_{CC}
	blue	5	GND
	yellow	6	H1/-
	brown	7	H2/-
	grey	8	H3/-
	pink	9	NTC/Data
	purple	10	NTC/CLK
	green	no pin	-

Cable and pin assignment, type B

	Color	Pin	Assignment
AWG 20	red	1	Winding 1
	black	2	Winding 2
	white	3	Winding 3
AWG 26	pink	9	-
	purple	10	-

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maxon ceramic

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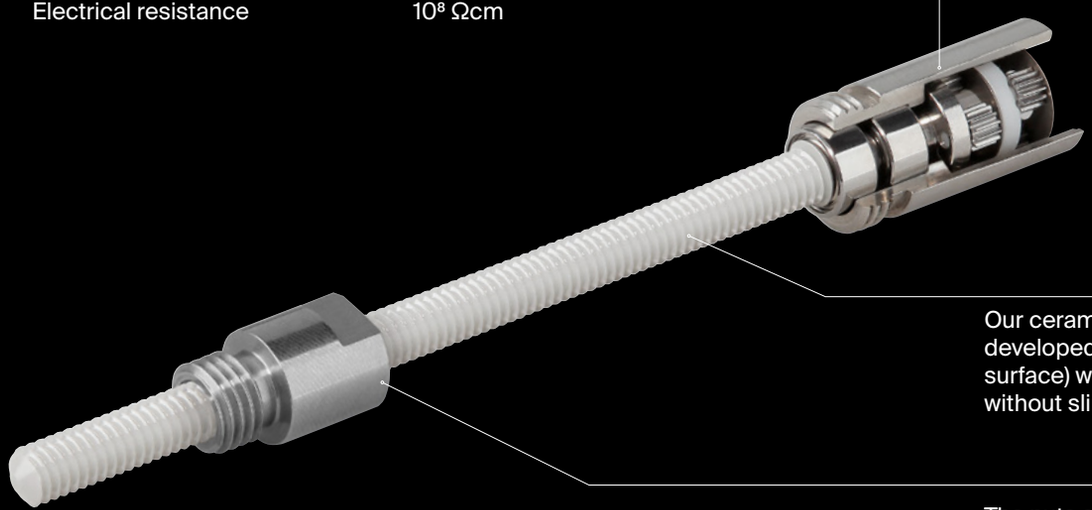


maxon ceramic

High performance industrial ceramic is used primarily for applications where customary materials would fail. maxon ceramic products include: precision screws, axles and shafts, customer-specific components for microtechnology, and scratchresistant housing components.

General material properties of zirconia Z_rO_2

Bending strength	>800 N/mm²
Elasticity modulus	2 x 10^5 N/mm²
Density	≥6.08 g/cm³
Hardness	1350 HV
Heat expansion coefficient	10 x 10^{-6} 1/K
Thermal conductivity	2 W/mK
Electrical resistance	10^8 Ωcm



Polished ceramic surfaces are ideal for sliding movements.

Our ceramic spindles with specially developed cgs surface (ceramic glide surface) work almost completely without slip-stick effect.

The nuts also benefit from the special maxon cgs surface and achieve significantly longer life spans.

→ Extremely high wear resistance and hardness

→ Excellent sliding characteristics

→ High mechanical strength

→ Long service life

→ High temperature resistance

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A unique material

Ceramics are used where all other materials fail.

At the Sexau location in the southwest of Germany, maxon develops and manufactures customer-specific CIM (Ceramic Injection Molding) parts. Our development and engineering department has more than 30 years of experience in powder injection molding, use cutting-edge CAD technology and make use of the finite element calculation method. CIM enables maxon to manufacture highly complex ceramic molds – with unique precision and high quality.

ceramic.maxongroup.com



The benefits of ceramic as material

- → Extremely high wear resistance and hardness
- → Excellent sliding characteristics
- → High mechanical strength
- → Long service life
- → High temperature resistance
- → Excellent insulation properties
- → High corrosion resistance and chemical stability
- → Biocompatible
- → Low specific weight

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Our fields of application

Watch technology

Components for mechanical clockwork

In clockwork, the tiny mechanical parts have to be machined with utmost precision for the clock to run reliably. With ceramic components, the meshing parts maintain precision over life spans never achieved before.

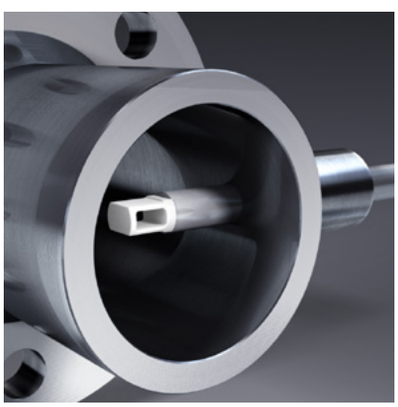
Ceramic components for automatic watches.

- Highest precision
- Unprecedented life spans
- High wear resistance
- Reliable series production
- Absolutely non-magnetic





Precise and long-lasting

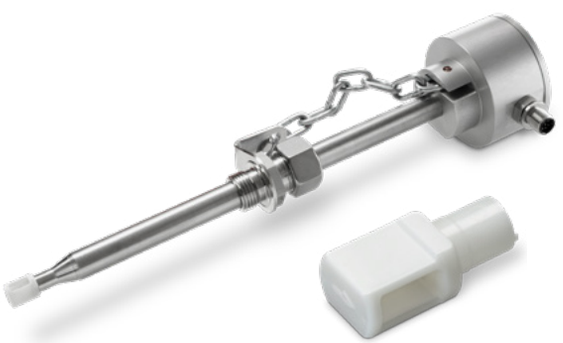


Measuring technology

Sensor housing for a flow meter

Ceramic resists harsh conditions. As a sensor housing, ceramic shows resistance against high temperatures, abrasive dust in the mass flow and chemically aggressive condensate. The low heat conductance protects the electronics inside of the sensor. This passive behavior toward electric and magnetic fields makes it possible to use electronic sensors.

- High resistance against external conditions
- Low heat conductance
- Passive behavior toward electric and magnetic fields
- Maintenance and follow-up costs are avoided
- Absolutely non-magnetic



Highly robust and resistant to extreme ambient conditions

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Audio technology

Housing for high-tech in-ear headphones

Scratch-resistant ceramic for the headphone housing ensures a long service life and makes it comfortable to wear.





Ceramic surfaces feature scratch-resistance and shine. As a result of its low heat conductance, ceramic feels warm and pleasant. The continuous development of our polishing and shaping processes combines aesthetic design and functionality in a very special way. Ceramic housings protect the high-quality technical components inside and give the products a long-lasting high-quality exterior.

- → Perfect surface finish
- → Scratch resistance for a long service life
- → Low heat conductance for pleasant wearing
- → Optimal acoustic properties

Audio technology

Bearing for high-end record player

To get the perfect sound experience, there can be no compromises: All factors have to harmonize perfectly. Special challenges such as magnetic fields and precise radial run-out can be mastered easily by using ceramics. The demands in the high-end sector are extremely high: Highest precision and quality have utmost priority in the material selection, processing and surface finishing. Seamless cooperation based on trust is the perfect prerequisite for first-class high-end products.





A ceramic magnetic bearing provides optimal conditions for sampling the record's groove without any interference.

- → Absolutely non-magnetic
- → Perfect surface finish
- → High wear resistance

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Industrial automation

Elements for industrial machines

Machine and system availability is of utmost importance in the industry. This is precisely where ceramic shines, featuring hardness, strength, wear resistance, and outstanding sliding characteristics. This is particularly true of maxon ceramic spindles with the ceramic glide surface (cgs). Sleeves, guides, axles, and shafts are other typical applications for ceramic. The chemically resistant, non-magnetic material can be used in applications where other materials reach their limits.

- High wear resistance
- High hardness
- Excellent sliding characteristics
- Extreme strength

Ceramic offers the hardness, strength, wear resistance and sliding characteristics that are sought after in industrial automation.



Medical

Insulation components for endoscopes

Medical technology places exceptionally high requirements on the materials used in the medical devices (e.g. endoscopes): Only excellent, visually perfect and reliable components are accepted. Additionally, the materials have to be biocompatible and resistant against body fluids.

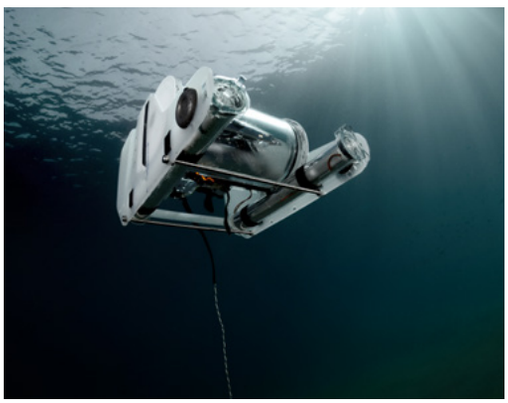
- Perfect surface finish
- Biocompatibility
- Low heat conductance
- Extreme robustness





Ceramic insulation components are highly valued in endoscopic applications: They are biocompatible and robust.

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Drive technology

Spindles for extreme conditions

Applications in salt water require robust and corrosion-resistant materials.

In drive technology, customary materials can reach their limits in some applications. For example, customized underwater drives require material that is resistant to salt water. Here our ceramic spindles shine: They are corrosion-resistant, robust, wear resistant and simultaneously offer high efficiency.

The maxon cgs (ceramic glide surface) ceramic spindles feature:

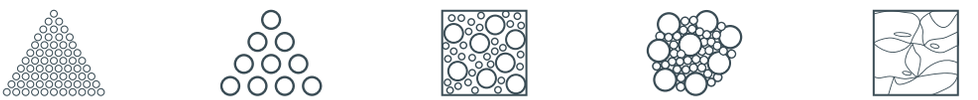
- Operation almost completely without slip-stick effect
- Smooth-running
- High hardness
- Extraordinary high service life
- High wear resistance
- High efficiency



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Procedures and manufacturing process

A range of procedures for manufacturing high-quality ceramic products ensure top results.



CIM process[1]	Powder	Feedstock	Injection molding	Solvent debindering	Thermal debindering & sintering
Compression molding procedures	Powder		Compression molding		Sintering
Additive manufacturing	Powder	Suspension	LCM process[2]		Thermal debindering & sintering

[1]Ceramic injection molding
[2]Lithography-based ceramic manufacturing

Zirconia ZrO_2

Highly resistant to mechanical stress

Zirconia is a high-performance industrial ceramic. It is used primarily for applications where traditional materials would fail.

Special characteristics of zirconia:

- High wear resistance and hardness
- Excellent sliding characteristics
- High mechanical strength
- High temperature resistance
- Excellent insulation properties
- High corrosion resistance and chemical stability; largely acid and alkali resistant
- Elasticity modulus and heat expansion coefficient similar to steel
- Biocompatible and hypoallergenic
- Low specific weight

General material properties

Bending strength	>800 N/mm²
Elasticity modulus	2 x 10^5 N/mm²
Density	≥6.08 g/cm³
Hardness	1350 HV
Heat expansion coefficient	10 x 10^{-6} 1/K
Thermal conductivity	2 W/ mK
Electrical resistance	10^{10} Ωcm

Aluminum oxide Al_2O_3

Highly resistant to thermal stress

Aluminum oxide is frequently used as insulation in electrical devices.

Special characteristics of aluminum oxide:

- High temperature resistance
- Good thermal conductivity
- Average mechanical strength
- Low coefficient of thermal expansion
- High corrosion resistance and chemical stability; largely acid and alkali resistant
- Good hardness
- Low specific weight

General material properties

Bending strength	>350 N/mm²
Elasticity modulus	3.5 x 10^5 N/mm²
Density	≥3.98 g/cm³
Hardness	2000 HV
Heat expansion coefficient	≥5 x 10^{-6} 1/K
Thermal conductivity	25 W/ mK
Electrical resistance	10^{15} Ωcm

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System-specific nuts

The right nut for each application

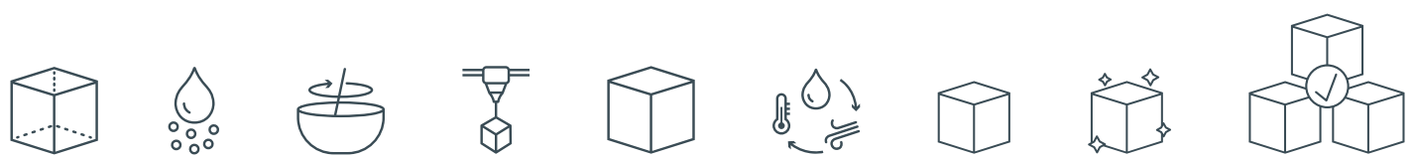
In combination with ceramic screws, nuts are available in steel, brass, bronze or plastic. For applications with very high demands to the life span, we use CVD-coated steel nuts.
The nuts benefit from the special maxon cgs surface of the screws, this results in significantly longer life spans than those offered by metal screws.
For backlash-free applications, we offer preloaded nuts. For applications with strong magnetic or electric fields, plastic nuts are preferred. In applications involving movements with little load, the nuts may be operated without the lubricant.

Individual solutions

In addition to our standard program, we also offer screws and nuts tailored to your application needs. We provide screws with fine thread, special leads, as well as double-thread screws. A customer-specific integration with your bearing system is also possible. Please contact us if you are interested in learning more.

Additive Manufacturing of Ceramic Components

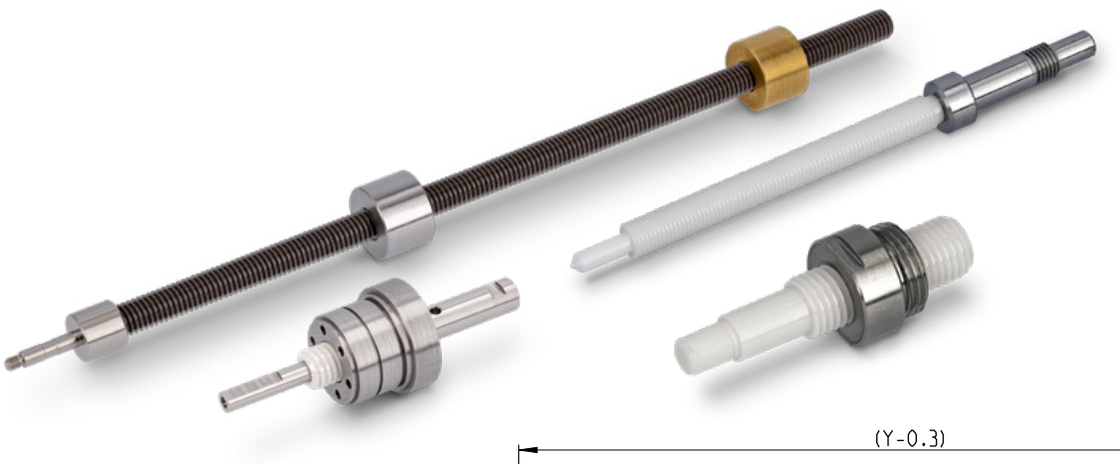
Process Flow

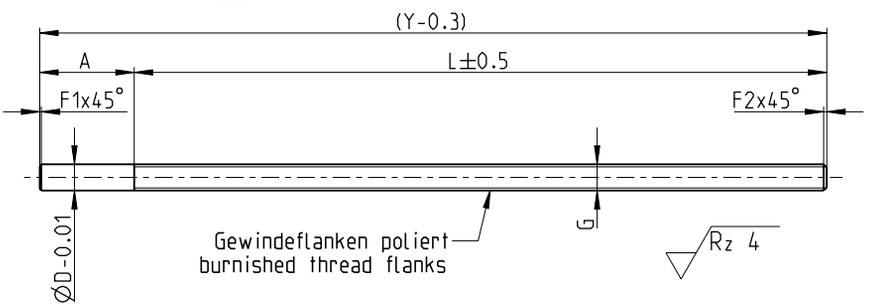


Technical data		
Tank capicity	mm^3	300 x 300 x 100
Lateral resolution	µm	70
Vertical resolution	µm	25
Manufacturing tolerances		ISO 2768mk
Minimum bore diameter	mm	0.5
Minimum/maximum wall thickness	mm	0.3 - max. 4
Materials		
Currently available materials		ZrO_2, Al_2O_3
Other materials possible after consultation and technical clarification		Zr8Y, Silicium Nitride, ATZ, ZTA, Cordierite, Hydroxyapatite (HAP), Tricalcium phosphate (TCP)
Necessary data for technical clarification		
Drawings and STEP, STL, Solid Works or ProEngineer PRT		

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Ceramic standard components
Spindles





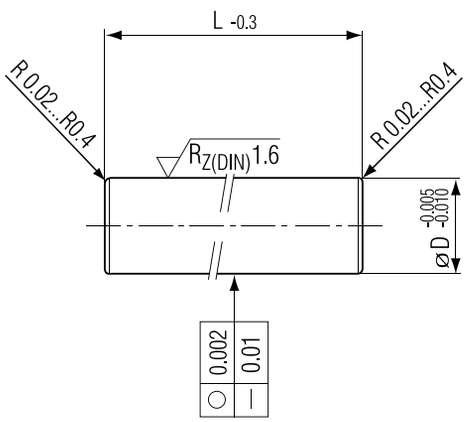
G	Color	Part No.	D	A max.	L max.	F1	F2	Pitch	(Y) max.
M2	white	426634	2.0	18	102	0.3	0.3	0.4	120
M2.5	white	426707	2.5	18	132	0.3	0.3	0.45	150
M3	white	426715	3.0	18	132	0.4	0.4	0.5	150
M4	white	426717	4.0	18	132	0.5	0.5	0.7	150
M5	white	426730	5.0	18	132	0.6	0.6	0.8	150
M6	white	426740	6.0	18	232	0.7	0.7	1.0	250
M8	white	426763	8.0	18	232	0.8	0.8	1.25	250

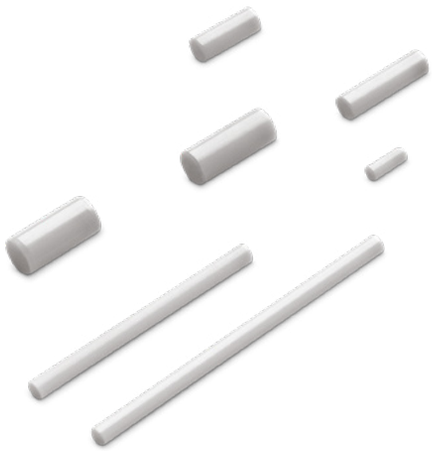
Larger diameters and lengths upon request.

Various spindle geometries/thread profiles are possible (trapezoidal screws, fine thread, buttress thread). The possible colors are white and gray.

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Ceramic standard components
Axes





∅ D	L = 6.4	L = 7.4	L = 10.6	L = 13.8	L = 15	L = 35	L = 40	L = 60	L = 70
0.8	255900	255901	255902	255903	255904	255905	348501	348502	348503
1.0	255892	255893	255894	255895	255896	255898	348498	348499	348500
1.5	255884	255885	255886	255887	255888	255889	255890	255792	255793
2.0	255873	348693	255875	255876	255877	255879	255880	255881	255882
2.5	143825	255866	255867	255868	255869	255870	255871	346621	348288
3.0	255857	255858	255859	255860	255861	255862	255863	346619	346620
4.0	255846	166875	857744	255849	255850	255851	255853	255854	255791
5.0	255834	255835	255836	255837	255838	255839	255840	255841	255842
5.5	255819	255820	255786	857764	255825	255826	255827	255828	255830
6.0	255807	255808	255809	255810	255811	255812	255813	255814	255815

Min. 0.5 mm diameter, max. 12 mm diameter. Other diameters and lengths can be produced individually.

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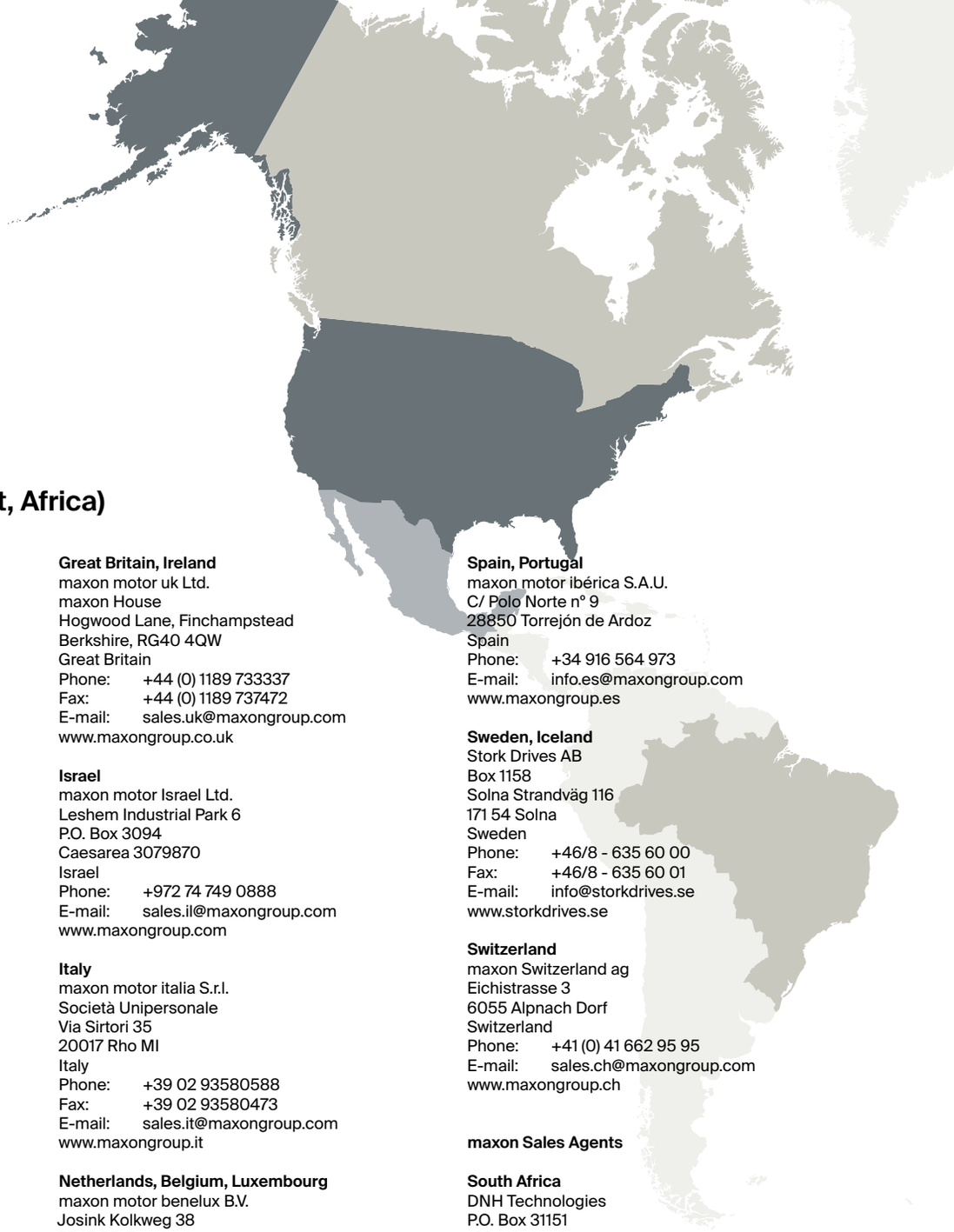
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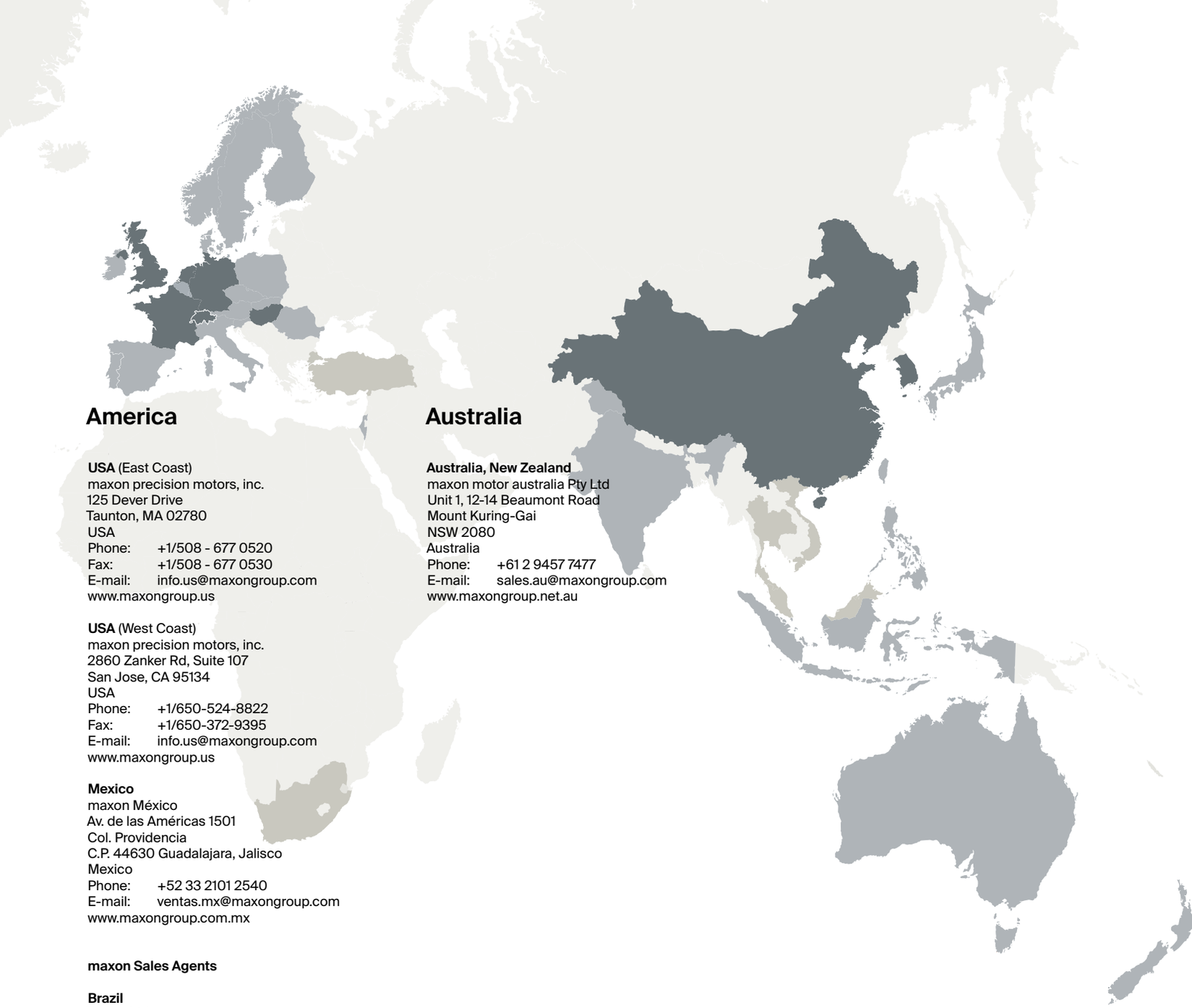
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maxon Sales Companies

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Australia	India	Romania
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Bulgaria	Ireland	Sweden
China	Israel	Switzerland
Croatia	Italy	Slovakia
Czech Republic	Japan	Singapore
Denmark	Latvia	Slovenia
Estonia	Lithuania	South Korea
Finland	Mexico	Spain
France	New Zealand	Taiwan
Germany	Norway	USA
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