

Technical data sheet

Rotary encoder Series Information

Part no.: 90000400

EI30-P 070 CL

Contents

- Technical data
- Part number code



For illustration purposes only

Encoder series	EI 070 CL
Encoder_Basic principle	incremental
Encoder_Operating principle	optically interpolated
Encoder_Flange diameter	Ø 70 mm
Encoder_Flange type	Clamping flange
Encoder_Solid shaft/Hollow shaft	Solid shaft
Encoder_Shaft diameter	Ø 12 mm
Encoder_Supply voltage	10 ... 30V DC
	4.75 ... 5.5 V DC
	5 – 30V DC
Encoder_Output circuit	1 Vss Sin/Cos
	HTL
	HTL, inv.
	TTL
	TTL, RS422 compatible, inv.
Encoder_Pulse count	10000 I/U
	10240 I/U
	12000 I/U
	12500 I/U
	1440 I/U
	15000 I/U
	16384 I/U
	20000 I/U
	20480 I/U
	25000 I/U
	2880 I/U
	3000 I/U
	3600 I/U
	4000 I/U
	5760 I/U
	6000 I/U
	7200 I/U
	7500 I/U
	8000 I/U
	9182 I/U

Technical data

Encoder EI30 P 070 CL

Resolution

Pulses per revolution PPR	up to 25000 PPR
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Mechanical Data

Flange	clamping flange
Flange material	aluminum
Housing material	die cast aluminum, powder coated
Flange diameter	Ø 70 mm [Ø 2.756"]

Shaft(s)

Shaft material	stainless steel
Starting torque	approx. 1 Ncm [1.416 in-ozf] at ambient temperature

Shaft	Ø 12 mm [Ø 0.472"]
Shaft length	L: 26 mm [1.024"]
Max. Permissible shaft loading radial	200 N [20.394 kp]
Max. Permissible shaft loading axial	150 N [15.295 kp]

Bearings

Bearings type	2 precision ball bearings
Nominal service life	1 x 10 ⁹ revs. at 100 % rated shaft load 1 x 10 ¹⁰ revs. at 40 % rated shaft load 11 x 10 ¹¹ revs. at 20 % rated shaft load
Max. operating speed	8000 rpm

Machinery Directive: basic data safety integrity level

MTTF _d	200 a
Mission time (TM)	25 a
Nominal service life (L10h)	1 x 10 ¹¹ revs. at 20 % rated shaft load and 8000 rpm
Diagnostic coverage (DC)	0 %

Electrical Data

Power supply/Current consumption	4,75 VDC up to 5,5 VDC: typ. 70 mA (100 mA only C3, D3)
Power supply/Current consumption	5 VDC up to 30 VDC: typ. 70 mA
Power supply/Current consumption	10 VDC up to 30 VDC: typ. 70 mA (100 mA only C2, C4, D4)
Operating principle	optical
Output circuit	TTL TTL, RS422 compatible, inv. HTL HTL, inv. 1 Vpp sin/cos
Pulse frequency	TTL ≤ 5000 ppr: max. 200 kHz HTL ≤ 5000 ppr: max. 200 kHz TTL more than 1200 ppr: max. 2 MHz HTL more than 1200 ppr: max. 600 kHz 1 Vpp sin/cos: max. 100 kHz
Channels	B N and inverted signals
Load	max. 40 mA / channel @ 1 Vpp sin/cos: min. 120 Ohm
Circuit protection	circuit type C4, C6, D4, D6 only

Accuracy

Phase offset	90° ± max. 7.5 % of the period duration
pulse-/pause-ratio	≤5000 ppr: 50 % ± max. 7 % Output circuits C2, C3, C4, D3, D4: 50 % ± max. 10 %

Environmental data

ESD (DIN EN 61000-4-2):	8 kV
Burst (DIN EN 61000-4-4):	2 kV
includes EMC:	DIN EN 61000-6-2 DIN EN 61000-6-3
Vibration: (DIN EN 60068-2-6)	50 m/s ² (10 Hz up to 2000 Hz)
Shock: (DIN EN 60068-2-27)	1000 m/s ² (6 ms)
Electrical Safety:	according DIN VDE 0160

Duty information

Customs tariff number:	90318020
Country of origin:	Germany

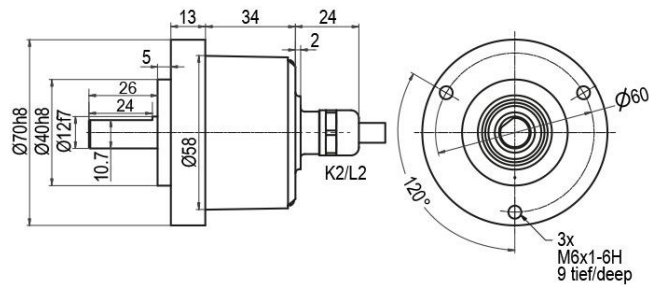
General Data

Weight	approx. 380 g [13.404 oz]
Connections	cable or connector outlet
Protection rating (EN 60529)	Housing: IP65, IP67; shaft sealed: IP65
Operating temperature	Connector: -40 °C up to +85 °C, Cable: -20 °C up to +80 °C (Option LT: -40 °C up to +85 °C). Connector: -40 °F up to +185 °F, Cable: -4 °F up to +176 °F, Option LT: -40 °F up to +185 °F 1 Vpp: -10 °C up to +70 °C [+14 °F up to +158 °F]
Storage temperature	Connector: -40 °C up to +85 °C, Cable: -30 °C up to +80 °C (Option LT: -40 °C up to +85 °C) Connector: -40 °F up to +185 °F, cable: -22 °F up to +176 °F, (Option LT: -40 °F up to +185 °F)

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Encoder EI30 P 070 CL

Cable connection A-N, A-C, axial, with 2 m cable



All dimensions in mm

Description

N inv. poss.

A-N	axial, shield not connected	•
A-C	axial, shield connected to encoder housing	•

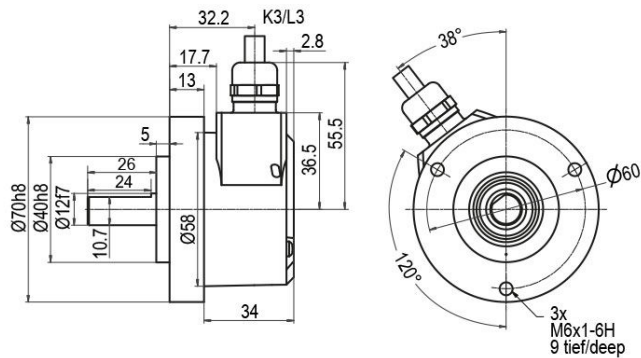
Assignments

	A-N, A-C	A-N, A-C	A-C
Circuit	C3, C4, C5, C6, C7	D3, D4, D5, D6, C1, C2, D7	D8
GND	WH	WH	WH
(+) Vcc	BN	BN	BN
A	GN	GN	GN
B	YE	YE	GY
N	GY	GY	–
–	–	–	–
A inv.	–	RD	YE
B inv.	–	BK, (BU at LT)	PK
N inv.	–	VT	–
Shield	flex	flex	flex

Technical data

Encoder EI30 P 070 CL

Cable connection R-N, R-C, radial, with 2 m cable



All dimensions in mm

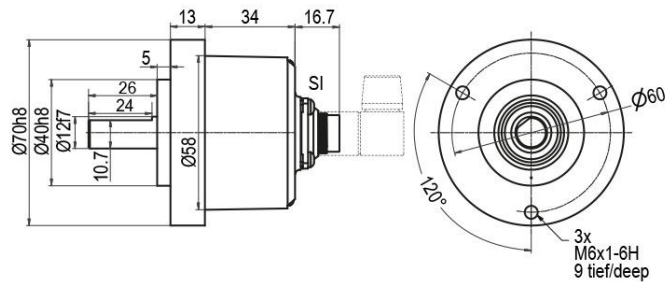
Description		N inv. poss.
R-N	radial, shield not connected	•
R-C	radial, shield connected to encoder housing	•

Assignments			
	R-N, R-C	R-N, R-C	R-C
Circuit	C3, C4, C5, C6, C7	D3, D4, D5, D6, C1, C2, D7	D8
GND	WH	WH	WH
(+) Vcc	BN	BN	BN
A	GN	GN	GN
B	YE	YE	GY
N	GY	GY	–
–	–	–	–
A inv.	–	RD	YE
B inv.	–	BK, (BU at LT)	PK
N inv.	–	VT	–
Shield	flex	flex	flex

Technical data

Encoder EI30 P 070 CL

Connector (M16x0.75) A, axial, 5-, 6-, 8-, 12-pin



All dimensions in mm

Description		N inv. poss.
A5	axial, 5-pin, Connector connected to encoder housing	—
A6	axial, 6-pin, Connector connected to encoder housing	—
A8	axial, 8-pin, Connector connected to encoder housing	•
A12	axial, 12-pin, Connector connected to encoder housing	•

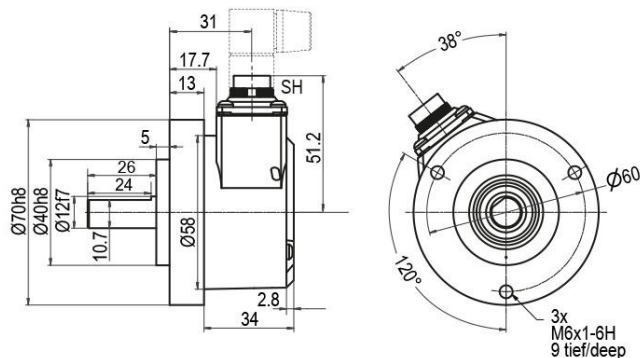
Assignments

	A5	A6	A8	A8	A12	A12
	5-pin	6-pin	8-pin	8-pin	12-pin	12-pin
Circuit	C3, C4, C5, C6, C7	C3, C4, C5, C6, C7	C1, C2, D3, D4, D5, D6, D7	D8	C1, C2, D3, D4, D5, D6, D7	D8
GND	1	6	1	1	K, L	K, L
(+) Vcc	2	1	2	2	M, B	M, B
A	3	2	3	3	E	E
B	4	4	4	4	H	H
N	5	3	5	—	C	—
—	—	—	—	—	—	—
A inv.	—	—	6	6	F	F
B inv.	—	—	7	7	A	A
N inv.	—	—	8	—	D	—
n. c.	—	5	—	5, 8	G, J	D, G, J
Shield	—	—	—	—	—	—

Technical data

Encoder EI30 P 070 CL

Connector (M16x0.75) R, radial, 5-, 6-, 8-, 12-pin



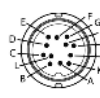
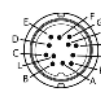
All dimensions in mm

Description

N inv. poss.

R5	radial, 5-pin, Connector connected to encoder housing	—
R6	radial, 6-pin, Connector connected to encoder housing	—
R8	radial, 8-pin, Connector connected to encoder housing	•
R12	radial, 12-pin, Connector connected to encoder housing	•

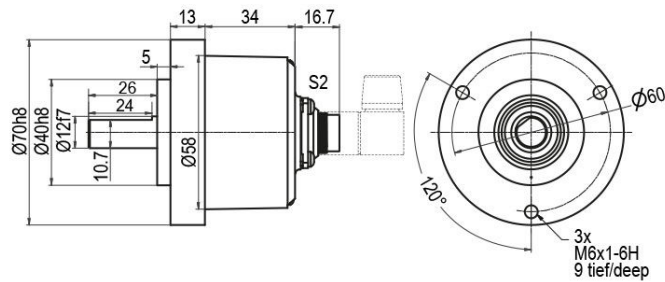
Assignments

	R5 5-pin	R6 6-pin	R8 8-pin	R8 8-pin	R12 12-pin	R12 12-pin
						
Circuit	C3, C4, C5, C6, C7	C3, C4, C5, C6, C7	C1, C2, D3, D4, D5, D6, D7	D8	C1, C2, D3, D4, D5, D6, D7	D8
GND	1	6	1	1	K, L	K, L
(+) Vcc	2	1	2	2	M, B	M, B
A	3	2	3	3	E	E
B	4	4	4	4	H	H
N	5	3	5	—	C	—
—	—	—	—	—	—	—
A inv.	—	—	6	6	F	F
B inv.	—	—	7	7	A	A
N inv.	—	—	8	—	D	—
n. c.	—	5	—	5, 8	G, J	D, G, J
Shield	—	—	—	—	—	—

Technical data

Encoder EI30 P 070 CL

Connector (M16x0.75) A7, axial, 7-pin



All dimensions in mm

Description		N inv. poss.
A7	axial, 7-pin, Connector connected to encoder housing	—

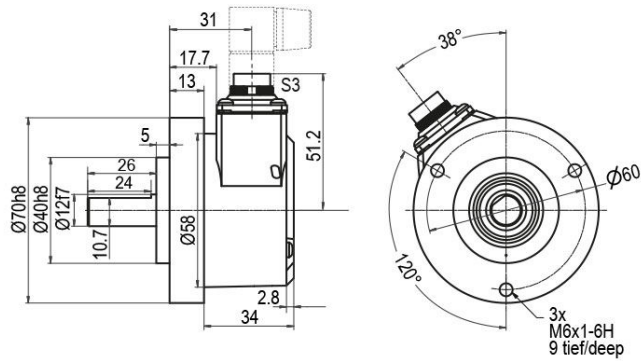
Assignments

A7	
7-pin	
Circuit	C3, C4, C5, C6, C7
GND	1
(+) Vcc	2
A	3
B	4
N	5
—	—
A inv.	—
B inv.	—
N inv.	—
n. c.	6, 7
Shield	—

Technical data

Encoder EI30 P 070 CL

Connector (M16x0.75) R7, radial, 7-pin



All dimensions in mm

Description		N inv. poss.
R7	radial, 7-pin, Connector connected to encoder housing	–

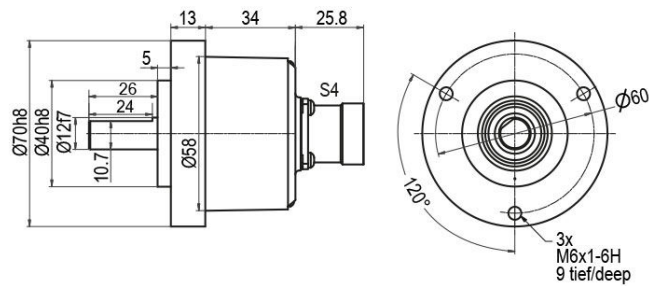
Assignments

R7	
7-pin	
Circuit	C3, C4, C5, C6, C7
GND	1
(+) Vcc	2
A	3
B	4
N	5
–	–
A inv.	–
B inv.	–
N inv.	–
n. c.	6, 7
Shield	–

Technical data

Encoder EI30 P 070 CL

Connector (M23) A12M, axial, 12-pin



All dimensions in mm

Description

N inv. poss.

A12M axial, 12-pin, Connector connected to encoder housing

—

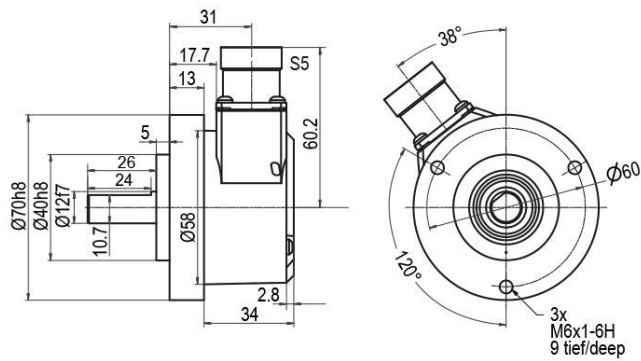
Assignments

	A12M	A12M	A12M
	12-pin	12-pin	12-pin
Circuit	C3, C4, C5, C6, C7	C1, C2, D3, D4, D5, D6, D7	D8
GND	10	10	10
(+) Vcc	12	12	12
A	5	5	5
B	8	8	8
N	3	3	—
—	—	—	—
A inv.	—	6	6
B inv.	—	1	1
N inv.	—	4	—
n. c.	1, 2, 4, 6, 7, 9, 11	2, 7, 9, 11	2, 3, 4, 7, 9, 11
Shield	—	—	—

Technical data

Encoder EI30 P 070 CL

Connector (M23) R12M, radial, 12-pin



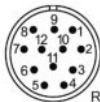
All dimensions in mm

Description N inv. poss.

R12M radial, 12-pin, Connector connected to encoder housing

Assignments

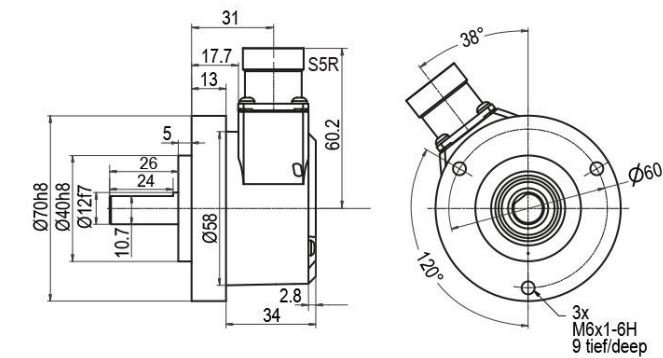
	R12M	R12M	R12M
	12-pin	12-pin	12-pin
Circuit	C3, C4, C5, C6, C7	C1, C2, D3, D4, D5, D6, D7	D8
GND	10	10	10
(+) Vcc	12	12	12
A	5	5	5
B	8	8	8
N	3	3	–
–	–	–	–
A inv.	–	6	6
B inv.	–	1	1
N inv.	–	4	–
n. c.	1, 2, 4, 6, 7, 9, 11	2, 7, 9, 11	2, 3, 4, 7, 9, 11
Shield	–	–	–

	AC12	AC12	AC12
	12-pin	12-pin	12-pin
			
Circuit	C3, C4, C5, C6, C7	C1, C2, D3, D4, D5, D6, D7	D8
GND	10	10	10
(+) Vcc	12	12	12
A	5	5	5
B	8	8	8
N	3	3	—
—	—	—	—
A inv.	—	6	6
B inv.	—	1	1
N inv.	—	4	—
n. c.	1, 2, 4, 6, 7, 9, 11	2, 7, 9, 11	2, 3, 4, 7, 9, 11
Shield	—	—	—

Technical data

Encoder EI30 P 070 CL

Connector (M23) RC, radial, 12-pin (clockwise)



All dimensions in mm

Description

N inv. poss.

RC12 radial, 12-pin, Connector connected to encoder housing

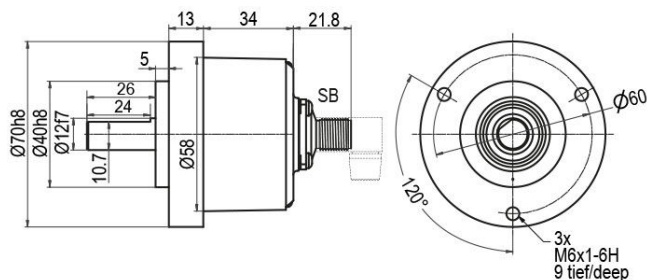
Assignments

	RC12	RC12	RC12
	12-pin	12-pin	12-pin
Circuit	C3, C4, C5, C6, C7	C1, C2, D3, D4, D5, D6, D7	D8
GND	10	10	10
(+) Vcc	12	12	12
A	5	5	5
B	8	8	8
N	3	3	–
–	–	–	–
A inv.	–	6	6
B inv.	–	1	1
N inv.	–	4	–
n. c.	1, 2, 4, 6, 7, 9, 11	2, 7, 9, 11	2, 3, 4, 7, 9, 11
Shield	–	–	–

Technical data

Encoder EI30 P 070 CL

Sensor-connector (M12x1) AS, axial, 4-, 5-, 8-, 12-pin



All dimensions in mm

Description

N inv. poss.

AS4	axial, 4-pin, Connector connected to encoder housing	—
AS5	axial, 5-pin, Connector connected to encoder housing	—
AS8	axial, 8-pin, Connector connected to encoder housing	•
AS12	axial, 12-pin, Connector connected to encoder housing	•

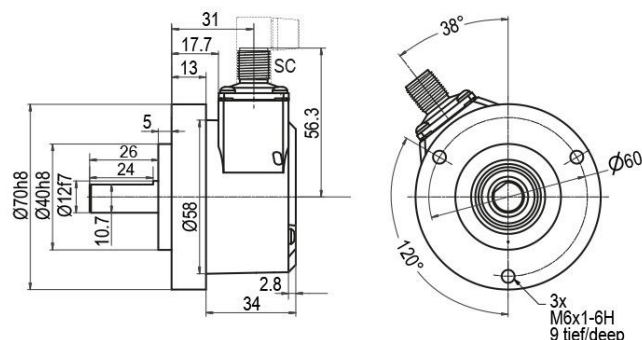
Assignments

	AS4 4-pin	AS5 5-pin	AS8 8-pin	AS8 8-pin	AS12 12-pin
Circuit	C3, C4, C5, C6, C7	C3, C4, C5, C6, C7	D3, D4, D5, D6, D7, C1, C2	D8	D3, D4, D5, D6, D7, C1, C2
GND	3	3	1	1	3
(+) Vcc	1	1	2	2	1
A	2	4	3	3	4
B	4	2	4	5	6
N	—	5	5	—	8
—	—	—	—	—	—
A inv.	—	—	6	4	9
B inv.	—	—	7	6	7
N inv.	—	—	8	—	10
n. c.	—	—	—	7, 8	2, 5, 11, 12
Shield	—	—	—	—	—

Technical data

Encoder EI30 P 070 CL

Sensor-connector (M12x1) RS, radial, 4-, 5-, 8-, 12-pin



All dimensions in mm

Description

N inv. poss.

RS4	radial, 4-pin, Connector connected to encoder housing	—
RS5	radial, 5-pin, Connector connected to encoder housing	—
RS8	radial, 8-pin, Connector connected to encoder housing	•
RS12	radial, 12-pin, Connector connected to encoder housing	•

Assignments

	RS4 4-pin	RS5 5-pin	RS8 8-pin	RS8 8-pin	RS12 12-pin
Circuit	C3, C4, C5, C6, C7	C3, C4, C5, C6, C7	C1, C2, D3, D4, D5, D6, D7	D8	C1, C2, D3, D4, D5, D6, D7
GND	3	3	1	1	3
(+) Vcc	1	1	2	2	1
A	2	4	3	3	4
B	4	2	4	5	6
N	—	5	5	—	8
—	—	—	—	—	—
A inv.	—	—	6	4	9
B inv.	—	—	7	6	7
N inv.	—	—	8	—	10
n. c.	—	—	—	7, 8	2, 5, 11, 12
Shield	—	—	—	—	—

Technical data

Encoder EI30 P 070 CL

Options

Low-friction bearings

Order key

The encoder EI30 P 070 CL is also available as a particularly smooth- running low-friction encoder. The starting torque is thereby changed to ≤ 0.5 Ncm [0.708 in-ozf] and the protection class at the shaft input to IP50.

LB

IP67 Shafts sealed to IP67 (not for 1 Vpp Sin/Cos)

The encoder EI30 P 070 CL can be supplied in a full IP67 version.

IP

Max. RPM: 3200 rpm

Permitted Shaft-Loading, axial: 110 N [11.216 kp]

Permitted Shaft-Loading, radial: 110 N [11.216 kp]

Max. PPR: 25000 ppr

Starting-torque: approx. 4 Ncm [5.664 in-ozf] at ambient temperature

Low temperature

Order key

The encoder EI30 P 070 CL with the output circuit types C1, C2, C3, C4, C5, C6, D3, D4, D5, D6 is also available with the extended temperature range -40 °C up to $+85$ °C [-40 °F up to $+185$ °F] (measured at the flange).

LT

Pressure equalising membrane

Order key

The EI30 P 070 CL shaft encoder is also optionally available with a pressure equalising membrane. This prevents water from penetrating into the encoder housing in the case of high air humidity.

PE

The IP67 protection level, temperature range and salt spray resistance are maintained. Resistant to chemicals and solvents in accordance with DIN EN ISO 2812-1.

Cable length

Order key

The encoder EI30 P 070 CL can be supplied with more than 2 m cable.

XXX = Decimeter

The maximum cable length depends on the supply voltage and the frequency.

Please extend the standard order code with a three figure number, specifying the cable length in decimetres.

Example: 5 m cable = 050

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Encoder EI30 P 070 CL

Example Order No.	Type				
EI30 P 070 CL	EI30 P 070 CL	EI30 P 070 CL			
Shaft					
12	12				
Pulses per revolution PPR:					
5000	2, 5, 10, 15, 20, 25, 30, 36, 40, 48, 50, 60, 64, 72, 90, 100, 120, 125, 128, 150, 160, 180, 200, 216, 240, 250, 254, 256, 300, 314, 320, 360, 400, 500, 512, 571, 600, 720, 750, 768, 800, 900, 1000, 1024, 1200, 1250, 1270, 1440, 1500, 1800, 2000, 2048, 2400, 2500, 2880, 3000, 3600, 4000, 4096, 4685, 5000, 5760, 6000, 7200, 7500, 8000, 8192, 10000, 10240, 12000, 12500, 15000, 16384, 20000, 20480, 25000 1 Vpp Sin/Cos only 1024, 2048 Other PPRs on request				
Channels:					
N	B, N (SIN: B)				
Output circuit					
C6	Resolution PPR	Power supply VDC	Output circuit	—	Order key
	up to 2500	5 - 30	HTL (TTL at 5 VDC)	—	C7
		5 - 30	HTL, inv. (TTL/RS422 comp. at 5 VDC)	—	D7
	up to 5000	4.75 - 5.5	TTL	—	C5
		4.75 - 5.5	TTL, RS422 comp., inverted	—	D5
		10 - 30	HTL	—	C6
		10 - 30	HTL inverted	—	D6
		10 - 30	TTL, RS422 comp., inverted	—	C1
	(higher frequency) 1200	4.75 - 5.5	TTL	—	C3
		4.75 - 5.5	TTL, RS422 comp., inverted	—	D3
	up to 25000	10 - 30	HTL	—	C4
		10 - 30	HTL inverted	—	D4
		10 - 30	TTL, RS422 comp., inverted	—	C2
		1024, 2048	4.75 - 5.5	1 Vpp sin/cos	—

Technical data

Encoder EI30 P 070 CL

Electrical connections

	Description	N inv. poss.	Order key
A-N	Cable: length (2 m standard)		
	axial, shield not connected	•	A-N
	axial, shield connected to encoder housing	•	A-C
	radial, shield not connected	•	R-N
	radial, shield connected to encoder housing	•	R-C
	Connector: (shield connected to encoder housing)		
	connector, M16x0.75, 5-pin, axial	–	A5
	connector, M16x0.75, 5-pin, radial	–	R5
	connector, M16x0.75, 6-pin, axial	–	A6
	connector, M16x0.75, 6-pin, radial	–	R6
	connector, M16x0.75, 8-pin, axial	•	A8
	connector, M16x0.75, 8-pin, radial	•	R8
	connector, M16x0.75, 12-pin, axial	•	A12
	connector, M16x0.75, 12-pin, radial	•	R12
	connector, M16x0.75, 7-pin, axial	–	A7
	connector, M16x0.75, 7-pin, radial	–	R7
	connector, M23, 12-pin, axial	•	A12M
	connector, clockwise pin count, M23, 12-pin, axial	•	AC12
	connector, M23, 12-pin, radial	•	R12M
	connector, clockwise pin count, M23, 12-pin, radial	•	RC12
	sensor-connector, M12x1, 4-pin, axial	–	AS4
	sensor-connector, M12x1, 4-pin, radial	–	RS4
	sensor-connector, M12x1, 5-pin, axial	–	AS5
	sensor-connector, M12x1, 5-pin, radial	–	RS5
	sensor-connector, M12x1, 8-pin, axial	•	AS8
	sensor-connector, M12x1, 8-pin, radial	•	RS8
	sensor-connector, M12x1, 12-pin, axial	•	AS12
	sensor-connector, M12x1, 12-pin, radial	•	RS12

Options

Description	Order key
Low-friction bearings	LB
IP67	IP
Low temperature	LT
Pressure equalising membrane	PE
Without option	Empty
Cable length	XXX = Decimeter

Example
Order No.:

EI30 P 070 CL 12 5000 N C6 A-N EI30 P 070 CL

Your encoder

Part number code

Part designation: **EABB CCCDDEE FFFFFFF GHJJKK LLMNOPPP RR**

A	Rotary encoder type I: Incremental S: Absolute, singleturn M: Absolute, multiturn
BB	Series 10: Entry 30: Basic 50: Extended 70: Advanced
CCC	Flange diameter 024: 24 mm 036: 36 mm 058: 58 mm 063: 63 mm 067: 67 mm 070: 70 mm 080: 80 mm 100: 100 mm 115: 115 mm
DD	Flange type BB: Hollow shaft with blind hole CC: Clamping flange (compact design) CF: Clamping flange (food and beverages) CH: Clamping flange (heavy-duty version) CL: Clamping flange HI: Hollow shaft (insulated) HO: Hollow shaft HT: Hollow shaft (special torque support) RC: Round flange (36/40 clamping flange, 58 with 6 mm shaft) RE: Round flange (expanded boreholes) RN: Round flange SC: Stator coupling SF: Screw flange (53 clamping flange, 58 food and beverages) SI: Servo flange (increased shaft load and IP protection) SQ: Square flange SR: Screw flange (36/40 clamping flange, 58 corrosion-resistant) SY: Synchro (incremental), Servo (36), Synchro (58) (absolute) TM: Speedometer (115 with 1 mm shaft, 58 motor feedback) TS: Speedometer (10 mm shaft)
EE	Shaft / bore hole diameter 06: 6 mm 07: 7 mm 08: 8 mm 08: 8 mm 10: 10 mm 11: 11 mm 12: 12 mm 14: 14 mm 15: 15 mm 06-72: Hollow bore / blind holes (6 – 72 mm)
FFFFFF	Signal / resolution Axxxx: A Bxxxx: AB Nxxxx: ABN P16384: Programmable xx: Singleturn, 1 – 16 bit xx: Multiturn, 0 – 43 bit (00 for singleturn)
G	Galvanic isolation (absolute only) 0: without 1: with
HH	Voltage supply (absolute only) 0: 10 – 32 V DC/with galvanic isolation 1: 4.75 – 5.5 V DC 2: 18 – 30 V DC
J	Operating principle M: magnetic O: optical P: optically interpolated

Part number code

KK	Interface 01: RS485 07: SSI binary 08: SSI Gray 35: CANopen 38: EtherCAT 48: PROFINET 58: EtherNet/IP
LL	Electrical connection M08: M8 connector M12: M12 connector M16: M16 connector M23: M23 connector M12BC: Bus cover connector
M	Cable outlet A: Axial R: Radial T: Tangential
NN	No. of pins xx: Number of pins
O	Shield connection (2 cable) (optional) C: connected N: not connected
PPP	Cable length xxx: Cable length (in dm)

Note

	A list with all available device types can be found on the Leuze website at www.leuze.com.
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