

## ABSOLUTE ROTARY ENCODER ETHERNET-POWERLINK



### Main Features

- Compact and heavy duty industrial model
- Communication via Ethernet Powerlink V2, V1
- Integrated web server
- Interface: Ethernet
- Housing: 58 mm Ø
- Full or hollow shaft: 6 or 10 mm Ø / 15 mm Ø
- Max. 65536 steps per revolution (16 Bit)
- Max. 16384 revolutions (14 Bit)
- Code: Binary

### 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

### Programmable Parameters

- Direction of rotation (complement)
- Resolution per revolution
- Total resolution
- Preset value
- Network- and e-mail- parameters

### Electrical Features

- Status indication Powerlink with a LED
- Network LEDs for collision, link, receive
- Temperature insensitive  
IR-Opto-receiver-ASIC
- Polarity inversion protection
- Over-voltage-peak protection

## ABSOLUTE ROTARY ENCODER ETHERNET-POWERLINK

### Technical Data

#### Electrical Data

Supply voltage	10 - 30 V DC* (absolute limits)
Power consumption	max. 4 Watt
EMC	Emitted interference: EN 61000-6-4
	Noise immunity: EN 61000-6-2
Bus connection	Ethernet Powerlink V2, V1
Transmission rate	100 MBit
Accuracy of division	$\pm \frac{1}{2}$ LSB (12 bit), $\pm 2$ 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

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

#### 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	$\leq 30 \text{ gcm}^2$
Friction torque	$\leq 3 \text{ Ncm}$ (without shaft sealing)
RPM (continuous operation)	Singleturn: max. 12.000 RPM
	Multiturn: max. 12.000 RPM
Shock (EN 60068-2-27)	$\leq 100 \text{ g}$ (halfsine, 6 ms)
Permanent shock (EN 60028-2-29)	$\leq 10 \text{ g}$ (halfsine, 16 ms)
Vibration (EN 60068-2-6)	$\leq 10 \text{ g}$ (10 Hz ... 1,000 Hz)
Weight (standard version)	Singleturn: $\approx 500 \text{ g}$
	Multiturn: $\approx 700 \text{ g}$
Weight (stainless steel version)	Singleturn: $\approx 1,000 \text{ g}$
	Multiturn: $\approx 1,400 \text{ g}$

Flange	Synchro (S)		Clamp (C)	Hollow shaft (B)
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

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### Minimum (mechanical) lifetime

Flange	Lifetime in 10 <sup>8</sup> revolutions with F <sub>a</sub> / F <sub>r</sub>		
	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

### Environmental Conditions

Operating temperature	0 .. +60 °C
Storage temperature	- 40 .. + 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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### Interface

#### Configuration

The setting of the controlled node number is achieved by 2 hexadecimal coded turn-switches in the connection cap. Possible addresses lie between 1 and 239 whereby every address can only be used once in a Powerlink segment.

#### Ethernet Powerlink V2:

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.

#### Ethernet Powerlink V1:

The IP-address is set up with a part named net-ID (192.168.000) which is constant and Host-ID (EPL-node ID). The resulting IP-address is: 192.168.000.EPL-node-ID.

#### Installation

An integrated hub with encoder version A1 offers cabling in a line structure. Usage of external additional components can be prevented by that way. For the Ethernet ports two connectors in four pin Micro Style M12 male and D-coded version can be used. Power supply must be connected to the five pin M12 male connector. For Ethernet wiring cross over cable types must be used like recommended in the Powerlink specification. Maximum transmission rates up to 100 Mbit are supported, whereby a maximum network length of 100 meters can be achieved, if cables according to Cat5e will be used.

#### Connector Ethernet Powerlink

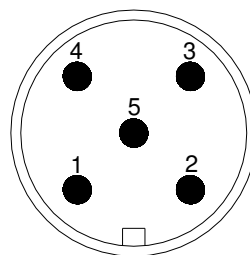
Pin Number	Signal
1	Tx +
2	Rx +
3	Tx -
4	Rx -

4 pin female connector, D-coded

#### Connector power supply

Pin Number	Signal
1	24 V power supply
2	24 V power supply
3	0 V power supply
4	0 V power supply
5	ground

5 pin male connector, A-coded



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### Protocols

The communication is based on Ethernet-Powerlink protocol, which was defined by the organization EPSG (Ethernet Powerlink Standardisation Group). By using the time slot method the protocol is suited for hard real time class 4 applications and enabled furthermore transmission of protocols like TCP, UDP and http within asynchronous slot of a Powerlink cycle Version 2. With integration of CANopen device profiles in the Powerlink specification users can overtake device parameters out of the fieldbus world. As alternative a graphical user interface

(GUI) and full documentation is provided on an integrated "micro web server" for a convenient configuration and diagnosis. Based on http, html and Java applets the GUI and all documents can be displayed on all common web browsers. All parameters are saved in a non volatile memory so that the configuration is available promptly after a restart. Another feature of the web server is the optional output of messages via the SMTP protocol. In this way parameters and diagnosis messages can be sent by e-mail.

TCP / UDP	Das TCP-Protocol assures an error free data transmission. For an enhanced real-time performance, the UDP protocol can be used alternatively.
http	Via http a common web browser can be used for read out, configuration and diagnosis of the encoder.
smtp	Via smtp protocol messages of the encoder can simply be sent by e-mail.

## ABSOLUTE ROTARY ENCODER ETHERNET-POWERLINK

### Programmable Encoder Parameters

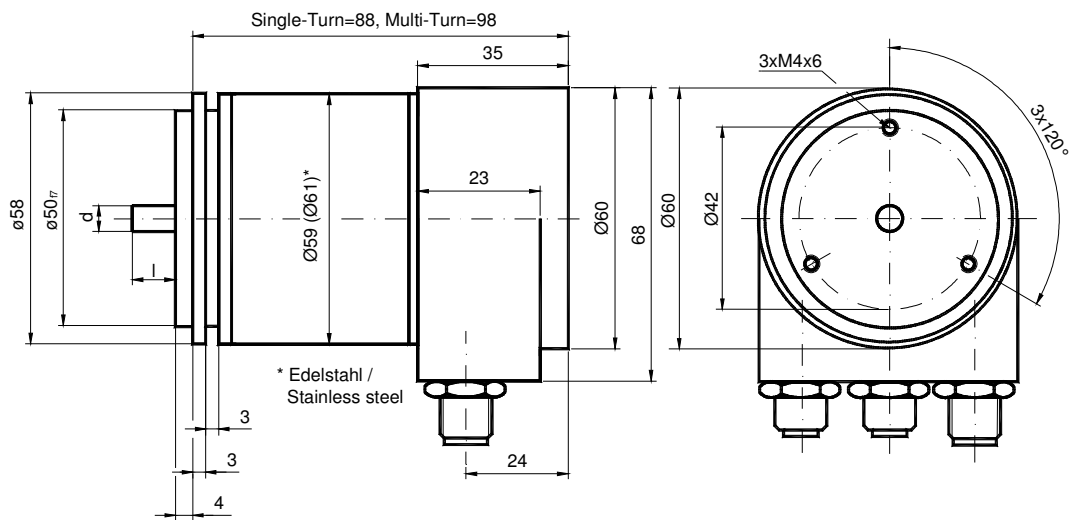
Code sequence	The code sequence (complement) can be programmed as an operating parameter. This parameter determines whether the output code increases or decreases when the axis is turned clockwise.
Resolution per Revolution	The parameter resolution per revolution is used to program the desired number 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 may not exceed the total resolution of the absolute rotary encoder.
Preset value	The preset value is the desired output value for the actual position of the axis. The actual output value will be set to this preset value.

## ABSOLUTE ROTARY ENCODER ETHERNET-POWERLINK

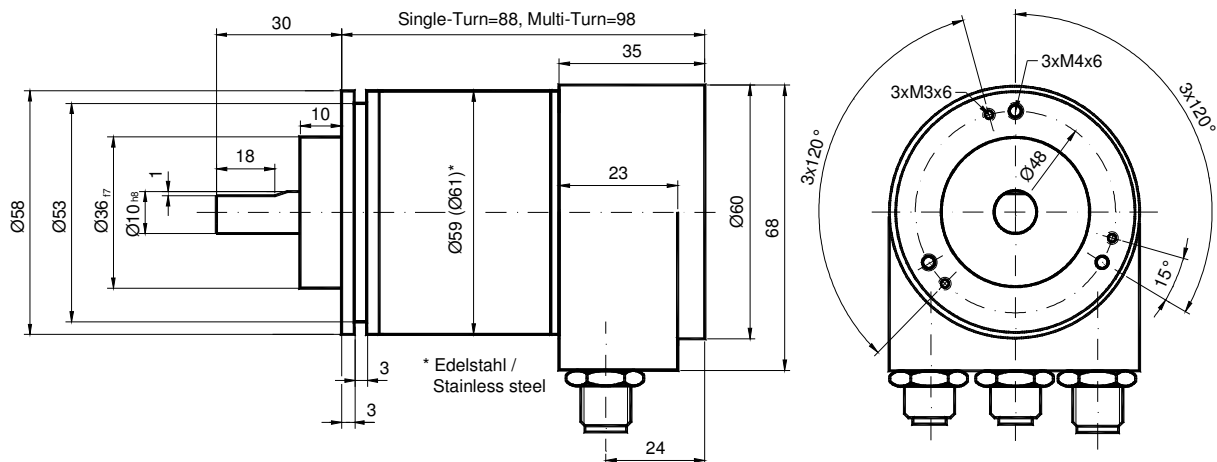
### Mechanical Drawings

**Synchro Flange (S)**  
available in 2 versions

Synchro flange	d / mm	l / mm
Version S06	6 <sub>f6</sub>	10
Version S10	10 <sub>h8</sub>	20

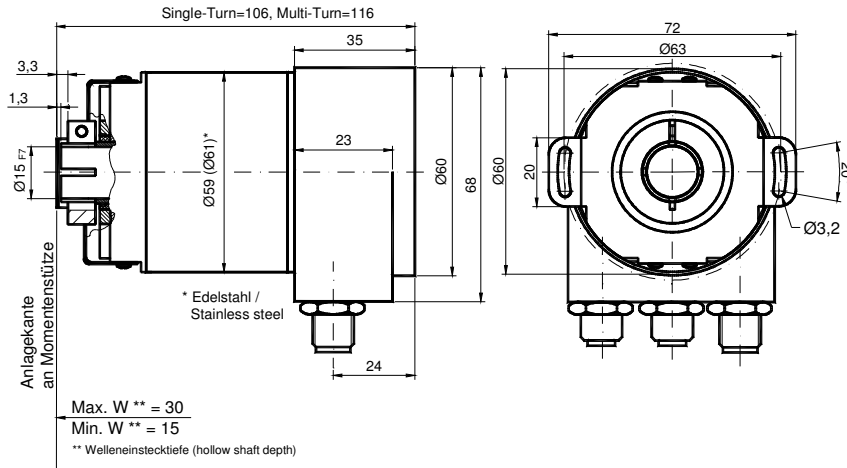


### Clamp Flange (C)



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### Hollow shaft (B)



### 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



**ABSOLUTE ROTARY ENCODER  
ETHERNET-POWERLINK**

**Models/Ordering Description**

Description	Type Key				
Interface Powerlink (Protocol)	EPL V1	<b>1</b>			
	EPL V2	<b>2</b>			
Version	2 x M12, actual release	<b>01</b>			
	Integr. hub, 3x M12	A1			
Code	Binary		<b>B</b>		
Revolutions (Bits)	Singleturn			<b>00</b>	
	Multiturn (4096 revolutions)			<b>12</b>	
	Multiturn (16384 revolutions)			14	
Steps per revolution (Bits)	8,1924			<b>13</b>	
	65,536			16	
Flange	Clamp flange				<b>C</b>
	Synchro flange				<b>S</b>
	Hollow shaft				<b>B</b>
Shaft diameter	10 mm				<b>10</b>
	06 mm				<b>06</b>
	15 mm (hollow shaft)				<b>15</b>
Mechanical options	Without				<b>0</b>
	Shaft sealing (IP66)				S
	Stainless steel version				V
	Customized				C
Connection	Radial, M12 connectors				<b>PRM</b>

**Standard = bold**, further models on request