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IXARC ABSOLUTE ROTARY ENCODER

PROFIsafe over PROFINET

Specifications

- Contactless, wear-free sensor system according to the Hall principle
- High vibration and shock resistance thanks to the robust mechanical design
- SIL2 and Performance Level d certified
- Safe position and safe speed signal
- Resolution: up to 8192 steps / revolution (13 bit)
- Measuring range: 4096 revolutions (12 bit)
- Absolute multiturn gear
- Housing: aluminium or stainless steel
- Protection type: up to IP69K
- Operating temperature range: - 40 °C to + 85 °C
- Programmable via PROFINET

Design and Function

Recording of the angular position and revolutions by means of Hall sensors − absolute multiturn transmission for up to 4096 revolutions − data output plus parameterisation and diagnosis via PROFINET.

Robust housing manufactured from seawater-resistant aluminium or stainless steel − stainless steel shaft − ball bearing with radial shaft seal − sensor circuit consisting of ASIC with Hall elements − electrical connection via M12 connector.

The PROFINET interface according to IEC 61158 / 61784 or PNO specifications order No. 2.712 and 2.722, version 2.3, is integrated into the absolute encoders.

Real time classes 1 and 3 are supported, i.e. Real Time (RT) and Isochronous Real Time (IRT) plus the requirements of conformance class C.

To achieve the SIL2 level, addtitional internal monitoring mechanisms as well as safe communication via PROFIsafe are designed in the PROFIsafe protocol is implemented according to the PROFIsafe Profile for Safety Technologie version 2.4 (PNO Order No. 3.192)

Setting the address, baud rate or terminating resistances is not necessary. A name, which is stored in the absolute encoder's non-volatile memory, is assigned via the PROFINET controller to address the device. The integrated 2-fold switch enables the PROFINET absolute encoders to be used in star, tree and line network topologies.

An exhaustive description of integration into a PROFINET network can be found in the manual.

PROFINET Properties

- Real Time (RT) and Isochronous Real Time (IRT)
- Device exchange without interchangeable medium or programming device
- Prioritised start-up (Fast Start Up)
- Media redundancy possible
- Firmware update via PROFINET
- Programming via PROFINET

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Technical Data

Electrical Data

Sensor system	ASIC with Hall elements
Operating voltage	+9 VDC to +36 VDC (reverse voltage protection)
Power consumption	< 3 W, switch-on current < 500 mA
Resolution	4096 steps / revolution (12 bit) or 8192 steps / revolution (13 bit)
Measuring range	4096 revolutions
Total number of steps	24 bit or 25 bit
Absolute accuracy of the position value	± 0.2% (with reference to one revolution)
Toleranz of the internal position monitoring	1,5 % (with reference to one revolution)
Internal updating time of the position value	1 ms
Output code	Binary
Code path	CW / CCW
Speed signal	16 bit, with prefix, unit: steps / gate time
	(gate time adjustable in the 10 ... 1000 ms range, default: 10 ms)
Internal updating time of the speed signal	1 ms

PROFINET Data

MAC address	00:0E:CF:XX:XX:XX
	The relevant, current MAC address is located on the model plate.
Transfer technology	100 Base-TX
Transfer rate	10 / 100 MBit/s
Line length	Max. 100 m (between two subscribers)
Minimum transmission cycle	250 µs

Input / Output Data

Input Data	2 byte status word
	4 byte position data
	2 byte speed data
Output Data	2 byte control word
	4 byte reference value

From the point of view of the control system.

Mechanical Data

Operating speed	1.000 rpm max.
Angular acceleration	10^5 rad/s² max.
Moment of inertia (rotor)	20 gcm²
Operating torque	≤ 8 Ncm (at 500 rpm)
Starting torque	≤ 4 Ncm
Perm. shaft load	250 N axial, 250 N radial
Bearing service life[1]	> 10^9 revolutions
Weight	ca. 0.450 kg

1) These values apply at maximum shaft load. Higher values are achievable at lower loads.

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Environmental Data

Operating temperature range	-40°C to +85°C
Storage temperature range	-40°C to +100 °C (without packaging)
Resistance	Shock: 500 m/s²; 11 ms, DIN EN 60068-2-27
	Vibration: 250 m/s²; 10 ... 2000 Hz, DIN EN 60068-2-6
EMC standards	EN 61000-6-4 (interference emission)
	EN 61000 6-2 (interference immunity)
Protection type	IP67 (DIN EN 60529)
Salt mist test	Test Kb according to IEC 60068-2-52

Safety Data

Certificat	TÜV No. (in preparation)
According to DIN EN 61508	PFH = $9,889 \cdot 10^{-8}$ 1/h
	SFF = 92,2%
	HFT = 0
	SIL2
According to DIN EN ISO 13849-1:	MTTFd = 162 years
	DC = 86,1 %
	Categorie 2
	Performance Level D
Maximum service life	20 years

Electrical Connection

|	
PROFINET	M12 connector D-coded 4 pin for bus in / bus out, socket
Supply	M12 connector A-coded 4 pin, pins

Programmable Parameters

Parameter	Value range	Parameter description
Scaling	off / on	
Code path	CW / CCW	CW (clockwise): increasing position values on rotation clockwise as seen on shaft
		CCW (counter clockwise): descending values on rotation clockwise (viewed looking at the shaft)
Resolution per revolution	1 ... 4096 (8192)	Steps
Total number of steps	1 ... 16,777,216 (33,554,432)	Overall measuring range
Reference value	0 ... total number of steps -1	For adaptation to the application, the position value can be set to any value within the measuring range. Once programmed, a reference value can be set via bit 0 in the control word (output data).
Gate time	10 ... 1000 ms	Time basis for speed registration

The values apply to type MCS-EIxxB-1212-xxxx-xxx and values in brackets to type: MCS-EIxxB-1213-xxxx-xxx

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Electrical Connection

Block Diagram
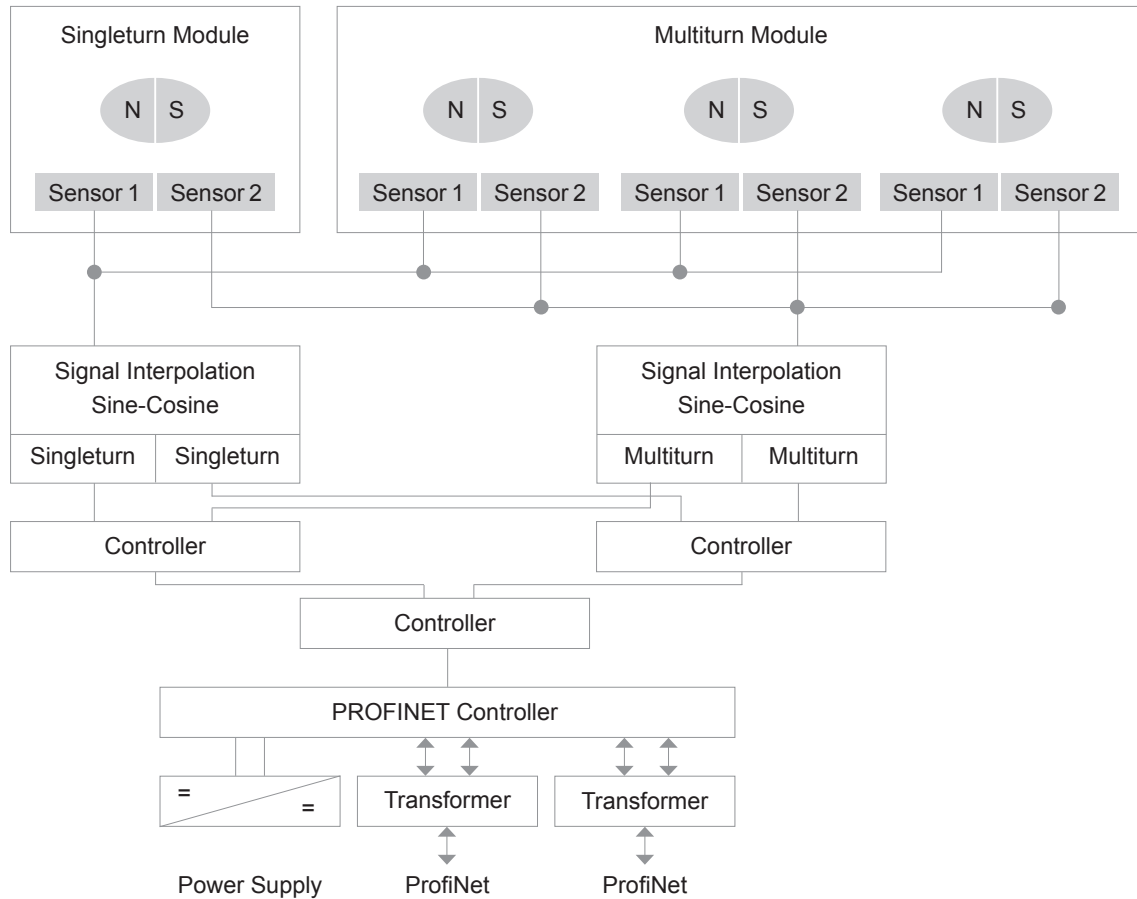
PROFINET M12 Connector Connection Assignment

(Port1 und Port 2)

Pin	1	2	3	4
Signal	TX+	RX+	TX-	RX-
Colour[1]	yellow	white	orange	blue

1) Industrial Ethernet cable colours according to ISO / IEC 8802-3.

Supply M12 Connector Connection Assignment

Pin	1	2	3	4
Signal	+UB (+9...+36 VDC)	−	-UB (0 VDC)	−

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Diagnosis-LEDs

UB (VS)	Link 1 (L1)	Link 2 (L2)	Status (NS)	Description
green	green	green	green/red	
on				Operating voltage available
	on			Network connection established
		on		Network connection established
			green	Data exchange, device in operation and OK
			green flashing	Network connection o.k. but no connection to a PROFINET controler
			red, slow flashing	Firmware download mode
			red flashing	Impermissible parameter or preset value, velocity to high or wrong modul
			Fast red flashing	Device error
			red	Connection to the PROFINET controller disrupted

Documentation, GSDML file, etc

The following documents plus the GSDML file, a bitmap and example programmes can be found in the Internet under

▸ **www.posital.com** in the download area.

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Product Selection Guide

Ordering Description

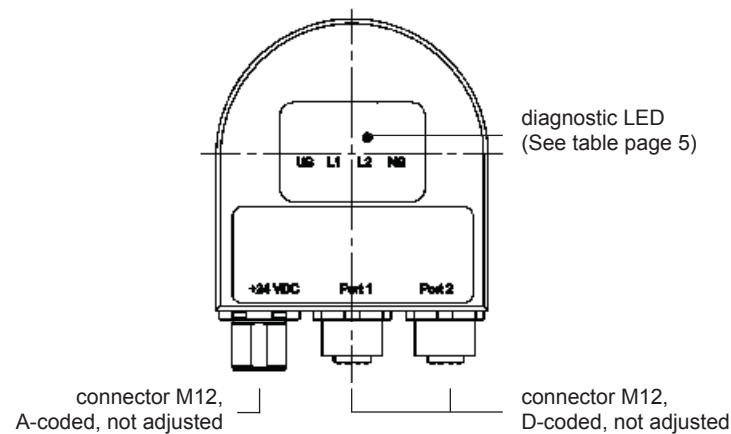|		MCS-	EI-	D	_	B-	12	_ _ -	_ _ _	_ -	_ _ _
▸ **Magnetocode Safety**	MCS-		EI-	D	_	B-	12				
▸ **Interface**	PROFINET		EI								
▸ **Performance Level**	PLd			D							
▸ **Output**	Two words				D						
	Double word (i.e. for Simatic TIA portal with Safety Advance)				T						
▸ **Code**	Binary					B					
▸ **Revolutions (bits)**	Multiturn (4096 revolutions)						12				
▸ **Steps per revolution (bits)**	4096 (0.09°)							12			
	8192 (0.04°)							13			
▸ **Flange / Shaft Diameter**	Clamp flange, Shaft Ø10mm with flat								A0L		
	Clamp flange, Shaft Ø10mm with keyway								AKL		
	Synchro flange, Shaft Ø6mm with flat								60Y		
	Blind hollow shaft, Shaft Ø12mm for key shaft								1H2		
▸ **Material**	Aluminium									S	
	Stainless steel V2A									V	
	Stainless steel V4A (1.4404)									W	
▸ **Connection**	Aligned M12 connectors										PRM

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Dimensional Drawings

▸ **58 mm housing with clamp flange**
▸ **Type key: MCS-EIDxB-121x-AKLx-PRM, x as place holder**
▸ **Shaft Ø10 mm with parallel key**

Shaft Ø10 mm with
groove and parallel key

Groove for parallel key
DIN 6885-A 3x3x10
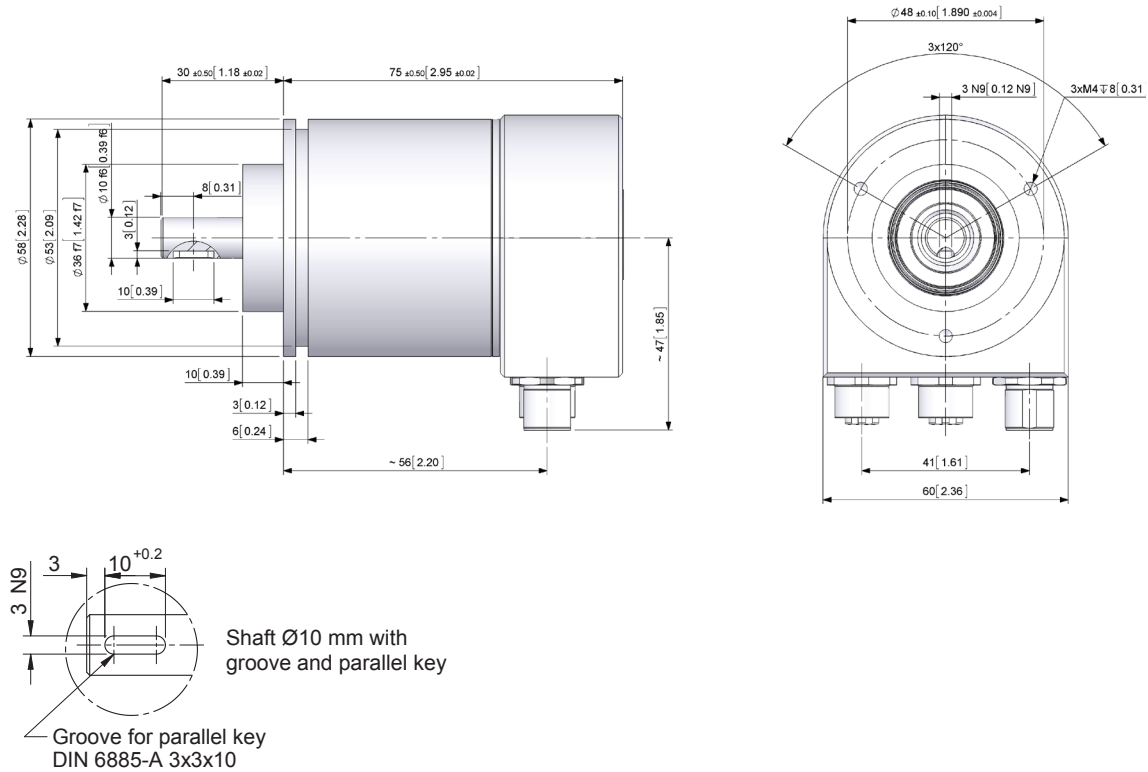
Rear View with M12 connectors

diagnostic LED
(See table page 5)

connector M12,
A-coded, not adjusted

connector M12,
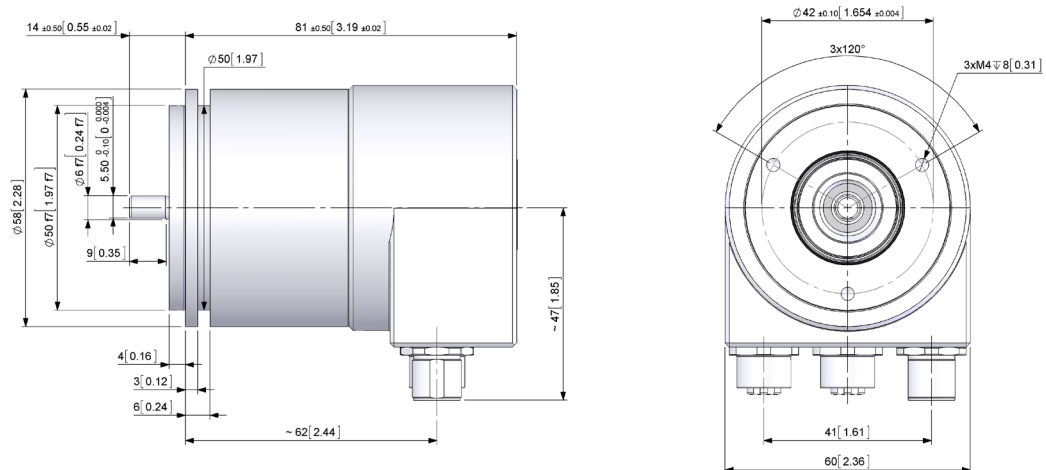D-coded, not adjusted

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> **58 mm housing with clamp flange**
> **Type key: MCS-EIDxB-121x-A0Lx-PRM, x as place holder**
> **Shaft Ø10 mm with flat**
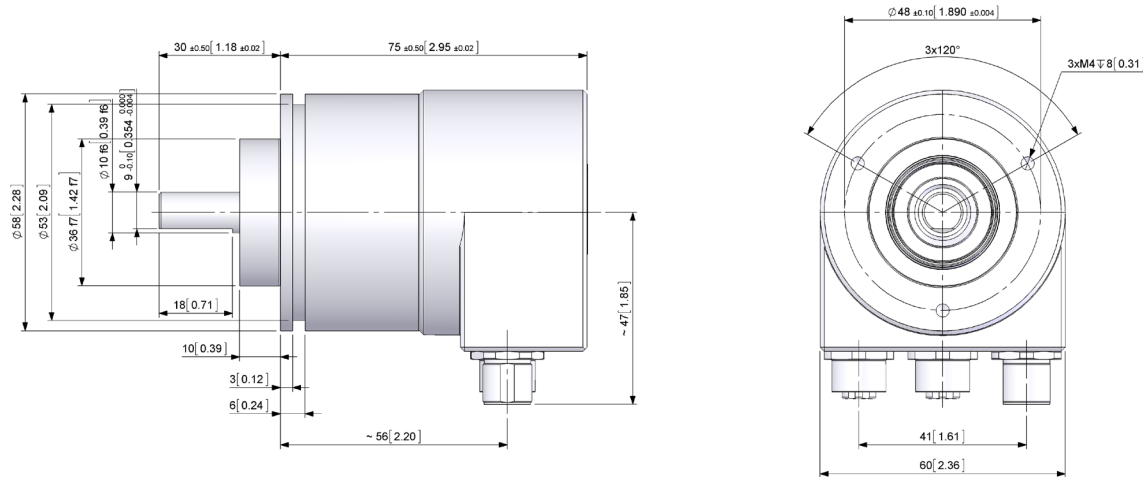
> **58 mm housing with synchro flange**
> **Type key: MCS-EIDxB-121x-60Yx-PRM, x as place holder**
> **Shaft Ø6 mm with flat**

The picture and drawing are for general presentation purposes only. Please refer to the "Download" section for detailed technical drawings. All dimension in mm [inch].

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