

ECl motors



ECI motors

Are you looking for high dynamic properties, high torque and full power on call? The electronically commutated, internal rotor motors of the ECI series are the professional drive solution when short timing cycles and quick motion cycles are required.

The following diagram illustrates the sequence of the Hall signals and the corresponding drive sequence with relevant colour and pin assignments at they are to 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

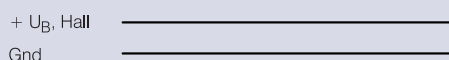
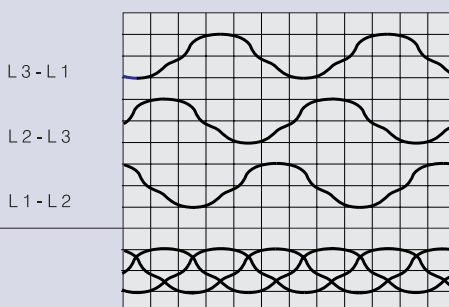
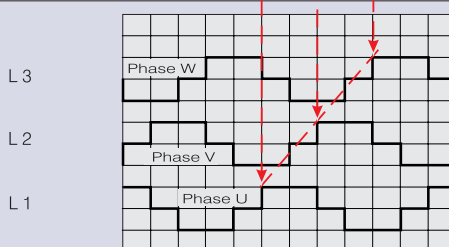
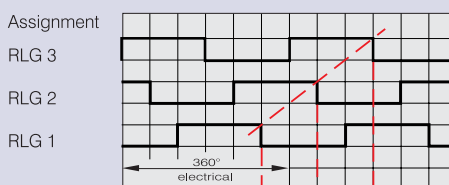
Idealized illustration of the sequence of the induced voltages between the relevant connections.

Total of induced voltages

Supply voltage for

Hall-IC A 3187 LUA

Clockwise direction of rotation



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

Sensor-Plug ECI 63.XX

Type: Molex
No. 39-01-2085



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

Power-Plug ECI 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: $V_0 = 26 \text{ V}$

Max. output current: $I_0 = 20 \text{ mA}$

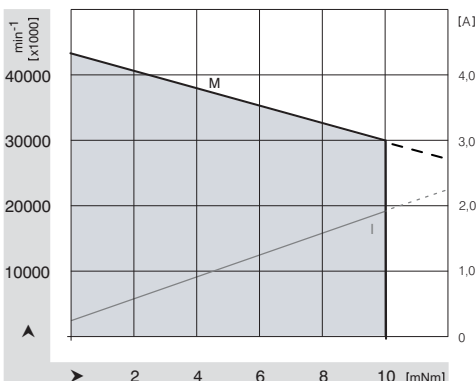
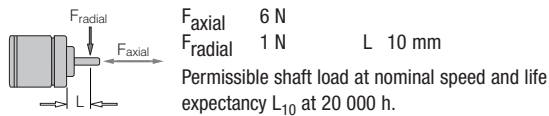
ECI 30.20



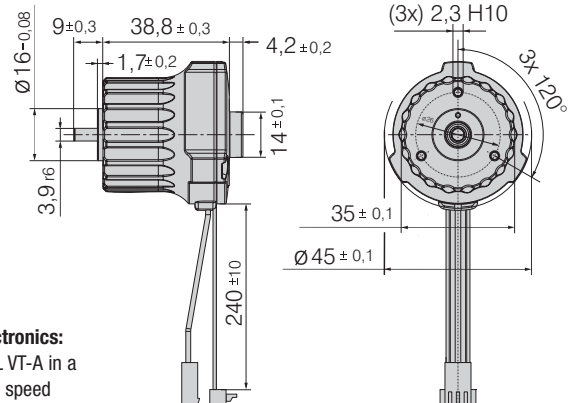
- High dynamic 3-phase, 6-pulse internal rotor motor.
- EC technology with slotless stator design.
- Extremely silent running, no cogging torque.
- Very suitable for high speed applications due to minimized iron losses.
- Dynamically balanced rotor with 4-pole neodymium magnet.
- Detection of rotor position 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		ECI 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_f)	min ⁻¹	43 000
Free-running current (I_{Bf})	A	0.20
Permanent stall torque (M_{BN0})	mNm	---
Permissible eff. stall current, motor lead (I_{n0eff})	A	---
Permissible permanent input power at stall (P_{BN0})	W	---
Short-term perm. 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



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



Operating electronics:
DRIVECONTROL VT-A in a version without speed control can be used for tests.

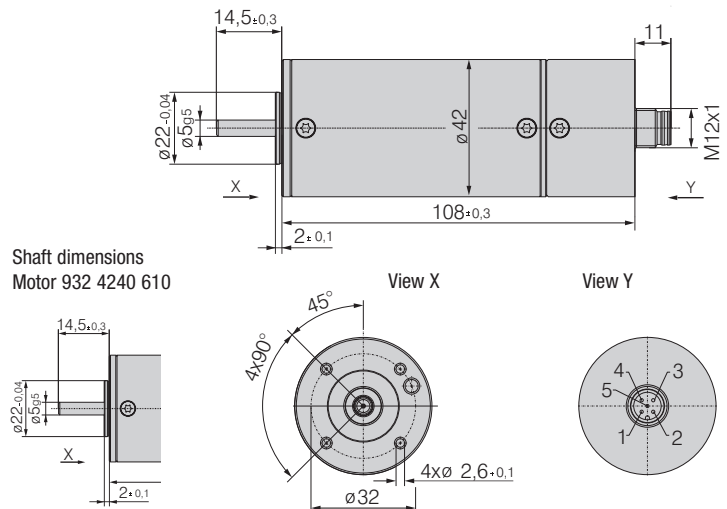
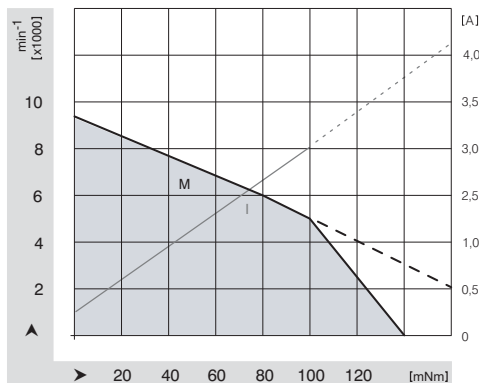
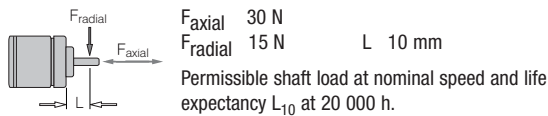
ECI 42.40-C



- Dynamic 3-phase internal rotor motor in EC technology with increased starting torque.
- Integrated operating electronics with powerful microcontroller.
- Excellent controllability due to digital 4-Q PI controller.
- High efficiency due to FET power stage.
- Analogue speed command signal.
- Protection against overload due to integrated, speed-dependent current limitation.
- Customized versions possible by software and hardware adaption (e.g. fixed speed, direction of rotation).

Nominal Data

Type		ECI 42.40-C	ECI 42.40-C version 610
Nominal voltage (U_{BN})	V DC	24 (18 ... 28)	24 (18...28)
Nominal speed (n_N)	min ⁻¹	6 000	5 000
Nominal torque (M_N)	mNm	80	100
Nominal current (I_{BN})	A	3.0	3.0
Nominal output power (P_N)	W	50	52
Free-running speed (n_i)	min ⁻¹	9 300	6 300
Free-running current (I_{BL})	A	0.30	0.25
Max. reverse voltage	VDC	30	30
Set value input	V	0 ... 10	0...10
Desired speed	min ⁻¹	0 ... 10 000	0...10 000
Recommended speed control range	min ⁻¹	300 ... n_{max}	300... n_{max}
Temperature monitoring		yes	yes
Overload protection		yes	yes
Average starting torque	mNm	140	140
Rotor moment of inertia (J_R)	kgm ² x10 ⁻⁶	3.2	3.2
Thermal resistance (R_{th})	K/W	3.3	3.3
Protection class		IP 40	IP 40
Ambient temperature range (T_U)	°C	0 ... +40	0...+40
Motor mass (m)	kg	0.7	0.7
Order No.		932 4240 600	932 4240 610



ECI 42.40-C-PX Gear motor

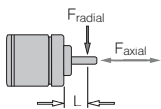


- Modular 1- to 3-stage planetary gearbox with zinc die-cast housing.
- Grease lubrication for maintenance free operation.
- Gearbox output shaft supported with a sleeve and a ball bearing.
- Optimized helical tooth system in the first stage for silent running and long service life.
- Motor data see ECI 42.40-C version 610.

Nominal Data		Gear ratio	Stage gearbox	Nominal torque	Speed range	Length L1	Length L2	Mass	Order No. 942 4240...
Type		I		Nm	min ⁻¹	mm	mm	kg	
ECI-42.40-C-PX 42-3		3.18:1	1	0.3	100...1 572	143.3	35.3	0.9	...603
ECI-42.40-C-PX 42-5		5:1	1	0.5	60...1 000	143.3	35.3	0.9	...600
ECI-42.40-C-PX 42-21		21.25:1	2	1.7	14...235	158.8	50.8	1.0	...601
ECI-42.40-C-PX 42-30		30:1	2	2.4	10...167	158.8	50.8	1.0	...602
ECI-42.40-C-PX 42-150		150:1	3	10.3*	2...33	174.3	66.3	1.1	...604

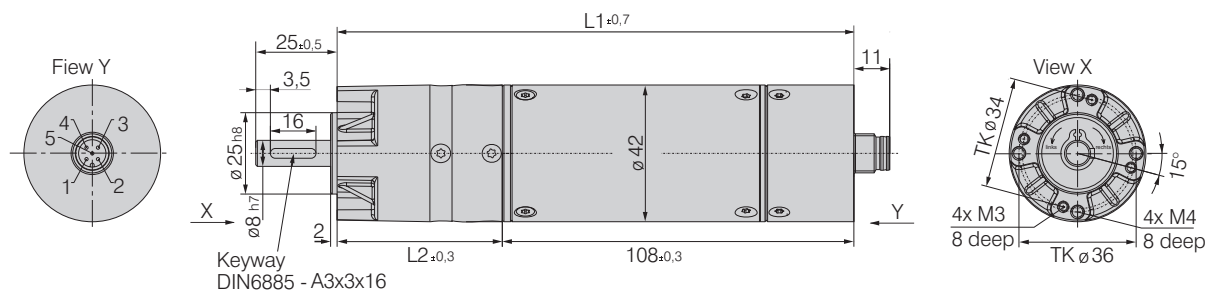
*Monitoring of max. output torque of 10.3 Nm required.

Gearbox output shaft load



F_{axial} 150 N
 F_{radial} 250 N L 12.5 mm

Permissible shaft load at nominal speed and life expectancy L_{10} at 5 000 h



Pin configuration for ECI 42.40-C

Pin connection

Pin 1	U_B
Pin 2	Direction of rotation
Pin 3	GND
Pin 4	Actual speed value
Pin 5	Set value

Pin configuration

Plug: Company Lumberg
 Type RKT 5-228/...m
 (direct coupling)
 RTK 5-228/2m
 ebm-papst Order No. 9920 0160 001
 Type RKWT 5-228/...m
 (angle coupling)
 Type FST 5-FKT 5-293/...m
 (Fixcon plug / coupling)

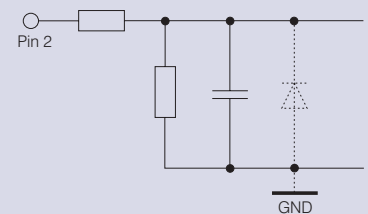
1. Control input rotation (Pin 2)

Pin 2

1	Counterclockwise rotation
0	Clockwise rotation

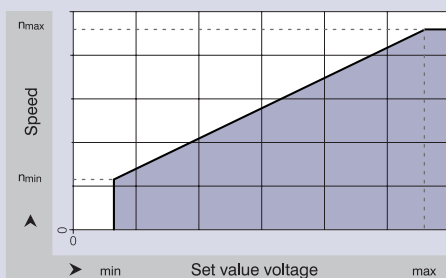
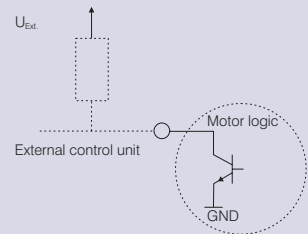
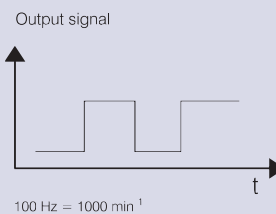
low (0) 0 ... 0.8 V
 high (1) 2.4 ... 28 V

Direction of rotation viewed on shaft



2. Actual speed value output (Pin 4)

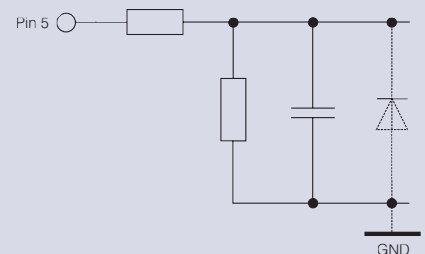
Version:
 Open Collector
 $U_{ext. max} = 30 V$
 $U_{CESAT} = 0.5 V$
 $I_{CMAX} = 5mA$



3. Set value input (Pin 5)

Speed setting for speed control via set value voltage interface 0 ... 10 V DC.
 (1 V = 1 000 U/min)

By set value voltage $< 0.2 V$
 the brake function will be activated.
 The braking function serves to slow down the motor only. It has no static holding brake function.



For detailed information, please refer to the corresponding specification data sheets.
 The instructions and safety notes in the operating manual must be kept at all times.

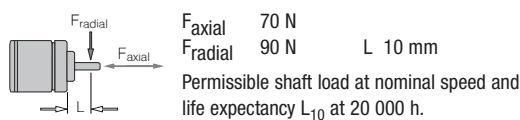
ECI 63



- High dynamic 3-phase, 6-pulse internal rotor motor.
- EC technology.
- 4-pole rotor with inserted neodymium magnets.
- Determination of rotor position via 3 Hall sensors.
- Precision ball bearings for long service life and silent running.
- Steel housing.
- Ready for assembling an encoder (HEDS 5500) or a brake.
- Motor supply and control via external operating electronics.
- A-side with fixed bearing seat.

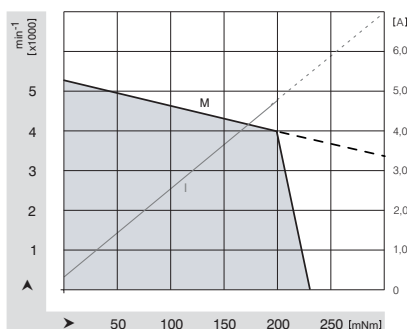
Motor Data

Type	ECI 63.25	ECI 63.40	ECI 63.75	
Nominal voltage (U_{BN})	V DC	24	24	24
Nominal speed (n_N)	min ⁻¹	4 000	4 150	4 250
Nominal torque (M_N)	mNm	200	360	610
Nominal current (I_{BN})	A	4.8	9.2	15.5
Nominal output power (P_N)	W	83	160	270
Free-running speed (n_l)	min ⁻¹	5 250	5 600	5 600
Free-running current (I_{Bl})	A	0.26	0.37	0.79
Permanent stall torque (M_{BND})	mNm	230	400	600
Permissible eff. stall current, motor lead (I_{n0eff})	A	6.1	11.5	16.5
Permissible permanent input power at stall (P_{BND})	W	20.0	29	31
Short-term perm. peak torque (M_{max})	mNm	875	1 500	2 700
Permiss. peak current, motor lead (I_{max})	A	23	44	75
Induced voltage (U_{imax})	V/1000min ⁻¹	4.7	4.6	4.6
Terminal resistance (R_t)	Ω	0,38	0.18	0.1
Terminal inductance (L_t)	mH	1.6	0.72	0.37
Rotor moment of inertia (J_p)	kgm ² x10 ⁻⁶	12.6	16.8	26.7
Thermal resistance (R_{th})	K/W	3.9	2.65	1.85
Protection class		IP 40	IP 40	IP 40
Ambient temperature range (T_U)	°C	0 ... +40	0 ... +40	0 ... +40
Motor mass (m)	kg	1.0	1.4	2.1
Order No.		932 6325 001	932 6340 001	932 6375 001

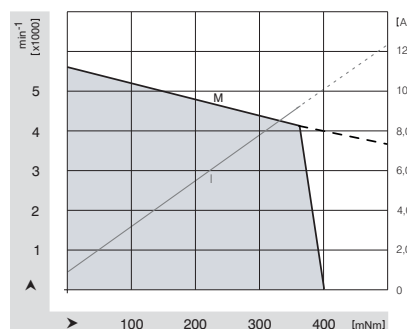


Operating electronics: DRIVECONTROL with analog interface
 for ECI 63.25 VT-D: 937 6207 002
 for ECI 63.40 VT-D: 937 6213 003
 for ECI 63.75 VT-E 20: 992 0490 020
 (optionally with limited performance data VT-D: 937 6213 003)

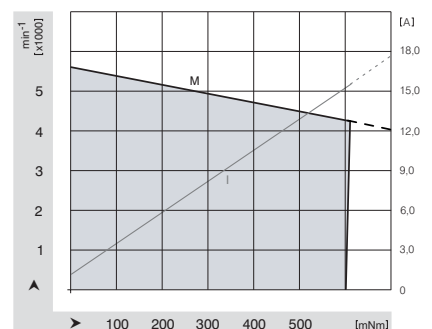
ECI 63.25



ECI 63.40



ECI 63.75



ECI 63 Gear motor



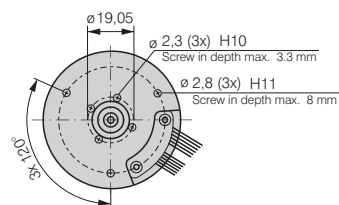
- Motor supply and control via external operating electronics.
- EC motor with 1- and 2-stage planetary gearbox.
- Zinc die-cast gearbox housing.
- Gearbox output shaft supported with a sleeve and a ball bearing.
- Grease lubrication for maintenance free operation.
- Motor data see page 7.

Note on the gearbox design: For applications with higher peak torque than the nominal torque, please contact us with your detailed requirements.

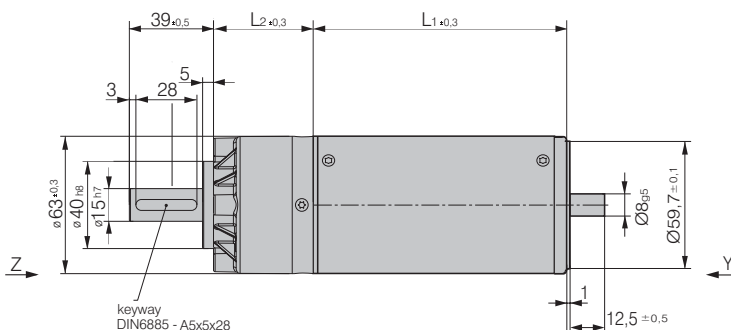
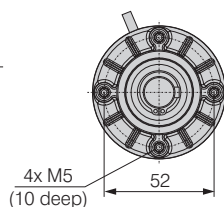
Gear data	Nominal current	Gear ratio	Gear stages	Nominal torque	Nominal speed	Mass	Order No. 942 6340...	Order No. 942 6375...
Type	A	i		Nm	min ⁻¹	kg		
ECI-63.40 PX-63-5	9.2	5 : 1	1	1.6	830	2.0	...001	
ECI-63.40 PX-63-30	9.2	30 : 1	2	8.7	138	2.3	...002	
ECI-63.75 PX-63-5	15.5	5 : 1	1	2.7	850	2.7		...001
ECI-63.75 PX-63-30	15.5	30 : 1	2	14.8	142	3.0		...002

Gear motor ECI 63.40 PX 1- and 2-stage

View Y



View Z



Connecting lead length: 300 mm

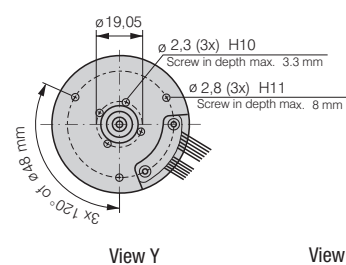
For wire assignments, see the chapter on ECI motor commutation on page 2.

For the ECI 63.75, the power connection is designed with open wire ends.

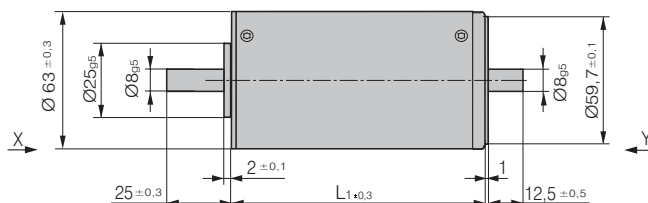
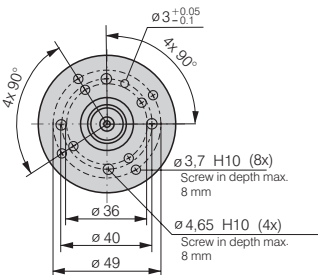
Motor lengths Gear lengths

Type	L1	L2 one stage	L2 two stages
ECI 63.25	85	-	-
ECI 63.40	100	45.8	67.2
ECI 63.75	135	45.8	67.2

Motor ECI 63.25 / ECI 63.40 / ECI 63.75



View X



DRIVECONTROL

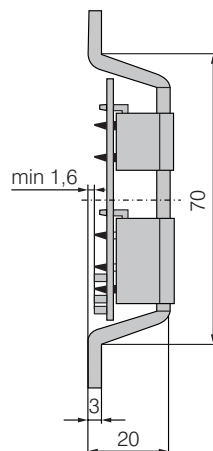
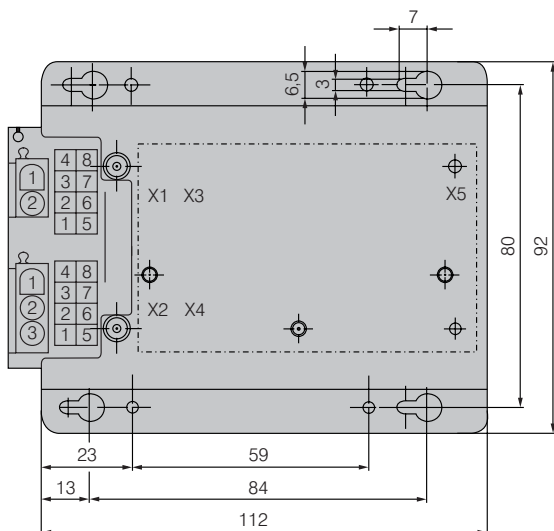
Series VT-D

- Operating electronics for driving 3-phase motors ECI 63.XX.
- Straight forward design in digital technology for the use as OEM electronics in series applications.
- Available in different performance levels and with adapted control characteristics for special applications.
- Only one supply voltage is required for motor and electronics.



Nominal data

Data	Unit	Value	
Nominal voltage	V	24	24
Nominal voltage range	V	18...30	18...30
Max. output voltage	V	90% von UB	90% von UB
Output current, peak	A	7	13
Set value input		0...10 V DC	0...10
Speed control range	min ⁻¹	300...4.000	300...4000
Speed control	Type	PI	PI
ACTUAL speed value		yes	yes
Operating temperature range	°C	0...40	0...40
Temperature monitoring		no	no
Mass	kg	0.2	0.2
Function for motor protection at stall		no	no
Ballast circuit		yes	yes
Protection class		IP 00	IP 00
Order No.		937 6207 002	937 6213 003



Dedicated pin configuration:

Supply X1:
194 0029 000
Control cable X2:
194 0017 001

X5:
Connection for auxiliary capacitor and braking resistor

For detailed information please refer to the operating manual.

ECI Sensor

Encoder HEDS 5500

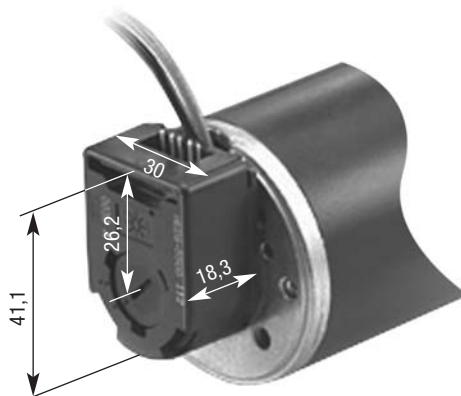
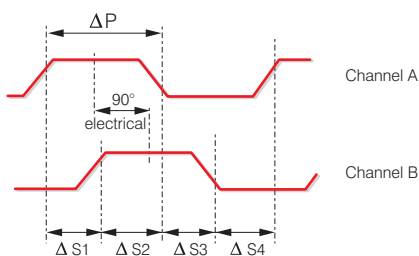


- Optoelectronic 2-channel incremental encoder. A resolution of max. 2,000 increments per revolution is attained by appropriate evaluation in an external control.
- The encoder works contact-free and free from wear. The resolution of the angle of rotation is effected by means of a light-emitting diode in front of a metal encoder disc and a photo-diode array.
- Option: Variants with other encoder resolutions are available on request.

Technical Data

No. of pulses	Z	500 pulses per revolution (channel A and B) – other resolutions on request
Output signal	A, B	2 rectangular-pulse signals (90° phase offset; TTL-compatible)
Limiting frequency	f	100 kHz
Supply voltage	U_B	+ 5 V \pm 10 %
Current consumption	I_B	typ. 17 mA max. 40 mA
Deviation of pulse width	Δ_S	typ. 5° (of electr. 90°)
Deviation of phase shift	Δ_P	typ. 7° (between channel A and B of electr. 90°)
Electrical connection	AMP	103686-4 or 600442-5
Plug type	Berg	65039-032 with 4825X-000 terminals or 65801-034
	Molex	2695 with 2759 terminals
Connection table	Pin	1: ground 2: free 3: A 4: UB 5: B

Pulse Train



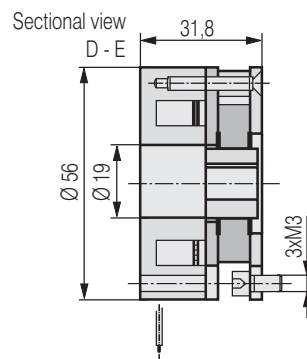
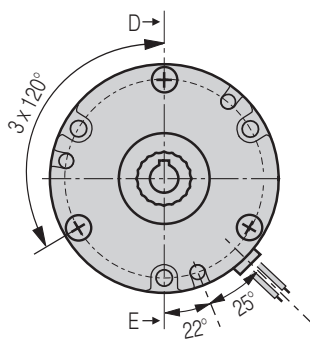
ECI Brake



- Spring-applied brake that is effective when the supply of the brake is switched off and the brake surfaces are pushed against each other by springs. The application of current will release the brake.
- The brake is maintenance free and operates irrespective of the position.

Nominal Data

Type	BFK 457-03	
Holding torque	1 Nm	
Operating voltage	24 V DC	
Nominal power	9 Watt	
Maximum speed	5000 min ⁻¹	
Protection class	IP 00	
Weight	0.40 kg	
Electrical connection	2 leads 200 mm long	
For Motor Series	ECI 63	



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