

Temposonics®

Absolute, Non-Contact Position Sensors

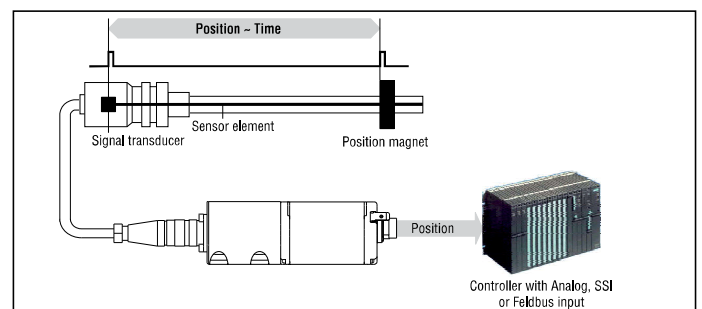
R-Series Rod Model RD4

Temposonics® RD4
Stroke length 25...5000 mm



**Compact sensor for
hydraulic cylinders
and machine manufacturing**

- Rugged industrial sensor
- Linear and absolute measurement
- LEDs for sensor diagnostics
- Non-contact sensing with highest durability
- Superior accuracy: Linearity better 0.02 % F.S.
- Repeatability 0.001 % F.S.
- Direct output for position and velocity
- Analog / SSI / CANbus / Profibus-DP / EtherCAT / Ethernet/IP™ / Powerlink / Profinet
- Multi-position measurement: max. 20 positions with 1 sensor



Temposonics® RD4 the extremely robust sensor, ideal for continuous operation under harshest industrial conditions is completely modular in mechanic and electronic design. A rod-shaped sensor housing protects the sensing element. The sensor head accommodates the complete modulare electronic interface with active signal conditioning. Double encapsulation ensures high operation safety and optimum EMC protection.

The position transmitter, a permanent magnet fixed at the mobile machine part, drives contactlessly over the sensor's stroke and starts measuring through the housing wall.

Temposonics® RD4 sensors were designed for installation into hydraulic cylinders, specifically for use in standard clevis head cylinders or any space limited cylinder application. They consist of:

- The pressure proof stainless steel sensor rod with fitting or threaded flange, which protects the sensing element in which the measurement signal arises. It fits into the bored piston rod.
- The external industrial housing (IP67) which accommodates the modular electronic interface with active signal conditioning. The sensor electronics is connected to the basic-sensor via side or bottom cable entry.

Technical data

Input	
Measured variables	- Position - Velocity - Multi-position measurement max. 20 positions (CANbus, Profibus, EtherCAT, Ethernet/IP™, Powerlink, Profinet)
Stroke length	25...5000 mm
Output	
Interfaces	Analog, SSI, CANbus, Profibus-DP, EtherCAT, Ethernet/IP™, Powerlink, Profinet
Accuracy	
Resolution	Output dependent
Linearity	$< \pm 0.02 \% \text{ F.S. (Minimum } \pm 50 \mu\text{m)}^1 < \pm$
Repeatability	$0.001 \% \text{ F.S. (Minimum } \pm 2.5 \mu\text{m)} < 4 \mu\text{m}$
Hysteresis	Analog: $0.01 \% \text{ F.S. / Digital: } < \pm 10 \mu\text{m}$
Ripple/Jitter	
Operating conditions	
Magnet speed	Any
Operating temperature	$-40 \text{ }^\circ\text{C} \dots +75 \text{ }^\circ\text{C}$
Dew point, humidity	90% rel. humidity, no condensation
Ingress protection	Sensor electronics IP67 (with professional mounted housing and connectors) Measuring rod with connecting cable for side cable entry IP65 Measuring rod with single wires and flat connector with bottom cable entry IP30 100 g
Shock test	(single shock IEC-Standard 60068-2-27)
Vibration test	10 g / 10 - 2000 Hz IEC-Standard 60068-2-6
Standards, EMC test ²	Electromagnetic emission EN 61000-6-4 Electromagnetic immunity EN 61000-6-2 EN 61000-4-2/3/4/6, Level 3/4, criterium A
Design, material	
Diagnostic display	LED beside connector
Sensor electronics	Aluminum
Measuring rod with flange	Stainless steel 1.4301 / AISI 304
Operating pressure	350 bar, (700 bar peak) for hydraulic rod Ring
Position magnet	magnets
Electrical connection	
Connection type	Connector or cable outlet (output dependent) 24
Supply voltage	VDC (-15 / +20 %)
- Polarity protection	up to -30 VDC
- Overvoltage protection	up to 36 VDC
Current drain	100 mA typical
Ripple	$\leq 0.28 \text{ Vpp}$
Electric strength	500 VDC (DC ground to machine ground)

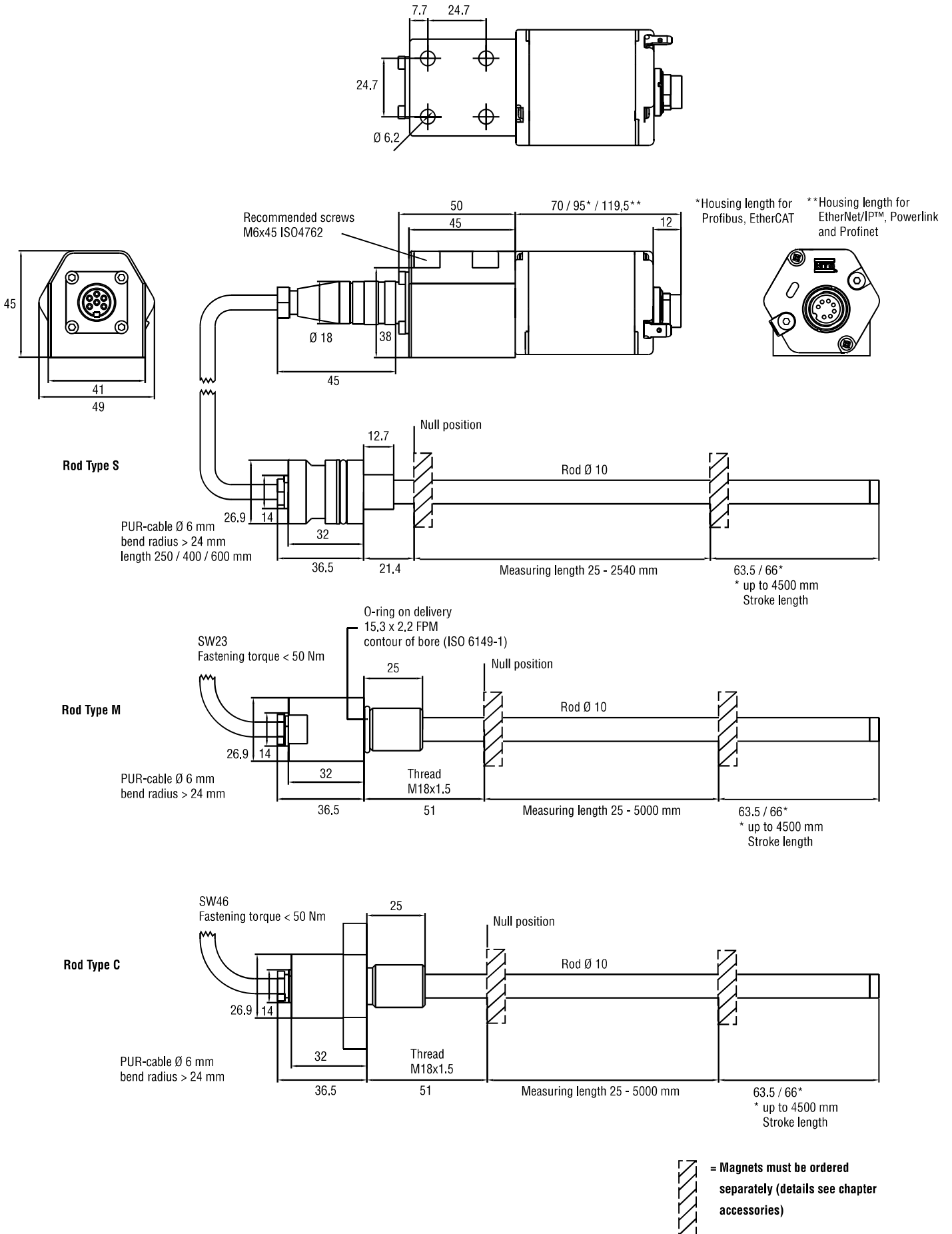
¹ For rod style "S" the linearity deviation can be higher in the first 30 mm (1.2 in.) of stroke length

² Measuring rod and connecting cable mounted inside metal housing

Info:

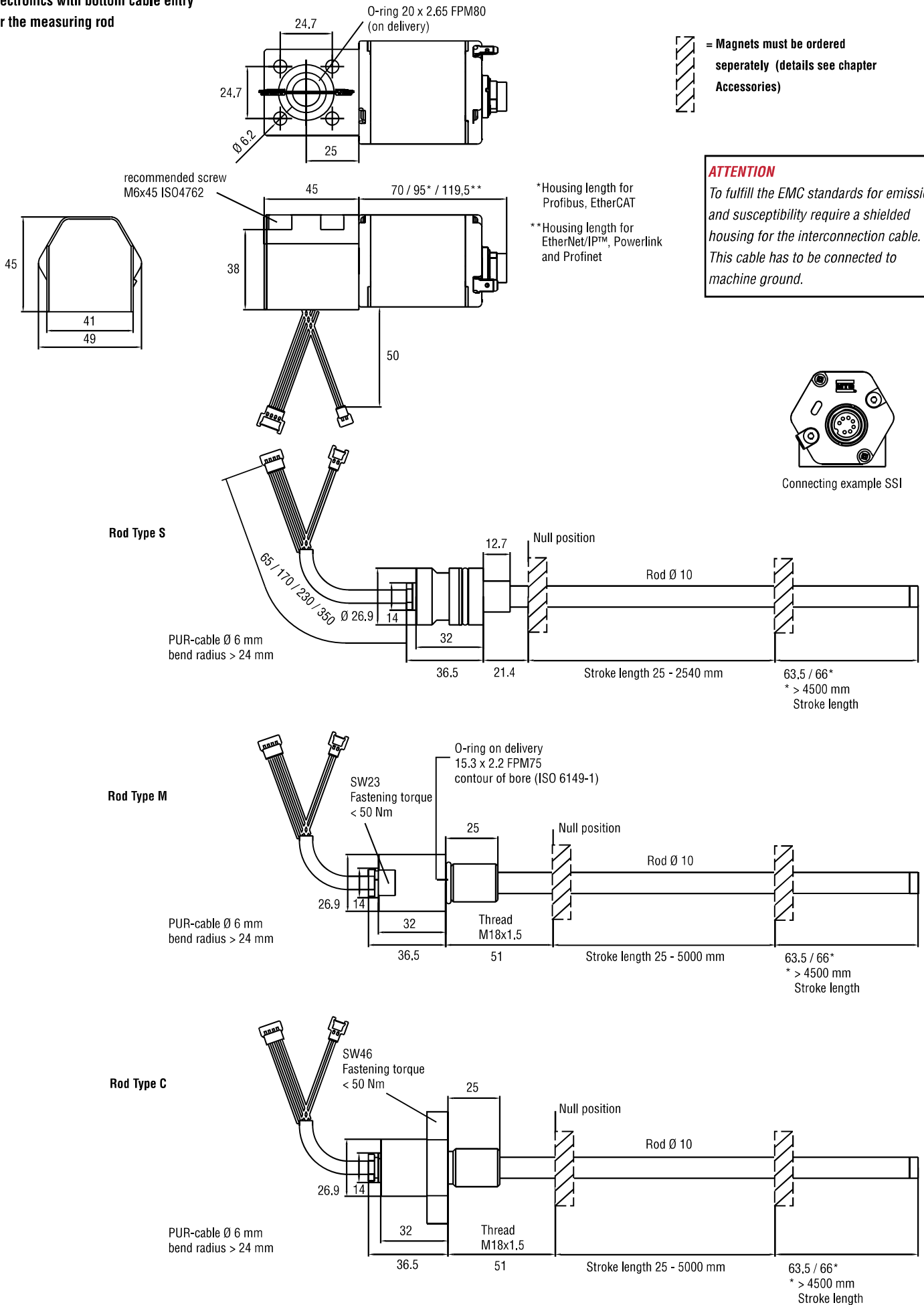
For detailed technical data and electrical connection for the outputs please see data sheets: R-Series Analog, SSI, CANbus, Profibus, EtherCAT, Ethernet/IP™, Powerlink, Profinet

Electronics with side cable entry for the measuring rod



All dimensions in mm

Electronics with bottom cable entry for the measuring rod



All dimensions in mm

Sensor installation with fitting flange »S«

Cylinder mounting

For installation in hydraulic cylinders, we recommend the sensor system consisting of the rod and the mounting flange, and the B type electronics.

Install the rod using the fit and seal it off by means of the O-ring and the supporting ring. Block the rod using a shoulder screw.

The adaptor plate of the separate electronics housing facilitates mounting on the outside of small cylinders. Advantage of this version: Connection to the measuring rod is via the bottom of the housing. Thus the sensor system is fully encapsulated and protected against external disturbances.

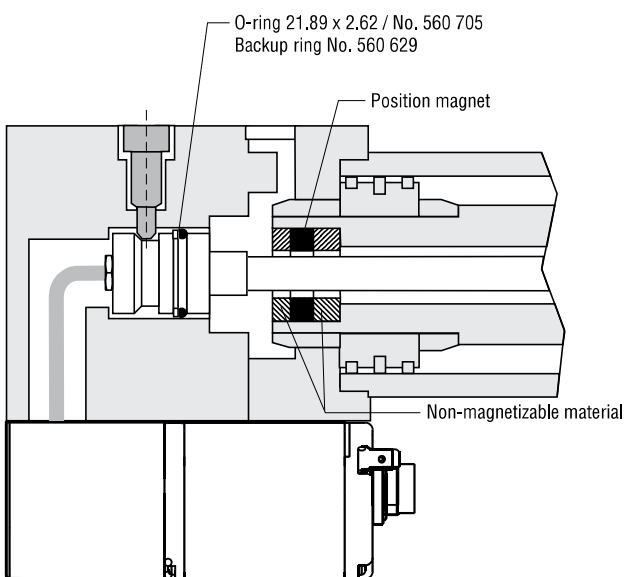
When installing the cylinder, please note:

- The position magnet should not grind over the measuring rod.
- The bore in the piston rod is dependent on the hydraulic pressure and the piston's velocity. The minimum drilling should be 13 mm. Do not exceed the peak pressure.
- The measuring rod should be protected against wear.

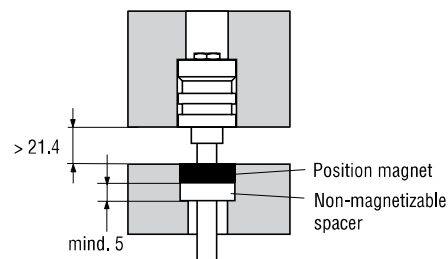
Mounting ring magnet

Mount the magnetic with the non-magnetic material for entrainment, screws, spacers, etc..

Mounting example fitting flange »S« and sensor electronics with bottom cable entry

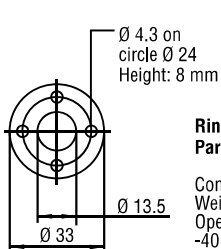


Minimum installation dimensions for magnetizable material



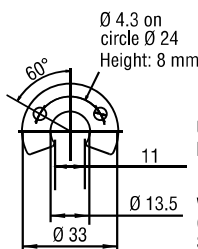
Bore in cylinder \varnothing 13...17 mm to push single wires with flat connector through.

Selection of position magnets (not included in delivery, please order separately)



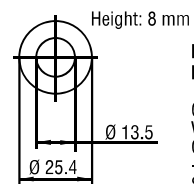
Ring magnet OD33
Part No. 201 542-2

Composite PA-Ferrite-GF20
Weight ca. 14 g
Operating temperature:
-40...+100 °C
Surface pressure max. 40 N/mm²
Fastening Torque for M4 screws max. 1 Nm



U-magnet OD33
Part No. 251 416-2

PA-Ferrit-GF20
Weight ca. 11 g
Operating temperature: -40...+100 °C
Surface pressure max. 40 N/mm²
Fastening torque for M4 screws max. 1 Nm



Ring magnet OD25,4
Part No. 400 533

Composite: PA-Ferrite
Weight ca. 10 g
Operating temperature:
-40...+100 °C
Surface pressure max. 40 N/mm²

All dimensions in mm

Standard position magnet not included in delivery (see chapter accessories)

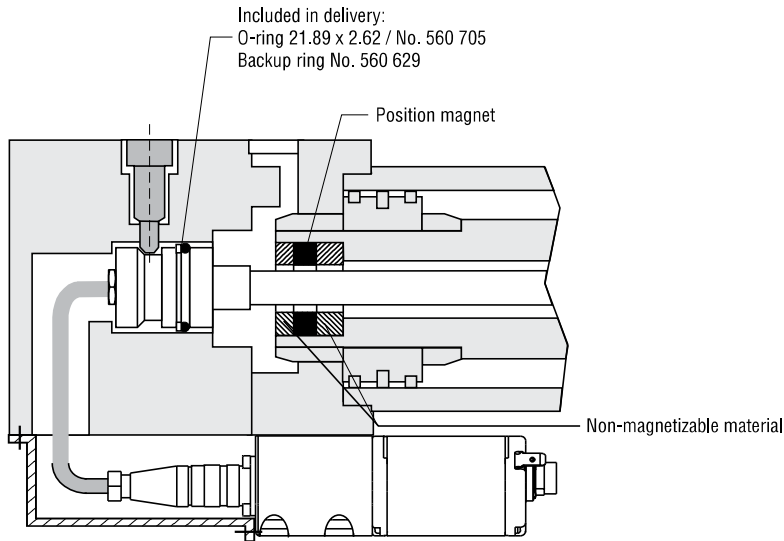
Position magnets

Ring magnet OD33 (part no. 201 542-2)
Ring magnet OD25,4 (part no. 400 533)
U-magnet OD33 (part no. 251 416-2)

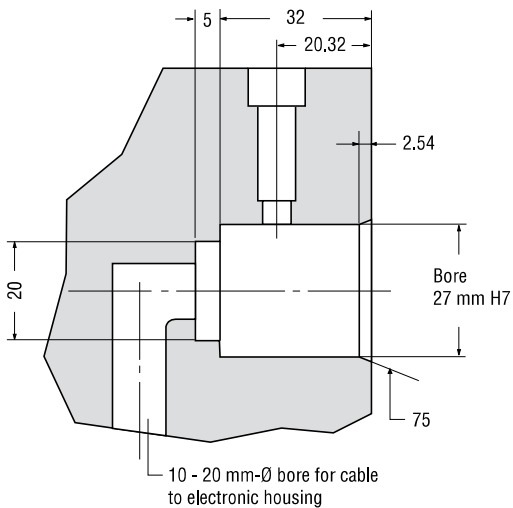
Connection types

Connector or cable outlet output dependent

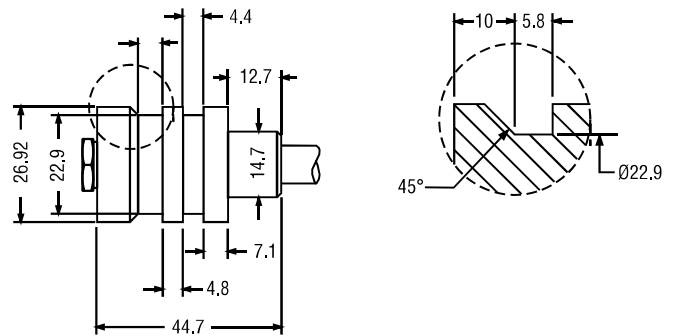
Mounting example fitting flange »S« and sensor electronics with side cable entry



Mounting detail: Setscrew 8 M6 - ISO 7379 with internal hexagon



Detail: Fitting flange



ATTENTION

To fulfill the EMC standards for emission and susceptibility the electronic housing has to be connected to machine ground.

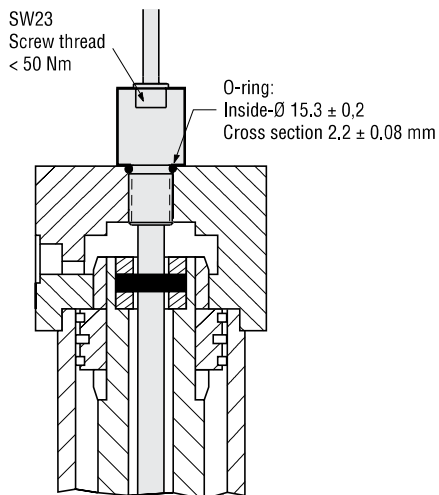
Sensor installation with fitting flange »M« and »C«

Rod

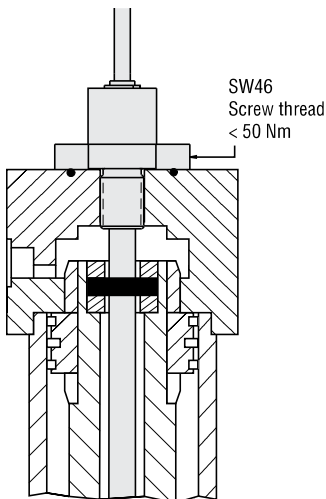
The sensor's pipe will be fixed via the threaded flange M18 x 1.5. Mounting should be with non-magnetizable material. If using magnetizable material please necessarily follow the displayed installation dimensions.

Mounting example fitting flange »M«

Sealing results from the provided O-ring 15.3x2.2 mounted in the undercut.



Mounting example fitting flange »C«



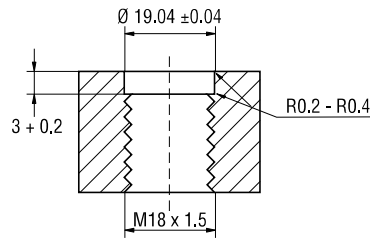
Hydraulic sealing

Recommended is a sealing of the flange facing with O-ring (e.g. 21.89 x 2.62) in a cylinder cover nut or an O-ring in undercut.

Cylinder mounting

- The position magnet should not grind over the measuring rod.
- The bore in the piston rod is dependent on the hydraulic pressure and the piston's velocity. The minimum drilling should be 10 mm. Do not exceed the peak pressure.
- The measuring rod should be protected against wear.
- Pressure sealing is defined by cylinder manufacturer

Detail screwing bore

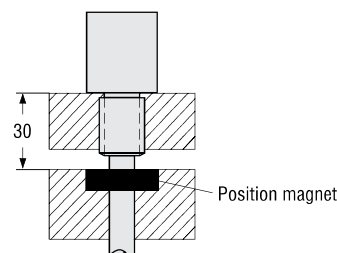


Alternative screwing bore:
See ISO 6149-1

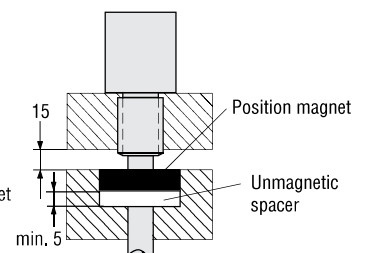
Position magnet

For accurate position measurement mount the magnet with non-magnetizable fastening material (screws, supports etc.).

Non-magnetizable material



Magnetizable material



Tempsonics® RD4



Sensor rod style

- S** – Fitting flange
- M** – Threaded flange M18 x 1.5, HEX23
- C** – Threaded flange M18 x 1.5, HEX46

Integral cable of sensor rod

For side cable entry:

- D1** - PUR-cable, length 250 mm
- D2** - PUR-cable, length 400 mm
- D3** - PUR-cable, length 600 mm

For bottom cable entry:

- R2** - Single wires with flat connector, length 65 mm
- R4** - Single wires with flat connector, length 170 mm
- R5** - Single wires with flat connector, length 230 mm
- R6** - Single wires with flat connector, length 350 mm

Sensor electronics

- S** - Side cable entry
- B** - Bottom cable entry

Stroke length

- Flange M, C: 0025...5000 mm
- Flange S: 0025...2540 mm
- Standard: See chart

Further parameter

See data sheets R-Series according to the required output Analog / SSI / CANbus / Profibus / EtherCAT / EtherNet/IP™ / Powerlink / Profinet

Magnets and Accessories must be ordered separately.

Description	Part No.
Ring magnet OD33, standard	201 542-2
U-magnet OD33	251 416-2
Ring magnet OD 25.4 mm	400 533
Ring magnet OD 17.4 mm	401 032
Connectors and cables see data sheet R-Series	
Spare parts	
O-ring 15.3 x 2.2 FPM 75	401 133
O-ring 21.89 x 2.62 PFPM 75	560 705
Backup ring	560 629
O-ring 20 x 2.65 FPM 80	561 435

Stroke Length Standard RD4	
Stroke length	Ordering steps
< 500 mm	5 mm
500...750 mm	10 mm
750...1000 mm	25 mm
1000...2500 mm	50 mm
> 2500 mm	100 mm