



The ECI Motor – dynamics, performance and high flexibility



Technical Information

You are looking for high dynamic properties, high torque and full power on demand? The electronically commutated inner rotor motors of the ECI series are the professional drive solution when short cycle times fast motion-sequences and long lifetime are required.

With the electronic commutation of the ECI motors the maximum values for life expectancy are made possible. Based on this the ECI motors can be used in many various applications as maintenance-free drive components throughout the entire life span of the device or machine. Depending on the motor type and size the commutation electronics to operate these motors is available either as integrated or external version.

High power density has been achieved by using highly efficient neodymium magnetic materials. This enables the ECI motors to deliver a high output power out of a comparably small motor volume for a vast variety of applications and assembly situations. For most of the motors in this series the magnets are designed as bar magnets that are embedded into the slots of a stacked rotor lamination core. Being permanently embedded, these magnets are not only efficient to manufacture in automated production, but they can also be used up to high motor speeds without the need for any additional safety measures.

The mechanically closed design of these inner rotor motors enables the motors to reach a protection class of IP 40 already in the standard motor version. Higher protection classes are available on request depending on the exact motor type. In addition the design of the motor flanges with various diameters of bore holes on different reference circle diameters offers extremely flexible mounting possibilities for the integration of the motors into many various applications. Furthermore several types of the ECI motors can be equipped with low-noise planetary gears in various ratios in order to adapt speed and torque in a best possible way to the individual requirements of your application.

In brief and straight to the point

- 3-phase, electronically commutated internal rotor with neodymium magnet
- Power range from 30 to 270 high power density and wide overload margin
- Long service life and silent running
- Determination of rotor position via 3 Hall-sensors
- Several motor types also available with planetary gears
- Optoelectronic encoder for some motor types available on request
- Spring applied brake for some motor types available on request
- Customer-specific winding layouts
- Winding insulation as per Insulation Class E
- Protection class as per EN 60 034-5: IP 40, higher if required

Contents

The series of ECI motors consists of altogether 4 motor sizes that are partially available in different motor lengths. Besides the operating electronics of the series DRIVECONTROL different gearbox versions are available. Further accessory components such as spring applied brakes and encoders that are available on request complete the programme of the ECI motors to make it suitable for the use in a wide range of different applications.



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ECl motors

The following diagram illustrates the sequence of the Hall signals and the corresponding drive sequence with relevant colour and pin assignments that apply to self-developed products and to purchased electronics. It also illustrates the phase position of these signals to the induced motor voltage.

Commutation sequences

Commutation sequence

Chronological signal sequence of integrated Hall sensors (= RLG) at the corresponding connections.

Switching sequences of the power output stage

Required relationship between the signal change from RLG and the relevant change for the switching status of the power transistors in relation to the phase lead to the motor.

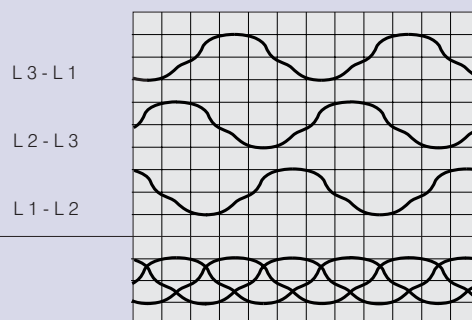
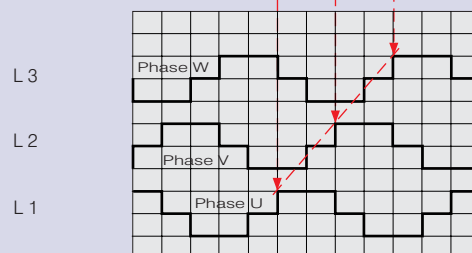
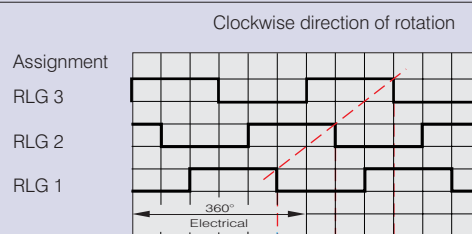
Induced voltages

Idealized illustration of the sequence of the induced voltages between the relevant connections.

Total of induced voltages

Supply voltage for

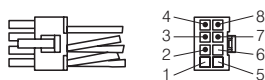
Hall-IC A 3187 LUA



ECl
Position
grey
white
green
yellow
violet
brown
yellow-brown
violet-yellow
brown-violet
red
black

Sensor-Plug ECl 24.XX / 63.XX

Type: Molex
No. 39-01-2085



1: —	2: red	3: white
4: green	5: —	6: —
7: black	8: grey	

Power-Plug ECl 24.XX / 63.XX

Type: Molex
No. 19-09-1036



1: yellow	2: violet	3: brown
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Hall-IC

Supply voltage range:

$V_{CC} = 4.5 \dots 24 \text{ V}$

Signal output: open collector

Max. output voltage: $V_o = 26 \text{ V}$

Max. output current: $I_o = 20 \text{ mA}$

ECl-Motor

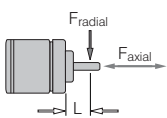
ECl 30.20



- High dynamic 3-phase, 6-pulse internal rotor motor.
- EC technology with slotless stator design.
- Extremely silent running, no cogging torque.
- Very suitable for high speed applications due to minimized iron losses.
- Dynamically balanced rotor with 4-pole neodymium magnet.
- Detection of rotor position via 3 Hall sensors.
- Option: motor without sensors for sensorless operation.
- Precision ball bearings for long service life and silent running.
- Motor supply and control via external operating electronics.

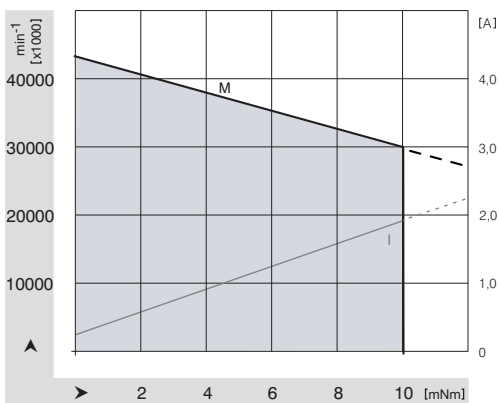
Nominal Data

Type	ECl 30.20	
Nominal voltage (U_{BN})	V DC	24
Nominal speed (n_N)	min ⁻¹	30 000
Nominal torque (M_N)	mNm	10
Nominal current (I_{BN})	A	1.9
Nominal output power (P_N)	W	32
Free-running speed (n_I)	min ⁻¹	43 000
Free-running current (I_{BL})	A	0.20
Permanent stall torque (M_{BNO})	mNm	---
Permissible eff. stall current, motor lead (I_{n0eff})	A	---
Permissible permanent input power at stall (P_{BNO})	W	---
Short-term permiss. peak torque (M_{max})	mNm	45
Permiss. peak current, motor lead (I_{max})	A	8
Induced voltage (U_{imax})	V/1000min ⁻¹	0.62
Terminal resistance (R_V)	Ω	1.9
Terminal inductance (L_V)	mH	0.26
Rotor moment of inertia (J_R)	kgm ² x10 ⁻⁶	1.5
Thermal resistance (R_{th})	K/W	---
Protection class		IP 20
Ambient temperature range (T_U)	°C	0...+40
Motor mass (m)	kg	0.21
Order No.		932 3020 001

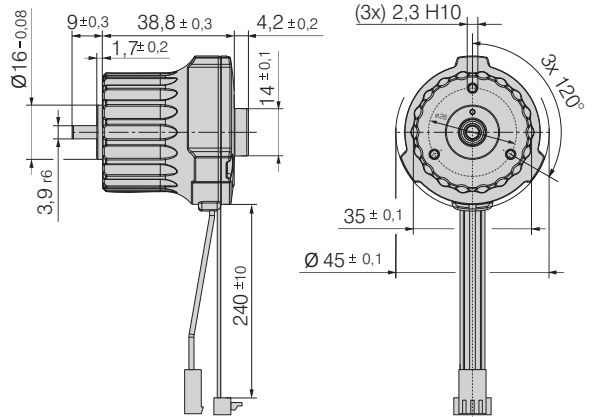


F_{axial} 6 N
 F_{radial} 1 N L_1 10 mm

Permissible shaft load at nominal speed and life expectancy L_{10} at 20 000 h.



Operating electronics:
 DRIVECONTROL VT-A in a version without speed control can be used for tests (adapter cable necessary).



Blind holes for self threading screws according to DIN 7500. Screw in depth 5,3 mm max.

