



Incremental rotary encoder

RH190N

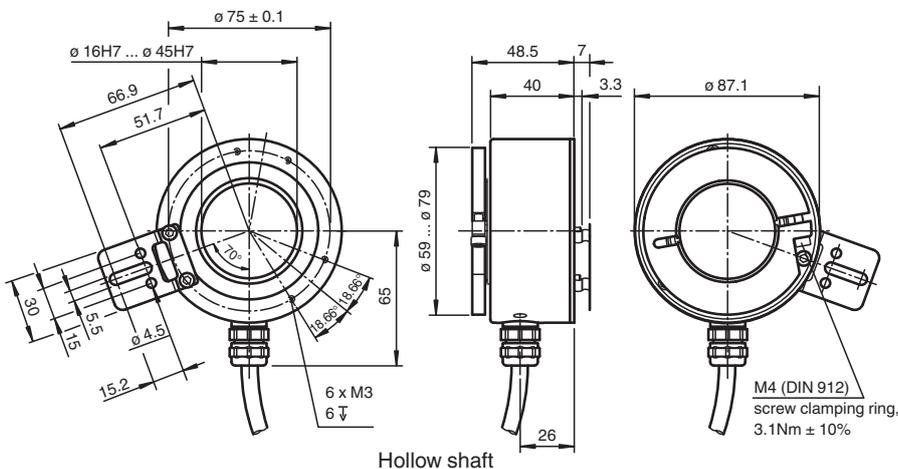
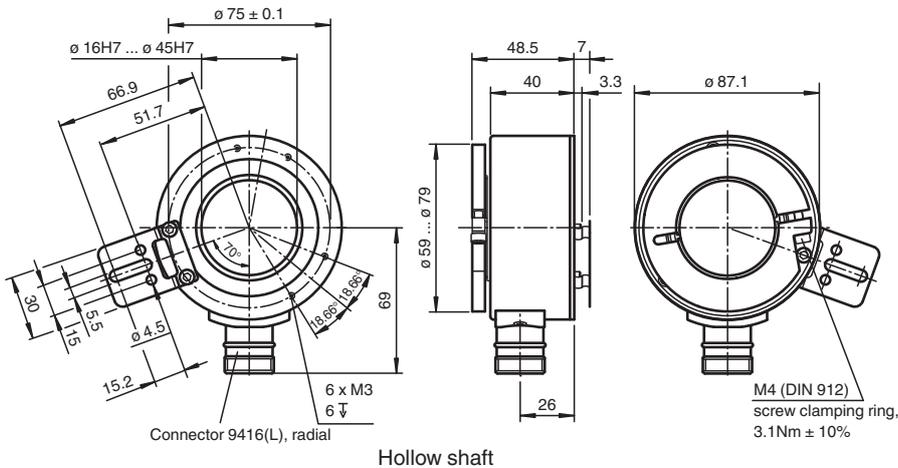
- Compact design housing $\varnothing 90$ mm
- Variable hollow shaft from $\varnothing 16$ mm ... $\varnothing 45$ mm
- Up to 50,000 ppr
- Easy shaft clamping
- Very high resolution and accuracy
- Optional: Shaft insulation through heavy-duty plastic insulating sleeve



Function

The hollow shaft encoder RH190 is a product, which has been developed specially for mechanical drive and lift engineering. It combines the advantages of modern technics and cost effective design. The hollow shaft encoder is available with shaft diameters between $\varnothing 16$ mm and $\varnothing 45$ mm. Thanks to its comparatively small outside diameter it can also be used if only little mounting space is available. The shaft fastening is designed in a way that the shaft of the customer is not being damaged. For specific applications the hollow shaft encoder is available with an electrical insulated hollow shaft.

Dimensions



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

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Technical Data

General specifications		
Detection type		photoelectric sampling
Pulse count		max. 50000
UL File Number		E223176
Functional safety related parameters		
MTTF _d		140 a
Mission Time (T _M)		20 a
L ₁₀		50 E+9 at 1750 rpm
Diagnostic Coverage (DC)		0 %
Electrical specifications		
Operating voltage	U _B	10 ... 30 V DC or 5 V DC ± 5 % (see "Output circuit" in the ordering information)
No-load supply current	I ₀	max. 70 mA
Output		
Output type		push-pull, incremental or RS-422, incremental (see "Output circuit" in the ordering information)
Voltage drop	U _d	< 2.5 V (push-pull, incremental)
Load current		max. per channel 40 mA , short-circuit protected, reverse polarity protected (push-pull, incremental) max. per channel 20 mA , short-circuit protected, reverse polarity protected (RS 422, incremental)
Output frequency		max. 200 kHz
Rise time		600 ns
De-energized delay	t _{off}	600 ns
Connection		
Connector		type 9416 (M23), 12-pin, type 9416L (M23), 12-pin
Cable		Ø6.5 mm, 4 x 2 x 0.14 mm ² , 1 m
Standard conformity		
Degree of protection		DIN EN 60529, IP65
Climatic testing		DIN EN 60068-2-78
Emitted interference		EN 61000-6-4:2007/A1:2011
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 ... 2000 Hz
Approvals and certificates		
UL approval		cULus Listed, General Purpose, Class 2 Power Source
Maximum permissible ambient temperature		max. 60 °C (max. 140 °F)
Ambient conditions		
Operating temperature		-5 ... 70 °C (23 ... 158 °F) , movable cable -20 ... 70 °C (-4 ... 158 °F), fixed cable
Storage temperature		-40 ... 80 °C (-40 ... 176 °F)
Mechanical specifications		
Material		
Housing		aluminum, blank
Flange		3.1645 aluminum
Shaft		Stainless steel 1.4305 / AISI 303 With insulating sleeve provided as an option, made from PPS GF40 material with internal diameters of 16 mm, 25 mm, 30 mm, 38 mm, isolation voltage of 3 kV (see type code)
Mass		approx. 900 g
Rotational speed		max. 3500 min ⁻¹
Starting torque		≤ 18 Ncm
Shaft load		
Angle offset		1 °
Axial offset		max. 1 mm

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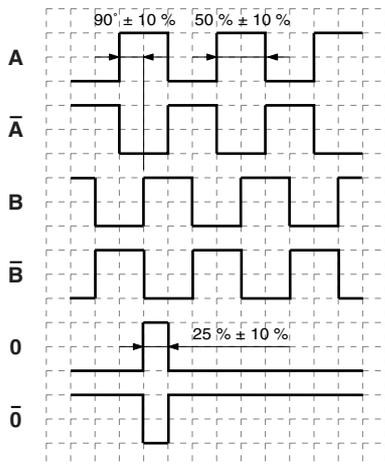
Connection

Signal	Cable Ø6.5 mm, 8-core	Connector 9416, 12-pin	Connector 9416L, 12-pin
GND	White	10	10
U _b	Brown	12	12
A	Green	5	5
B	Grey	8	8
\bar{A}	Yellow	6	6
\bar{B}	Pink	1	1
0	Blue	3	3
$\bar{0}$	Red	4	4
Shield	-	Housing	Housing
NC	-	2, 7, 9, 11	2, 7, 9, 11

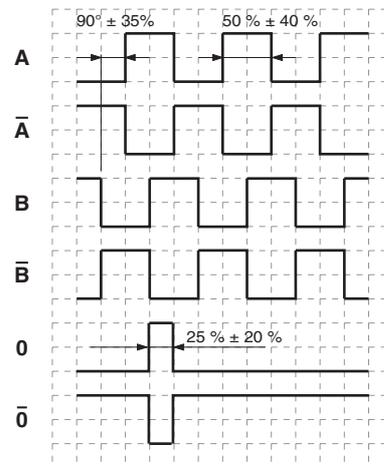
Operation

Signal outputs

↻ cw - with view onto the shaft clamping ring



< 5000 pulses



≥ 5000 pulses

Type Code

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Order code

R H I 9 0 N - A R 6 N -

Pulse count 20, 100, 125, 360, 500, 512, 600, 1000, 1024, 1250, 2048, 2500, 4096, 5000, 8192, 10000, 25000, 50000

Option
N Normal

Output switching
1 10 V ... 30 V, push-pull
6 5 V, RS 422
X 10 V ... 30 V, RS 422

Signal output
6 A + B + 0 and \bar{A} + \bar{B} + $\bar{0}$

Exit position
R Radial

Connection type
AA Plug connector type 9416, 12-pin
AB Plug connector type 9416L, 12-pin
K1 Cable Ø6.5 mm, 4 x 2 x 0.14 mm², 1 m

Flange version
A Hollow shaft

Shaft dimension
0E Hollow shaft Ø16 mm
0F Hollow shaft Ø20 mm
2F Hollow shaft Ø22 mm
0G Hollow shaft Ø24 mm
0H Hollow shaft Ø25 mm
0I Hollow shaft Ø30 mm
0J Hollow shaft Ø18 mm
0L Hollow shaft Ø38 mm
0N Hollow shaft Ø45 mm
0W Hollow shaft Ø15.875 mm
0Z Hollow shaft Ø 1"
IE Hollow shaft Ø16 mm, insulated
IH Hollow shaft Ø25 mm, insulated
II Hollow shaft Ø30 mm, insulated
IL Hollow shaft Ø38 mm, insulated

Housing material
N Aluminium, uncoatedly

Shaft version
H Hollow shaft

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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.

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

- 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!

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Do not remachine the housing!

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