



Absolute rotary encoder

ENA58IL-S***-SSI

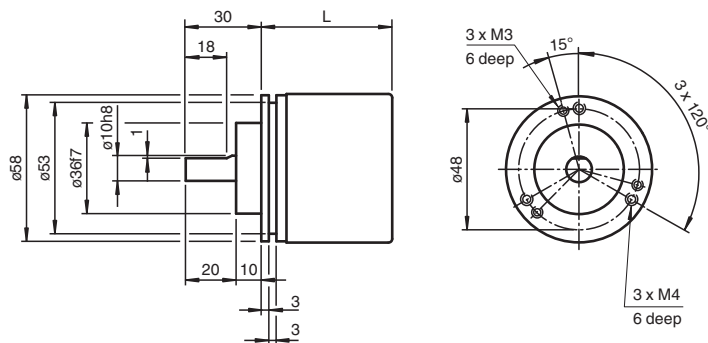
- Solid shaft
- SSI interface
- Up to 32 Bit multiturn
- Free of wear magnetic sampling
- High resolution and accuracy
- Additionally push buttons for preset function (only model characteristic SB2, SG2)
- Up to 4096 pulses on incremental track



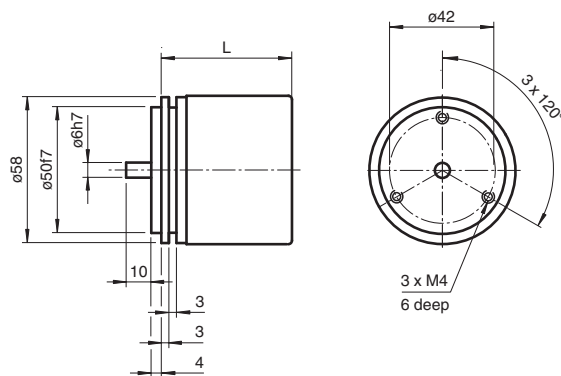
Function

The ENA58IL series are high precision encoders with internal magnetic sampling. This multiturn absolute encoder transmits a position value corresponding to the shaft setting via the SSI interface (Synchronous Serial Interface). The control module sends a start sequence to the absolute encoder to obtain the position data. The rotary encoder then sends the position data synchronous to the cycles of the control module. It is possible to select the counting direction with the function input.

Dimensions



Clamping flange



Servo flange

Dimensions

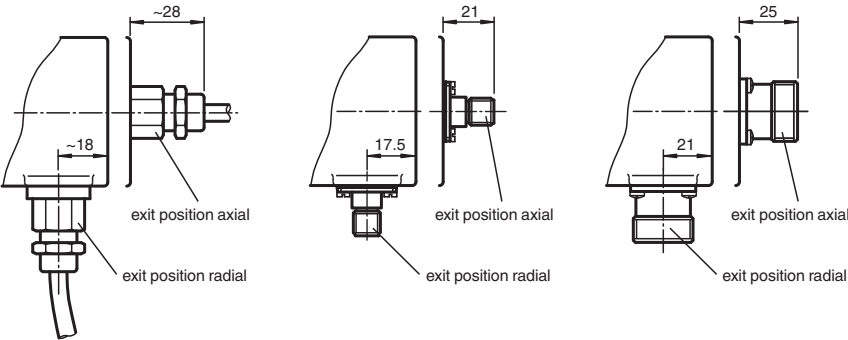
Design	L [mm]	
	Axial output	Radial output
Singleturn	41.7	52.7
Multiturn	52.7	

Connections
Dimensions in mm

Cable

Connector M12

Connector M23



Technical Data

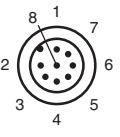
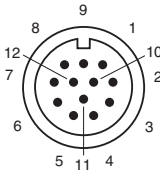
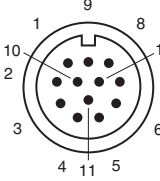
General specifications		
Detection type		magnetic sampling
Device type		Absolute rotary encoder
Linearity error		≤ ± 0.1 °
UL File Number		E223176 "For use in NFPA 79 Applications only" , if UL marking is marked on the product.
Electrical specifications		
Operating voltage	U _B	4.5 ... 30 V DC (SSI, SSI + RS422) ; 10 ... 30 V DC (SSI + Push/Pull)
No-load supply current	I ₀	typ. 50 mA
Power consumption	P ₀	approx. 1.5 W
Time delay before availability	t _v	< 450 ms
Output code		Gray code, binary code
Code course (counting direction)		adjustable
Interface		
Interface type		SSI ; SSI + incremental track
Resolution		
Single turn		up to 16 Bit
Multiturn		up to 16 Bit
Overall resolution		up to 32 Bit
Transfer rate		0.1 ... 2 MBit/s
Cycle time		< 100 μs
Standard conformity		RS 422
Input 1		
Input type		Selection of counting direction (cw/ccw)
Signal voltage		
High		4.75 V ... U _B or unconnected (cw descending)
Low		0 ... 2 V (cw ascending)

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

Technical Data

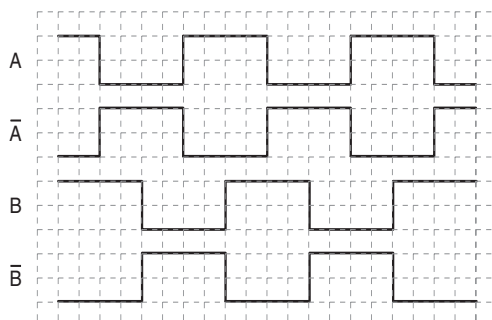
Input current	< 6 mA
Switch-on delay	< 250 ms
Input 2	
Input type	zero-set (PRESET 1) with falling edge
Signal voltage	
High	4.75 V ... U_B
Low	0 ... 2 V
Input current	< 6 mA
Signal duration	min. 1.1 s
Output	
Output type	RS422, Push/Pull
Signal output	A+B+/A+/B
Pulses	1024, 2048, 4096
Connection	
Connector	M12 connector, 8-pin or M23 connector, 12-pin
Cable	Ø7 mm, 6 x 2 x 0.14 mm ² , 1 m (cable length, see order code)
Standard conformity	
Degree of protection	DIN EN 60529, IP65 or IP67 (not for M23 device plug)
Climatic testing	DIN EN 60068-2-3, no moisture condensation
Emitted interference	EN 61000-6-4:2007
Noise immunity	EN 61000-6-2:2005
Shock resistance	DIN EN 60068-2-27, 200 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	cable, movable installation: -5 ... 70 °C (23 ... 158 °F), cable, fixed installation: -30 ... 70 °C (-22 ... 158 °F) connector models: -40 ... 85 °C (-40 ... 185 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)
Relative humidity	98 % , no moisture condensation
Mechanical specifications	
Material	
Housing	nickel-plated steel , painted
Flange	Aluminum
Shaft	Stainless steel
Mass	approx. 300 g , with cable
Rotational speed	max. 12000 min ⁻¹
Moment of inertia	50 gcm ²
Starting torque	< 5 Ncm
Shaft load	
Axial	40 N
Radial	110 N

Connection

Signal	Cable, 12-core	Connector M12, 8-pin	Connector M23, 12-pin, cw	Connector M23, 12-pin, ccw	Explanation
GND (encoder)	White	1	1	1	Power supply
U_B (encoder)	Brown	2	2	8	Power supply
Clock (+)	Green	3	3	3	Positive cycle line
Clock (-)	Yellow	4	4	11	Negative cycle line
Data (+)	Grey	5	5	2	Positive transmission data
Data (-)	Pink	6	6	10	Negative transmission data
A	Black		7	12	Incremental track A
V/R	Red	8	8	5	Input for selection of counting direction
PRESET 1	Blue	7	9	9	Zero-setting input
B	Grey/Pink		10	4	Incremental track B
$\bar{A}$	Violet		11	6	Incremental track $\bar{A}$
$\bar{B}$	Red/Blue		12	7	Incremental track $\bar{B}$
					

Operation

Signal output



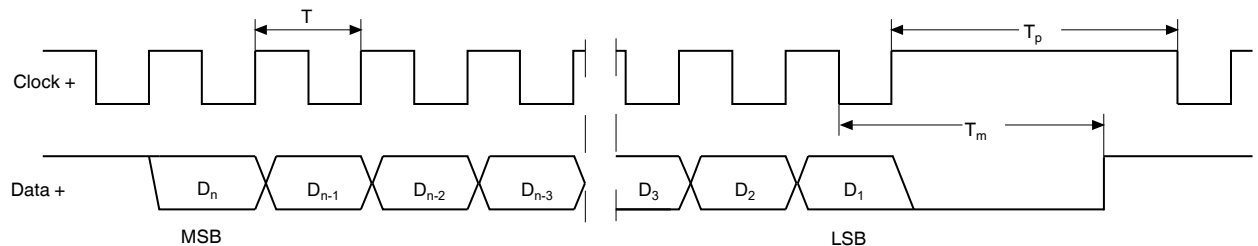
↺ cw - with view onto the shaft

Interface

The Synchronous Serial Interface was specially developed for transferring the output data of an absolute encoder to a control device. The control module sends a clock bundle and the absolute encoder responds with the position value.

Thus only 4 lines are required for the clock and data, no matter what the resolution of the rotary encoder is. The RS 422 interface is optically isolated from the power supply.

SSI signal course Standard



$D_1, \dots, D_n$: Position data
 MSB: Most significant bit
 LSB: Least significant bit

$T = 1/f$: Duration of period of clock signal $\leq 2 \text{ MHz}$
 T_m : Monoflop time $20 \mu\text{s} \pm 1 \mu\text{s}$
 T_p : Clock pause $\geq$ monoflop time ($T_p \geq T_m$)

SSI output format Standard

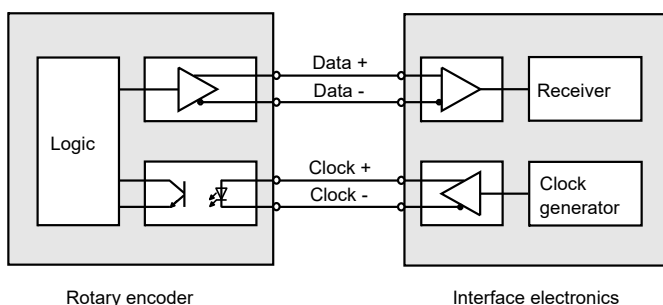
- At idle status signal lines "Data +" and "Clock +" are at high level (5 V).
- The first time the clock signal switches from high to low, the data transfer in which the current information (position data (D_n)) is stored in the encoder is introduced.
- The highest order bit (MSB) is applied to the serial data output of the encoder with the first rising pulse edge.
- The next successive lower order bit is transferred with each following rising pulse edge.
- After the lowest order bit (LSB) has been transferred the data line switches to low until the monoflop time T_m has expired.
- No subsequent data transfer can be started until the data line switches to high again or the time for the clock pause T_p has expired.
- After the clock sequence is complete, the monoflop time T_m is triggered with the last falling pulse edge.
- The monoflop time T_m determines the lowest transmission frequency.

SSI output format ring slide operation (multiple transmission)

- In ring slide operation, multiple transmission of the same data word over the SSI interface makes it possible to offer the possibility of detecting transmission errors.
- In multiple transmission, n bits are transferred per data word in standard format. The value n equals the total resolution of the encoder.
As an example: a multturn encoder with a resolution of 8192 steps/revolution (13 bit) and a max. number of 4096 revolutions (12 bit) has a total resolution of $n = 25$ bit.
- If the clock change is not interrupted after the last falling pulse edge, ring slide operation automatically becomes active. This means that the information that was stored at the time of the first clock change is generated again.
- After the first position transmission, the $n+1$ pulse controls data repetition. If the $n+1$ pulse follows after an amount of time greater than the monoflop time T_m , a new current data word will be transmitted with the following pulses.



If the pulse line is exchanged, the data word is generated offset.

Block diagram**Line length**

Line length in m	Baudrate in kHz
< 50	< 400
< 100	< 300
< 200	< 200
< 400	< 100

Parameterization**Push buttons on encoder with model characteristic SB2, SG2**

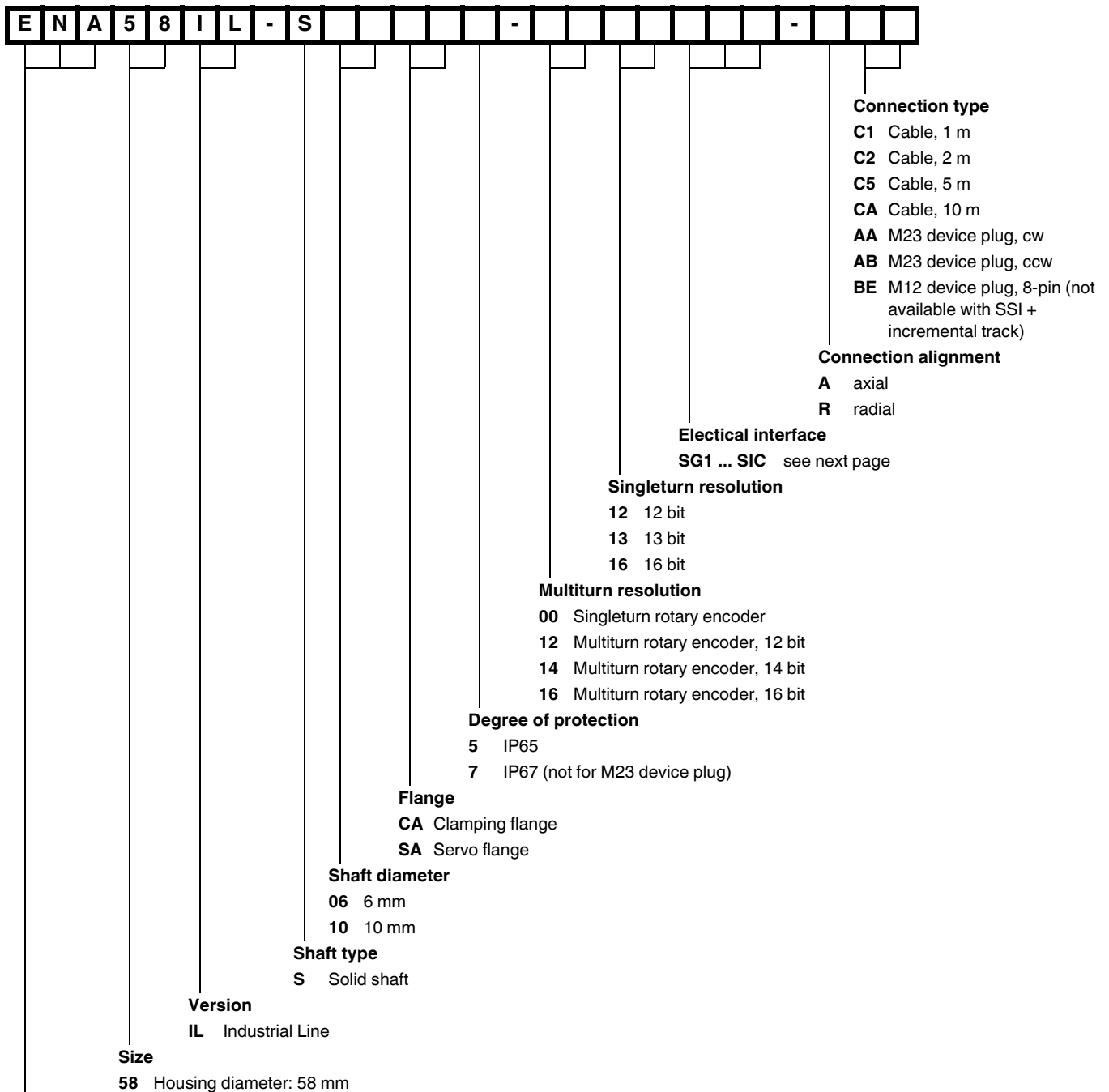
In addition to the electrical preset function (PRESET 1) these models are equipped with 2 push buttons for manually setting the zero point of the rotary encoder.

Manually zero set

1. Simultaneously press and hold the push buttons A and B for 2 s.

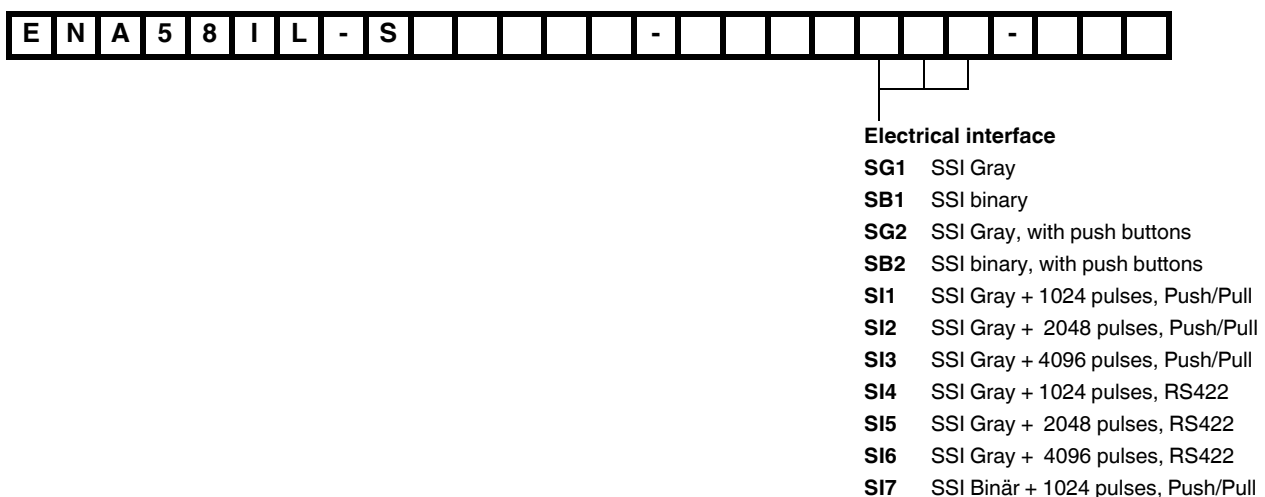
After releasing the push buttons the rotary encoder sets the current position as zero point.

Type Code



Device type

ENA Absolute rotary encoder



SI8	SSI Binär + 2048 pulses, Push/Pull
SI9	SSI Binär + 4096 pulses, Push/Pull
SIA	SSI Binär + 1024 pulses, RS422
SIB	SSI Binär + 2048 pulses, RS422
SIC	SSI Binär + 4096 pulses, RS422

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t166164_eng.pdf



Absolute rotary encoder

ENA58IL-R***-SSI

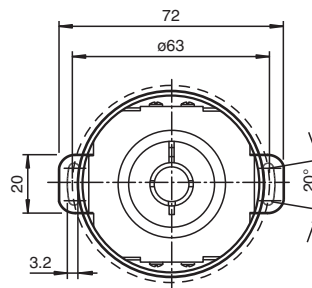
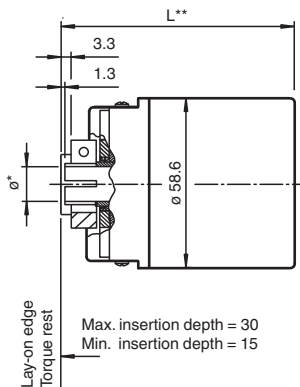
- Recessed hollow shaft
- SSI interface
- Up to 32 Bit multiturn
- Free of wear magnetic sampling
- High resolution and accuracy
- Additionally push buttons for preset function (only model characteristic SB2, SG2)
- Up to 4096 pulses on incremental track



Function

The ENA58IL series are high precision encoders with internal magnetic sampling. This multiturn absolute encoder transmits a position value corresponding to the shaft setting via the SSI interface (Synchronous Serial Interface). The control module sends a start sequence to the absolute encoder to obtain the position data. The rotary encoder then sends the position data synchronous to the cycles of the control module. It is possible to select the counting direction with the function input.

Dimensions



* See type code

** Singleturn design with axial output: L = 60.6
All other designs: L = 71 mm

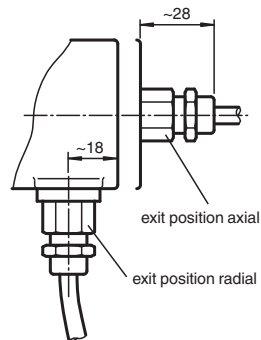
Recessed hollow shaft

Dimensions

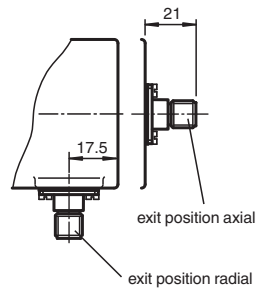
Connections

Dimensions in mm

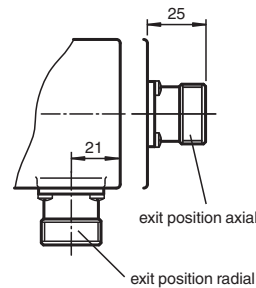
Cable



Connector M12



Connector M23



Technical Data

General specifications

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

Electrical specifications

Operating voltage	U_B	4.5 ... 30 V DC (SSI, SSI + RS422) ; 10 ... 30 V DC (SSI + Push/Pull)
No-load supply current	I_0	typ. 50 mA
Power consumption	P_0	approx. 1.5 W
Time delay before availability	t_v	< 450 ms
Output code		Gray code, binary code
Code course (counting direction)		adjustable

Interface

Interface type	SSI ; SSI + incremental track
Resolution	
Single turn	up to 16 Bit
Multiturn	up to 16 Bit
Overall resolution	up to 32 Bit
Transfer rate	0.1 ... 2 MBit/s
Cycle time	< 100 μ s
Standard conformity	RS 422

Input 1

Input type	Selection of counting direction (cw/ccw)
Signal voltage	
High	4.75 V ... U_B or unconnected (cw descending)
Low	0 ... 2 V (cw ascending)
Input current	< 6 mA
Switch-on delay	< 250 ms

Input 2

Input type	zero-set (PRESET 1) with falling edge
Signal voltage	
High	4.75 V ... U_B
Low	0 ... 2 V

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t168601_eng.pdf

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

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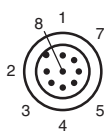
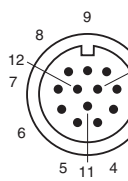
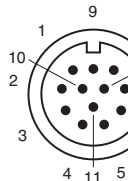
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 **PEPPERL+FUCHS**

Technical Data

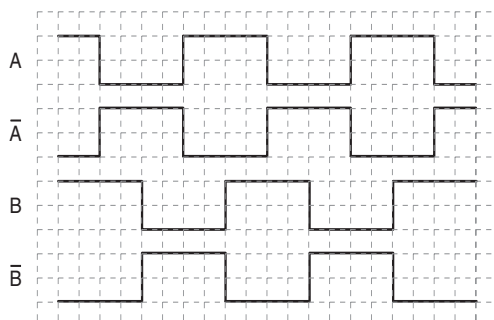
Input current	< 6 mA
Signal duration	min. 1.1 s
Output	
Output type	RS422, Push/Pull
Signal output	A+B+/A-/B
Pulses	1024, 2048, 4096
Connection	
Connector	M12 connector, 8-pin or M23 connector, 12-pin
Cable	Ø7 mm, 6 x 2 x 0.14 mm ²
Standard conformity	
Degree of protection	DIN EN 60529, IP65 or IP67 (not for M23 device plug)
Climatic testing	DIN EN 60068-2-3, no moisture condensation
Emitted interference	EN 61000-6-4:2007
Noise immunity	EN 61000-6-2:2005
Shock resistance	DIN EN 60068-2-27, 200 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	cable, movable installation: -5 ... 70 °C (23 ... 158 °F), cable, fixed installation: -30 ... 70 °C (-22 ... 158 °F) connector models: -40 ... 85 °C (-40 ... 185 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)
Relative humidity	98 % , no moisture condensation
Mechanical specifications	
Material	
Housing	nickel-plated steel , painted
Flange	Aluminum
Shaft	Stainless steel
Mass	approx. 300 g , with cable
Rotational speed	max. 12000 min ⁻¹
Moment of inertia	50 gcm ²
Starting torque	< 5 Ncm
Shaft load	
Axial	24 N
Radial	198 N
Angle offset	± 0.9 °
Axial offset	± 0.3 mm static
Radial offset	± 0.5 mm static

Connection

Signal	Cable, 12-core	Connector M12, 8-pin	Connector M23, 12-pin, cw	Connector M23, 12-pin, ccw	Explanation
GND (encoder)	White	1	1	1	Power supply
U_B (encoder)	Brown	2	2	8	Power supply
Clock (+)	Green	3	3	3	Positive cycle line
Clock (-)	Yellow	4	4	11	Negative cycle line
Data (+)	Grey	5	5	2	Positive transmission data
Data (-)	Pink	6	6	10	Negative transmission data
A	Black		7	12	Incremental track A
V/R	Red	8	8	5	Input for selection of counting direction
PRESET 1	Blue	7	9	9	Zero-setting input
B	Grey/Pink		10	4	Incremental track B
$\bar{A}$	Violet		11	6	Incremental track $\bar{A}$
$\bar{B}$	Red/Blue		12	7	Incremental track $\bar{B}$
					

Operation

Signal output

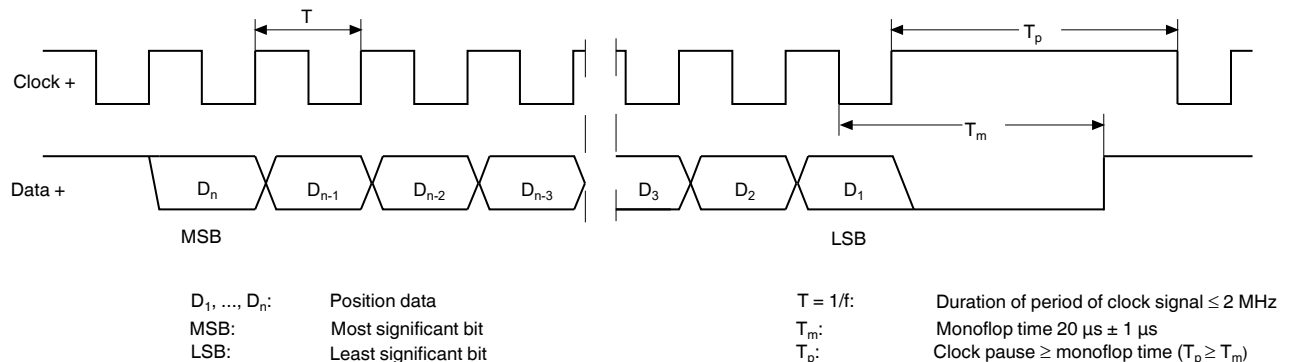


↺ cw - with view onto the shaft

Interface

The Synchronous Serial Interface was specially developed for transferring the output data of an absolute encoder to a control device. The control module sends a clock bundle and the absolute encoder responds with the position value. Thus only 4 lines are required for the clock and data, no matter what the resolution of the rotary encoder is. The RS 422 interface is optically isolated from the power supply.

SSI signal course Standard



SSI output format Standard

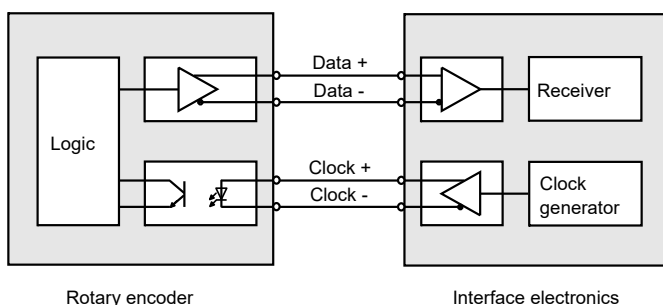
- At idle status signal lines "Data +" and "Clock +" are at high level (5 V).
- The first time the clock signal switches from high to low, the data transfer in which the current information (position data (D_n)) is stored in the encoder is introduced.
- The highest order bit (MSB) is applied to the serial data output of the encoder with the first rising pulse edge.
- The next successive lower order bit is transferred with each following rising pulse edge.
- After the lowest order bit (LSB) has been transferred the data line switches to low until the monoflop time T_m has expired.
- No subsequent data transfer can be started until the data line switches to high again or the time for the clock pause T_p has expired.
- After the clock sequence is complete, the monoflop time T_m is triggered with the last falling pulse edge.
- The monoflop time T_m determines the lowest transmission frequency.

SSI output format ring slide operation (multiple transmission)

- In ring slide operation, multiple transmission of the same data word over the SSI interface makes it possible to offer the possibility of detecting transmission errors.
- In multiple transmission, n bits are transferred per data word in standard format. The value n equals the total resolution of the encoder.
As an example: a multiturn encoder with a resolution of 8192 steps/revolution (13 bit) and a max. number of 4096 revolutions (12 bit) has a total resolution of $n = 25$ bit.
- If the clock change is not interrupted after the last falling pulse edge, ring slide operation automatically becomes active. This means that the information that was stored at the time of the first clock change is generated again.
- After the first position transmission, the $n+1$ pulse controls data repetition. If the $n+1$ pulse follows after an amount of time greater than the monoflop time T_m , a new current data word will be transmitted with the following pulses.



If the pulse line is exchanged, the data word is generated offset.

Block diagram**Line length**

Line length in m	Baudrate in kHz
< 50	< 400
< 100	< 300
< 200	< 200
< 400	< 100

Parameterization**Push buttons on encoder with model characteristic SB2, SG2**

In addition to the electrical preset function (PRESET 1) these models are equipped with 2 push buttons for manually setting the zero point of the rotary encoder.

Manually zero set

1. Simultaneously press and hold the push buttons A and B for 2 s.

After releasing the push buttons the rotary encoder sets the current position as zero point.

Type Code

SI6	SSI Gray + 4096 pulses, RS422
SI7	SSI Binär + 1024 pulses, Push/Pull
SI8	SSI Binär + 2048 pulses, Push/Pull
SI9	SSI Binär + 4096 pulses, Push/Pull
SIA	SSI Binär + 1024 pulses, RS422
SIB	SSI Binär + 2048 pulses, RS422
SIC	SSI Binär + 4096 pulses, RS422

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t168601_eng.pdf



Absolute rotary encoder ENA58IL-S***-CANopen

- Solid shaft
- Up to 31 bit overall resolution
- CANopen interface
- Free of wear magnetic sampling
- High resolution and accuracy

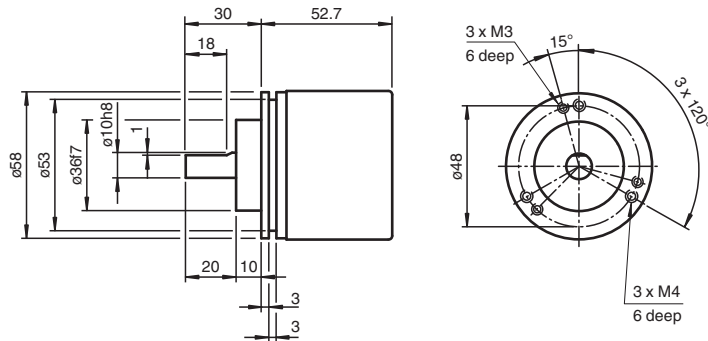


Function

This absolute rotary encoder provides a position value corresponding to the shaft position on its integrated CAN bus interface. The integrated CAN-bus interface supports all CANopen functions. Thus the following modes can be programmed to either enabled or disabled:

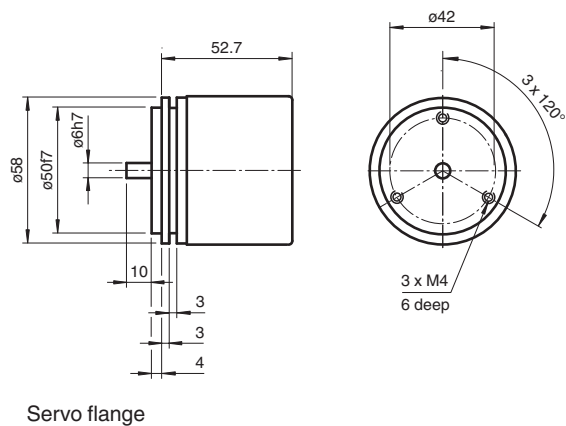
- Polled mode
- Cyclic mode
- Sync mode

Dimensions



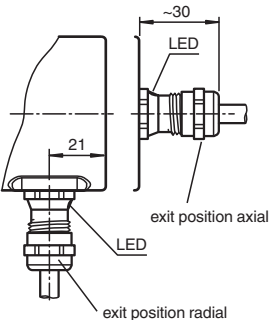
Clamping flange

Dimensions

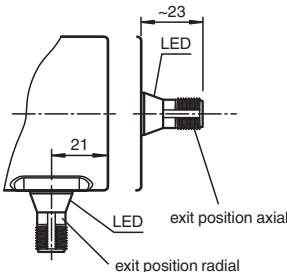


Connections

Cable



Connector M12



Technical Data

General specifications		
Detection type		magnetic sampling
Device type		Absolute rotary encoder
Linearity error		$\pm 0.1^\circ$
UL File Number		E223176 "For use in NFPA 79 Applications only" , if UL marking is marked on the product.
Electrical specifications		
Operating voltage	U_B	9 ... 30 V DC (with galvanic isolation)
Power consumption	P_0	≤ 1.2 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 15 Bit
Overall resolution		up to 31 Bit
Transfer rate		min. 20 kBit/s , max. 1 MBit/s
Cycle time		≥ 1 ms
Standard conformity		DSP 406
Connection		
Connector		M12 connector, 5 pin
Cable		$\varnothing 6$ mm, 4 x 2 x 0.14 mm ²

Technical Data

Standard conformity

Degree of protection		DIN EN 60529, IP65 or IP67
Climatic testing		DIN EN 60068-2-3, no moisture condensation
Emitted interference		EN 61000-6-4:2007
Noise immunity		EN 61000-6-2:2005
Shock resistance		DIN EN 60068-2-27, 200 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.
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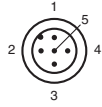
Ambient conditions

Operating temperature		cable, movable installation: -5 ... 70 °C (23 ... 158 °F), cable, fixed installation: -30 ... 70 °C (-22 ... 158 °F) connector models: -40 ... 85 °C (-40 ... 185 °F)
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
Relative humidity		98 % , no moisture condensation

Mechanical specifications

Material		
Housing		nickel-plated steel , painted
Flange		Aluminum
Shaft		Stainless steel
Mass		approx. 300 g
Rotational speed		max. 12000 min ⁻¹
Moment of inertia		50 gcm ²
Starting torque		< 5 Ncm
Shaft load		
Axial		40 N
Radial		110 N
Dimensions		
Diameter		58 mm

Connection

Signal	Wire end	5-pin, M12 x 1 connector
CAN GND	green	1
+V _S	red	2
GND	yellow	3
CAN-High	white	4
CAN-Low	brown	5
Shielding	Shielding	Housing
Pinout		

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	AutoBaudrate	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 occurred
On	Bus off	The CAN controller is in state 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.
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.

Type Code

E	N	A	5	8	I	L	-	S						-					B	1	6	-			
---	---	---	---	---	---	---	---	---	--	--	--	--	--	---	--	--	--	--	---	---	---	---	--	--	--

Device type
ENA Absolute rotary encoder

5

- Adhere to the minimum bending radius as given in the data sheet and avoid tensile as well as shearing load.

Operating instructions

Every encoder manufactured by Pepperl+Fuchs leaves the factory in a perfect condition. In order to ensure this quality as well as a faultless operation, the following specifications have to be taken into consideration:

- Avoid any impact on the housing and in particular on the encoder shaft as well as the axial and radial overload of the encoder shaft.
- The accuracy and service life of the encoder is guaranteed only, if a suitable coupling is used.
- The operating voltage for the encoder and the follow-up device (e. g. control) has to be switched on and off simultaneously.
- Any wiring work has to be carried out with the system in a dead condition.
- The maximum operating voltages must not be exceeded. The devices have to be operated at extra-low safety voltage.

Notes on connecting the electric screening

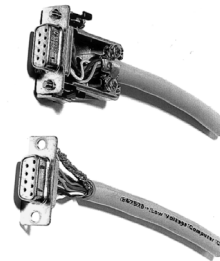
The immunity to interference of a plant depends on the correct screening. In this field installation faults occur frequently. Often the screen is applied to one side only, and is then soldered to the earthing terminal with a wire, which is a valid procedure in LF engineering. However, in case of EMC the rules of HF engineering apply.

One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

The following instructions have to be observed:

- Apply the screen on both sides to a "common earth" in a large surface, if there is no risk of equipotential currents.
- The screen has to be passed behind the insulation and has to be clamped on a large surface below the tension relief.
- In case of cable connections to screw-type terminals, the tension relief has to be connected to an earthed surface.
- If plugs are used, metallised plugs only should be fitted (such as sub D plugs with metallised housing). Please observe the direct connection of the tension relief to the housing.

Advantage:	metallised connector, shield
	clamped with the strain relief
	clamp
Disadvantage:	soldering shield on



Safety instructions

Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

If failures cannot be remedied, the device has to be shut down and has to be secured against accidental operation.

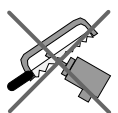
Repairs may be carried out only by the manufacturer. Entry into and modifications of the device are not permissible.

Tighten the clamping ring only, if a shaft has been fitted in the area of the clamping ring (hollow shaft encoders).

Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



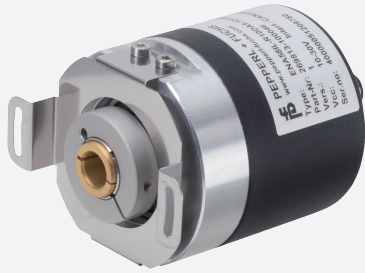
Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!



Absolute rotary encoder ENA58IL-R***-CANopen

- Recessed hollow shaft
- Up to 31 bit overall resolution
- CANopen interface
- Free of wear magnetic sampling
- High resolution and accuracy



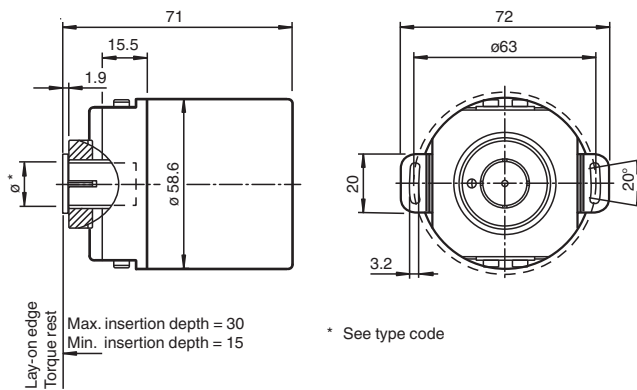
Function

This absolute rotary encoder provides a position value corresponding to the shaft position on its integrated CAN bus interface. 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

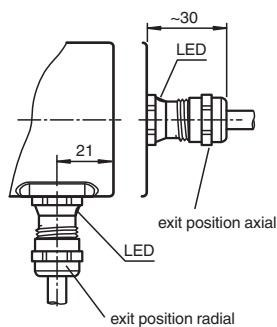


Recessed hollow shaft

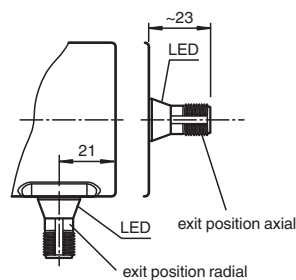
Connections

Dimensions in mm

Cable



Connector M12



Technical Data

General specifications

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

Electrical specifications

Operating voltage	U_B	9 ... 30 V DC (with galvanic isolation)
Power consumption	P_0	≤ 1.2 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 15 Bit
Overall resolution	up to 31 Bit
Transfer rate	min. 20 kBit/s , max. 1 MBit/s
Cycle time	≥ 1 ms
Standard conformity	DSP 406

Connection

Connector	M12 connector, 5 pin
Cable	$\varnothing 6$ mm, 4 x 2 x 0.14 mm ²

Standard conformity

Degree of protection	DIN EN 60529, IP65 or IP67
Climatic testing	DIN EN 60068-2-3, no moisture condensation
Emitted interference	EN 61000-6-4:2007
Noise immunity	EN 61000-6-2:2005
Shock resistance	DIN EN 60068-2-27, 200 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.
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Ambient conditions

Operating temperature	cable, movable installation: -5 ... 70 °C (23 ... 158 °F), cable, fixed installation: -30 ... 70 °C (-22 ... 158 °F) connector models: -40 ... 85 °C (-40 ... 185 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)
Relative humidity	98 % , no moisture condensation

Mechanical specifications

Material	
Housing	nickel-plated steel , painted
Flange	Aluminum
Shaft	Stainless steel
Mass	approx. 300 g
Rotational speed	max. 12000 min ⁻¹
Moment of inertia	50 gcm ²
Starting torque	< 5 Ncm
Shaft load	
Axial	24 N
Radial	198 N
Angle offset	$\pm 0.9^\circ$
Axial offset	± 0.3 mm static

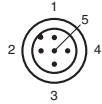
Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t183818_eng.pdf

Technical Data

Radial offset	± 0.5 mm static
Dimensions	
Diameter	58 mm

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t183818_eng.pdf

Connection

Signal	Wire end	5-pin, M12 x 1 connector
CAN GND	green	1
+V _S	red	2
GND	yellow	3
CAN-High	white	4
CAN-Low	brown	5
Shielding	Shielding	Housing
Pinout		

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	AutoBaudrate	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 occurred
On	Bus off	The CAN controller is in state 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.
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.

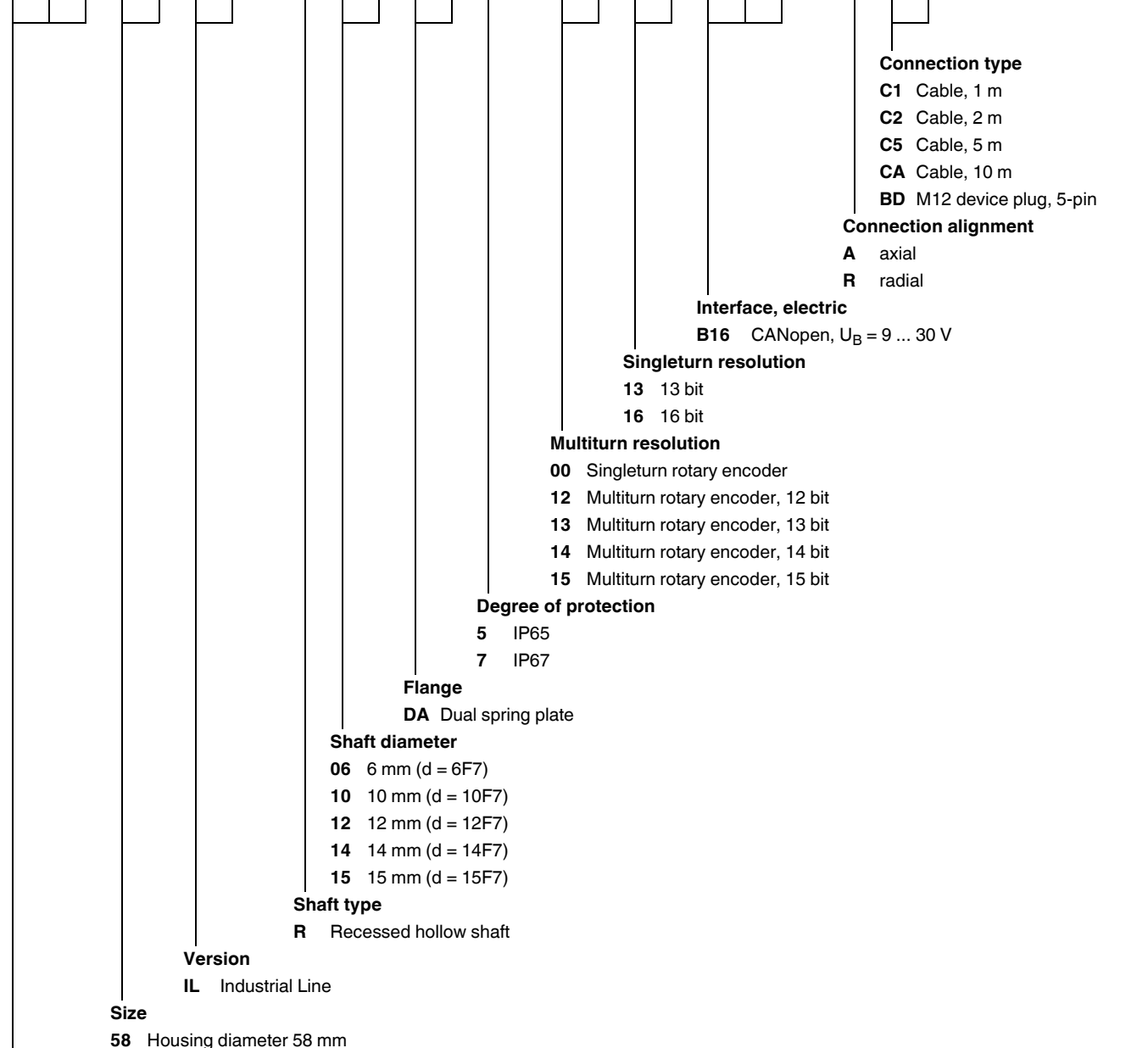
Programmable rotary encoder parameters

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.

Type Code

Model number

E	N	A	5	8	I	L	-	R				D	A	-					B	1	6	-			
---	---	---	---	---	---	---	---	---	--	--	--	---	---	---	--	--	--	--	---	---	---	---	--	--	--



Device type
ENA Absolute rotary encoder

Installation

Anti-interference measures

The use of highly sophisticated microelectronics requires a consistently implemented anti-interference and wiring concept. This becomes all the more important the more compact the constructions are and the higher the demands are on the performance of modern machines.

The following installation instructions and proposals apply for "normal industrial environments". There is no ideal solution for all interfering environments.

When the following measures are applied, the encoder should be in perfect working order:

- Termination of the serial line with a 120 Ω resistor (between Receive/Transmit and Receive/Transmit) at the beginning and end of the serial line (e. g. the control and the last encoder).
- The wiring of the encoder should be laid at a large distance to energy lines which could cause interferences.
- Cable cross-section of the screen at least 4 mm².
- Cable cross-section at least 0,14 mm².

- The wiring of the screen and 0 V should be arranged radially, if and when possible.
- Do not kink or jam the cables.
- Adhere to the minimum bending radius as given in the data sheet and avoid tensile as well as shearing load.

Operating instructions

Every encoder manufactured by Pepperl+Fuchs leaves the factory in a perfect condition. In order to ensure this quality as well as a faultless operation, the following specifications have to be taken into consideration:

- Avoid any impact on the housing and in particular on the encoder shaft as well as the axial and radial overload of the encoder shaft.
- The accuracy and service life of the encoder is guaranteed only, if a suitable coupling is used.
- The operating voltage for the encoder and the follow-up device (e. g. control) has to be switched on and off simultaneously.
- Any wiring work has to be carried out with the system in a dead condition.
- The maximum operating voltages must not be exceeded. The devices have to be operated at extra-low safety voltage.

Notes on connecting the electric screening

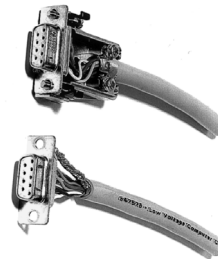
The immunity to interference of a plant depends on the correct screening. In this field installation faults occur frequently. Often the screen is applied to one side only, and is then soldered to the earthing terminal with a wire, which is a valid procedure in LF engineering. However, in case of EMC the rules of HF engineering apply.

One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

The following instructions have to be observed:

- Apply the screen on both sides to a "common earth" in a large surface, if there is no risk of equipotential currents.
- The screen has to be passed behind the insulation and has to be clamped on a large surface below the tension relief.
- In case of cable connections to screw-type terminals, the tension relief has to be connected to an earthed surface.
- If plugs are used, metallised plugs only should be fitted (such as sub D plugs with metallised housing). Please observe the direct connection of the tension relief to the housing.

Advantage:	metallised connector, shield
	clamped with the strain relief
	clamp
Disadvantage:	soldering shield on



Safety instructions

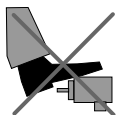
Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

If failures cannot be remedied, the device has to be shut down and has to be secured against accidental operation.

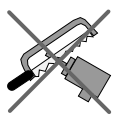
Repairs may be carried out only by the manufacturer. Entry into and modifications of the device are not permissible.

Tighten the clamping ring only, if a shaft has been fitted in the area of the clamping ring (hollow shaft encoders).

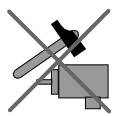
Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t183818_eng.pdf



Absolute rotary encoder ENA58IL-S***-J1939

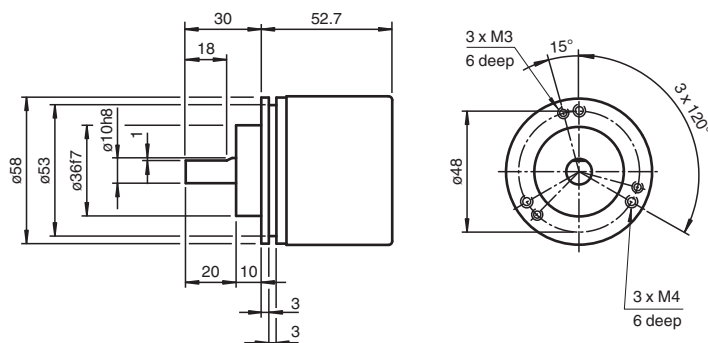
- Solid shaft
- Up to 31 bit overall resolution
- CAN bus with SAE J1939 protocol
- Free of wear magnetic sampling
- High resolution and accuracy



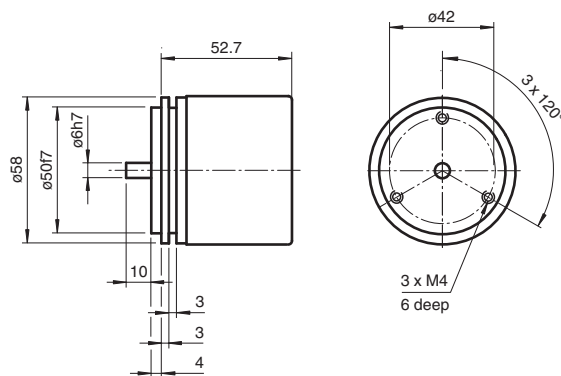
Function

This absolute rotary encoder provides a position value corresponding to the shaft position on its integrated J1939 interface. The rugged miniature encoders are based on magnetic sampling.

Dimensions



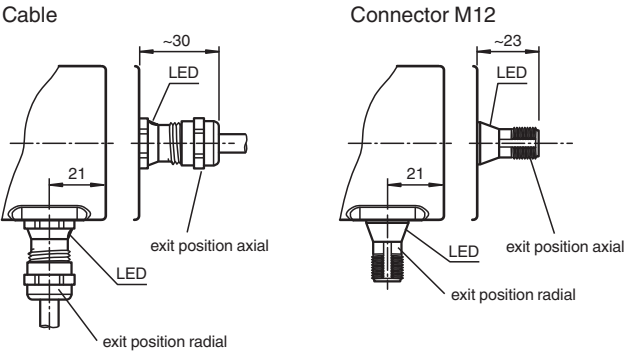
Clamping flange



Servo flange

Dimensions

Connections
Dimensions in mm



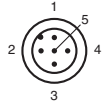
Technical Data

General specifications		
Detection type		magnetic sampling
Device type		Absolute rotary encoder
Linearity error		$\leq \pm 0.1^\circ$
UL File Number		E223176 "For use in NFPA 79 Applications only" , if UL marking is marked on the product.
Indicators/operating means		
LED green		Operating mode
LED red		wrong baud rate
Electrical specifications		
Operating voltage	U_B	9 ... 30 V DC (with galvanic isolation)
Power consumption	P_0	$\leq 1.2\text{ W}$
Time delay before availability	t_v	$< 250\text{ ms}$
Output code		binary code
Code course (counting direction)		adjustable
Interface		
Interface type		J1939
Resolution		
Single turn		up to 16 Bit
Multiturn		up to 15 Bit
Overall resolution		up to 31 Bit
Transfer rate		min. 20 kBit/s , max. 1 MBit/s
Cycle time		$\geq 1\text{ ms}$
Standard conformity		ISO 11898
Connection		
Connector		M12 connector, 5 pin
Cable		$\varnothing 6\text{ mm}$, 4 x 2 x 0.14 mm ²
Standard conformity		
Degree of protection		DIN EN 60529, IP65 or IP67
Climatic testing		DIN EN 60068-2-3, no moisture condensation
Emitted interference		EN 61000-6-4:2007
Noise immunity		EN 61000-6-2:2005
Shock resistance		DIN EN 60068-2-27, 200 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		

Technical Data

Operating temperature		cable, movable installation: -5 ... 70 °C (23 ... 158 °F), cable, fixed installation: -30 ... 70 °C (-22 ... 158 °F) connector models: -40 ... 85 °C (-40 ... 185 °F)
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
Relative humidity		98 % , no moisture condensation
Mechanical specifications		
Material		
Housing		nickel-plated steel , painted
Flange		Aluminum
Shaft		Stainless steel
Mass		approx. 300 g
Rotational speed		max. 12000 min ⁻¹
Moment of inertia		50 gcm ²
Starting torque		< 5 Ncm
Shaft load		
Axial		40 N
Radial		110 N
Dimensions		
Diameter		58 mm

Connection

Signal	Wire end	5-pin, M12 x 1 connector
CAN GND	green	1
+V _S	red	2
GND	yellow	3
CAN-High	white	4
CAN-Low	brown	5
Shielding	Shielding	Housing
Pinout		

Interface

Example of the transmit commands

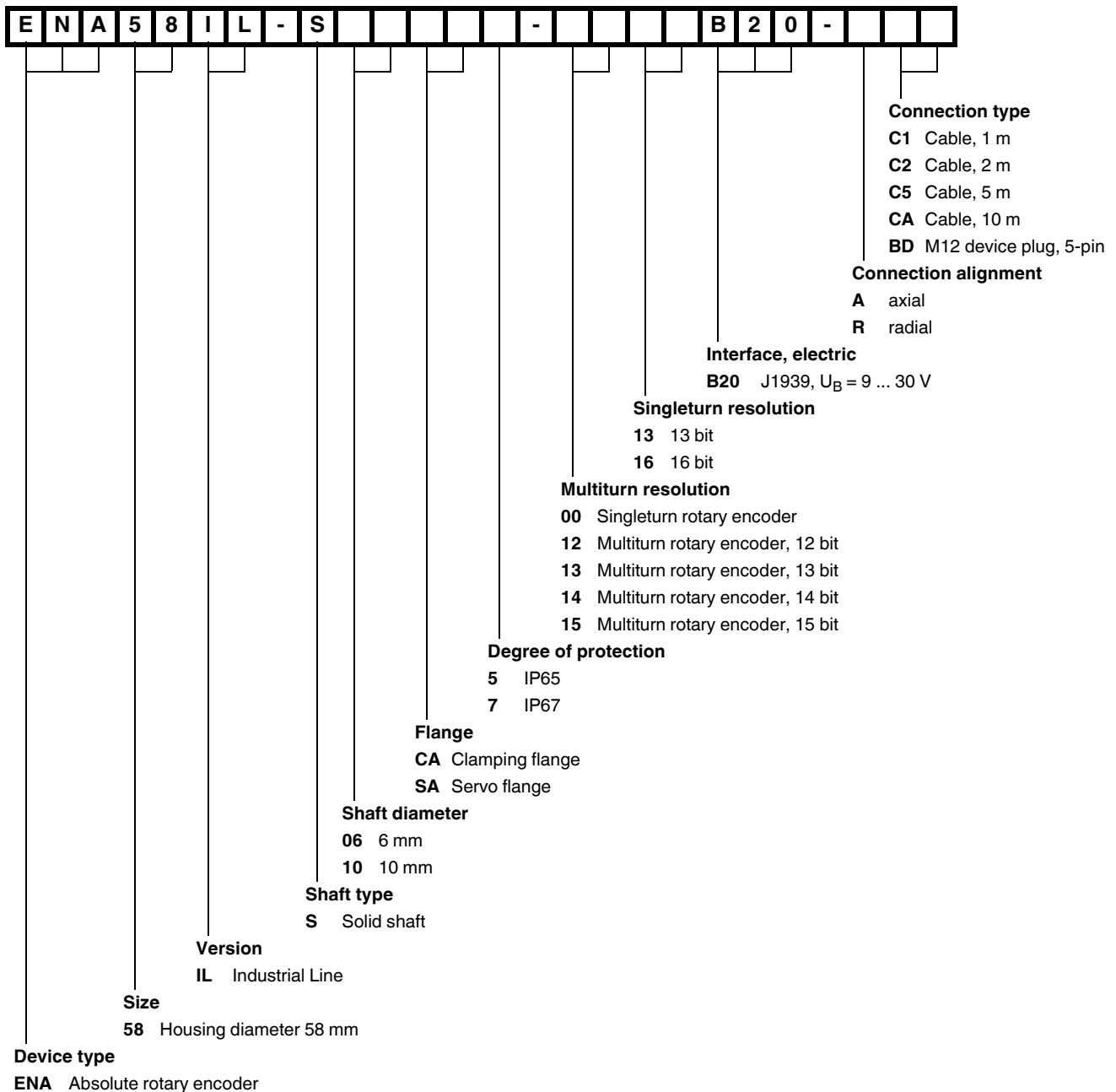
Command	Identifier	Data	Comments
Read request Direction	18EA2000	01 EF 00 00 00 00 00 00	
Read request Node	18EA2000	08 EF 00 00 00 00 00 00	
Write Direction	00EF2000	01 01 00 00 00 FF FF FF (CCW increase position)	When you change direction it will give you a different positional value. You will then need to set your preset value.
Write PRESET	00EF2000	04 A8 61 00 00 FF FF FF (value 25.000)	The preset value should be received at positional value 18FFAA20.
Write Save	00EF2000	FA 73 61 76 65 FF FF FF	The settings saved in non-volatile memory

If you change the node number, you will need to cycle power (after you save your settings) for the node number to change. Once you cycle power, you will need to enter the new node number in your identifier. You can confirm everything is saved in non-volatile memory by cycling power.

Receive:
18FFAA20: Positional and speed data
18EA2000: Read response

Type Code

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t185582_eng.pdf



Installation

Anti-interference measures

The use of highly sophisticated microelectronics requires a consistently implemented anti-interference and wiring concept. This becomes all the more important the more compact the constructions are and the higher the demands are on the performance of modern machines.

The following installation instructions and proposals apply for "normal industrial environments". There is no ideal solution for all interfering environments.

When the following measures are applied, the encoder should be in perfect working order:

- Termination of the serial line with a 120 Ω resistor (between Receive/Transmit and Receive/Transmit) at the beginning and end of the serial line (e. g. the control and the last encoder).
- The wiring of the encoder should be laid at a large distance to energy lines which could cause interferences.
- Cable cross-section of the screen at least 4 mm².
- Cable cross-section at least 0,14 mm².
- The wiring of the screen and 0 V should be arranged radially, if and when possible.
- Do not kink or jam the cables.
- Adhere to the minimum bending radius as given in the data sheet and avoid tensile as well as shearing load.

Operating instructions

Every encoder manufactured by Pepperl+Fuchs leaves the factory in a perfect condition. In order to ensure this quality as well as a faultless operation, the following specifications have to be taken into consideration:

- Avoid any impact on the housing and in particular on the encoder shaft as well as the axial and radial overload of the encoder shaft.
- The accuracy and service life of the encoder is guaranteed only, if a suitable coupling is used.
- The operating voltage for the encoder and the follow-up device (e. g. control) has to be switched on and off simultaneously.
- Any wiring work has to be carried out with the system in a dead condition.
- The maximum operating voltages must not be exceeded. The devices have to be operated at extra-low safety voltage.

Notes on connecting the electric screening

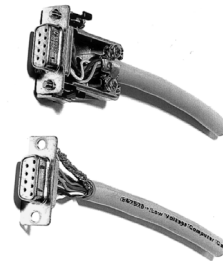
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One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

The following instructions have to be observed:

- Apply the screen on both sides to a "common earth" in a large surface, if there is no risk of equipotential currents.
- The screen has to be passed behind the insulation and has to be clamped on a large surface below the tension relief.
- In case of cable connections to screw-type terminals, the tension relief has to be connected to an earthed surface.
- If plugs are used, metallised plugs only should be fitted (such as sub D plugs with metallised housing). Please observe the direct connection of the tension relief to the housing.

Advantage:	metallised connector, shield
	clamped with the strain relief
Disadvantage:	soldering shield on



Safety instructions

Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

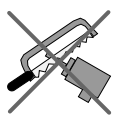
If failures cannot be remedied, the device has to be shut down and has to be secured against accidental operation. Repairs may be carried out only by the manufacturer. Entry into and modifications of the device are not permissible.

Tighten the clamping ring only, if a shaft has been fitted in the area of the clamping ring (hollow shaft encoders).

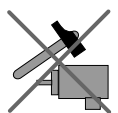
Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!

Absolute rotary encoder

ENA58IL-R***-J1939



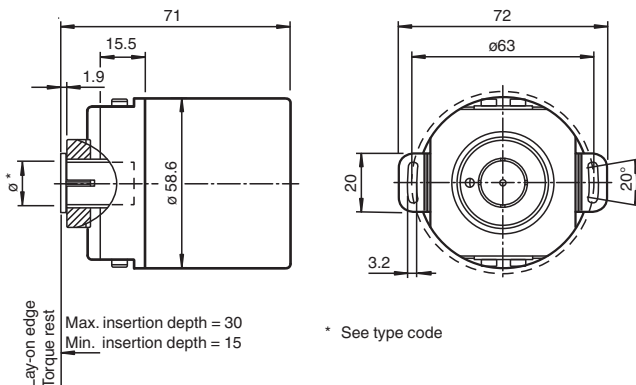
- Recessed hollow shaft
- Up to 31 bit overall resolution
- CAN bus with SAE J1939 protocol
- Free of wear magnetic sampling
- High resolution and accuracy



Function

This absolute rotary encoder provides a position value corresponding to the shaft position on its integrated J1939 interface. The rugged miniature encoders are based on magnetic sampling.

Dimensions

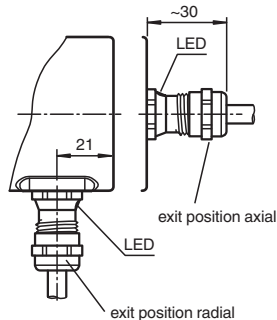


Recessed hollow shaft

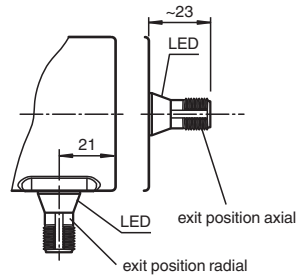
Connections

Dimensions in mm

Cable



Connector M12



Technical Data

General specifications

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

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PEPPERL+FUCHS

Technical Data

Detection type		magnetic sampling
Device type		Absolute rotary encoder
Linearity error		$\leq \pm 0.1^\circ$
UL File Number		E223176 "For use in NFPA 79 Applications only", if UL marking is marked on the product.
Indicators/operating means		
LED green		Operating mode
LED red		wrong baud rate
Electrical specifications		
Operating voltage	U_B	9 ... 30 V DC (with galvanic isolation)
Power consumption	P_0	≤ 1.2 W
Time delay before availability	t_v	< 250 ms
Output code		binary code
Code course (counting direction)		adjustable
Interface		
Interface type		J1939
Resolution		
Single turn		up to 16 Bit
Multiturn		up to 15 Bit
Overall resolution		up to 31 Bit
Transfer rate		min. 20 kBit/s , max. 1 MBit/s
Cycle time		≥ 1 ms
Standard conformity		ISO 11898
Connection		
Connector		M12 connector, 5 pin
Cable		$\varnothing 6$ mm, 4 x 2 x 0.14 mm ²
Standard conformity		
Degree of protection		DIN EN 60529, IP65 or IP67
Climatic testing		DIN EN 60068-2-3, no moisture condensation
Emitted interference		EN 61000-6-4:2007
Noise immunity		EN 61000-6-2:2005
Shock resistance		DIN EN 60068-2-27, 200 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		cable, movable installation: -5 ... 70 °C (23 ... 158 °F), cable, fixed installation: -30 ... 70 °C (-22 ... 158 °F) connector models: -40 ... 85 °C (-40 ... 185 °F)
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
Relative humidity		98 % , no moisture condensation
Mechanical specifications		
Material		
Housing		nickel-plated steel , painted
Flange		Aluminum
Shaft		Stainless steel
Mass		approx. 300 g
Rotational speed		max. 12000 min ⁻¹
Moment of inertia		50 gcm ²
Starting torque		< 5 Ncm
Shaft load		
Axial		24 N
Radial		198 N

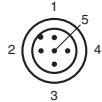
Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t185557_eng.pdf

Technical Data

Angle offset		± 0.9 °
Axial offset		± 0.3 mm static
Radial offset		± 0.5 mm static
Dimensions		
Diameter		58 mm

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t185557_eng.pdf

Connection

Signal	Wire end	5-pin, M12 x 1 connector
CAN GND	green	1
+V _S	red	2
GND	yellow	3
CAN-High	white	4
CAN-Low	brown	5
Shielding	Shielding	Housing
Pinout		

Interface

Example of the transmit commands

Command	Identifier	Data	Comments
Read request Direction	18EA2000	01 EF 00 00 00 00 00 00	
Read request Node	18EA2000	08 EF 00 00 00 00 00 00	
Write Direction	00EF2000	01 01 00 00 00 FF FF FF (CCW increase position)	When you change direction it will give you a different positional value. You will then need to set your preset value.
Write PRESET	00EF2000	04 A8 61 00 00 FF FF FF (value 25.000)	The preset value should be received at positional value 18FFAA20.
Write Save	00EF2000	FA 73 61 76 65 FF FF FF	The settings saved in non-volatile memory

If you change the node number, you will need to cycle power (after you save your settings) for the node number to change. Once you cycle power, you will need to enter the new node number in your identifier. You can confirm everything is saved in non-volatile memory by cycling power.

Receive:
18FFAA20: Positional and speed data
18EA2000: Read response

Type Code

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t185557_eng.pdf

Model number

E	N	A	5	8	I	L	-	R				D	A	-					B	2	0	-			
---	---	---	---	---	---	---	---	---	--	--	--	---	---	---	--	--	--	--	---	---	---	---	--	--	--

Connection type

C1 Cable, 1 m

C2 Cable, 2 m

C5 Cable, 5 m

CA Cable, 10 m

BD M12 device plug, 5-pin

Connection alignment

A axial

R radial

Interface, electric

B20 J1939, U_B = 9 ... 30 V

Singleturn resolution

13 13 bit

16 16 bit

Multiturn resolution

00 Singleturn rotary encoder

12 Multiturn rotary encoder, 12 bit

13 Multiturn rotary encoder, 13 bit

14 Multiturn rotary encoder, 14 bit

15 Multiturn rotary encoder, 15 bit

Degree of protection

5 IP65

7 IP67

Flange

DA Dual spring plate

Shaft diameter

06 6 mm (d = 6F7)

10 10 mm (d = 10F7)

12 12 mm (d = 12F7)

14 14 mm (d = 14F7)

15 15 mm (d = 15F7)

Shaft type

R Recessed hollow shaft

Version

IL Industrial Line

Size

58 Housing diameter 58 mm

Device type
ENA Absolute rotary encoder

Installation

Anti-interference measures

The use of highly sophisticated microelectronics requires a consistently implemented anti-interference and wiring concept. This becomes all the more important the more compact the constructions are and the higher the demands are on the performance of modern machines.

The following installation instructions and proposals apply for "normal industrial environments". There is no ideal solution for all interfering environments.

When the following measures are applied, the encoder should be in perfect working order:

- Termination of the serial line with a 120 Ω resistor (between Receive/Transmit and Receive/Transmit) at the beginning and end of the serial line (e. g. the control and the last encoder).
- The wiring of the encoder should be laid at a large distance to energy lines which could cause interferences.
- Cable cross-section of the screen at least 4 mm².
- Cable cross-section at least 0,14 mm².

- The wiring of the screen and 0 V should be arranged radially, if and when possible.
- Do not kink or jam the cables.
- Adhere to the minimum bending radius as given in the data sheet and avoid tensile as well as shearing load.

Operating instructions

Every encoder manufactured by Pepperl+Fuchs leaves the factory in a perfect condition. In order to ensure this quality as well as a faultless operation, the following specifications have to be taken into consideration:

- Avoid any impact on the housing and in particular on the encoder shaft as well as the axial and radial overload of the encoder shaft.
- The accuracy and service life of the encoder is guaranteed only, if a suitable coupling is used.
- The operating voltage for the encoder and the follow-up device (e. g. control) has to be switched on and off simultaneously.
- Any wiring work has to be carried out with the system in a dead condition.
- The maximum operating voltages must not be exceeded. The devices have to be operated at extra-low safety voltage.

Notes on connecting the electric screening

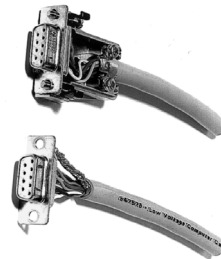
The immunity to interference of a plant depends on the correct screening. In this field installation faults occur frequently. Often the screen is applied to one side only, and is then soldered to the earthing terminal with a wire, which is a valid procedure in LF engineering. However, in case of EMC the rules of HF engineering apply.

One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

The following instructions have to be observed:

- Apply the screen on both sides to a "common earth" in a large surface, if there is no risk of equipotential currents.
- The screen has to be passed behind the insulation and has to be clamped on a large surface below the tension relief.
- In case of cable connections to screw-type terminals, the tension relief has to be connected to an earthed surface.
- If plugs are used, metallised plugs only should be fitted (such as sub D plugs with metallised housing). Please observe the direct connection of the tension relief to the housing.

Advantage:	metallised connector, shield
	clamped with the strain relief
	clamp
Disadvantage:	soldering shield on



Safety instructions

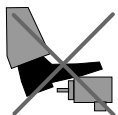
Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

If failures cannot be remedied, the device has to be shut down and has to be secured against accidental operation.

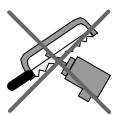
Repairs may be carried out only by the manufacturer. Entry into and modifications of the device are not permissible.

Tighten the clamping ring only, if a shaft has been fitted in the area of the clamping ring (hollow shaft encoders).

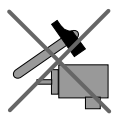
Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t185557_eng.pdf



Multiturn absolute rotary encoder ENA58IL-S***-IO-Link

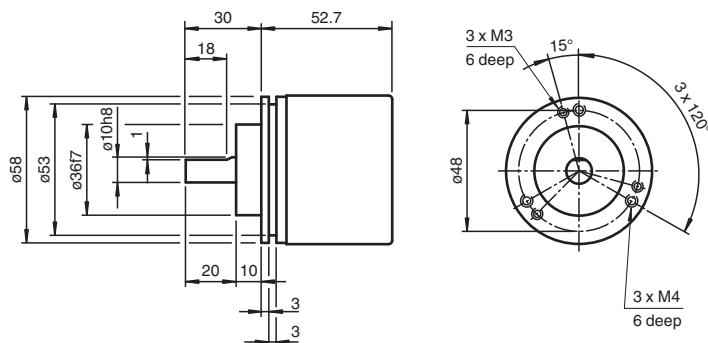
- Absolute rotary encoder of the innovative Performance Line
- Solid shaft
- Position and shaft velocity
- IO-Link Interface for process data, parameterization and diagnosis
- Suitable for condition monitoring
- Measuring range, direction of rotation and switching signals programmable
- Free of wear magnetic sampling
- High resolution and accuracy



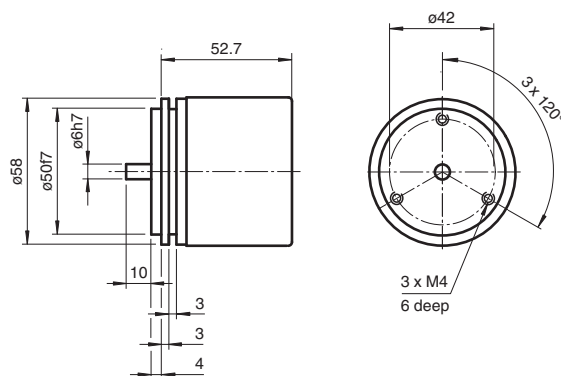
Function

Absolute encoders with IO Link are high precision encoders with internal magnetic sampling. The integrated IO Link interface offers an optimal adaption to different applications through parameterization as well as process data transfer and condition monitoring.

Dimensions



Clamping flange



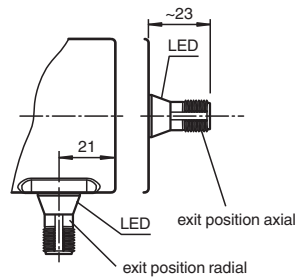
Servo flange

Dimensions

Connections

Dimensions in mm

Connector M12



Technical Data

General specifications

Detection type	magnetic sampling
Device type	Absolute rotary encoder as Performance Line
Measured variable	position shaft velocity Temperature
Linearity error	$\leq \pm 0.1^\circ$
UL File Number	E223176 "For use in NFPA 79 Applications only", if UL marking is marked on the product.

Indicators/operating means

LED STATUS	LED green flashing with short break (1 Hz) - IO-Link mode
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Electrical specifications

Operating voltage	U_B	18 ... 30 V DC
No-load supply current	I_0	max. 50 mA
Power consumption	P_0	approx. 1.5 W
Time delay before availability	t_v	< 1 s

Interface

Interface type	IO-Link
IO-Link revision	1.1
Device profile	Identification and Diagnosis - I&D
Resolution	
Single turn	up to 16 Bit programmable
Multiturn	up to 15 Bit programmable
Overall resolution	up to 31 Bit programmable
Process data	Input 12 Byte - measurement value 4 Byte - resolution 16 Bit - auxiliary measurement value 4 Byte - switching signals 4 Bit - diagnosis signals 2 Bit - status data Output 1 Byte - Trigger 1 Bit
Vendor ID	1 (0x0001)
Device ID	5244419 (0x500603), 5244420 (0x500604), 5244423 (0x500607), 5244424 (0x500608)
Transfer rate	COM3 (230.4 kbits/s)
Min. cycle time	1.5 ms
SIO mode support	no
Compatible master port type	Class A Class B (use 3-pole adapter or 3-wire cable)

Connection

Connector	M12 connector, 5 pin, A-coded
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Release date: 2026-08-26 Date of issue: 2026-08-26 Filename: t214148_eng.pdf

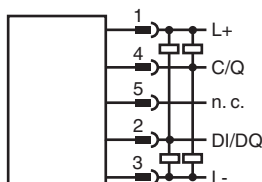
Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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 **PEPPERL+FUCHS**

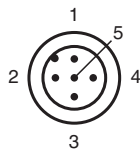
Technical Data

Standard conformity		
Degree of protection		DIN EN 60529, IP65, IP67
Communication interface		IEC 61131-9 / IO-Link V1.1.2
Climatic testing		DIN EN 60068-2-78, no moisture condensation
Emitted interference		EN 61000-6-4:2007
Noise immunity		EN 61000-6-2:2005
Shock resistance		DIN EN 60068-2-27, 100 g, 6 ms
Vibration resistance		DIN EN 60068-2-6, 10 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		Zinc plated steel, painted
Flange		Aluminum
Shaft		Stainless steel
Mass		approx. 350 g
Rotational speed		max. 12000 min ⁻¹
Moment of inertia		< 30 gcm ²
Starting torque		< 3 Ncm
Shaft load		
Axial		40 N
Radial		110 N

Connection Assignment



Connection Assignment



Type Code

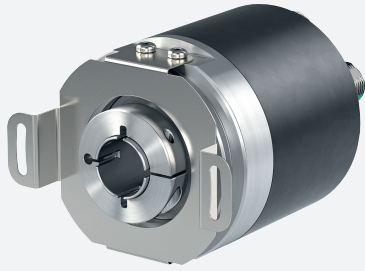
Structure of the type code																											
E	N	A	5	8	I	L	-	S	(1)	(1)	(2)	(2)	(3)	-	(4)	(4)	1	6	-	I	O	-	(5)	(5)	(5)	0	1
ENA														Device type													
ENA														Absolute rotary encoder													

Type Code

58	Size
58	Housing diameter 58 mm
IL	Version
IL	Industrial Line / Performance Line
S	Shaft type
S	Solid shaft
(1) (1)	Shaft diameter
06	6 mm
10	10 mm
(2) (2)	Flange
CA	Clamping flange
SA	Servo flange
(3)	Degree of protection
5	IP65
7	IP66, IP67
(4) (4)	Multiturn resolution
00	Singleturn rotary encoder
15	Multiturn rotary encoder, parameterizable up to 15 bit
16	Singleturn resolution
16	16 Bit
IO	Interface, electric
IO	IO-Link
(5) (5) (5)	Connection type
ABP	Axial connection alignment, M12 x 1, 5-pin, A coded
RBD	Radial connection alignment, M12 x 1, 5-pin, A coded
01	Parameterization status
01	P+F factory setting

Multiturn absolute rotary encoder

ENA58IL-R***-IO-Link



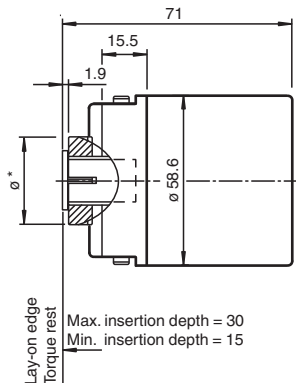
- Absolute rotary encoder of the innovative Performance Line
- Recessed hollow shaft
- Position and shaft velocity
- IO-Link Interface for process data, parameterization and diagnosis
- Suitable for condition monitoring
- Measuring range, direction of rotation and switching signals programmable
- Free of wear magnetic sampling
- High resolution and accuracy



Function

Absolute encoders with IO Link are high precision encoders with internal magnetic sampling. The integrated IO Link interface offers an optimal adaption to different applications through parameterization as well as process data transfer and condition monitoring.

Dimensions



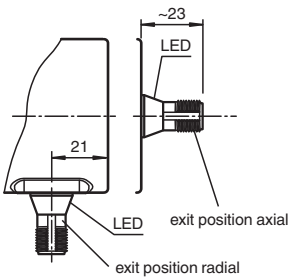
* See type code

Recessed hollow shaft

Connections

Dimensions in mm

Connector M12



Technical Data

General specifications

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

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Technical Data

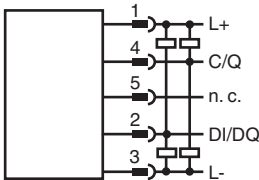
Detection type	magnetic sampling	
Device type		Absolute rotary encoder as Performance Line
Measured variable		position shaft velocity Temperature
Linearity error		$\leq \pm 0.1^\circ$
UL File Number		E223176 "For use in NFPA 79 Applications only" , if UL marking is marked on the product.
Indicators/operating means		
LED STATUS		LED green flashing with short break (1 Hz) - IO-Link mode
Electrical specifications		
Operating voltage	U_B	18 ... 30 V DC
No-load supply current	I_0	max. 50 mA
Power consumption	P_0	approx. 1.5 W
Time delay before availability	t_v	< 1 s
Interface		
Interface type		IO-Link
IO-Link revision		1.1
Device profile		Identification and Diagnosis - I&D
Resolution		
Single turn		up to 16 Bit programmable
Multiturn		up to 15 Bit programmable
Overall resolution		up to 31 Bit programmable
Process data		Input 12 Byte - measurement value 4 Byte - resolution 16 Bit - auxiliary measurement value 4 Byte - switching signals 4 Bit - diagnosis signals 2 Bit - status data Output 1 Byte - Trigger 1 Bit
Vendor ID		1 (0x0001)
Device ID		5244417 (0x500601), 5244418 (0x500602), 5244421 (0x500605), 5244422 (0x500606)
Transfer rate		COM3 (230.4 kbits/s)
Min. cycle time		1.5 ms
SIO mode support		no
Compatible master port type		Class A Class B (use 3-pole adapter or 3-wire cable)
Connection		
Connector		M12 connector, 5 pin , A-coded
Standard conformity		
Degree of protection		DIN EN 60529, IP65, IP67
Communication interface		IEC 61131-9 / IO-Link V1.1.2
Climatic testing		DIN EN 60068-2-78, no moisture condensation
Emitted interference		EN 61000-6-4:2007
Noise immunity		EN 61000-6-2:2005
Shock resistance		DIN EN 60068-2-27, 100 g, 6 ms
Vibration resistance		DIN EN 60068-2-6, 10 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		

Release date: 2026-08-26 Date of issue: 2026-08-26 Filename: t214147_eng.pdf

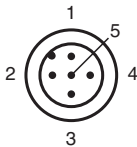
Technical Data

Material		
Housing		Zinc plated steel, painted
Flange		Aluminum
Shaft		Stainless steel
Mass		approx. 370 g
Rotational speed		max. 12000 min ⁻¹
Moment of inertia		< 30 gcm ²
Starting torque		< 3 Ncm
Shaft load		
Axial		24 N
Radial		198 N
Angle offset		± 0.9 °
Axial offset		± 0.3 mm static; ± 0,1 mm dynamic
Radial offset		± 0.5 mm static; &lusmn 0,2 mm dynamic

Connection Assignment



Connection Assignment



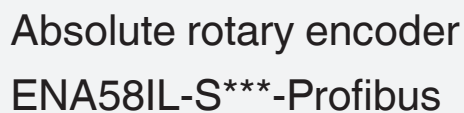
Type Code

Structure of the type code

E	N	A	5	8	I	L	-	R	(1)	(1)	D	A	(2)	-	(3)	(3)	1	6	-	I	O	-	(4)	(4)	(4)	0	1
ENA		Device type																									
ENA		Absolute rotary encoder																									
58		Size																									
58		Housing diameter 58 mm																									
IL		Version																									
IL		Industrial Line / Performance Line																									
R		Shaft type																									
R		Recessed hollow shaft																									
(1) (1)		Shaft diameter																									
06		6 mm																									
10		10 mm																									
12		12 mm																									
14		14 mm																									
15		15 mm																									

Type Code

DA	Flange
DA	Dual spring plate
(2)	Degree of protection
5	IP65
7	IP66, IP67
(3) (3)	Multiturn resolution
00	Singleturn rotary encoder
15	Multiturn rotary encoder, parameterizable up to 15 bit
16	Singleturn resolution
16	16 Bit
IO	Interface, electric
IO	IO-Link
(4) (4) (4)	Connection type
ABP	Axial connection alignment, M12 x 1, 5-pin, A coded
RBD	Radial connection alignment, M12 x 1, 5-pin, A coded
01	Parameterization status
01	P+F factory setting



- Solid shaft
- 30 Bit multiturn
- Free of wear magnetic sampling
- High resolution and accuracy
- Mechanical compatibility with all major encoders with fieldbus interface
- Status LEDs



The ENA58IL series with Profibus interface are high-precision rotary encoders with internal magnetic sampling. The most common mechanical interfaces are available in the ENA58IL series. For the electrical connection, models with connection cover and radial connector outlet or cable outlet or models with axial connector outlet are available. This versatility allows the use of the rotary encoder for all common applications.

Technical drawing of the servo flange showing side and front views with dimensions.

Side View Dimensions:

- Overall length: 53.2
- Distance from end face to start of flange: 43.2
- Flange thickness: 13
- Outer diameter of main body: $\varnothing 58$
- Outer diameter of flange: $\varnothing 50.7$
- Inner diameter of flange: $\varnothing 61.7$
- Distance from end face to center of flange: 10
- Distance from center of flange to center of main body: 3
- Distance from center of main body to center of flange: 3
- Distance from center of main body to end face: 4

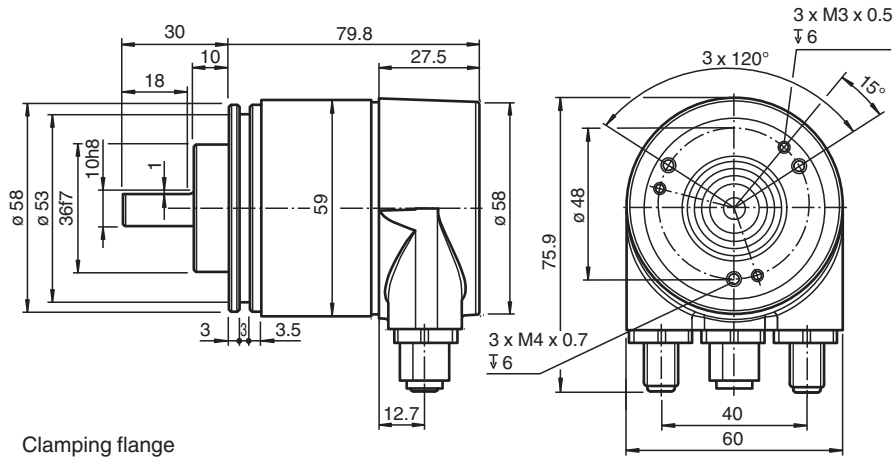
Front View Dimensions:

- Outer diameter of flange: $\varnothing 42$
- Three mounting holes: 3 x M4, 6 deep
- Angle between mounting holes: $3 \times 120^\circ$

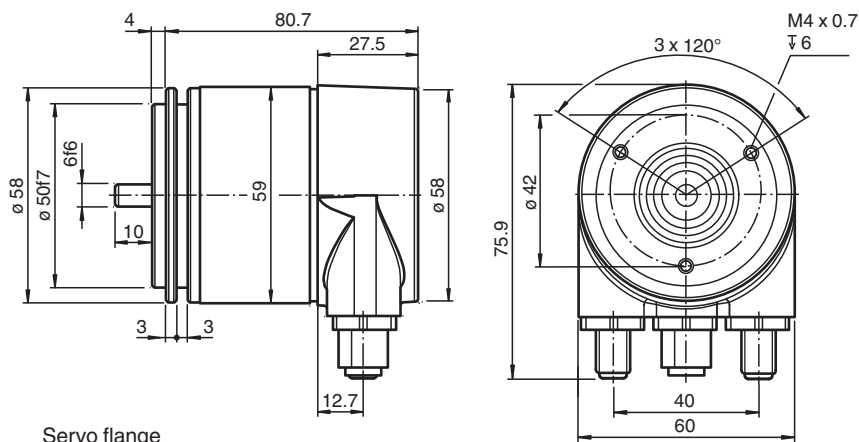
Labels:

- exit position axial
- Servo flange

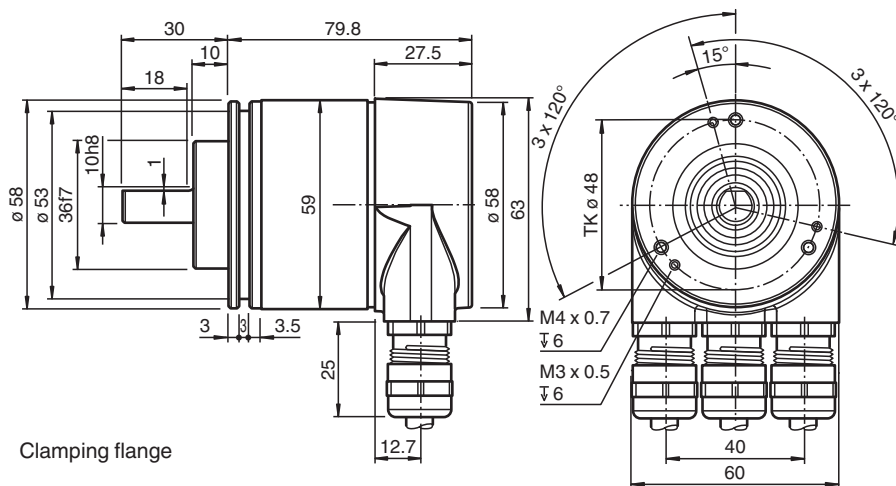
Dimensions



Clamping flange

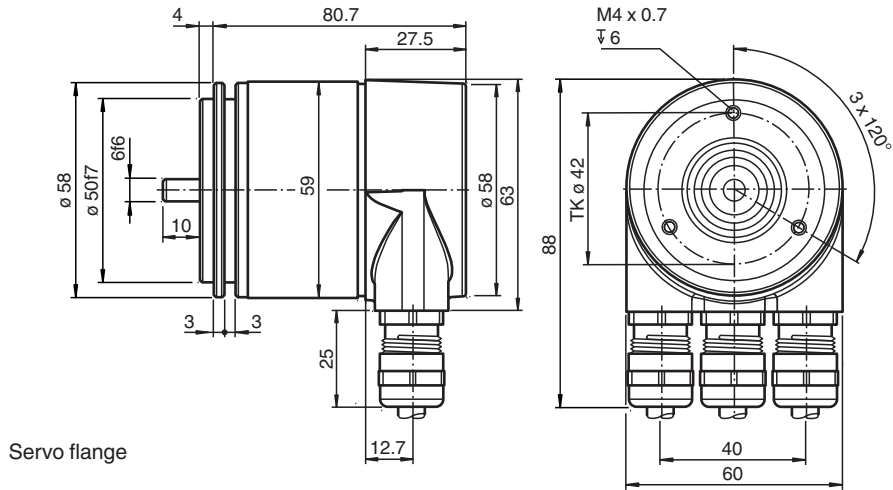


Servo flange



Clamping flange

Dimensions



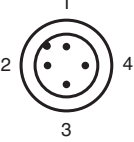
Technical Data

General specifications			
Detection type		magnetic sampling	
Device type		Absolute rotary encoder	
Linearity error		≤ ± 0.1 °	
UL File Number		E223176 "For use in NFPA 79 Applications only" , if UL marking is marked on the product.	
Electrical specifications			
Operating voltage	U _B	10 ... 30 V DC	
Power consumption	P ₀	approx. 2.5 W	
Time delay before availability	t _v	< 1000 ms	
Output code		binary code	
Code course (counting direction)		adjustable	
Interface			
Interface type		PROFIBUS DP DPV0, DPV1, DPV2	
Resolution			
Single turn		up to 16 Bit	
Multiturn		up to 14 Bit	
Overall resolution		up to 30 Bit	
Transfer rate		≤ 12 MBit/s	
Connection			
Connector		For model with axial connector outlet or connection cover with radial connector outlet: Profibus: 1 plug M12 x 1, 5-pin, B-coded; 1 socket M12 x 1, 5-pin, B-coded Supply: 1 plug M12 x 1, 4-pin, A-coded	
Terminal compartment		For model with connection cover with radial cable outlet	
Standard conformity			
Degree of protection		DIN EN 60529 , axial connector outlet: IP54 connection cover and shaft seal: IP66/IP67 connection cover, no shaft seal: IP65	
Climatic testing		DIN EN 60068-2-3, no moisture condensation	
Emitted interference		EN 61000-6-4:2007	
Noise immunity		EN 61000-6-2:2005	
Shock resistance		DIN EN 60068-2-27, 100 g, 6 ms	
Vibration resistance		DIN EN 60068-2-6, 10 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			

Technical Data

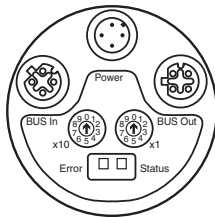
Operating temperature	-40 ... 85 °C (-40 ... 185 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)
Relative humidity	98 % , no moisture condensation
Mechanical specifications	
Material	
Housing	Zinc plated steel, painted
Flange	Aluminum
Shaft	Stainless steel
Mass	approx. 300 g for model without connection cover approx. 480 g for model with connection cover
Rotational speed	max. 12000 min ⁻¹ for IP54, IP65 max. 3000 min ⁻¹ for IP66/IP67
Moment of inertia	30 gcm ²
Starting torque	< 3 Ncm
Shaft load	
Axial	40 N
Radial	110 N
Accessories	
Designation	for model without connection cover : Terminator ICZ-TR-V15B, item number 127860 (optional)

Connection

Pin	Male connector M12 x 1, 4-pin, A-coded	Male connector M12 x 1, 5-pin, B-coded	Female connector M12 x 1, 5-pin, B-coded	Terminal	Explanation
1	Supply voltage +U _B	Not connected	+ 5 V for terminator (2P5)	⊥	Ground connection for power supply
2	Not connected	Data wire A, Bus IN	Data wire A, Bus Out	B (left)	Data line B (pair 1), Bus In
3	0 V	Not connected	GND for terminator (2M)	A (left)	Data line A (pair 1), Bus In
4	Not connected	Data wire B, Bus IN	Data wire B, Bus Out	(-)	0 V
5	-	Not connected	Not connected	(+)	10 V ... 30 V
		4	4	B (right)	Data line B (pair 2), Bus Out
				A (right)	Data line A (pair 2), Bus Out
				(-)	0 V
				(+)	10 V ... 30 V
					The supply lines only have to be connected once (regardless to which terminal). The outgoing bus is being uncoupled while the terminal resistor is on.

Operation

Model with axial connector outlet



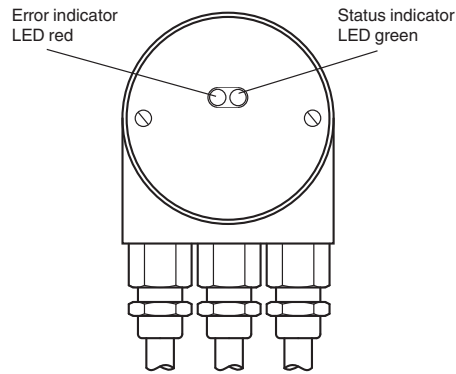
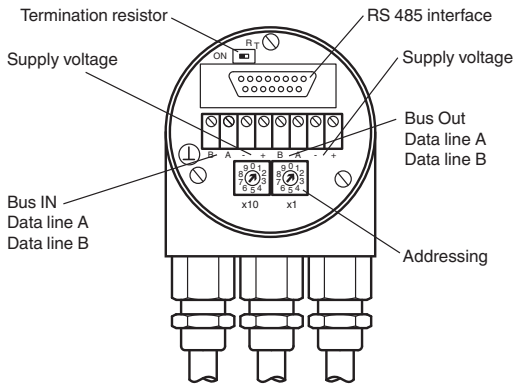
Adjusting the participant address

The participant address can be adjusted with the rotary switches. The address can be defined between 1 and 99, and may only be assigned once.

LED-indicators

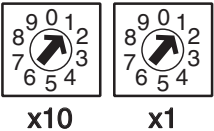
LED red	LED green	Meaning
off	off	No voltage supply
on	on	Encoder ready, no configuration data received. possible reasons: - wrong address adjusted - wrong bus wiring
on	flashing	Parameterising or configuration error. Encoder receives data of incorrect length or inconsistent data. possible reason: adjusted encoder resolution exceeds
flashing	on	Encoder ready, no communication with master (i.e. wrong address setting)
on	off	Data timeout (> 40 s). (i.e. data lines interrupted)
off	on	Normal operation, Data Exchange Mode
off	flashing	Installation Mode in Data Exchange Mode.

Model with connection cover



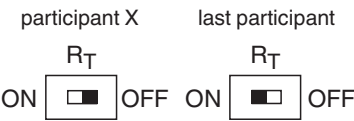
Adjusting the participant address

The participant address can be adjusted with the rotary switches. The address can be defined between 1 and 99, and may only be assigned once.



Adjusting the termination resistor

The terminating resistor R_T (220 Ω) can be connected to the circuit by means of the switch:



LED-indicators

LED red	LED green	Meaning
off	off	No voltage supply
on	on	Encoder ready, no configuration data received. possible reasons: - wrong address adjusted - wrong bus wiring
on	flashing	Parameterising or configuration error. Encoder receives data of incorrect length or inconsistent data. possible reason: adjusted encoder resolution exceeds
flashing	on	Encoder ready, no communication with master (i.e. wrong address setting)
on	off	Data timeout (> 40 s). (i.e. data lines interrupted)
off	on	Normal operation, Data Exchange Mode
off	flashing	Installation Mode in Data Exchange Mode.

Type Code

Model number

E	N	A	5	8	I	L	-	S							-					B	0	6	-				
Device type ENA Absolute rotary encoder Size 58 Housing diameter: 58 mm Version IL Industrial Line Shaft type S Solid shaft Shaft diameter 06 6 mm 10 10 mm Flange CA Clamping flange SA Servo flange Degree of protection 4 IP54 with axial connector outlet 5 IP65 with connection cover, no shaft seal 7 IP66/IP67 with connection cover and shaft seal Multiturn resolution 00 Singleturn rotary encoder 12 Multiturn rotary encoder, 12 bit 14 Multiturn rotary encoder, 14 bit Singleturn resolution 13 13 bit 16 16 bit Interface, electric B06 Profibus Connection type and alignment ABP axial, 2 plugs / 1 socket M12 x 1 RH1 radial, connection cover with terminal compartment and 3 x cable glands RH2 radial, connection cover with 2 plugs / 1 socket M12 x 1																											

Installation

Anti-interference measures

The use of highly sophisticated microelectronics requires a consistently implemented anti-interference and wiring concept. This becomes all the more important the more compact the constructions are and the higher the demands are on the performance of modern machines.

The following installation instructions and proposals apply for "normal industrial environments". There is no ideal solution for all interfering environments.

When the following measures are applied, the encoder should be in perfect working order:

- Termination of the serial line with a 120 Ω resistor (between Receive/Transmit and Receive/Transmit) at the beginning and end of the serial line (e. g. the control and the last encoder).
- The wiring of the encoder should be laid at a large distance to energy lines which could cause interferences.
- Cable cross-section of the screen at least 4 mm².
- Cable cross-section at least 0,14 mm².
- The wiring of the screen and 0 V should be arranged radially, if and when possible.
- Do not kink or jam the cables.
- Adhere to the minimum bending radius as given in the data sheet and avoid tensile as well as shearing load.

Operating instructions

Every encoder manufactured by Pepperl+Fuchs leaves the factory in a perfect condition. In order to ensure this quality as well as a faultless operation, the following specifications have to be taken into consideration:

- Avoid any impact on the housing and in particular on the encoder shaft as well as the axial and radial overload of the encoder shaft.
- The accuracy and service life of the encoder is guaranteed only, if a suitable coupling is used.
- The operating voltage for the encoder and the follow-up device (e. g. control) has to be switched on and off simultaneously.
- Any wiring work has to be carried out with the system in a dead condition.
- The maximum operating voltages must not be exceeded. The devices have to be operated at extra-low safety voltage.

Notes on connecting the electric screening

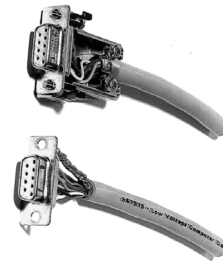
The immunity to interference of a plant depends on the correct screening. In this field installation faults occur frequently. Often the screen is applied to one side only, and is then soldered to the earthing terminal with a wire, which is a valid procedure in LF engineering. However, in case of EMC the rules of HF engineering apply.

One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

The following instructions have to be observed:

- Apply the screen on both sides to a "common earth" in a large surface, if there is no risk of equipotential currents.
- The screen has to be passed behind the insulation and has to be clamped on a large surface below the tension relief.
- In case of cable connections to screw-type terminals, the tension relief has to be connected to an earthed surface.
- If plugs are used, metallised plugs only should be fitted (such as sub D plugs with metallised housing). Please observe the direct connection of the tension relief to the housing.

Advantage:	metallised connector, shield
	clamped with the strain relief
	clamp
Disadvantage:	soldering shield on



Safety instructions

Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

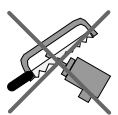
If failures cannot be remedied, the device has to be shut down and has to be secured against accidental operation. Repairs may be carried out only by the manufacturer. Entry into and modifications of the device are not permissible.

Tighten the clamping ring only, if a shaft has been fitted in the area of the clamping ring (hollow shaft encoders).

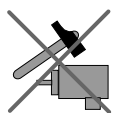
Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



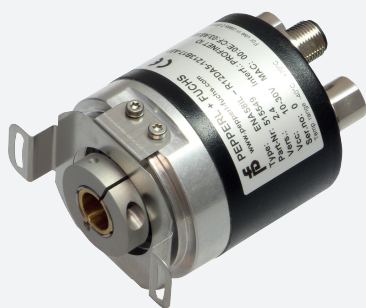
Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!



Absolute rotary encoder

ENA58IL-R***-Profibus

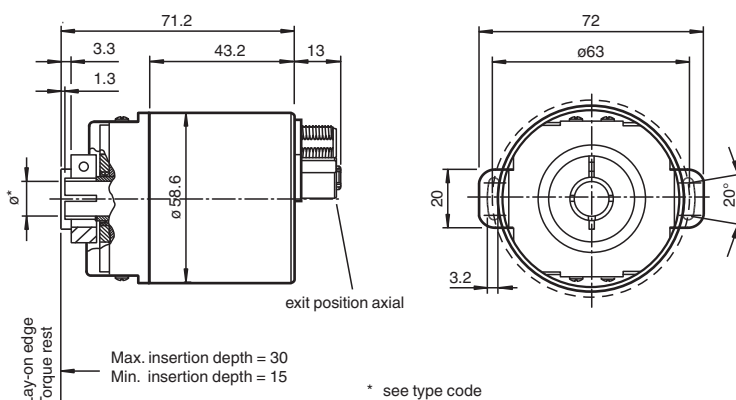
- Recessed hollow shaft
- 30 Bit multiturn
- Free of wear magnetic sampling
- High resolution and accuracy
- Mechanical compatibility with all major encoders with fieldbus interface
- Status LEDs



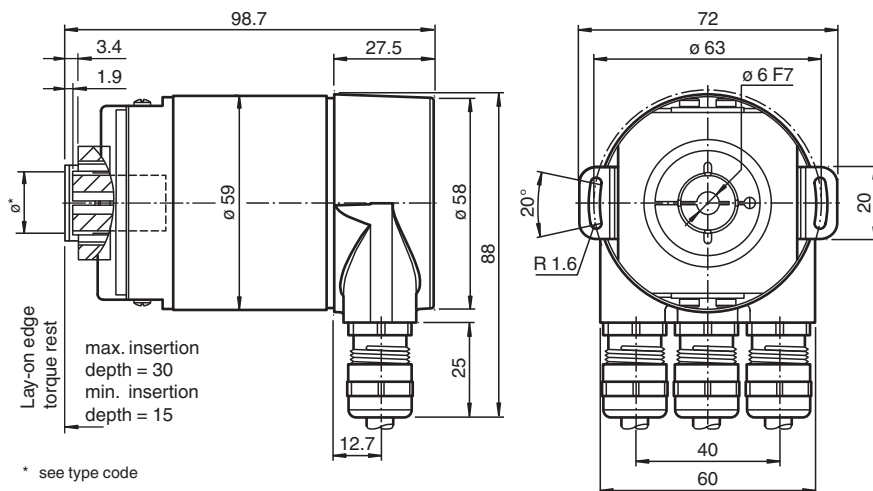
Function

The ENA58IL series with Profibus interface are high-precision rotary encoders with internal magnetic sampling. The most common mechanical interfaces are available in the ENA58IL series. For the electrical connection, models with connection cover and radial connector outlet or cable outlet or models with axial connector outlet are available. This versatility allows the use of the rotary encoder for all common applications.

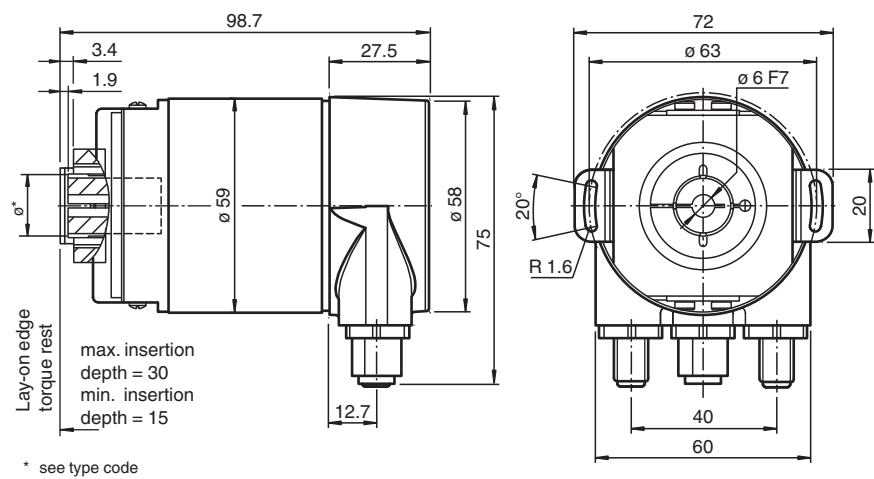
Dimensions



Recessed hollow shaft



Dimensions



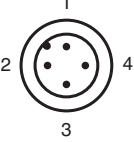
Technical Data

General specifications			
Detection type		magnetic sampling	
Device type		Absolute rotary encoder	
Linearity error		≤ ± 0.1 °	
UL File Number		E223176 "For use in NFPA 79 Applications only" , if UL marking is marked on the product.	
Electrical specifications			
Operating voltage	U _B	10 ... 30 V DC	
Power consumption	P ₀	approx. 2.5 W	
Time delay before availability	t _v	< 1000 ms	
Output code		binary code	
Code course (counting direction)		adjustable	
Interface			
Interface type		PROFIBUS DP DPV0, DPV1, DPV2	
Resolution			
Single turn		up to 16 Bit	
Multiturn		up to 14 Bit	
Overall resolution		up to 30 Bit	
Transfer rate		≤ 12 MBit/s	
Connection			
Connector		For model with axial connector outlet or connection cover with radial connector outlet: Profibus: 1 plug M12 x 1, 5-pin, B-coded; 1 socket M12 x 1, 5-pin, B-coded Supply: 1 plug M12 x 1, 4-pin, A-coded	
Terminal compartment		For model with connection cover with radial cable outlet	
Standard conformity			
Degree of protection		DIN EN 60529 , axial connector outlet: IP54 connection cover and shaft seal: IP66/IP67 connection cover, no shaft seal: IP65	
Climatic testing		DIN EN 60068-2-3, no moisture condensation	
Emitted interference		EN 61000-6-4:2007	
Noise immunity		EN 61000-6-2:2005	
Shock resistance		DIN EN 60068-2-27, 100 g, 6 ms	
Vibration resistance		DIN EN 60068-2-6, 10 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			

Technical Data

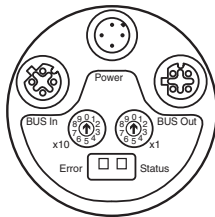
Operating temperature	-40 ... 85 °C (-40 ... 185 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)
Relative humidity	98 % , no moisture condensation
Mechanical specifications	
Material	
Housing	Zinc plated steel, painted
Flange	Aluminum
Shaft	Stainless steel
Mass	approx. 300 g for model without connection cover approx. 510 g for model with connection cover
Rotational speed	max. 12000 min ⁻¹ for IP54, IP65 max. 3000 min ⁻¹ for IP66/IP67
Moment of inertia	30 gcm ²
Starting torque	< 3 Ncm
Shaft load	
Axial	24 N
Radial	198 N
Angle offset	± 0.9 °
Axial offset	± 0.3 mm static
Radial offset	± 0.5 mm static
Accessories	
Designation	for model without connection cover : Terminator ICZ-TR-V15B, item number 127860 (optional)

Connection

Pin	Male connector M12 x 1, 4-pin, A-coded	Male connector M12 x 1, 5-pin, B-coded	Female connector M12 x 1, 5-pin, B-coded	Terminal	Explanation
1	Supply voltage $+U_B$	Not connected	+ 5 V for terminator (2P5)	$\perp$	Ground connection for power supply
2	Not connected	Data wire A, Bus IN	Data wire A, Bus Out	B (left)	Data line B (pair 1), Bus In
3	0 V	Not connected	GND for terminator (2M)	A (left)	Data line A (pair 1), Bus In
4	Not connected	Data wire B, Bus IN	Data wire B, Bus Out	(-)	0 V
5	-	Not connected	Not connected	(+)	10 V ... 30 V
		4	4	B (right)	Data line B (pair 2), Bus Out
				A (right)	Data line A (pair 2), Bus Out
				(-)	0 V
				(+)	10 V ... 30 V
					The supply lines only have to be connected once (regardless to which terminal). The outgoing bus is being uncoupled while the terminal resistor is on.

Operation

Model with axial connector outlet



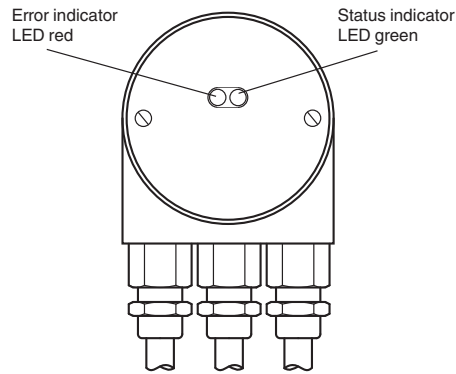
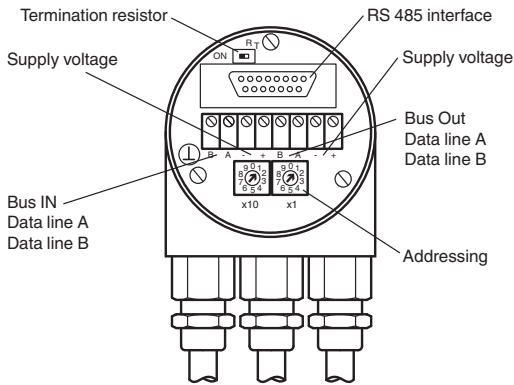
Adjusting the participant address

The participant address can be adjusted with the rotary switches. The address can be defined between 1 and 99, and may only be assigned once.

LED-indicators

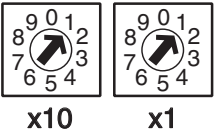
LED red	LED green	Meaning
off	off	No voltage supply
on	on	Encoder ready, no configuration data received. possible reasons: - wrong address adjusted - wrong bus wiring
on	flashing	Parameterising or configuration error. Encoder receives data of incorrect length or inconsistent data. possible reason: adjusted encoder resolution exceeds
flashing	on	Encoder ready, no communication with master (i.e. wrong address setting)
on	off	Data timeout (> 40 s). (i.e. data lines interrupted)
off	on	Normal operation, Data Exchange Mode
off	flashing	Installation Mode in Data Exchange Mode.

Model with connection cover



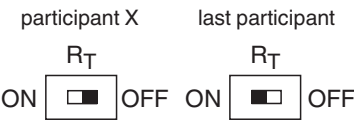
Adjusting the participant address

The participant address can be adjusted with the rotary switches. The address can be defined between 1 and 99, and may only be assigned once.



Adjusting the termination resistor

The terminating resistor R_T (220 Ω) can be connected to the circuit by means of the switch:



LED-indicators

LED red	LED green	Meaning
off	off	No voltage supply
on	on	Encoder ready, no configuration data received. possible reasons: - wrong address adjusted - wrong bus wiring
on	flashing	Parameterising or configuration error. Encoder receives data of incorrect length or inconsistent data. possible reason: adjusted encoder resolution exceeds
flashing	on	Encoder ready, no communication with master (i.e. wrong address setting)
on	off	Data timeout (> 40 s). (i.e. data lines interrupted)
off	on	Normal operation, Data Exchange Mode
off	flashing	Installation Mode in Data Exchange Mode.

Type Code

Model number

E	N	A	5	8	I	L	-	R			D	A		-				B	0	6	-						
																								Connection type and alignment			
																								ABP axial, 2 plugs / 1 socket M12 x 1			
																								RH1 radial, connection cover with terminal compartment and 3 x cable glands			
																								RH2 radial, connection cover with 2 plugs / 1 socket M12 x 1			
																								Interface, electric			
																								B06 Profibus			
																								Singleturn resolution			
																								13 13 bit			
																								16 16 bit			
																								Multiturn resolution			
																								00 Singleturn rotary encoder			
																								12 Multiturn rotary encoder, 12 bit			
																								14 Multiturn rotary encoder, 14 bit			
																								Degree of protection			
																								4 IP54 with axial connector outlet			
																								5 IP65 with connection cover, no shaft seal			
																								7 IP66/IP67 with connection cover and shaft seal			
																								Flange			
																								DA Dual spring plate			
																								Shaft diameter			
																								06 6 mm (d = 6F7)			
																								10 10 mm (d = 10F7)			
																								12 12 mm (d = 12F7)			
																								14 14 mm (d = 14F7)			
																								15 15 mm (d = 15F7)			
																								Shaft type			
																								R Recessed hollow shaft			
																								Version			
																								IL Industrial Line			
																								Size			
																								58 Housing diameter: 58 mm			
																								Device type			
																								ENA Absolute rotary encoder			

Installation

Anti-interference measures

The use of highly sophisticated microelectronics requires a consistently implemented anti-interference and wiring concept. This becomes all the more important the more compact the constructions are and the higher the demands are on the performance of modern machines.

The following installation instructions and proposals apply for "normal industrial environments". There is no ideal solution for all interfering environments.

When the following measures are applied, the encoder should be in perfect working order:

- Termination of the serial line with a 120 Ω resistor (between Receive/Transmit and Receive/Transmit) at the beginning and end of the serial line (e. g. the control and the last encoder).
- The wiring of the encoder should be laid at a large distance to energy lines which could cause interferences.
- Cable cross-section of the screen at least 4 mm².
- Cable cross-section at least 0,14 mm².
- The wiring of the screen and 0 V should be arranged radially, if and when possible.
- Do not kink or jam the cables.
- Adhere to the minimum bending radius as given in the data sheet and avoid tensile as well as shearing load.

Operating instructions

Every encoder manufactured by Pepperl+Fuchs leaves the factory in a perfect condition. In order to ensure this quality as well as a faultless operation, the following specifications have to be taken into consideration:

- Avoid any impact on the housing and in particular on the encoder shaft as well as the axial and radial overload of the encoder shaft.
- The accuracy and service life of the encoder is guaranteed only, if a suitable coupling is used.
- The operating voltage for the encoder and the follow-up device (e. g. control) has to be switched on and off simultaneously.
- Any wiring work has to be carried out with the system in a dead condition.
- The maximum operating voltages must not be exceeded. The devices have to be operated at extra-low safety voltage.

Notes on connecting the electric screening

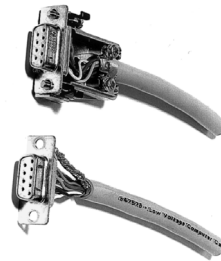
The immunity to interference of a plant depends on the correct screening. In this field installation faults occur frequently. Often the screen is applied to one side only, and is then soldered to the earthing terminal with a wire, which is a valid procedure in LF engineering. However, in case of EMC the rules of HF engineering apply.

One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

The following instructions have to be observed:

- Apply the screen on both sides to a "common earth" in a large surface, if there is no risk of equipotential currents.
- The screen has to be passed behind the insulation and has to be clamped on a large surface below the tension relief.
- In case of cable connections to screw-type terminals, the tension relief has to be connected to an earthed surface.
- If plugs are used, metallised plugs only should be fitted (such as sub D plugs with metallised housing). Please observe the direct connection of the tension relief to the housing.

Advantage:	metallised connector, shield
	clamped with the strain relief
	clamp
Disadvantage:	soldering shield on



Safety instructions

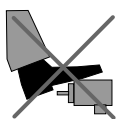
Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

If failures cannot be remedied, the device has to be shut down and has to be secured against accidental operation.

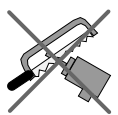
Repairs may be carried out only by the manufacturer. Entry into and modifications of the device are not permissible.

Tighten the clamping ring only, if a shaft has been fitted in the area of the clamping ring (hollow shaft encoders).

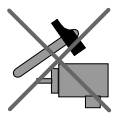
Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!



Absolute rotary encoder

ENA58IL-S***-B17

- Solid shaft
- 30 Bit multiturn
- Free of wear magnetic sampling
- High resolution and accuracy
- Mechanical compatibility with all major encoders with fieldbus interface
- Status LEDs

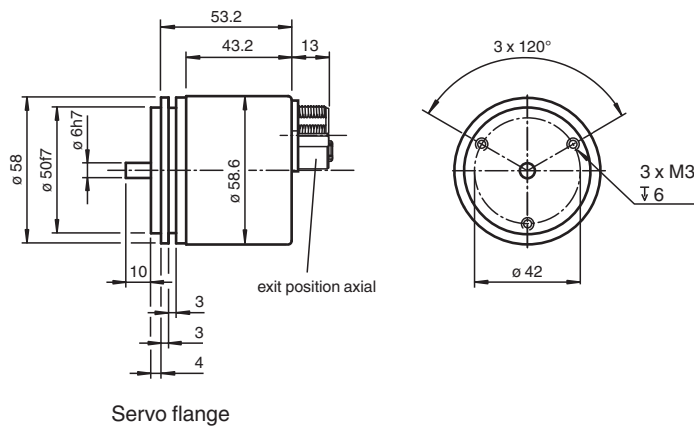
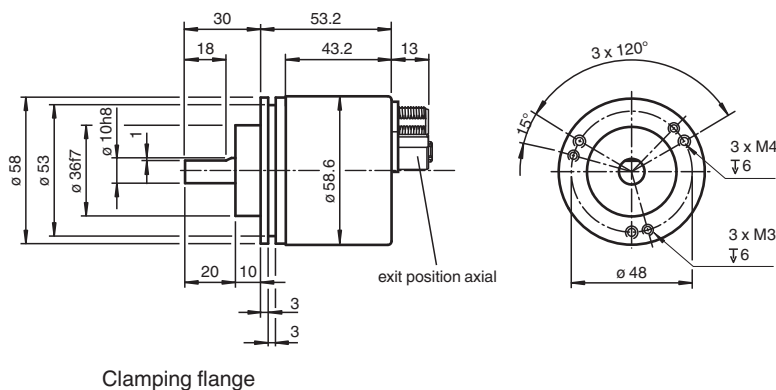
Absolute rotary encoder with magnetic sampling and PROFINET interface



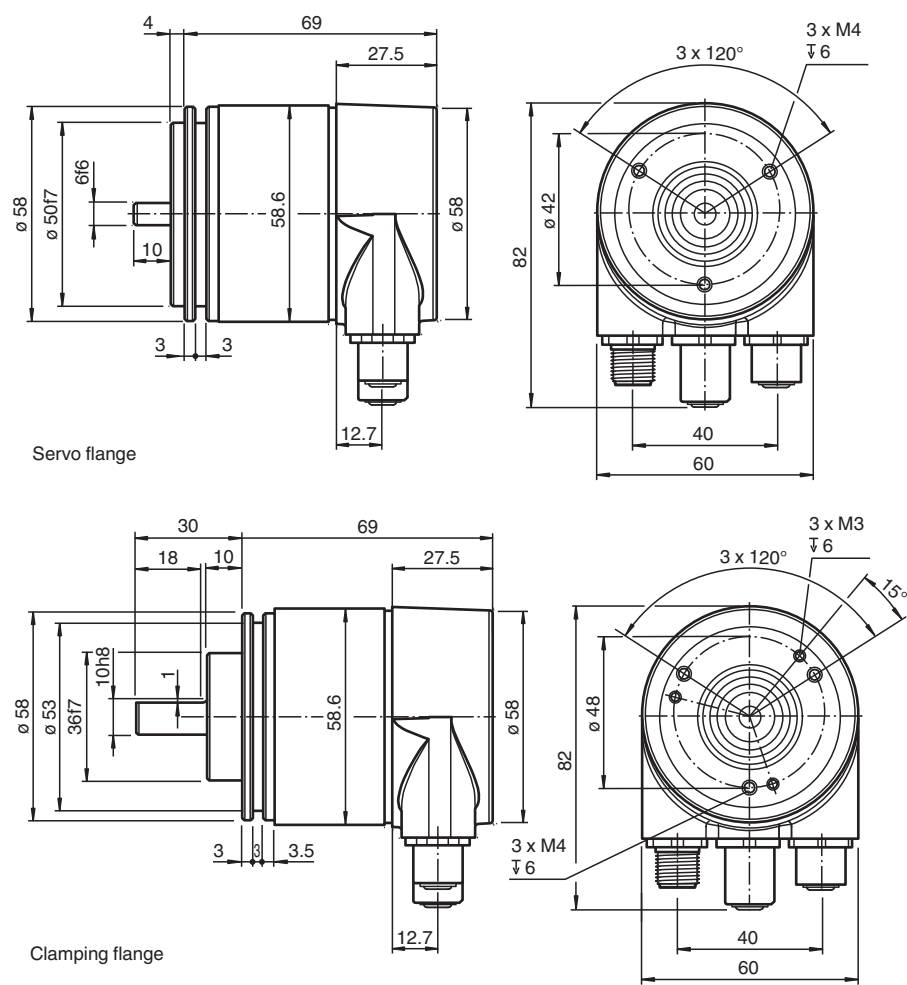
Function

The absolute rotary encoders with PROFINET IO interface and magnetic sampling can be used in all PROFINET applications. Thanks to the Encoder Profile 4.2 and the IRT mode, they are ideally suited for I4.0 applications.

Dimensions



Dimensions



Technical Data

General specifications		
Detection type		magnetic sampling
Device type		Absolute rotary encoder
Linearity error		≤ ± 0.1 °
UL File Number		E223176 "For use in NFPA 79 Applications only" , if UL marking is marked on the product.
Electrical specifications		
Operating voltage	U _B	10 ... 30 V DC
Power consumption	P ₀	approx. 4 W
Time delay before availability	t _v	< 15 s
Output code		binary code
Code course (counting direction)		programmable, cw ascending (clockwise rotation, code course ascending) cw descending (clockwise rotation, code course descending)
Interface		
Interface type		PROFINET IO
Device profile		Encoder Profile V4.2
Resolution		
Single turn		up to 16 Bit
Multiturn		up to 14 Bit
Overall resolution		up to 30 Bit
Transfer rate		100 MBit/s
Cycle time		≥ 250 μs

Release date: 2023-12-20 Date of issue: 2023-12-20 Filename: t209827_eng.pdf

Technical Data

Connection		
Connector		Ethernet: 2 sockets M12 x 1, 4-pin, D-coded Supply: 1 plug M12 x 1, 4-pin, A-coded
Standard conformity		
Degree of protection		DIN EN 60529, IP65, IP66, IP67
Climatic testing		DIN EN 60068-2-3, no moisture condensation
Emitted interference		EN 61000-6-4:2007
Noise immunity		EN 61000-6-2:2005
Shock resistance		DIN EN 60068-2-27, 100 g, 6 ms
Vibration resistance		DIN EN 60068-2-6, 10 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		Zinc plated steel, painted
Flange		Aluminum
Shaft		Stainless steel
Mass		approx. 300 g
Rotational speed		max. 12000 min ⁻¹ for IP65 max. 3000 min ⁻¹ for IP66/IP67
Moment of inertia		50 gcm ²
Starting torque		< 5 Ncm
Shaft load		
Axial		40 N
Radial		110 N

Type Code

Structure of the type code

E	N	A	5	8	I	L	-	S	(1)	(1)	(2)	(2)	(3)	-	(4)	(4)	(5)	(5)	B	1	7	-	(6)	(6)	(6)
---	---	---	---	---	---	---	---	---	-----	-----	-----	-----	-----	---	-----	-----	-----	-----	---	---	---	---	-----	-----	-----

ENA	Device type
ENA	Absolute rotary encoder

58	Size
58	Housing diameter 58 mm

IL	Version
IL	Industrial Line

S	Shaft type
S	Solid shaft

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

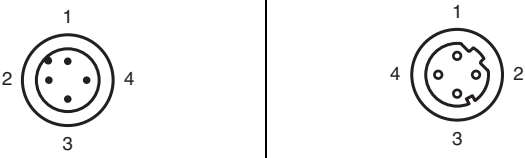
(2) (2)	Flange
CA	Clamping flange
SA	Servo flange

(3)	Degree of protection
5	IP65
7	IP67

Type Code

(4) (4)	Multiturn resolution
00	Singleturn rotary encoder
12	Multiturn rotary encoder, 12 bit
14	Multiturn rotary encoder, 14 bit
(5) (5)	Singleturn resolution
13	13 Bit
16	16 Bit
B17	Interface, electric
B17	PROFINET
(6) (6) (6)	Connection type
ABP	Axial connection alignment, 2 Sockets / plug M12 x 1
RH2	Radial connection alignment, Bus cover with 2 sockets / plug M12 x 1

Connection

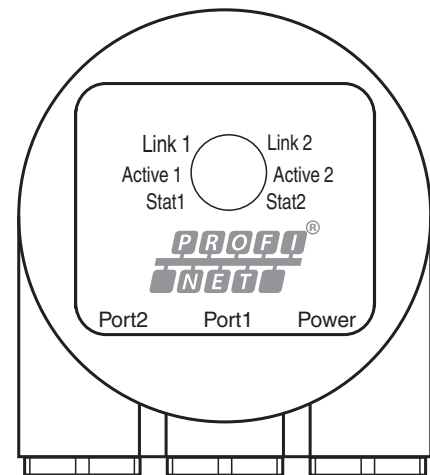
Pin	Male connector M12 x 1, 4-pin, A-coded	Female connector M12 x 1, 4-pin, D-coded
1	Supply voltage +U _B	Tx +
2	-	Rx +
3	0 V	Tx -
4	-	Rx -
		

Indication

Diagnostic LEDs

LED	Color	Description for LED = ON
Active1	Yellow	Incoming and outgoing data traffic for port 1
Link1*	Green	Connection to other Ethernet devices on port 1
Active2	Yellow	Incoming and outgoing data traffic for port 2
Link2*	Green	Connection to other Ethernet devices on port 2
Stat1	Green	Status 1, details see table below
Stat2	Red	Status 2, details see table below

* flashes with 2 Hz if engineering identification call is activated and link connection is available



Stat1 (green)	Stat2 (red) bus failure	Meaning	Cause
off	off	No power	
on	on	No connection to another device Criteria: no data exchange	- bus disconnected - Master not available / switched off
on	flashes ¹⁾	Parameterization fault, no data exchange Criteria: data exchange correct. However, the slave did not switch to the data exchange mode.	- Slave not configured yet or wrong configuration - Wrong station address assigned (but not outside the permitted range) - Actual configuration of the slave differs from the nominal configuration
on	off	Data exchange. Slave and operation ok.	

1) flashing frequency 0.5 Hz for at least 3 seconds



Absolute rotary encoder

ENA58IL-R***-B17

- Recessed hollow shaft
- 30 Bit multiturn
- Free of wear magnetic sampling
- High resolution and accuracy
- Mechanical compatibility with all major encoders with fieldbus interface
- Status LEDs

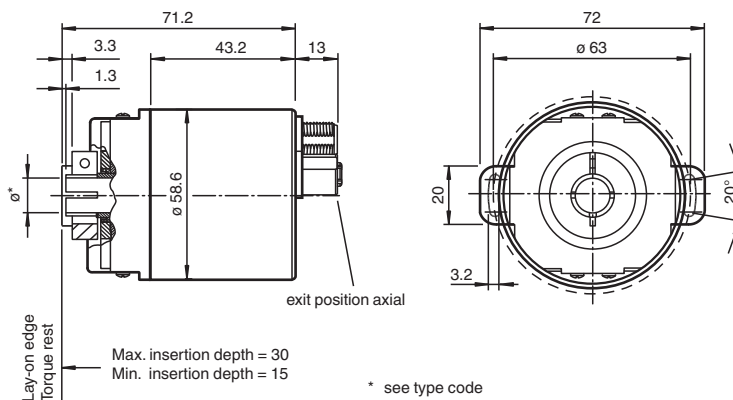
Absolute rotary encoder with magnetic sampling and PROFINET interface



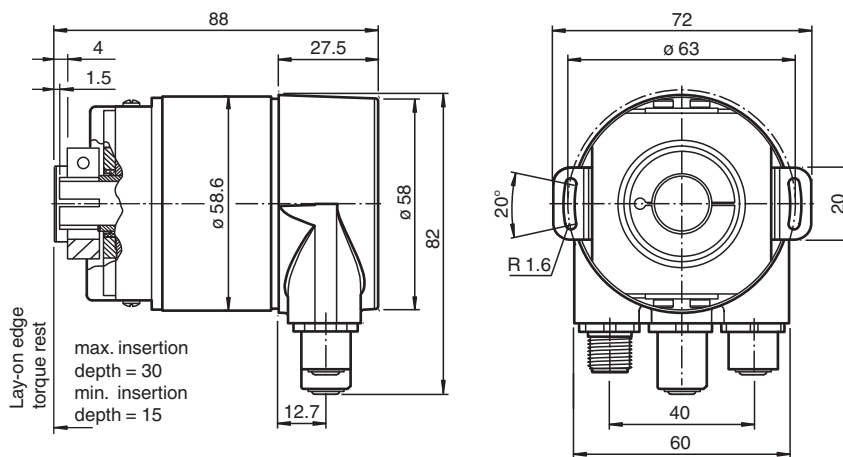
Function

The absolute rotary encoders with PROFINET IO interface and magnetic sampling can be used in all PROFINET applications. Thanks to the Encoder Profile 4.2 and the IRT mode, they are ideally suited for I4.0 applications.

Dimensions



Recessed hollow shaft



Recessed hollow shaft

Technical Data

General specifications

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

Electrical specifications

Operating voltage	U _B	10 ... 30 V DC
Power consumption	P ₀	approx. 4 W
Time delay before availability	t _v	< 15 s
Output code	binary code	
Code course (counting direction)		programmable, cw ascending (clockwise rotation, code course ascending) cw descending (clockwise rotation, code course descending)

Interface

Interface type	PROFINET IO
Device profile	Encoder Profile V4.2
Resolution	
Single turn	up to 16 Bit
Multiturn	up to 14 Bit
Overall resolution	up to 30 Bit
Transfer rate	100 MBit/s
Cycle time	$\geq 250 \mu s$

Connection

Connector	Ethernet: 2 sockets M12 x 1, 4-pin, D-coded Supply: 1 plug M12 x 1, 4-pin, A-coded
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Standard conformity

Degree of protection	DIN EN 60529, IP65, IP66, IP67
Climatic testing	DIN EN 60068-2-3, no moisture condensation
Emitted interference	EN 61000-6-4:2007
Noise immunity	EN 61000-6-2:2005
Shock resistance	DIN EN 60068-2-27, 100 g, 6 ms
Vibration resistance	DIN EN 60068-2-6, 10 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.
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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	Zinc plated steel, painted
Flange	Aluminum
Shaft	Stainless steel
Mass	approx. 300 g
Rotational speed	max. 12000 min ⁻¹ for IP65 max. 3000 min ⁻¹ for IP66/IP67
Moment of inertia	50 gcm ²
Starting torque	< 5 Ncm
Shaft load	
Axial	24 N
Radial	198 N
Angle offset	$\pm 0.9^\circ$
Axial offset	± 0.3 mm static

Release date: 2023-12-20 Date of issue: 2023-12-20 Filename: t209826_eng.pdf

Technical Data

Radial offset

± 0.5 mm static

Type Code

Structure of the type code

E	N	A	5	8	I	L	-	R	(1)	(1)	D	A	(2)	-	(3)	(3)	(4)	(4)	B	1	7	-	(5)	(5)	(5)
---	---	---	---	---	---	---	---	---	-----	-----	---	---	-----	---	-----	-----	-----	-----	---	---	---	---	-----	-----	-----

ENA	Device type
ENA	Absolute rotary encoder

58	Size
58	Housing diameter 58 mm

IL	Version
IL	Industrial Line

R	Shaft type
R	Recessed hollow shaft

(1) (1)	Shaft diameter
06	6 mm (d = 6F7)
10	10 mm (d = 10F7)
12	12 mm (d = 12F7)
14	14 mm (d = 14F7)
15	15 mm (d = 15F7)

DA	Flange
DA	Dual spring plate

(2)	Degree of protection
5	IP65
7	IP67

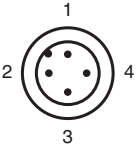
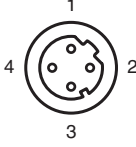
(3) (3)	Multiturn resolution
00	Singleturn rotary encoder
12	Multiturn rotary encoder, 12 bit
14	Multiturn rotary encoder, 14 bit

(4) (4)	Singleturn resolution
13	13 Bit
16	16 Bit

B17	Interface, electric
B17	PROFINET

(5) (5) (5)	Connection type
ABP	Axial connection alignment, 2 Sockets / plug M12 x 1
RH2	Radial connection alignment, Bus cover with 2 sockets / plug M12 x 1

Connection

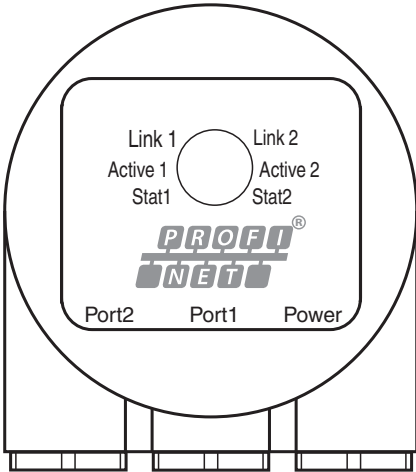
Pin	Male connector M12 x 1, 4-pin, A-coded	Female connector M12 x 1, 4-pin, D-coded
1	Supply voltage +U _B	Tx +
2	-	Rx +
3	0 V	Tx -
4	-	Rx -
 		

Indication

Diagnostic LEDs

LED	Color	Description for LED = ON
Active1	Yellow	Incoming and outgoing data traffic for port 1
Link1*	Green	Connection to other Ethernet devices on port 1
Active2	Yellow	Incoming and outgoing data traffic for port 2
Link2*	Green	Connection to other Ethernet devices on port 2
Stat1	Green	Status 1, details see table below
Stat2	Red	Status 2, details see table below

* flashes with 2 Hz if engineering identification call is activated and link connection is available



Stat1 (green)	Stat2 (red) bus failure	Meaning	Cause
off	off	No power	
on	on	No connection to another device Criteria: no data exchange	• bus disconnected • Master not available / switched off
on	flashes ¹⁾	Parameterization fault, no data exchange Criteria: data exchange correct. However, the slave did not switch to the data exchange mode.	• Slave not configured yet or wrong configuration • Wrong station address assigned (but not outside the permitted range) • Actual configuration of the slave differs from the nominal configuration
on	off	Data exchange. Slave and operation ok.	

1) flashing frequency 0.5 Hz for at least 3 seconds



Absolute rotary encoder ENA58IL-S***-EtherCAT

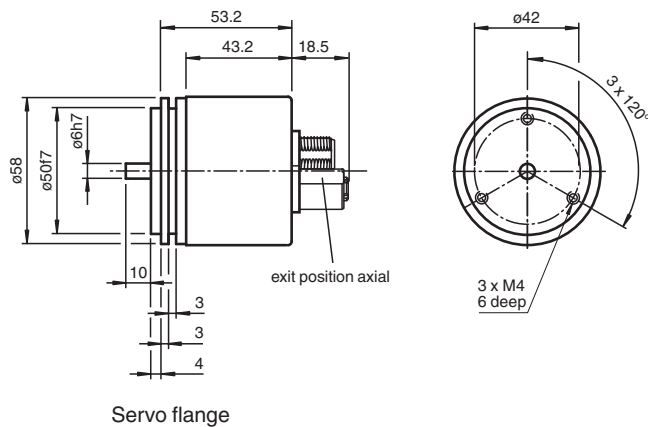
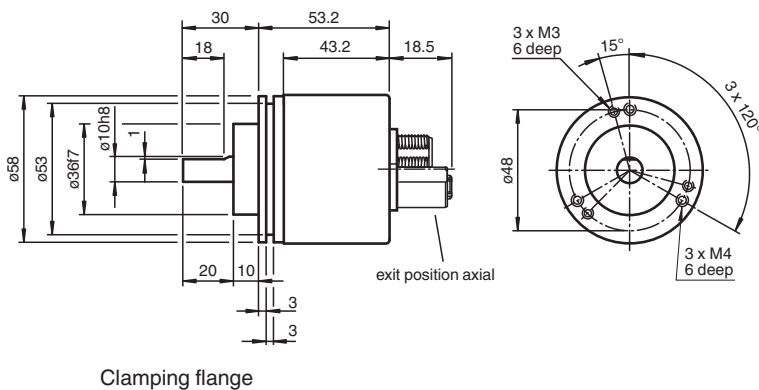
- Solid shaft
- 30 Bit multiturn
- Free of wear magnetic sampling
- High resolution and accuracy
- Mechanical compatibility with all major encoders with fieldbus interface
- Status LEDs



Function

The ENA58IL series are high precision encoders with internal magnetic sampling.

Dimensions



Technical Data

General specifications

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

Electrical specifications

Operating voltage	U_B	10 ... 30 V DC
Power consumption	P_0	approx. 4 W
Time delay before availability	t_v	< 250 ms
Output code		binary code
Code course (counting direction)		adjustable

Interface

Interface type		EtherCAT® CoE (CANopen over EtherCAT, according to CiA DS-301 and DS-406 device profile CiA)
Resolution		
Single turn		up to 16 Bit
Multiturn		up to 14 Bit
Overall resolution		up to 30 Bit
Transfer rate		10 MBit/s / 100 MBit/s

Connection

Connector	Ethernet: 2 sockets M12 x 1, 4-pin, D-coded Supply: 1 plug M12 x 1, 4-pin, A-coded
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Standard conformity

Degree of protection	DIN EN 60529, IP65, IP67
Climatic testing	DIN EN 60068-2-3, no moisture condensation
Emitted interference	EN 61000-6-4:2007
Noise immunity	EN 61000-6-2:2005
Shock resistance	DIN EN 60068-2-27, 100 g, 6 ms
Vibration resistance	DIN EN 60068-2-6, 10 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.
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Ambient conditions

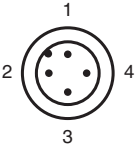
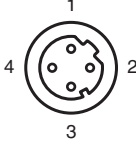
Operating temperature	-40 ... 85 °C (-40 ... 185 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)
Relative humidity	98 %, no moisture condensation

Mechanical specifications

Material	
Housing	Zinc plated steel, painted
Flange	Aluminum
Shaft	Stainless steel
Mass	approx. 300 g
Rotational speed	max. 12000 min ⁻¹
Moment of inertia	50 gcm ²
Starting torque	< 5 Ncm
Shaft load	
Axial	40 N
Radial	110 N

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t174281_eng.pdf

Connection

Pin	Male connector M12 x 1, 4-pin, A-coded	Female connector M12 x 1, 4-pin, D-coded
1	Supply voltage +U _B	Tx +
2	-	Rx +
3	0 V	Tx -
4	-	Rx -
 		

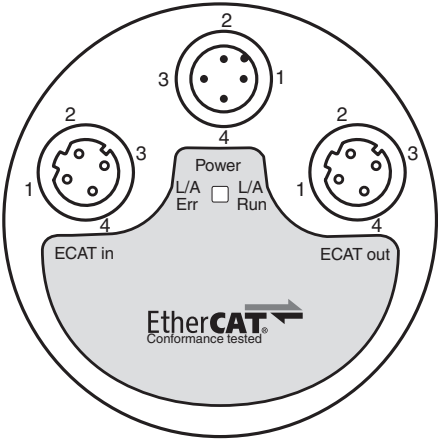
Indication

Port LEDs

LED	Color	Status	Description
Link/Act IN	green	on	LINK active for HUB port 1
		blinking	Activity on HUB port 1
Link/Act OUT	green	on	LINK active for HUB port 2
		blinking	Activity on HUB port 2

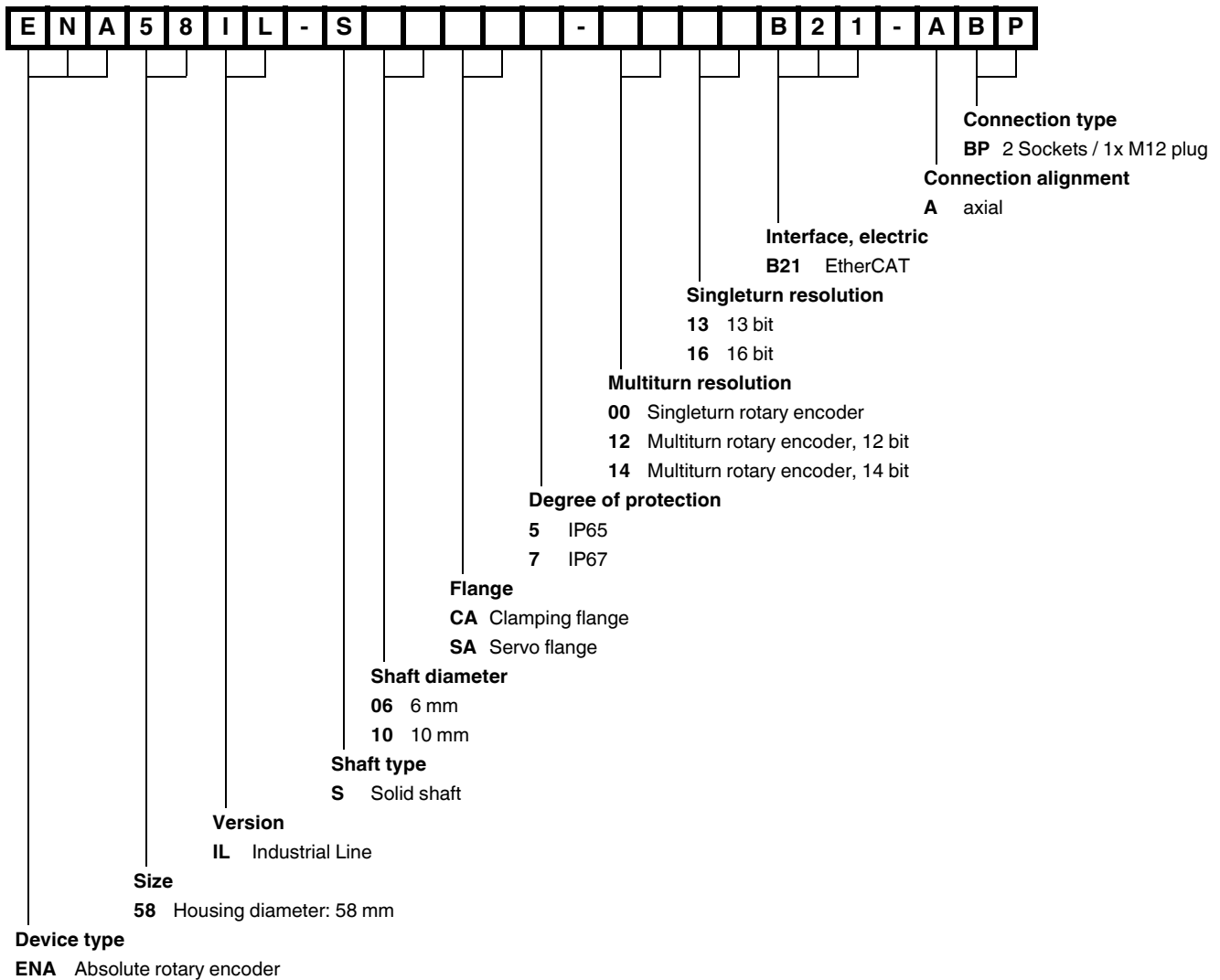
EtherCAT LEDs

LED	Color	Status	Description
Error	red	off	no error
		blinking	invalid configuration
		single flash	local error
		double flash	process data watchdog timeout/ EtherCAT watchdog timeout
		flickering	booting error
		on	application failure
Run	green	off	initialization
		blinking	Pre-Operational
		single flash	Safe-Operational
		flickering	initialization or bootstrap
		on	Operational



Type Code

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t174281_eng.pdf



Installation

Anti-interference measures

The use of highly sophisticated microelectronics requires a consistently implemented anti-interference and wiring concept. This becomes all the more important the more compact the constructions are and the higher the demands are on the performance of modern machines.

The following installation instructions and proposals apply for "normal industrial environments". There is no ideal solution for all interfering environments.

When the following measures are applied, the encoder should be in perfect working order:

- Termination of the serial line with a 120 Ω resistor (between Receive/Transmit and Receive/Transmit) at the beginning and end of the serial line (e. g. the control and the last encoder).
- The wiring of the encoder should be laid at a large distance to energy lines which could cause interferences.
- Cable cross-section of the screen at least 4 mm².
- Cable cross-section at least 0,14 mm².
- The wiring of the screen and 0 V should be arranged radially, if and when possible.
- Do not kink or jam the cables.
- Adhere to the minimum bending radius as given in the data sheet and avoid tensile as well as shearing load.

Operating instructions

Every encoder manufactured by Pepperl+Fuchs leaves the factory in a perfect condition. In order to ensure this quality as well as a faultless operation, the following specifications have to be taken into consideration:

- Avoid any impact on the housing and in particular on the encoder shaft as well as the axial and radial overload of the encoder shaft.
- The accuracy and service life of the encoder is guaranteed only, if a suitable coupling is used.
- The operating voltage for the encoder and the follow-up device (e. g. control) has to be switched on and off simultaneously.
- Any wiring work has to be carried out with the system in a dead condition.
- The maximum operating voltages must not be exceeded. The devices have to be operated at extra-low safety voltage.

Notes on connecting the electric screening

The immunity to interference of a plant depends on the correct screening. In this field installation faults occur frequently. Often the screen is applied to one side only, and is then soldered to the earthing terminal with a wire, which is a valid procedure in LF engineering. However, in case of EMC the rules of HF engineering apply.

One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

The following instructions have to be observed:

- Apply the screen on both sides to a "common earth" in a large surface, if there is no risk of equipotential currents.
- The screen has to be passed behind the insulation and has to be clamped on a large surface below the tension relief.
- In case of cable connections to screw-type terminals, the tension relief has to be connected to an earthed surface.
- If plugs are used, metallised plugs only should be fitted (such as sub D plugs with metallised housing). Please observe the direct connection of the tension relief to the housing.

Advantage:	metallised connector, shield
	clamped with the strain relief
	clamp
Disadvantage:	soldering shield on



Safety instructions

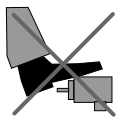
Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

If failures cannot be remedied, the device has to be shut down and has to be secured against accidental operation.

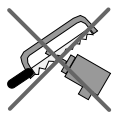
Repairs may be carried out only by the manufacturer. Entry into and modifications of the device are not permissible.

Tighten the clamping ring only, if a shaft has been fitted in the area of the clamping ring (hollow shaft encoders).

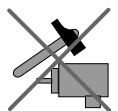
Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



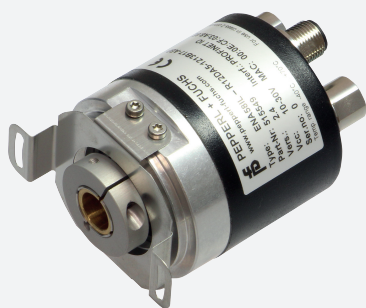
Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!



Absolute rotary encoder ENA58IL-R***-EtherCAT

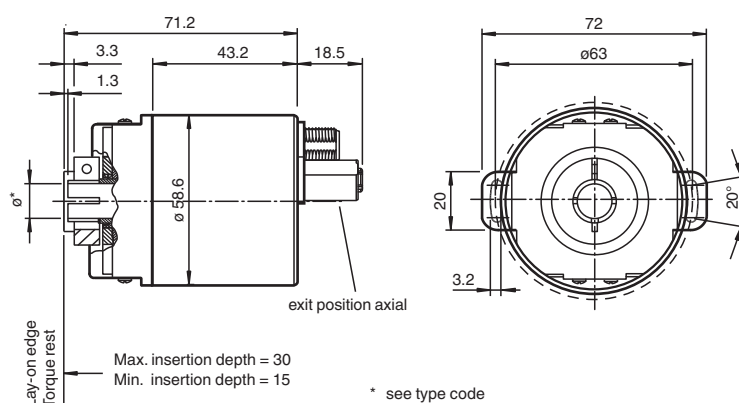
- Recessed hollow shaft
- 30 Bit multiturn
- Free of wear magnetic sampling
- High resolution and accuracy
- Mechanical compatibility with all major encoders with fieldbus interface
- Status LEDs



Function

The ENA58IL series are high precision encoders with internal magnetic sampling.

Dimensions



Recessed hollow shaft

Technical Data

General specifications

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

Electrical specifications

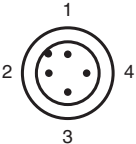
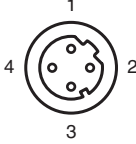
Operating voltage	U_B	10 ... 30 V DC
Power consumption	P_0	approx. 4 W
Time delay before availability	t_v	< 250 ms
Output code		binary code
Code course (counting direction)		adjustable

Interface

Technical Data

Interface type	EtherCAT® CoE (CANopen over EtherCAT, according to CiA DS-301 and DS-406 device profile CiA)
Resolution	
Single turn	up to 16 Bit
Multiturn	up to 14 Bit
Overall resolution	up to 30 Bit
Transfer rate	10 MBit/s / 100 MBit/s
Connection	
Connector	Ethernet: 2 sockets M12 x 1, 4-pin, D-coded Supply: 1 plug M12 x 1, 4-pin, A-coded
Standard conformity	
Degree of protection	DIN EN 60529, IP65, IP66, IP67
Climatic testing	DIN EN 60068-2-3, no moisture condensation
Emitted interference	EN 61000-6-4:2007
Noise immunity	EN 61000-6-2:2005
Shock resistance	DIN EN 60068-2-27, 100 g, 6 ms
Vibration resistance	DIN EN 60068-2-6, 10 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	Zinc plated steel, painted
Flange	Aluminum
Shaft	Stainless steel
Mass	approx. 300 g
Rotational speed	max. 12000 min ⁻¹
Moment of inertia	50 gcm ²
Starting torque	< 5 Ncm
Shaft load	
Axial	24 N
Radial	198 N
Angle offset	± 0.9 °
Axial offset	± 0.3 mm static
Radial offset	± 0.5 mm static

Connection

Pin	Male connector M12 x 1, 4-pin, A-coded	Female connector M12 x 1, 4-pin, D-coded
1	Supply voltage +U _B	Tx +
2	-	Rx +
3	0 V	Tx -
4	-	Rx -
 		

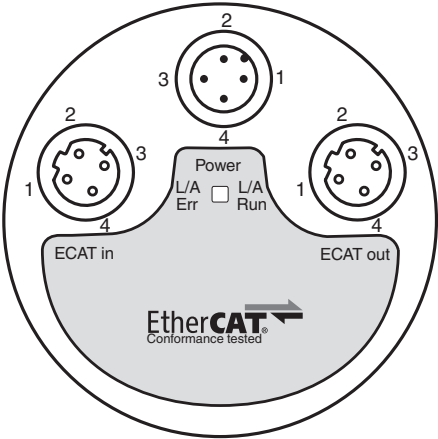
Indication

Port LEDs

LED	Color	Status	Description
Link/Act IN	green	on	LINK active for HUB port 1
		blinking	Activity on HUB port 1
Link/Act OUT	green	on	LINK active for HUB port 2
		blinking	Activity on HUB port 2

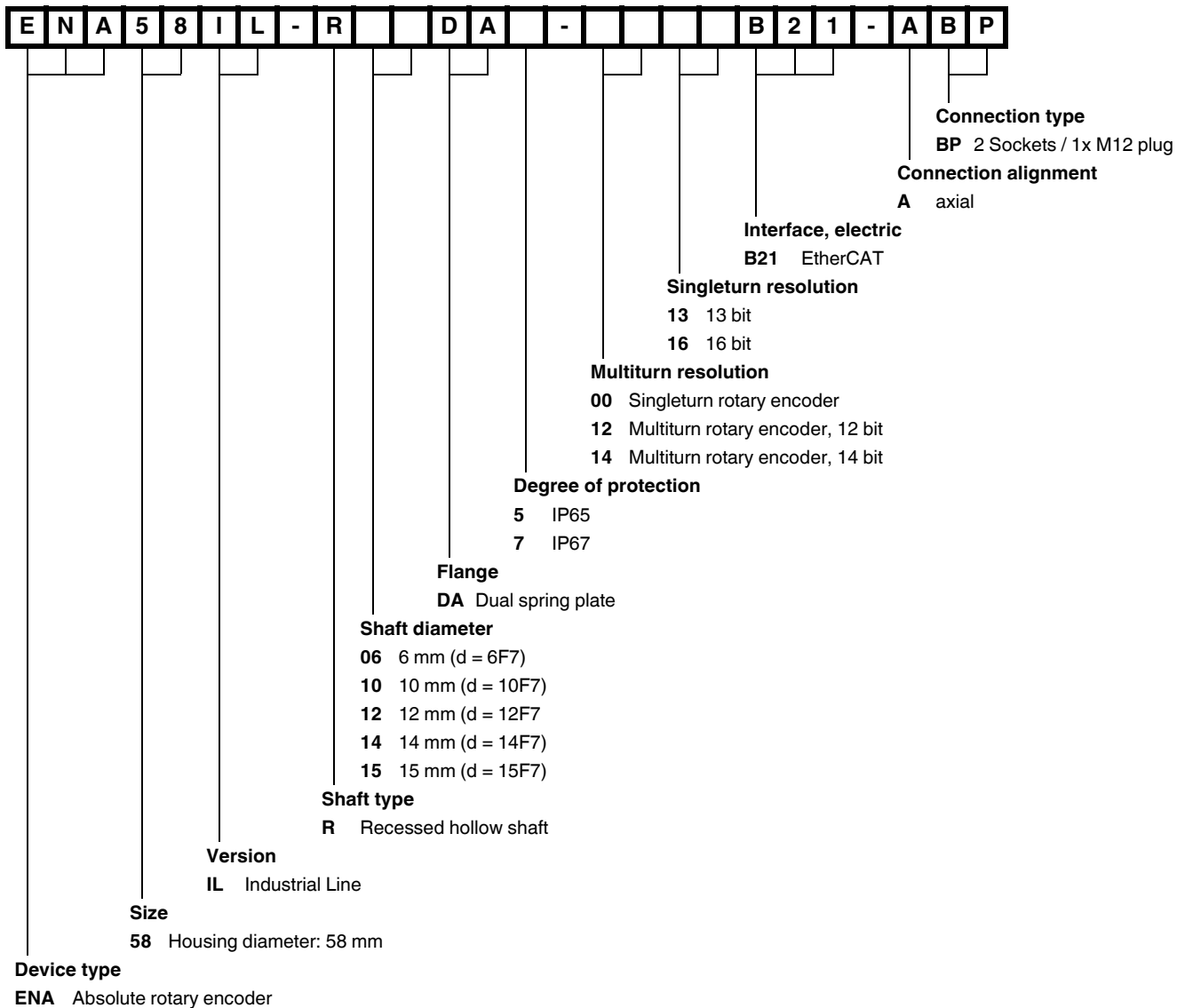
EtherCAT LEDs

LED	Color	Status	Description
Error	red	off	no error
		blinking	invalid configuration
		single flash	local error
		double flash	process data watchdog timeout/ EtherCAT watchdog timeout
		flickering	booting error
		on	application failure
Run	green	off	initialization
		blinking	Pre-Operational
		single flash	Safe-Operational
		flickering	initialization or bootstrap
		on	Operational



Type Code

Release date: 2025-04-28 Date of issue: 2025-04-28 Filename: t175231_eng.pdf



Installation

Anti-interference measures

The use of highly sophisticated microelectronics requires a consistently implemented anti-interference and wiring concept. This becomes all the more important the more compact the constructions are and the higher the demands are on the performance of modern machines.

The following installation instructions and proposals apply for "normal industrial environments". There is no ideal solution for all interfering environments.

When the following measures are applied, the encoder should be in perfect working order:

- Termination of the serial line with a 120 Ω resistor (between Receive/Transmit and Receive/Transmit) at the beginning and end of the serial line (e. g. the control and the last encoder).
- The wiring of the encoder should be laid at a large distance to energy lines which could cause interferences.
- Cable cross-section of the screen at least 4 mm².
- Cable cross-section at least 0,14 mm².
- The wiring of the screen and 0 V should be arranged radially, if and when possible.
- Do not kink or jam the cables.
- Adhere to the minimum bending radius as given in the data sheet and avoid tensile as well as shearing load.

Operating instructions

Every encoder manufactured by Pepperl+Fuchs leaves the factory in a perfect condition. In order to ensure this quality as well as a faultless operation, the following specifications have to be taken into consideration:

- Avoid any impact on the housing and in particular on the encoder shaft as well as the axial and radial overload of the encoder shaft.
- The accuracy and service life of the encoder is guaranteed only, if a suitable coupling is used.

- The operating voltage for the encoder and the follow-up device (e. g. control) has to be switched on and off simultaneously.
- Any wiring work has to be carried out with the system in a dead condition.
- The maximum operating voltages must not be exceeded. The devices have to be operated at extra-low safety voltage.

Notes on connecting the electric screening

The immunity to interference of a plant depends on the correct screening. In this field installation faults occur frequently. Often the screen is applied to one side only, and is then soldered to the earthing terminal with a wire, which is a valid procedure in LF engineering. However, in case of EMC the rules of HF engineering apply.

One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

The following instructions have to be observed:

- Apply the screen on both sides to a "common earth" in a large surface, if there is no risk of equipotential currents.
- The screen has to be passed behind the insulation and has to be clamped on a large surface below the tension relief.
- In case of cable connections to screw-type terminals, the tension relief has to be connected to an earthed surface.
- If plugs are used, metallised plugs only should be fitted (such as sub D plugs with metallised housing). Please observe the direct connection of the tension relief to the housing.

Advantage:	metallised connector,
shield	clamped with the strain
relief	clamp

Disadvantage:	soldering shield on
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Safety instructions

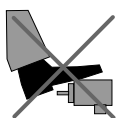
Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

If failures cannot be remedied, the device has to be shut down and has to be secured against accidental operation.

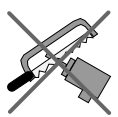
Repairs may be carried out only by the manufacturer. Entry into and modifications of the device are not permissible.

Tighten the clamping ring only, if a shaft has been fitted in the area of the clamping ring (hollow shaft encoders).

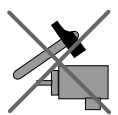
Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!