

Power and intelligence
in modular design.



The new ECL 63 modular drive series

The engineer's choice

ebmpapst

Not just a module, a smart module.

To turn a simple module into a smart module, it is necessary to think one step ahead of the rest. Therefore, we have packed many more features into our new ECI 63 modular drive series than just a uniform design. For example an adapted electronics design that allows every drive configuration to also be designed for various performance and function classes. And an ingenious connection technology that allows the individual modules to be connected extremely easily and in a space-saving manner. This allows you to commission your desired drive even faster.



A standard as individual as ebm-papst

Standardised drive solutions in modular design – combined with ebm-papst quality, ebm-papst service and the best ebm-papst technology means that we set the bar a little higher in this segment. Our objective was to develop a modular system that provides better customisation with even faster availability, which lowers our customers' development and maintenance costs and ensures shorter commissioning and maintenance times with a shared programming interface.

In doing so, our many years of experience in developing and producing customer-specific special drives proved invaluable. After all, our engineers are intimately familiar with our customers' many needs, the most frequent applications and the weak points to be avoided when designing state-of-the-art drive solutions.

Modular down to the smallest detail

The result: our new, fully modular ECI drive series. The series consists of individual modules for everything from the motor to the gearbox and brake to the rotary encoder and electronics; these can be selected according to the modular requirement in order to fulfil a specific drive task in the most optimal way. We assemble the units selected in this way into a finished drive and thus can deliver them with extremely quick turnaround.

The first model of the new ECI module is size 63 (outer diameter of the motor housing in mm) with active lengths of 20, 40 and 60 mm. It is the starting point of a series that we will extend both upwards and downwards in future hardware extension levels, adding performance classes with diameters from 32 mm to 80 mm.

Greater than the sum of its parts – never was this proverb more true.

Whether internal performance, external simplicity or general refinement – in their variety of new combinations, the modules of the ECI 63 feature not only a powerful drive, but an economic and logistically efficient solution for most drive tasks. And thanks to the wide performance range with the same basic shape and design, upgrading existing devices and systems is possible.



The motors. Specialists for every area.

At the heart of the series are newly developed multi-pole internal rotor motors. Here, the objective was to take into account different requirements for the internal design in order to achieve maximum values in terms of output, torque and efficiency. Thus even with uniform principles in design, our engineers have developed specifically optimised motor designs for all sizes.

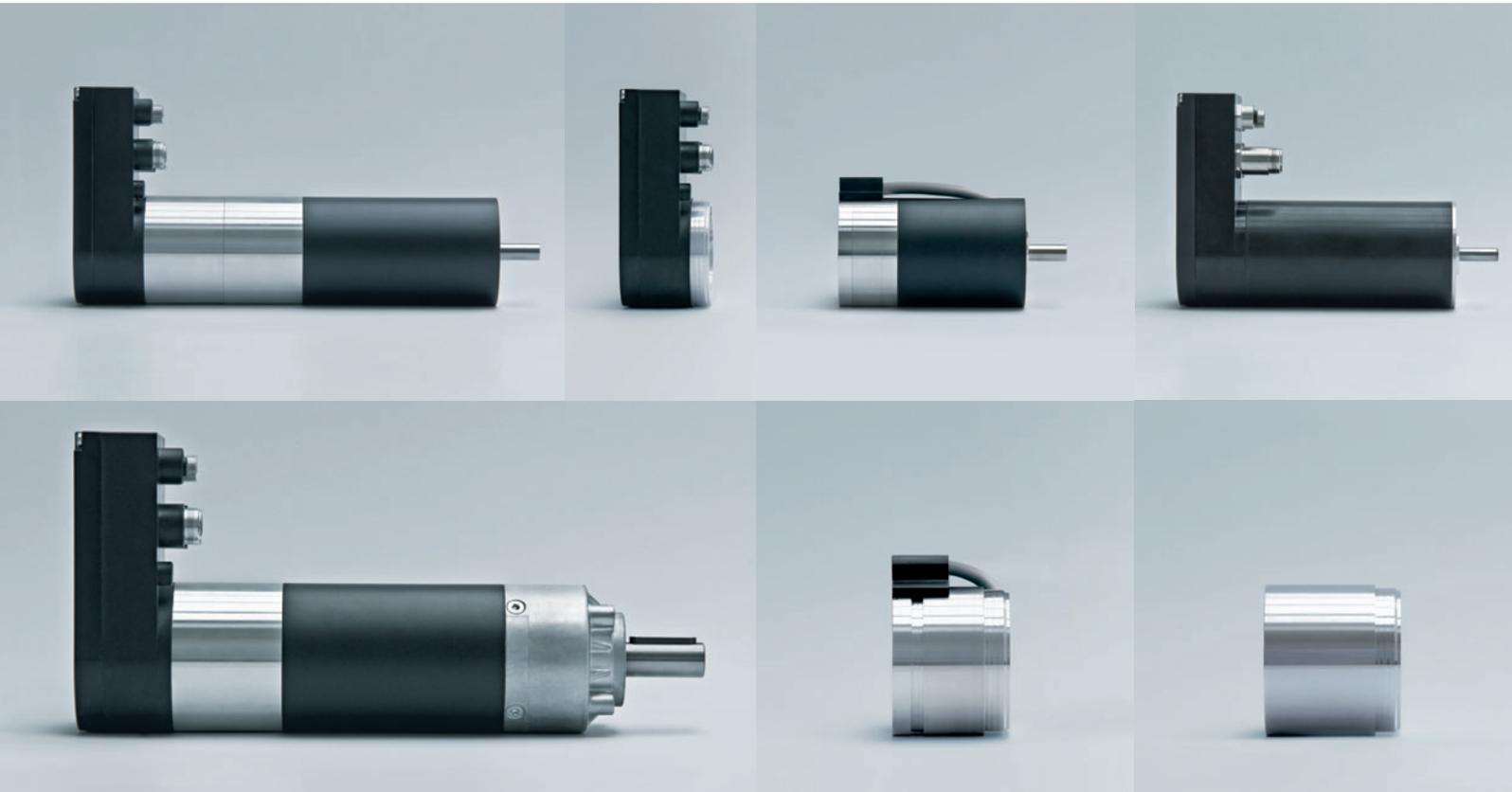
All designs share high running smoothness, high power density and maximum strength. For this purpose, elaborate FEM calculations ensure optimum distribution of the magnetic flow density in the motor and multi-pole motor laminations. This effort yields remarkable results: Nominal torque up to 1000 mNm at up to 400 W output power and a motor efficiency of up to 90 % for size 63 mean that the power is easily twice that of the direct predecessor motors.

Internal modules, protected to IP54 specifications

The combination of the auxiliary modules can be selected as desired, but follows a clear structure. The motor is always the first module in the drive housing. Depending on the requirement, it is followed by a high-torque permanent magnet brake and high-resolution encoders in various designs.

The “rear block” of all of the functional modules that can be integrated is the motor control element with integrated electronics, including the corresponding interfaces. All modules are assembled using a systematic interface design. The result is a drive with type of protection IP 54 from a single cast.

Packaging and sorting machines, printing machinery or applications in the textile industry – the various hardware extension levels and performance classes of the ECI 63 are well suited to many areas of industrial automation. In medical technology, laboratory instruments and many other application areas, the modular concept of the drive series can make full use of its strengths. The high-level type of protection of the module drive also supplies a long service life without additional expense even in tough environments.



External expansion is no problem.

However, even with the installation of the integrated modules, the limit of expansion options is not exhausted. As an alternative to the integrated modules or in addition to them, you can install additional modules with a shaft in open design that is led through the B side or rear of the drive. Here, additional brakes with powerful spring force mechanics and encoders in various designs are available.

For space-saving direct attachment of various gearboxes, a flange is included for installing compact planetary or angular gearboxes. The versatile flange is equipped as standard with several semicircular fasteners – but can also be flexibly designed and thus adapted to every drive task.

Electronics that are modular and scalable.

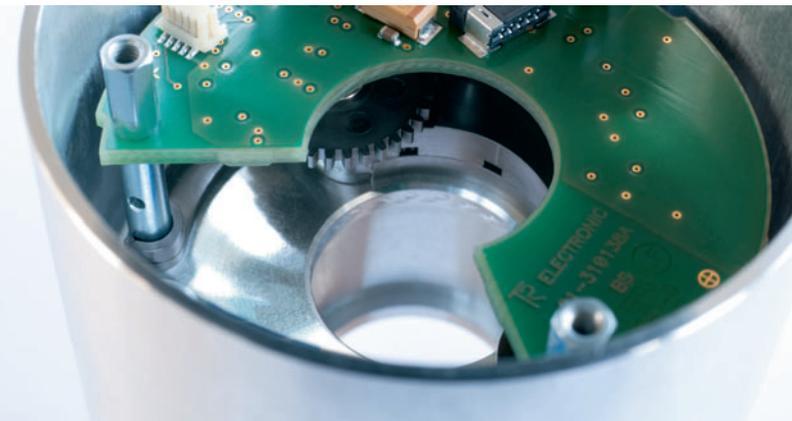
The building block approach of the ECI module includes the drive electronics. This reduces the range of motor variants needed to a minimum and enables each configuration to be equipped with up to four different performance classes (K1, K3, K4, K5) for its drive task.

The higher the number of the class, the wider the range of functions. This range extends from a simple module with rotor position encoder and external commutation (K1) to the high-end design (K5), which includes features such as a CANopen interface with multiple program modules to DSP 402. An implementation and programming tool and an interpreter enable you to create user-specific sequence programs that carry out the functions of a small PLC.



Performance advantages at a glance

- Reduced design and maintenance costs
- Full compatibility of all modules
- Can be adapted mechanically and electronically to a wide variety of requirements
- More powerful motors with up to 100 % more torque
- IP 54 standard for every configuration
- CANopen interface in size K5
- Small installation space due to double use of the intermediate flange of the modules



Modules that mesh with each other.

Conventional drive solutions often have disadvantages compared to closed drive solutions. Lining up multiple components not only results in sensitive joints – the installation lengths of the front and rear flange also add up. It's a good thing our developers are not satisfied with convention!

To ensure the usual compactness of our drives, the modules of the ECI 63 do not have a front and rear panel, but instead have intermediate bottoms designed to have load-bearing capacity, each of which serves as the connection and termination point of the subsequent module. A special connection method is used so that at the same time the winding connections of the stator are mechanically joined and inter-connected to the electronics located behind it.

ECI motor

ECI 63.20/ECI 63.40/ECI 63.60

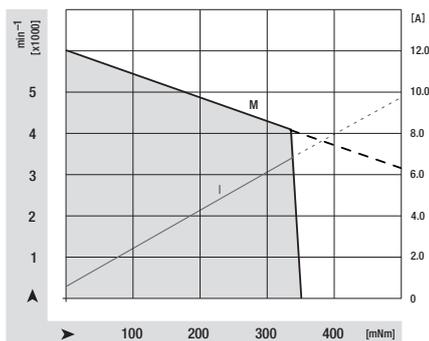


- Highly dynamic 3-phase internal rotor motor in EC technology
- Multi-pole motor design for optimum power density
- Aluminium housing
- Robust ball bearing system for long service life
- Mechanical design and interfaces designed for modular flexibility
- Basic motor with electronics module K1 for operation with external drive electronics
- Protection class IP 54 included in basic concept

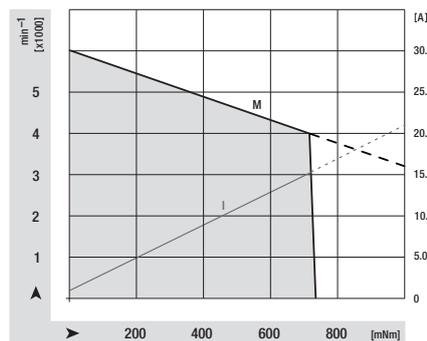
Type		ECI 63.20	ECI 63.40	ECI 63.60
Nominal voltage (U_{BN})	V DC	24	24	24
Nominal speed (n_N)	min ⁻¹	4 000	4 000	4 000
Nominal torque (M_N)	mNm	330	720	1 000
Nominal current (I_{BN})	A	6.9	15.1	21
Nominal output power (P_N)	W	138	301	419
Free-running speed (n_L)	min ⁻¹	6 000	6 000	5 710
Free-running current (I_{BL})	A	0.57	0.92	0.69
Permanent stall torque (M_{BND})	mNm	350	760	1 050
Permissible eff. stall current, motor lead (I_{Noeff})	A	7.5	16.3	22.8
Permissible permanent input power at stall (P_{BND})	W	22	30	36
Short-term perm. peak torque (M_{max})	mNm	1 000	2 100	3 000
Permiss. peak current, motor lead (I_{max})	A	30	65	74
Induced voltage (U_{imax})	V/1000 min ⁻¹	4.17	4.17	4.38
Terminal resistance (R_V)	Ω	0.147	0.07	0.054
Terminal inductance (L_V)	mH	0.248	0.121	0.089
Rotor moment of inertia (J_R)	kgm ² x10 ⁻⁶	19	38	57
Thermal resistance (R_{th})	K/W	2.7	2.1	1.85
Protection class		IP 54	IP 54	IP 54
Ambient temperature range (T_U)	°C	0 to +40	0 to +40	0 to +40
Motor mass (m)	kg	0.9	1.2	1.5
Order No.		932 6320 100	932 6340 100	932 6360 100



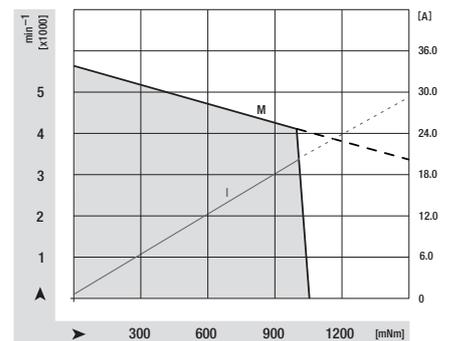
ECI 63.20

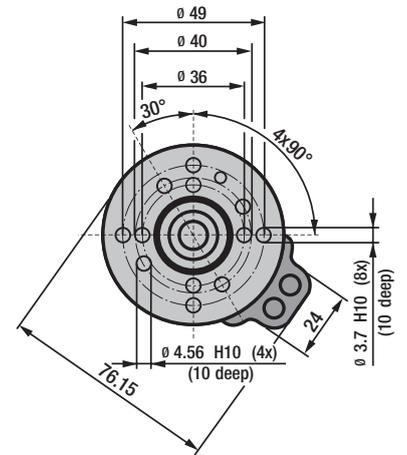
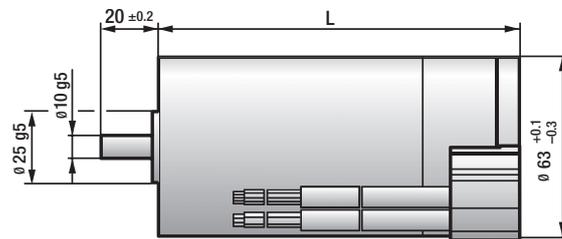
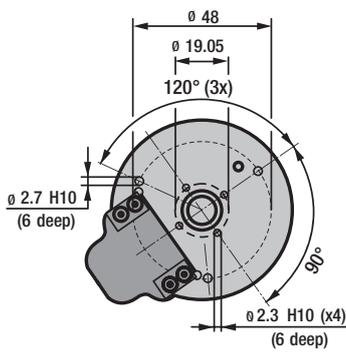


ECI 63.40



ECI 63.60





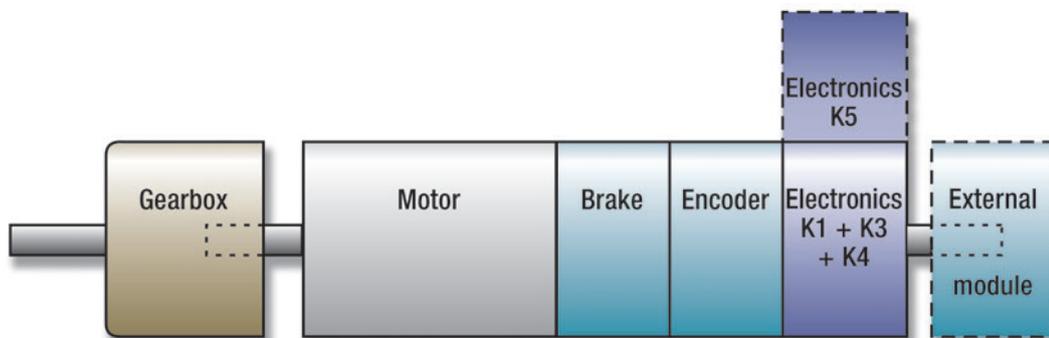
Winding supply lines

No.	Colour	Function
1	blue	W
2	brown	V
3	black	U

Signal lines

No.	Colour	Function
4	green	Hall A
5	white	Hall B
6	grey	Hall C
7	red	U _B Hall, 12 V DC
12	red-blue	Gnd
Other wires are not assigned		

Type	ECI 63.20	ECI 63.40	ECI 63.60
L	106.1	126.1	146.1



Modular design / characteristics

Depending on the basic motor, which is available in 3 lengths (ECI 63.20 / 40 / 60), 2 windings are available for each length (nominal voltages 24 and 48 V). Thus a wide operating range can be covered by using different operating voltages. On the A side, the motors are designed for attachment of various gearboxes. As integrated modules (IP 54), a permanent magnet brake and a multiturn absolute encoder are available. In addition, an optical

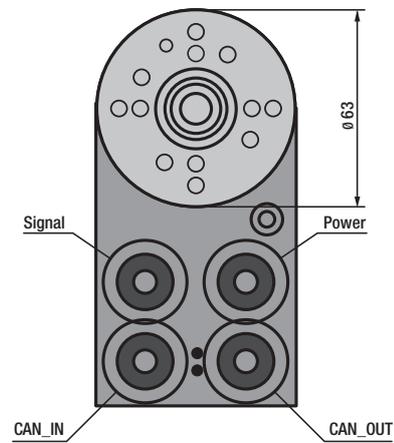
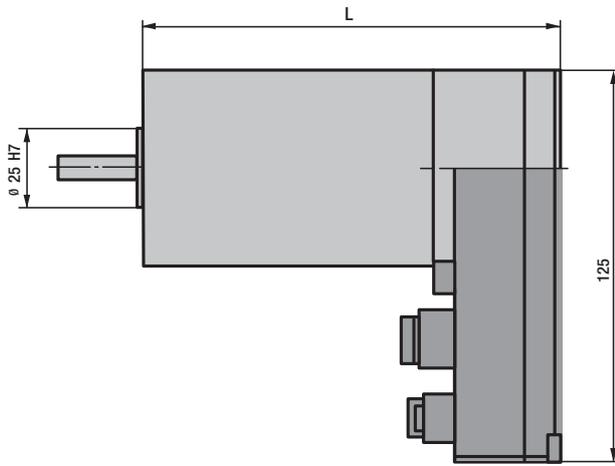
encoder or spring brake can also be installed on the B side. The completion of the integrated modules is always done by an electronics module that can incorporate different scopes of function, from a simple pcb with Hall sensors (K1) all the way to highly integrated electronic control units with CANopen interface (K5).

ECI 63.20/63.40/63.60

with electronics module K5

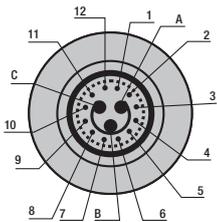


- Completely integrated electronic operation and control unit “K5” with CANopen communication interface
- Sinus commutation of the drives with field-oriented control
- Speed control range down to $n=0 \text{ min}^{-1}$ with holding torque
- Different operating modes according to DSP 402 (speed, positioning, homing, torque) possible via software
- Electronics in safely sealed housing
- Connectors M16 and M12 in sealed industry standard
- Extensive interface with many inputs and outputs



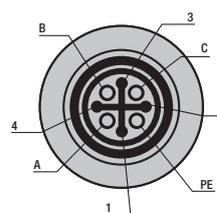
Type	ECI 63.20	ECI 63.40	ECI 63.60
L	112	132	152

Detail of signal



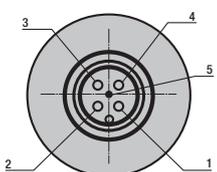
Pin 1	Digital I/O 1	PNP 24 V
Pin 2	Digital I/O 2	PNP 24 V
Pin 3	Digital I/O 3	PNP 24 V
Pin 4	Digital I/O 4	PNP 24 V
Pin 5	Digital I/O 5	PNP 24 V
Pin 6	Digital I/O 6	PNP 24 V
Pin 7	Digital I/O 7	PNP 24 V
Pin 8	Digital I/O 8	PNP 24 V
Pin 9	Digital I/O 9	NPN (open collector, 30 V _{max})
Pin 10	Enable	PNP 24 V
Pin 11	Analog IN 1	0 to 10 V
Pin 12	Analog IN 2	0 to 10 V
Pin A	Analog IN –	GND _{Analog}
Pin B	U _c	Logic power supply + (24 V)
Pin C	GND	Logic power supply – (GND)

Detail of power



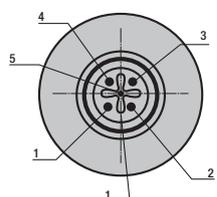
Pin A	U _{ZK}	Power supply
Pin B	Ballast/Brake	Ballast resistor/brake connection
Pin C	GND power	Power supply
Pin PE	PE	Earthing (on motor housing)
Pin 1	CAN_H	CAN_Bus high signal
Pin 2	CAN_L	CAN_Bus low signal
Pin 3	Enable	Motor enable
Pin 4	I/O	Digital I/O

Detail of CAN_OUT



Pin 1	n.c.	
Pin 2	Digital I/O 9	NPN
Pin 3	CAN_GND	CAN_GND
Pin 4	CAN_H	CAN_Bus high signal
Pin 5	CAN_L	CAN_Bus low signal

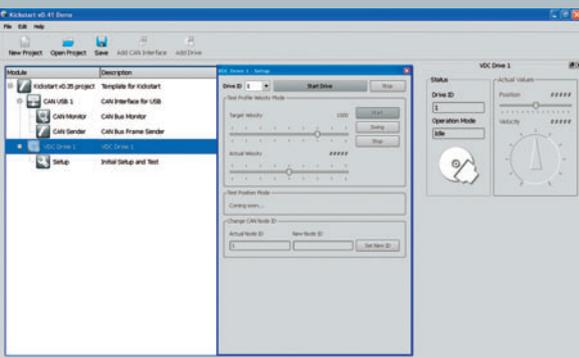
Detail of CAN_IN



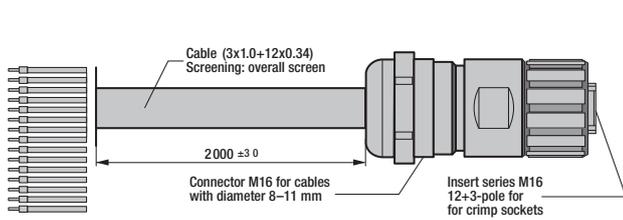
Pin 1	n.c.	
Pin 2	Enable	Enable
Pin 3	CAN_GND	CAN_GND
Pin 4	CAN_H	CAN_Bus high signal
Pin 5	CAN_L	CAN_Bus low signal

Electronics K5 commissioning accessories

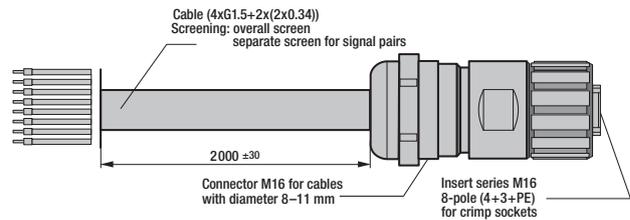
PC commissioning tool, cable sets and CAN adapters



- Windows-based PC commissioning tool for all motors with drive of electronics class K5 with CANopen communication interface
- Quick and intuitive operation and commissioning of the drive systems
- Range of function based on the possibilities of the CiA Drives Profile DSP 402
- Commissioning, configuration, programming (via interpreter) and monitoring of drives via CANopen communication interface
- Can be run on all common software platforms (e. g. Windows 2000, Windows XP, Windows Vista, Windows 7) directly from USB stick (automatic hardware detection and driver installation necessary)



Order No. 6670 002 005

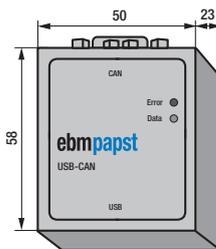


Order No. 6677 002 060

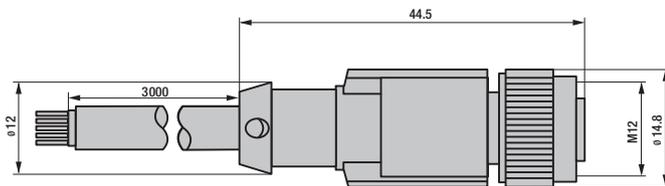
Pin 1	white	Digital I/O 1	PNP 24 V
Pin 2	brown	Digital I/O 2	PNP 24 V
Pin 3	green	Digital I/O 3	PNP 24 V
Pin 4	yellow	Digital I/O 4	PNP 24 V
Pin 5	grey	Digital I/O 5	PNP 24 V
Pin 6	pink	Digital I/O 6	PNP 24 V
Pin 7	blue	Digital I/O 7	PNP 24 V
Pin 8	red	Digital I/O 8	PNP 24 V
Pin 9	black	Digital I/O 9	NPN (open collector, 30 V _{max})
Pin 10	violet	Enable	PNP 24 V
Pin 11	grey-pink	Analog IN 1	0 to 10 V
Pin 12	red-blue	Analog IN 2	0 to 10 V
Pin A	brown (1.0)	Analog I/O –	GND _{Analog}
Pin B	black (1.0)	U _C	Logic power supply + (24 V)
Pin C	grey (1.0)	GND	Logic power supply – (GND)

Strand	Pin		
black (1)	Pin A	U_ZK	Power supply
black (2)	Pin B	Ballast/Break	Ballast resistor/brake connection
black (3)	Pin C	GND power	Power supply
yellow/green	Pin PE	PE	Earthing (on motor housing)
white	Pin 1	CAN_H	CAN_Bus high signal
brown	Pin 2	CAN_L	CAN_Bus low signal
green	Pin 3	Enable	Enable
yellow	Pin 4	I/O	Digital I/O (open collector)

CAN to USB adapter for commissioning motors of class K5 via a computer with commissioning software and CANopen bus system.

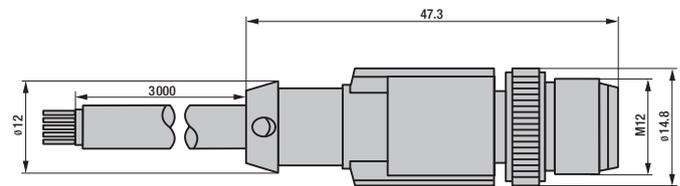


Function	Description
CAN speed	CAN high-speed (up to 1 Mbps)
CAN signals	CAN_H, CAN_L, CAN_GND, CAN_V+, GND
CAN plug	DB9 plug
USB interface	USB 2.0 Full Speed
USB output	Max. 1 W/max. 200 mA via USB port
USB plug	USB Type B socket
Permitted ambient temp. range	0 to 60 °C
Mass	50 g
Order No.	914 0000 000



Order No. 6675 027 000 (Phoenix Contact No. 1682948)
Sensor/actuator cable for CAN_IN, 5-pole, PUR halogen-free black, screened, free cable end to straight socket M12, cable length 3 m

Pin	Function	Description	Colour
1	n.c.	not wired	brown
2	Enable	Enable	white
3	CAN_GND	CAN Ground	blue
4	CAN_H	CAN_Bus high signal	black
5	CAN_L	CAN_Bus low signal	grey



Order No. 6675 028 000 (Phoenix Contact No. 1682744)
Sensor/actuator cable for CAN_OUT, 5-pole, PUR halogen-free black, screened, straight plug M12 to free cable end, cable length 3 m

Pin	Function	Description	Colour
1	n.c.	not wired	brown
2	Digital I/O 9	NPN	white
3	CAN_GND	CAN Ground	blue
4	CAN_H	CAN_Bus high signal	black
5	CAN_L	CAN_Bus low signal	grey

ECI gearbox versions

ECI with Performax 63 and Performax 63 HRL

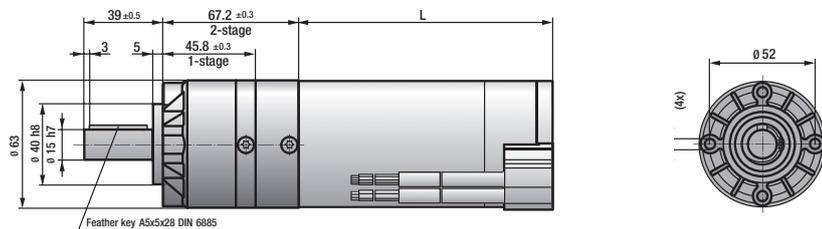


- Planetary gearbox series in modular design
- The revolving planetary gears enable transmission of high torques in a small installation space
- Gearbox housing made of robust die-cast zinc
- Noise-optimised by helical plastic gears in the input stage
- High torques provided by case-hardened gears in the second stage
- Performax 63 HRL series with double ball bearing mounted output shaft for use with particularly high radial forces

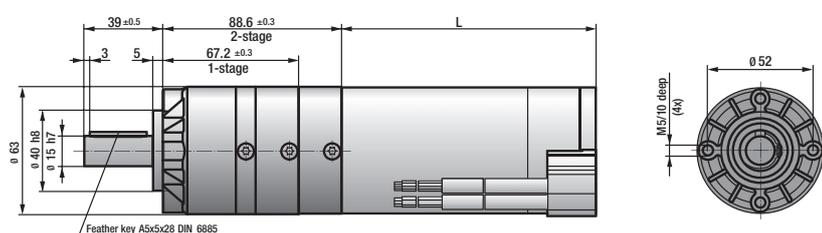
Gear data	Reduction	Reduction stages	Nominal torque	Nominal speed	Nominal current	Mass
Type	i		Nm	min ⁻¹	A	kg
ECI 63.20 PX 63-3	3.2	1	0.9	1250	6.9	1.4
ECI 63.20 PX 63-5	5	1	1.5	800	6.9	1.4
ECI 63.20 PX 63-21	21.3	2	5.7	188	6.9	1.9
ECI 63.20 PX 63-30	30	2	8.0	133	6.9	1.9
ECI 63.40 PX 63-3	3.2	1	2.1	1250	15.1	1.7
ECI 63.40 PX 63-5	5	1	3.2	800	15.1	1.7
ECI 63.40 PX 63-21	21.3	2	12.4	188	15.1	2.2
ECI 63.40 PX 63-30	30	2	17.5	133	15.1	2.2
ECI 63.60 PX 63-3	3.2	1	2.9	1250	21	2.0
ECI 63.60 PX 63-21	21.3	2	17.2	188	21	2.5
ECI 63.20 PX 63HRL-5	5	1	1.5	800	6.9	1.6
ECI 63.20 PX 63HRL-30	30	2	8.0	133	6.9	2.0
ECI 63.40 PX 63HRL-5	5	1	3.2	800	15.1	1.9
ECI 63.40 PX 63HRL-30	30	2	17.5	133	15.1	2.3
ECI 63.60 PX 63HRL-5	5	1	4.5	800	21	2.2
ECI 63.60 PX 63HRL-30	30	2	24.3	133	21	2.6

Additional designs with alternative gearboxes available on request

Performax 63



Performax 63 HRL



ECI gearbox versions

ECI with NoiselessPlus 63 and EtaCrown 75

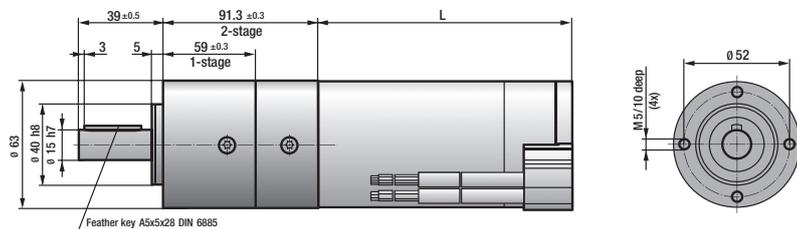


- NoiselessPlus – planetary gearbox with aluminium housing
- High-quality slotted helical gearing in the hollow gear
- Optimised for power output, smooth running and service life
- EtaCrown – innovative angular gear with crown gear technology
- High gearbox efficiency
- Smooth-running and robust due to optimised gear design

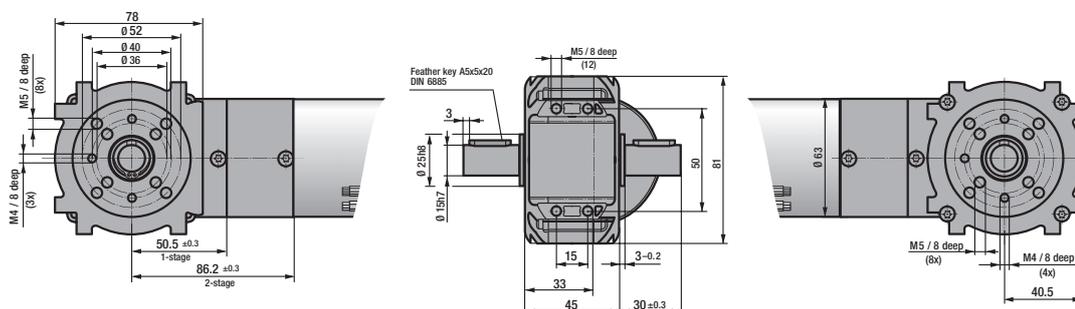
Gear data	Reduction	Reduction stages	Nominal torque	Nominal speed	Nominal current	Mass
Type	i		Nm	min ⁻¹	A	kg
ECI 63.20 PN 63-4	4.3	1	1.3	930	6.9	1.5
ECI 63.20 PN 63-6	6	1	1.8	667	6.9	1.5
ECI 63.20 PN 63-19	19	2	5.1	211	6.9	1.7
ECI 63.40 PN 63-4	4.3	1	2.8	930	15.1	1.8
ECI 63.40 PN 63-6	6	1	3.9	667	15.1	1.8
ECI 63.40 PN 63-19	19	2	11.1	211	15.1	2.0
ECI 63.60 PN 63-4	4.3	1	3.9	930	21	2.1
ECI 63.60 PN 63-6	6	1	5.4	667	21	2.1
ECI 63.60 PN 63-19	19	2	15.4	211	21	2.3
ECI 63.20 EC 75-4	4.1	1	1.2	976	6.9	1.8
ECI 63.20 EC 75-7	6.7	1	2	597	6.9	1.8
ECI 63.20 EC 75-20	20.3	2	5.4	197	6.9	2.2
ECI 63.20 EC 75-33	33.3	2	8.9	120	6.9	2.2

Additional designs with alternative gearboxes available on request

NoiselessPlus 63



EtaCrown 75



ECl sensor module external

Encoder HEDS 5500



- Optoelectronic 2-channel incremental encoder
- The encoder features non-contact, wear-free operation
- 2 rectangular signals with 90° phase shift, TTL compatible
- Variants with other encoder resolutions on request

ECl sensor module integrated

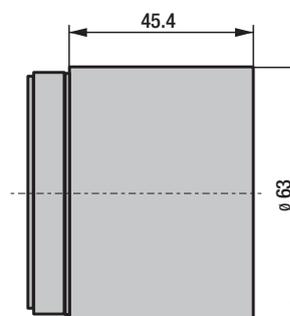
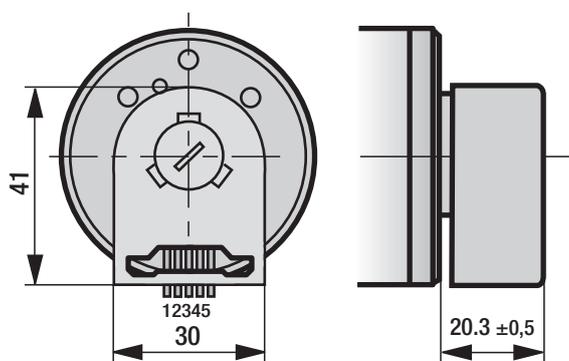
Multiturn absolute encoder FMG-Kit



- Module integrated between basic motor and electronics module
- Multiturn absolute encoder
- System with magnetic scanning and reduction gear
- Positioning capability with absolute value measurement
- The current position value is available immediately after switching on
- Available in conjunction with electronics modules of class K5 only

Type	HEDS 5500	
Number of pulses	512 pulses per revolution (channel A and B)	
Cut-off frequency	kHz	100
Supply voltage	V DC	5 +/- 10%
Current draw	mA	Typ. 17 (max. 40)
Protection class	IP 00	
Pin assignment	1=Gnd 2=free 3=A 4=UB 5=B	
Plug type	e. g. AMP 103686-4 or 600442-5	

Type	FMG-Kit
Multiturn resolution	12-bit
Measuring range	0 to 4 096 revolutions
Direction of rotation	cw / ccw
Protection class	IP 54 (for built-in module)



ECI brake module external

Spring applied brake BFK



- Open mounting of the module to the motor B side
- Holding brake with emergency stop function
- Spring applied braking torque, released electromagnetically
- Single-disk brake with 2 friction contact surfaces

ECI brake module integrated

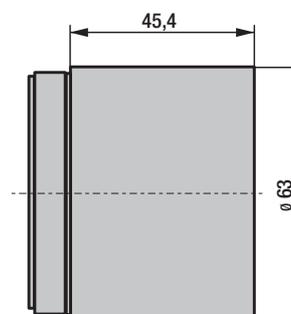
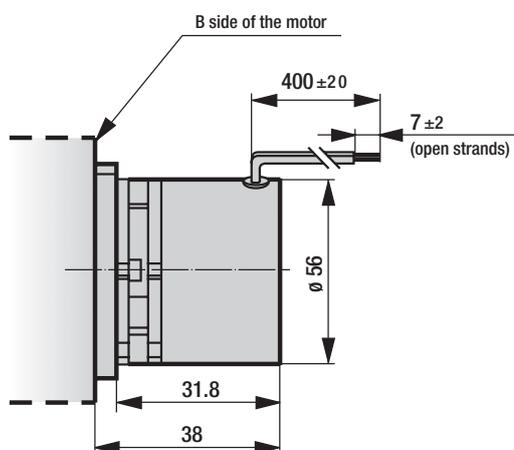
High torque permanent magnet brake



- Module integrated between basic motor and electronics module
- Holding brake with limited emergency stop function
- Optimized magnetic design with high power density
- Braking torque is generated by a permanent magnetic field and is released electromagnetically
- Free of residual torque and play
- Reduced mass inertia for optimum dynamics

Type	BFK	
Nominal voltage	V DC	24 +/- 10%
Rated output	W	9
Braking torque	Nm	0.5
Mass	kg	0.4
Closing time	ms	12.5
Opening time	ms	18
Protection class	IP 00	

Type	High torque	
Nominal voltage	V DC	12 +/- 10%
Rated output	W	9
Braking torque	Nm	2
Mass moment of inertia	kgm ²	9 x 10 ⁻⁶
Closing time	ms	20
Opening time	ms	35
Protection class	IP 54 (for built-in module)	



ebm-papst
St. Georgen GmbH & Co. KG

Hermann-Papst-Straße 1
D-78112 St. Georgen, Germany
Phone +49 7724 81-0
Fax +49 7724 81-1309
info2@de.ebmpapst.com

www.ebmpapst.com