

POSITAL

FRABA

DATA SHEET

ABSOLUTE OPTICAL ROTARY ENCODER

ETHERNET POWERLINK



Main Features

- Compact Industrial Model
- Communication via Ethernet Powerlink V2
- Interface: Ethernet
- Housing: \varnothing 58 mm
- Full or hollow shaft:
 \varnothing 6 or 10 mm / \varnothing 15 mm
- Max. 65536 Steps per Revolution
(16 Bit)
- Max. 16384 Revolutions (14 Bit)
- Code: Binary

Programmable Parameters

- Code Sequence
- Resolution per Revolution
- Total Resolution
- Preset Value
- Node Number
- Limit Switch Minimum and Maximum

Mechanical Structure

- Flange and housing, Aluminum
and Brass Respectively
- Stainless Steel Shaft
- Precision Ball Bearings with Sealing
Rings
- Code Disc Made of Durable and
Unbreakable Plastic
- Robust Electrical Connection in IP 67

Electrical Features

- Status Indication Powerlink with two
LEDs
- Network LEDs
- Temperature Insensitive
IR-Opto-Receiver-ASIC
- Polarity Inversion Protection
- Over-Voltage-Peak Protection

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1 Technical Data

1.1 Electrical Data

Supply voltage	10 – 30 V DC ¹ (absolute limits)
Power consumption	Max. 3 Watt
EMC	Emitted interference: EN 61000-6-4
	Noise immunity: EN 61000-6-2
Bus connection	Ethernet Powerlink V2
Transmission rate	100 MBit
Accuracy of division	$\pm \frac{1}{2}$ LSB (12 bit), ± 2 LSB (16 bit)
Step frequency LSB	Max. 800kHz (internal valid code)
Electrical lifetime	$> 10^5$ h
Device addressing	Programmable IP-Address with 2hex coded rotary switches Option: Setting Node Number by Powerlink telegram for version without rotary switches

1) Absolute rotary encoders should be connected only to subsequent electronics whose power supplies comply with EN 50178 (protective low voltage)

1.2 Mechanical Data

Housing	Aluminum, optional stainless steel
Lifetime	Dependent on shaft version and shaft loading – refer to table
Max. Shaft Loading	Axial 40 N, radial 110 N
Inertia of Rotor	≤ 30 gcm ²
Friction Torque	≤ 3 Ncm (without shaft sealing)
RPM (Continuous Operation)	Single-Turn: Max. 12.000 RPM
	Multi-Turn: Max. 12.000 RPM
Shock (EN 60068-2-27)	≤ 100 g (halfsine, 6 ms)
Permanent Shock (EN 60028-2-29)	≤ 10 g (halfsine, 16 ms)
Vibration (EN 60068-2-6)	≤ 10 g (10 Hz – 1,000 Hz)
Weight (Standard Version)	Single-Turn: ≈ 500 g
	Multi-Turn: ≈ 700 g
Weight (Stainless Steel Version)	Single-Turn: $\approx 1,000$ g
	Multi-Turn: $\approx 1,400$ g

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1.3 Flange

	Synchro (S)		Clamp (C)	Hollow Shaft (B)
	6 mm	10 mm	10 mm	15 mm
Shaft Diameter	6 mm	10 mm	10 mm	15 mm
Shaft Length	10 mm	20mm	20 mm	–
Hollow Shaft Depth min. / max.	–	–	–	15 mm / 30 mm

1.4 Minimum (Mechanical) Lifetime

Flange	Lifetime in 10 ⁸ revolutions with F _a / F _r		
	40 N / 60 N	40 N / 80 N	40 N / 110 N
C10 (Clamp flange 10 x 20)	247	104	40
S10 (Synchro flange 10 x 20)	262	110	42
S6 (Synchro flange 6 x 10) without shaft sealing	822	347	133

S6 (Synchro flange 6 x 10) with shaft sealing: max. 20 N axial, 80 N radial

1.5 Environmental Conditions

Operating Temperature	- 40 °C up to + 79 °C
Storage Temperature	- 40 °C up to + 85 °C
Humidity	98 % (without liquid state)
Protection Class (EN 60529)	Casing side: IP 65
	Shaft side: IP 64 (optional with shaft sealing: IP66)

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2 Interface

2.1 Configuration

The setting of the controlled node number is achieved by 2 hexadecimal coded turn-switches on the outside of the connection cap or optional by Powerlink telegrams. If the node address is set by software the default factory setting is 165 decimal. In general possible addresses for the EPL-Node-ID lie between 1 and 239 whereby every address can

only be used once in a Powerlink segment. The switches are HEX coded, so the node number is calculated as follows:

$$\text{EPL-node-ID [decimal]} = \text{Switch}_{x16} [\text{hex value}] * 16 + \text{switch}_{x1} [\text{hex value}] * 1$$

2.2 IP address for Powerlink

The IP-address is set up with a part named net-ID (192.168.100) which is constant and Host-ID (EPL-

node ID). The resulting IP-address is: 192.168.100.EPL-node-ID.

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3 Diagnostic

3.1 Function of LEDs for HUB

LED	Color	Status	Description for LED
LS/DA 1	Green	On	LINK is active for port 1
		Blinking	Activity on HUB port 1
LS/DA 2	Green	On	LINK is active for port 2
		Blinking	Activity on HUB port 2

3.2 Function of LEDs for Powerlink

LED	Color	Status	Description
Error	Red	On	Internal communication error Buffer underrun/overflow, Collision CRC error, Loss of SoC
		Off	No error
Status	Green	Off	Not active
		Flickering	Basic Ethernet mode
		Single flash	Pre-Operational 1
		Double flash	Pre-Operational 2
		Triple flash	Ready to operate
		On	Operational
		Blinking	Stopped

3.3 Mounting

An integrated hub in encoder version A2 offers cabling in a line structure (Daisy Chain). Usage of external additional components can be prevented by that way. For the Ethernet ports two connectors in four pin Micro Style M12 female and D-coded version are used on sensor side. Power supply

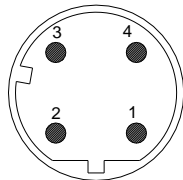
must be connected to the four pin M12 A-coded male connector. A four or five pin female M12 A-coded mating plug for the connector. Transmission rate is defined to 100 Mbit, whereby a maximum network length of 100 meters can be achieved, if cables according to Cat5e will be used.

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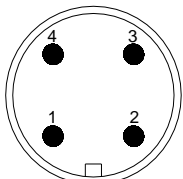
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3.4 Connector Ethernet Powerlink

Signal	Pin Number	Sketch on Encoder View ¹
Tx +	1	
Rx +	2	
Tx -	3	
Rx -	4	

1) 4 pin female connector, D-coded

3.5 Connector Power Supply

Signal	Pin Number	Sketch on Encoder View ²
US (10 - 30 V DC)	1	
N.C.	2	
GND (0V)	3	
N.C.	4	

2) 4 pin male connector, A-coded

3.6 Programmable Encoder Parameters

The CANopen encoder profile DS-406 is implemented for Class 2 (C2) devices in the Powerlink encoder. Following parameters are supported:

Operating Parameters	This parameter determines the counting direction, in which the output code increases or decreases. As an important operating parameter the code sequence (complement) can be programmed.
Resolution per Revolution	The parameter resolution per revolution is used to program the desired number of steps per revolution.
Total Resolution	This parameter is used to program the desired number of measuring units over the total measuring range. This value shall not exceed the physical maximum resolution of the absolute rotary encoder.
Preset Value	The preset value is the desired position value, which should be reached at a certain physical position of the axis. The position value is set to the desired process value by the parameter preset.
Limit Switch, Min. and Max.	Two position values can be programmed as limit switches. By reaching or exceeding these values one bit each for minimum and maximum of the 32-bit process value is set to high. The functionality to enable the limit switches is controlled by another parameter.

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3.7 Programmable Powerlink Transmission Modes

Polled Mode	By a poll-request telegram the managing node calls for the current process value. The absolute rotary encoder reads the current position value according to the SoC telegram, calculates eventually set-parameters and sends back the obtained process value by a poll response message.
Multiplexed Mode	The absolute rotary encoder is requested by the managing node (master) not in each Powerlink bus cycle, but rather in every n^{th} cycle. Usage of this mode offers a higher bandwidth at low bus cycle time. Especially for processes where the encoder position is not needed in each cycle this transmission mode is very effective.
Poll Response Chaining	Within one Powerlink bus cycle the managing node is initiating a sequence for transmission of responses of several controlled nodes (slaves) in a specific time slot. Through this several poll-request telegrams by the managing node can be saved and the bandwidth is increased. The difference to the Multiplexed Mode is that the controlled node is requested in each Powerlink bus cycle.

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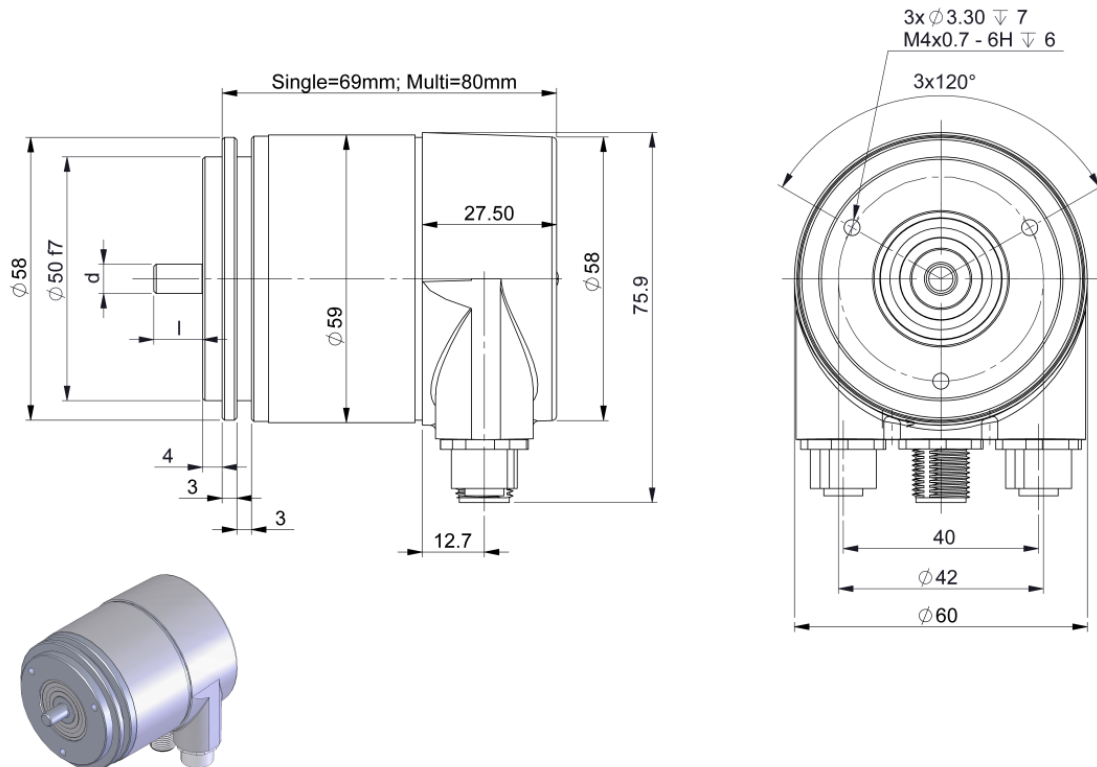
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4 Mechanical Drawings

4.1 Synchro Flange (S)

Available in 2 Versions

Synchro Flange	d / mm	l / mm
Version S06	6 _{f6}	10
Version S10	10 _{h8}	20



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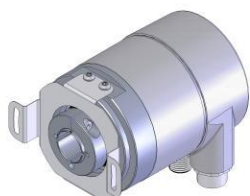
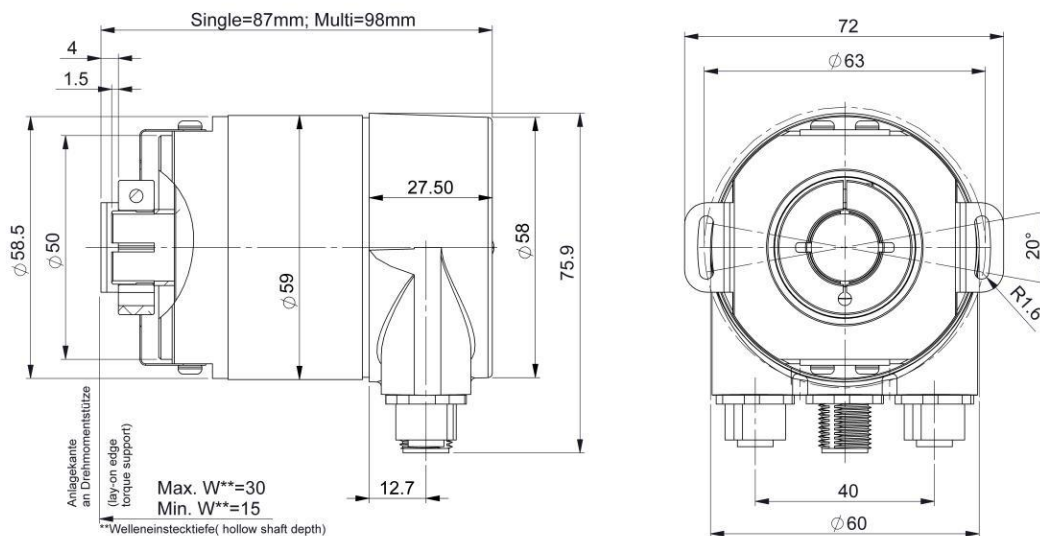
4.3 Hollow Shaft (B)

4.4 Mounting Instructions

The clamp ring may only be tightened if the shaft of the driving element is in the hollow shaft. The diameter of the hollow shaft can be reduced to 12mm, 10 mm or 8 mm by using an adapter (this reducing adapter can be pushed into the hollow shaft).

Allowed shaft movements of the drive element are listed in the table.

	Axial	Radial
Static	± 0.3 mm	± 0.5 mm
Dynamic	± 0.1 mm	± 0.2 mm



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5 Models/Ordering Description

Description	Type Key								
IXARC Optical	OCD-	E	---	B	-	---	-	---	-
Interface Powerlink (Protocol)	EPL V2	2							
Version	Hub, 3x M12, Release		A2						
Code	Binary			B					
Revolutions (Bits)	Singleturn					00			
	Multiturn (4096 Revolutions)					12			
	Multiturn (16384 Revolutions)					14			
Steps per revolution (Bits)	8,1924					13			
	65,536					16			
Flange	Clamp Flange							C	
	Synchro Flange							S	
	Hollow Shaft							B	
Shaft Diameter	10 mm							10	
	06 mm							06	
	15 mm (hollow shaft)							15	
Mechanical options	Without								0
	Shaft sealing (IP66)								S
	Stainless steel version								V
	Customized								C
Connection	Radial, M12 connectors								PRM

Standard = bold, further models on request

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6 Accessories and Documentation

Description		Type
Connector	–	M12, 4 pin, D-coded
Connector	–	M12, 4 pin, female, A-coded
Clamp disc ²⁾	4 pcs. / encoder	SP 15 ²⁾
Shaft coupling ²⁾	Drilling: 10 mm	GS 10 ²⁾
	Drilling: 6 mm	GS 06
Clamp ring ²⁾	2 pcs. / encoder	SP H ²⁾
Reducing adapter ³⁾	15 mm to 12 mm	RR12 ³⁾
Reducing adapter ³⁾	15 mm to 10 mm	RR10 ³⁾
Reducing adapter ³⁾	15 mm to 8 mm	RR8 ³⁾
User manual ¹⁾	Installation / configuration manual, English	UMD-EP ¹⁾
User manual ¹⁾	Installation / configuration manual, German	UME-EP ¹⁾

1) These can be downloaded free of charge from our homepage www.posital.de.

2) Not for hollow shaft

3) Only for hollow shaft

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7 Check Out Some of the Other POSITAL Products



Absolute Magnetic Encoders for Industrial Environment

To measure rotary movements or rotary displacements, an absolute magnetic rotary encoder can be used. The contact-free measuring sensor stage of the IXARC Magnetic Sensor does not have any abrasion. The Sensor can be connected directly to digital control

units via SSI, CANopen or Analog Interface.

[More Information](#)



Heavy Duty Stainless steel Magnetic Encoders for the Toughest Environments

Its stainless steel housing and high protection class of IP69K makes the IXARC Magnetic Heavy Duty rotary encoder resistant against active chemical cleaning and corrosion. Combined with the sturdy ball bearings this sensor is an ideal choice for reliable measurement under extreme environmental conditions and outdoor applications.

[More Information](#)



Tilt Sensors to Measure Inclinations up to 360°

TILTIX is developed on advanced MEMS technology based capacitance measurement. The sensor is a pre-calibrated device which can be put into immediate operation, upon simple and easy installation with a three point mount and setting of preset. Its compact design, installation “anywhere” and other versatile features makes it an ideal choice for very accurate measurement.

[More Information](#)

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