Absolute rotary encoder

ENA58PL-S***-CANopen redundant

- Solid shaft
- Up to 30 bit overall resolution
- Redundant CANopen Interface
- Independent photoelectric and magnetic redundant sampling
- Redundant connection option with 2 connectors
- High resolution and accuracy

Function

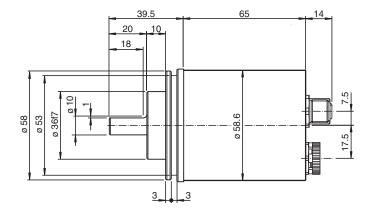The absolute rotary encoder is equipped with an independent optical and magnetic sampling.
Optionally, versions with a combined connector or separate connector outlets for each sampling technology are available.
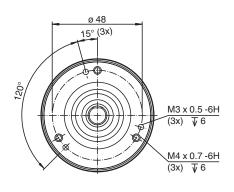Due to the redundancy, the absolute rotary encoder is ideally suited for safety-relevant applications. The integrated CAN bus interface supports all CANopen functions.
Thus the following modes can be programmed to either enabled or disabled:
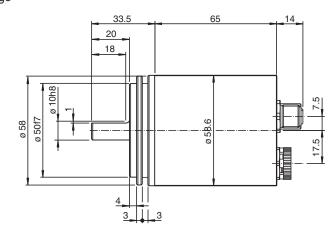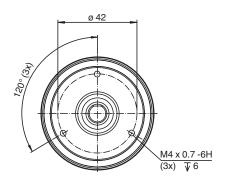
- Polled mode
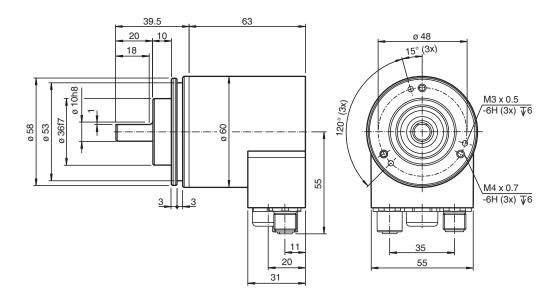- Cyclic mode
- Sync mode

Dimensions

Clamping flange

Servo flange

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Dimensions

Clamping flange

Servo flange

Technical Data

General specifications

Detection type	photoelectric and magnetic sampling
Device type	Absolute rotary encoder
Linearity error	$\leq \pm 0.1\ °$
UL File Number	E223176 "For use in NFPA 79 Applications only" , if UL marking is marked on the product.

Functional safety related parameters

Performance level (PL)	Suitable for PL d; both channels of the encoder must be connected to a safety PLC and evaluated there.

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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Technical Data

Category		Suitable for cat. 3; both channels of the encoder must be connected to a safety PLC and evaluated there.
MTTF		100 a at 40 °C (based on EN ISO 13849-1)
Mission Time (T_M)		10 a
Electrical specifications		
Operating voltage	U_B	10 ... 30 V DC (with galvanic isolation)
Power consumption	P_0	≤ 3.7 W
Time delay before availability	t_v	< 250 ms
Output code		binary code
Code course (counting direction)		adjustable
Interface		
Interface type		CANopen
Resolution		
Single turn		up to 16 Bit
Multiturn		up to 14 Bit
Overall resolution		up to 30 Bit
Transfer rate		min. 20 kBit/s , max. 1 MBit/s
Cycle time		≥ 1 ms
Standard conformity		DSP 406
Connection		
Connector		1 plug M12 x 1, 5-pin, A-coded (with connection type BD) 1 plug M12 x 1, 5-pin, A-coded and 1 socket M12 x 1, 5-pin, A-coded (with connection type BN)
Standard conformity		
Degree of protection		DIN EN 60529, IP65 or IP67
Climatic testing		DIN EN 60068-2, no moisture condensation
Emitted interference		EN 61000-6-4
Noise immunity		EN 61000-6-2
Shock resistance		DIN EN 60068-2-27, 100 g, 6 ms
Vibration resistance		DIN EN 60068-2-6, 20 g, 10 ... 1000 Hz
Approvals and certificates		
UL approval		cULus Listed, General Purpose, Class 2 Power Source , if UL marking is marked on the product.
Ambient conditions		
Operating temperature		-40 ... 85 °C (-40 ... 185 °F)
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
Relative humidity		98 % , no moisture condensation
Mechanical specifications		
Material		
Housing		Aluminum
Flange		Aluminum
Shaft		Stainless steel 1.4305 / AISI 303
Mass		approx. 320 g
Rotational speed		max. 3000 min^{-1}
Moment of inertia		30 gcm^2
Starting torque		< 5 Ncm
Shaft load		
Axial		40 N
Radial		110 N
Dimensions		
Length		55.7 mm
Diameter		58 mm

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Type Code

Structure of the type code

| E | N | A | 5 | 8 | P | L | – | S | (1) | (1) | (2) | (2) | (3) | – | (4) | (4) | (5) | (5) | C | R | D | – | (6) | (7) | (7) |

ENA	Device type
ENA	Absolute rotary encoder

58	Size
58	Housing diameter 58 mm

PL	Version
PL	Performance Line

S	Shaft tye
S	Solid shaft

(1) (1)	Shaft diameter
06	6 mm
10	10 mm

(2) (2)	Flange
CA	Clamping flange
SA	Servo flange (only with degree of protection B)

(3)	Degree of protection
5	IP65
7	IP67

(4) (4)	Multiturn resolution
12	Multiturn rotary encoder, 12 Bit
14	Multiturn rotary encoder, 14 Bit

(5) (5)	Singleturn resolution
13	13 Bit
16	16 Bit

CRD	Interface, electric
CRD	CANopen redundant, U_B 5 V ... 30 V

(6)	Connection alignment
A	Axial
R	Radial

(7) (7)	Connection type
BD	M12 device plug, 5-pin
BN	M12 device plug, 5-pin and M12 socket, 5-pin

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Connection

Signal	Device plug M12 x 1, 5-pin, A-coded	Device socket M12 x1, 5-pin, A-coded
	always present	only with connection type BN
CAN GND	1	1
$+V_S$	2	2
GND	3	3
CAN-High	4	4
CAN-Low	5	5
Shielding	Housing	Housing
Pinout		

The following scheme illustrates the relationships for the electrical connection:

Indication

LED-indicator with dual color LED

CAN Run (green)	State	Description
Blinking	Pre-Operational	Boot up message is sent, device configuration is possible, device is in CAN state „Pre-Operational"
Single flash	Stopped	The Encoder is in CAN state „Stopped"
On	Operational	The encoder is in CAN state „Operational"
Off		No power supply

Err (red)	State	Description
Off	No error	The Encoder is in operating mode
Flickering	AutoBitrate	Auto baud mode is active and the encoder tries to find within the time out period a valid CAN message for baud rate measurement
Single flash	Warning limit reached	At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames)
Double flash	Error control event	A guard event (NTM slave or NTM master) or a heartbeat event has occured
On	Bus off	The CAN controller is in stae bus off. No communication possible anymore. Too many error frames in the network.

Programming

Programmable CAN operating modes

Mode	Explanation
Polled mode	The connected host requests the current actual position value via a remote transmission request telegram. The absolute encoder reads in the current position, calculates all parameters that have been set and sends back the process actual value through the same CAN identifier.
Cyclic mode	The absolute encoder sends the current actual process value cyclically, without being prompted by the host. The cycle time can be programmed in milliseconds for values between 1 ms and 65536 ms.

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| Sync mode | After the sync telegram has been received by the host, the absolute encoder sends the current actual process value. If multiple nodes should respond to the sync telegram, the individual nodes report one after the other according to their CAN identifier. There is no programming of an offset time. The sync counter can be programmed so that the rotary encoder does not transmit until after a defined number of sync telegrams. |

Programmable rotary encoder parameters

Parameter	Explanation
Operating parameter	The direction of rotation (complement) can be specified by parameter as the operating parameter. This parameter determines the direction of rotation in which the output code will ascend or descend.
Resolution per revolution	The "Resolution" parameter is used to program the rotary encoder so that a desired number of steps can be implemented in reference to one revolution.
Preset value	The preset value is the desired position value that must be achieved for a specific physical setting of the axis. The preset value parameter is used to set the actual position value to the desired actual process value.
Min. and max. limit switch	A total of two positions can be programmed. The absolute encoder sets one bit to high state in the 32 Bit actual process value if a value falls outside the range between these two positions.
Cam	8 freely programmable cams can be set within the overall resolution. This produces the functionality of a mechanical cam shifting mechanism.

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