

# Multiturn absolute encoder

## ESM58-TZ



- Industrial standard housing Ø58 mm
- Ethernet interface with TCP/IP
- 30 Bit multiturn
- Integrated webservice
- Recessed hollow shaft



### Function

In addition to the CANopen-, DeviceNet-, PROFIBUS- and AS-Interface encoders, we have broadened our product line of bus-capable absolute encoders with the ESM58 for Ethernet.

Absolute rotary encoders deliver an absolute step value for each angle setting.

This device has a maximum basic resolution of 65536 steps per revolution (16 bits) and codes up to 16384 revolutions (14 bits). Thus the overall resolution amounts to 30 bits. On account of the high number of measuring steps resulting (more than 1 billion), this type of encoder can be used to divide very long linear distances into small measuring steps.

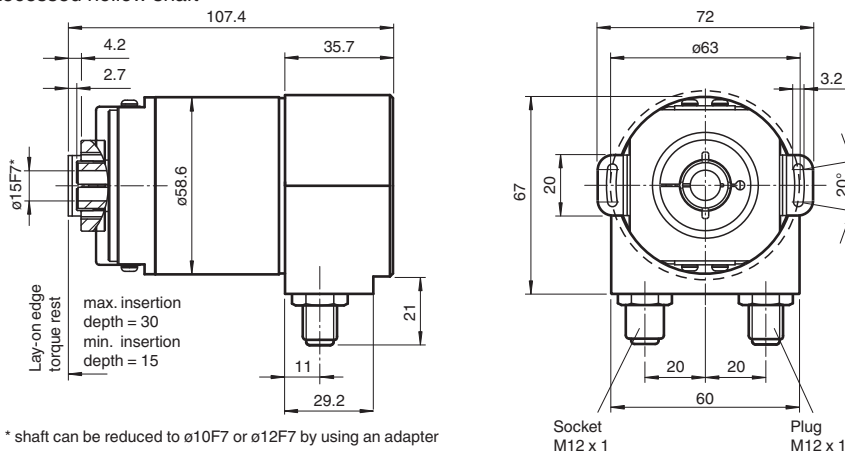
The Ethernet interface of this absolute encoder supports the TCP/IP protocol. The integrated webservice provides Java applets, which allow the whole parameterisation of the encoder via any web browser. In addition to various functions like resolution adjustment, e-mail-services, change of the IP address and many others, the following operation modes can be selected:

- Polled mode
- Cyclic mode
- Change of state mode

The absolute encoder is mounted directly onto the application shaft, without any coupling. Rotation of the absolute encoder is prevented by a torque rest.

### Dimensions

Recessed hollow shaft



### Technical Data

#### General specifications

Detection type	photoelectric sampling
Device type	Multiturn absolute encoder

#### Functional safety related parameters

MTTF <sub>d</sub>	120 a
Mission Time (T <sub>M</sub> )	20 a

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

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## Technical Data

L <sub>10</sub>		1.9 E+11 at 6000 rpm and 20/40 N axial/radial shaft load
Diagnostic Coverage (DC)		0 %
<b>Electrical specifications</b>		
Operating voltage	U <sub>B</sub>	10 ... 30 V DC
Power consumption	P <sub>0</sub>	max. 4 W
Linearity		± 0.5 LSB (12 Bit) ,
Output code		binary code
Code course (counting direction)		programmable, cw ascending (clockwise rotation, code course ascending) cw descending (clockwise rotation, code course descending)
<b>Interface</b>		
Interface type		TCP/IP
Resolution		
Single turn		up to 16 Bit
Multiturn		14 Bit
Overall resolution		up to 30 Bit
Physical		Ethernet
Transfer rate		10 MBit/s / 100 MBit/s
<b>Connection</b>		
Connector		Ethernet: 1 socket M12 x 1, 4-pin, D-coded Supply: 1 plug M12 x 1, 5-pin, A-coded
<b>Standard conformity</b>		
Degree of protection		DIN EN 60529, shaft side: IP64 (without shaft seal)/IP66 (with shaft seal) housing side: 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
<b>Approvals and certificates</b>		
UL approval		cULus Listed, General Purpose, Class 2 Power Source
<b>Ambient conditions</b>		
Operating temperature		0 ... 60 °C (32 ... 140 °F) Standard , with Option T -40 ... 85 °C (-40 ... 185 °F)
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
<b>Mechanical specifications</b>		
Material		housing: powder coated aluminum flange: aluminum shaft: stainless steel
Mass		approx. 500 g
Rotational speed		max. 12000 min <sup>-1</sup> without shaft seal max. 3000 min <sup>-1</sup> with shaft seal
Moment of inertia		30 gcm <sup>2</sup>
Starting torque		≤ 3 Ncm without shaft seal ≤ 5 Ncm with shaft seal
Tightening torque, fastening screws		max. 1.8 Nm
<b>Shaft load</b>		
Angle offset		± 0.9 °
Axial offset		static: ± 0.3 mm, dynamic: ± 0.1 mm
Radial offset		static: ± 0.5 mm, dynamic: ± 0.2 mm

## Accessories

	<b>V15-G-YE2M-PVC</b>	Female cordset, M12, 5-pin, PVC cable
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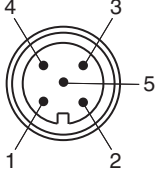
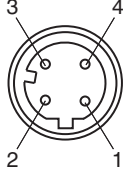
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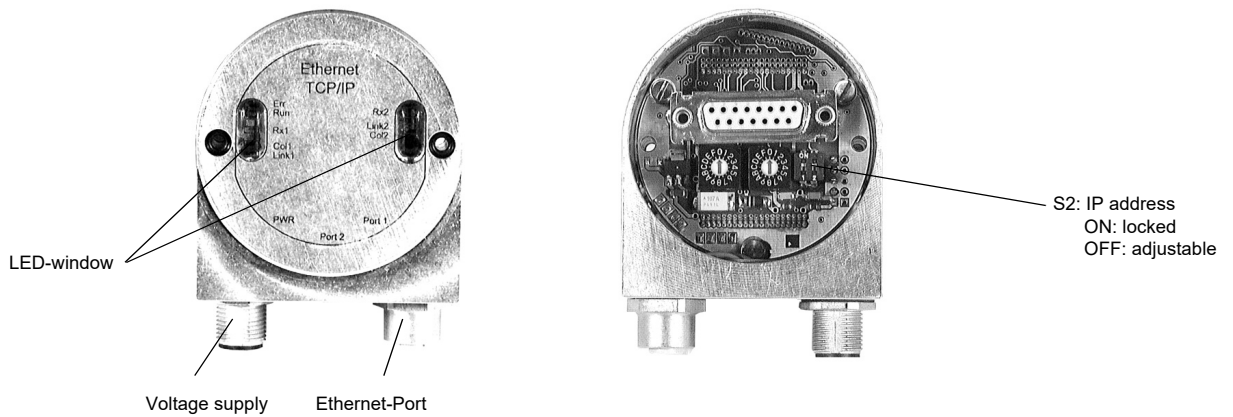
## Accessories

	<b>V15-G-YE5M-PVC</b>	Female cordset, M12, 5-pin, PVC cable
	<b>V1SD-G-ABG-PG9</b>	Male connector M12 straight D-coded 4-pin, for cable diameter 5 - 8 mm, shielded, field-attachable
	<b>V1SD-G-2M-PUR-ABG-V45-G</b>	Connection cable, M12 to RJ-45, PUR cable 4-pin, CAT5e
	<b>V15-G-PG9</b>	Female connector M12 straight A-coded 5-pin, for cable diameter 6 - 8 mm, field-attachable
	<b>ACC-PACK-ABS-_S_58 ø15</b>	Accessories set for Ø58 absolut rotary encoder with recessed hollow shaft 15 mm
	<b>ACC-PACK-ABS-_S_58 ø14</b>	Accessories set for Ø58 absolut rotary encoder with recessed hollow shaft 14 mm
	<b>ACC-PACK-ABS-_S_58 ø12</b>	Accessories set for Ø58 absolut rotary encoder with recessed hollow shaft 12 mm
	<b>ACC-PACK-ABS-_S_58 ø10</b>	Accessories set for Ø58 absolut rotary encoder with recessed hollow shaft 10 mm

**Connection**

Pin	Male connector M12 x 1, 5-pin, A-coded	Female connector M12 x 1, 4-pin, D-coded
1	+ 24 V	Tx +
2	+ 24 V	Rx +
3	0 V	Tx -
4	0 V	Rx -
5	PE	
		

**Indication**



**LED-indicators**

LED	Colour	Meaning
Rx1	yellow	Data traffic on Port 1
Link1	green	Connection to an Ethernet device on Port 1
Col1	red	Bus collision on Port 1
Err	red	Internal error
Run	green	Ethernet interface ready to work

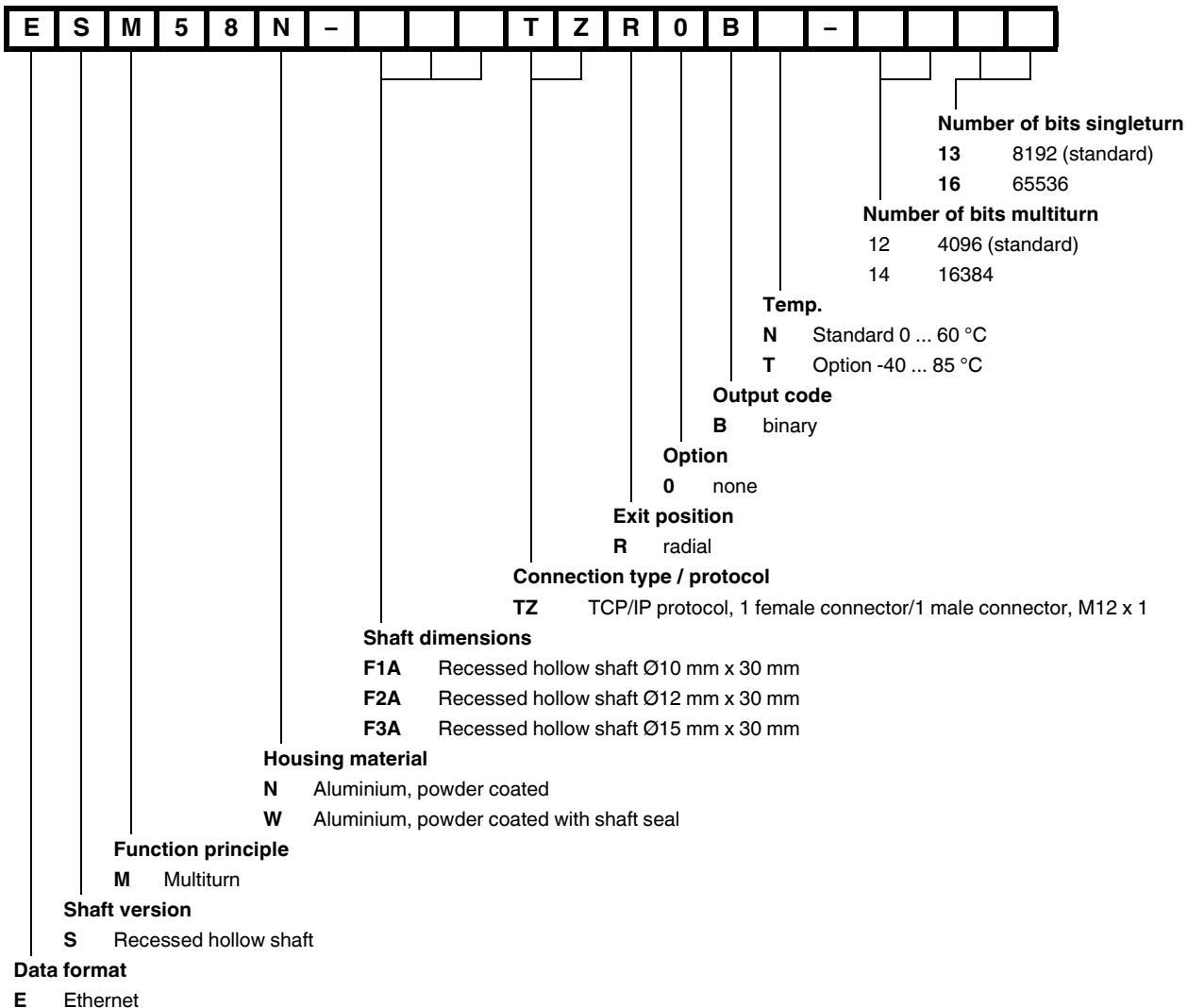
Set switch S2 to position OFF. The IP address can be adjusted now. In switch position ON, the IP address is blocked to avoid unintended change. The rotary switches and switch S1 are without any function.

**IP address adjustment**

**Type Code**

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**Order code**



**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 mm<sup>2</sup>.
- Cable cross-section at least 0,14 mm<sup>2</sup>.
- 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.

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- 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.

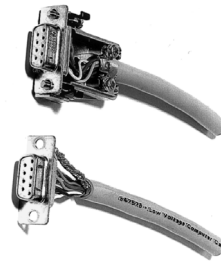
One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

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: metalised connector,  
shield  
clamped with the strain  
relief  
clamp

Disadvantage: soldering shield on



**Safety instructions**

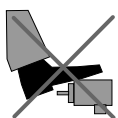
Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

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).

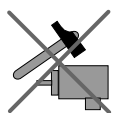
Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!

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