



## PCST24

Rod-style displacement sensor for  
hydraulic cylinders, level indicators



- Protection class up to IP67/IP69
- Wear and maintenance free
- High level of shock resistance up to 50 g (100 shocks)
- Guiding distance of up to 19 mm (depending on magnet/profile)

### Product versions



Analog output, 1 channel



Analog output, 2 channels



Digital output SSI



Digital output CANopen



## PCST24 - Rod-style Magnetostrictive Position Sensor Version with analog output, 1 channel

### Specification

|                              |                                                                                                                                                                                                                                                                                                  | Order options, 1 channel |                                                                        |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------------------------------------------------|
| Mounting                     | Thread M18 x 1,5<br>Thread ¾"-16UNF                                                                                                                                                                                                                                                              | <b>1</b>                 | M18<br>Z3/4                                                            |
| Working pressure             | 400 bar, other values on request                                                                                                                                                                                                                                                                 |                          |                                                                        |
| Measurement range            | 100 ... 5750 (in 10 mm increments)<br>other lengths upon request                                                                                                                                                                                                                                 | <b>2</b>                 | 100 ... 5750                                                           |
| Output                       | 0 ... 10 V signal conditioner<br>U1 with alarm_HOLD<br>0.5 ... 10 V signal conditioner<br>U2 with alarm_LOW; U2 with alarm_HOLD<br>0.5 ... 4.5 V signal conditioner<br>U8 with alarm_LOW; U8 with alarm_HOLD<br>4 ... 20 mA signal conditioner (3 wire)<br>I1 with alarm_LOW; I1 with alarm_HOLD | <b>3</b>                 | U1<br>U1/H<br>U2<br>U2/U; U2/H<br>U8<br>U8/U; U8/H<br>I1<br>I1/U; I1/H |
| Function and characteristics | Position magnet 1, increasing<br>Position magnet 1, decreasing<br>Start value, direction & end value adjustable by the customer                                                                                                                                                                  | <b>4</b>                 | P1A<br>P1D<br>PMU                                                      |
| Resolution                   | 16 bit f.s., min. 10 µm                                                                                                                                                                                                                                                                          |                          |                                                                        |
| Sampling rate                | Up to 1 kHz, depending on the measurement range                                                                                                                                                                                                                                                  |                          |                                                                        |
| Linearity                    | Ranges >500 mm: ±0.10 % f.s.<br>±0.02 % f.s.<br>Ranges ≤500 mm: ±0.5 mm<br>±0.2 mm                                                                                                                                                                                                               | <b>5</b>                 | L10<br>L02<br>L10<br>L02MM                                             |
| Repeatability                | ±3 µm                                                                                                                                                                                                                                                                                            |                          |                                                                        |
| Housing material             | Sensor rod: stainless steel EN 1.4404 (AISI 316L),<br>head: AlMgSi                                                                                                                                                                                                                               |                          |                                                                        |
| Protection class             | IP67 (optional IP67/IP69; connector version: with<br>mating connector only)                                                                                                                                                                                                                      |                          |                                                                        |
| Connection                   | Connector M12, 8 pin<br>Cable, standard length 2 m; other lengths upon request                                                                                                                                                                                                                   | <b>6</b>                 | M12<br>KAB2M                                                           |
| Temperature range            | -40 ... +85°C                                                                                                                                                                                                                                                                                    |                          |                                                                        |
| Shock                        | DIN EN 60068-2-27:2010, 50 g/11 ms, 100 shocks                                                                                                                                                                                                                                                   |                          |                                                                        |
| Vibration                    | DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles                                                                                                                                                                                                                                               |                          |                                                                        |
| EMC                          | DIN EN 61326-1:2013                                                                                                                                                                                                                                                                              |                          |                                                                        |

### Order code

|        |   |          |   |          |   |          |   |          |   |          |   |          |
|--------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|
| PCST24 | - | <b>1</b> | - | <b>2</b> | - | <b>3</b> | - | <b>4</b> | - | <b>5</b> | - | <b>6</b> |
|--------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|

**Order example:** PCST24 – M18 – 1000 – I1 – P1A – L10 – M12



## PCST24 - Rod-style Magnetostrictive Position Sensor

### Version with analog output, 2 channels

## Specifications

|                                        |                                                                                                                                                                                                                                                                                                                                                                   |   | Order options, 2 channels                                                |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------|
| Mounting                               | Thread M18 x 1,5<br>Thread ¾"-16UNF                                                                                                                                                                                                                                                                                                                               | 1 | M18<br>Z3/4                                                              |
| Working pressure                       | 400 bar, other values on request                                                                                                                                                                                                                                                                                                                                  |   |                                                                          |
| Measurement range                      | 100 ... 5750 (in 10 mm increments)<br>other lengths upon request                                                                                                                                                                                                                                                                                                  | 2 | 100 ... 5750                                                             |
| Output                                 | 0 ... 10 V signal conditioner<br>U1 with alarm_HOLD<br>0.5 ... 10 V signal conditioner<br>U2 with alarm_LOW; U2 with alarm_HOLD<br>0.5 ... 4.5 V signal conditioner<br>U8 with alarm_LOW; U8 with alarm_HOLD<br>4 ... 20 mA signal conditioner (3 wire)<br>I1 with alarm_LOW; I1with alarm_HOLD                                                                   | 3 | U1<br>U1/H<br>U2<br>U2/U; U2/H<br>U8<br>U8/U; U8/H<br>I1<br>I1/U; I1/H   |
| Function and characteristics, output 1 | Position magnet 1, increasing<br>Position Magnet 1, decreasing<br>Difference magnet 1/2, increasing (2 magnets required)<br>Difference magnet 1/2, decreasing (2 magnets required)                                                                                                                                                                                | 4 | P1A<br>P1D<br>DA<br>DD                                                   |
| Function and characteristics, output 2 | Position magnet 2, increasing (2 magnets required)<br>Position magnet 2, decreasing (2 magnets required)<br>Difference magnet 1/2, increasing (2 magnets required)<br>Difference Magnet 1/2, decreasing (2 magnets required)<br>Velocity <b>with</b> direction detection (with 1 magnet only)<br>Velocity <b>without</b> direction detection (with 1 magnet only) | 5 | P2A<br>P2D<br>DA<br>DD<br>VZx.x <sup>1)</sup><br><br>VAX.x <sup>2)</sup> |
| Resolution                             | 16 bit f.s., min. 10 µm                                                                                                                                                                                                                                                                                                                                           |   |                                                                          |
| Sampling rate                          | Up to 1 kHz, depending on the measurement range                                                                                                                                                                                                                                                                                                                   |   |                                                                          |
| Linearity                              | Ranges >500 mm: ±0.10 % f.s.<br>±0.02 % f.s.<br>Ranges ≤500 mm: ±0.5 mm<br>±0.2 mm                                                                                                                                                                                                                                                                                | 6 | L10<br>L02<br>L10<br>L02MM                                               |
| Repeatability                          | ±3 µm                                                                                                                                                                                                                                                                                                                                                             |   |                                                                          |
| Housing material                       | Sensor rod: stainless steel EN 1.4404 (AISI 316L),<br>head: AlMgSi                                                                                                                                                                                                                                                                                                |   |                                                                          |
| Protection class                       | IP67 (optional IP67/IP69; connector version: with<br>mating connector only)                                                                                                                                                                                                                                                                                       |   |                                                                          |
| Connection                             | Connector M12, 8 pin<br>Cable, standard length 2 m; other lengths upon request                                                                                                                                                                                                                                                                                    | 7 | M12<br>KAB2M                                                             |
| Temperature range                      | -40 ... +85°C                                                                                                                                                                                                                                                                                                                                                     |   |                                                                          |
| Shock                                  | DIN EN 60068-2-27:2010, 50 g/11 ms, 100 shocks                                                                                                                                                                                                                                                                                                                    |   |                                                                          |
| Vibration                              | DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles                                                                                                                                                                                                                                                                                                                |   |                                                                          |
| EMC                                    | DIN EN 61326-1:2013                                                                                                                                                                                                                                                                                                                                               |   |                                                                          |

## Order code

PCST24 – **1** – **2** – **3** – **4** – **5** – **6** – **7**

**Order example:** PCST24 – M18 – 1000 – I1 – P1A – VZ1.0 – L10 – M12

1) VZx.x = velocity with direction detection (with 1 magnet only), in steps of 0.1 m/s

| <b>Example: VZ1.5</b> | towards start position |        | towards end position |
|-----------------------|------------------------|--------|----------------------|
|                       | -1.5 m/s               | 0      | 1.5 m/s              |
| Output U2:            | 0.5 V                  | 5.25 V | 10 V                 |
| Output I1:            | 4 mA                   | 12 mA  | 20 mA                |

2) VAx.x = velocity without direction detection (with 1 magnet only), in steps of 0.1 m/s

| <b>Example: VA1.5</b> | towards start position |       | towards end position |
|-----------------------|------------------------|-------|----------------------|
|                       | -1.5 m/s               | 0     | 1.5 m/s              |
| Output U2:            | 10 V                   | 0.5 V | 10 V                 |
| Output I1:            | 20 mA                  | 4 mA  | 20 mA                |

## Accessories:

**Connector cable (see page 28)**

**Position magnets (see from page 13)**



## PCST24 - Rod-style Magnetostrictive Position Sensor Version with digital output SSI

### Specifications

|                     |                                                                                    |   | Order options              |
|---------------------|------------------------------------------------------------------------------------|---|----------------------------|
| Mounting            | Thread M18 x 1,5<br>Thread ¾"-16UNF                                                | 1 | M18<br>Z3/4                |
| Working pressure    | 400 bar, other values on request                                                   |   |                            |
| Measurement range   | 100 ... 5750 (in 10 mm increments)<br>other lengths upon request                   | 2 | 100 ... 5750               |
| Resolution          | 5 / 10 / 20 / 50 / 100                                                             | 3 | 5 / 10 / 20 / 50 / 100     |
| Output              | Synchronous serial interface (SSI)                                                 | 4 | SSI                        |
| Output code         | Gray<br>Dual                                                                       | 5 | G<br>D                     |
| Number of data bits | 24 bit<br>25 bit                                                                   | 6 | 24<br>25                   |
| Sampling rate       | Up to 1 kHz, depending on the measurement range                                    |   |                            |
| Linearity           | Ranges >500 mm: ±0.10 % f.s.<br>±0.02 % f.s.<br>Ranges ≤500 mm: ±0.5 mm<br>±0.2 mm | 7 | L10<br>L02<br>L10<br>L02MM |
| Repeatability       | ±3 µm                                                                              |   |                            |
| Housing material    | Sensor rod: stainless steel EN 1.4404 (AISI 316L),<br>head: AlMgSi                 |   |                            |
| Protection class    | IP67 (optional IP67/IP69; connector version: with<br>mating connector only)        |   |                            |
| Connection          | Connector M12, 8 pin<br>Cable, standard length 2 m; other lengths upon request     | 8 | M12<br>KAB2M               |
| Temperature range   | -40 ... +85°C                                                                      |   |                            |
| Shock               | DIN EN 60068-2-27:2010, 50 g/11 ms, 100 shocks                                     |   |                            |
| Vibration           | DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles                                 |   |                            |
| EMC                 | DIN EN 61326-1:2013                                                                |   |                            |

### Order code

|        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCST24 | - | 1 | - | 2 | - | 3 | - | 4 | / | 5 | / | 6 | - | 7 | - | 8 |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Order example:** PCST24 – M18 – 1000 – 5 – SSI / G / 24 – L10 – M12

### Accessories:

**Connector cable (see page 28)**

**Position magnets (see from page 13)**



## PCST24 - Rod-style Magnetostrictive Position Sensor Version with digital output CANopen

### Specifications

|                   |                                                                                                                                                |   | Order options                              |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------|
| Mounting          | Thread M18 x 1,5<br>Thread ¾"-16UNF                                                                                                            | 1 | M18<br>Z3/4                                |
| Working pressure  | 400 bar, other values on request                                                                                                               |   |                                            |
| Measurement range | 100 ... 5750 (in 10 mm increments)<br>other lengths upon request                                                                               | 2 | 100 ... 5750                               |
| Output            | CANopen-Bus<br>CANopen-Bus with integrated terminating resistance<br>CAN SAE J1939<br>CAN SAE J1939-Bus with integrated terminating resistance | 3 | CANOP<br>CANOP/R<br>CANJ1939<br>CANJ1939/R |
| Resolution        | 50 µm                                                                                                                                          |   |                                            |
| Sampling rate     | Up to 1 kHz, depending on the measurement range                                                                                                |   |                                            |
| Linearity         | Ranges >500 mm: ±0.10 % f.s.<br>±0.02 % f.s.<br>Ranges ≤500 mm: ±0.5 mm<br>±0.2 mm                                                             | 4 | L10<br>L02<br>L10<br>L02MM                 |
| Repeatability     | ±3 µm                                                                                                                                          |   |                                            |
| Housing material  | Sensor rod: stainless steel EN 1.4404 (AISI 316L),<br>head: AlMgSi                                                                             |   |                                            |
| Protection class  | IP67 (optional IP67/IP69; connector version: with<br>mating connector only)                                                                    |   |                                            |
| Connection        | Connector M12, 5 pin                                                                                                                           | 5 | M12/CAN                                    |
| Shock             | DIN EN 60068-2-27:2010, 50 g/11 ms, 100 shocks                                                                                                 |   |                                            |
| Vibration         | DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles                                                                                             |   |                                            |
| Temperature range | -40 ... +85°C                                                                                                                                  |   |                                            |
| EMC               | DIN EN 61326-1:2013                                                                                                                            |   |                                            |

### Order code

|        |   |   |   |   |   |   |   |   |   |   |
|--------|---|---|---|---|---|---|---|---|---|---|
| PCST24 | - | 1 | - | 2 | - | 3 | - | 4 | - | 5 |
|--------|---|---|---|---|---|---|---|---|---|---|

Order example: PCST24 – M18 – 1000 – CANOP – L10 – M12/CAN

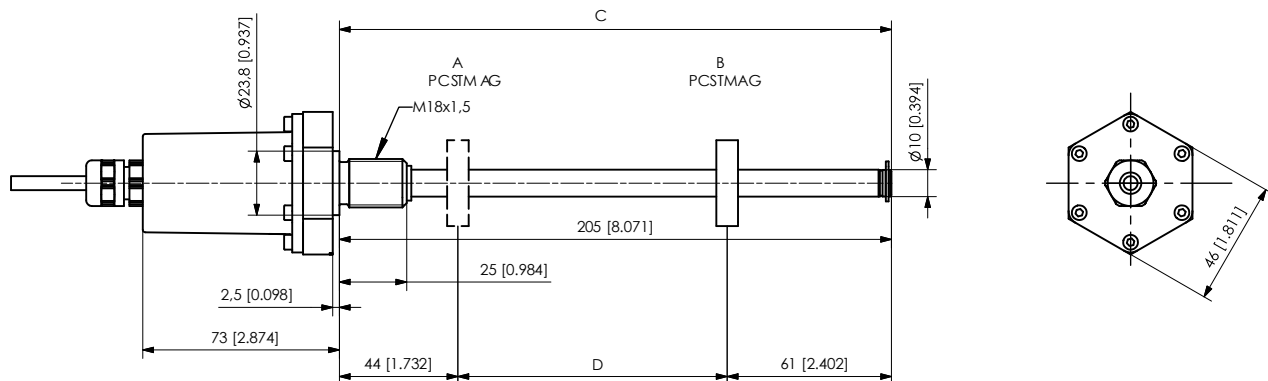
### Accessories:

Connector cable (see page 29)

Position magnets (see from page 13)

## Dimensions

### Cable output, M18 flange



A – Start position

B – End position

C – Total length = Measurement length + 105 [4.134]

(e.g. 205 [8.071])

D – Flange M18 x 1.5

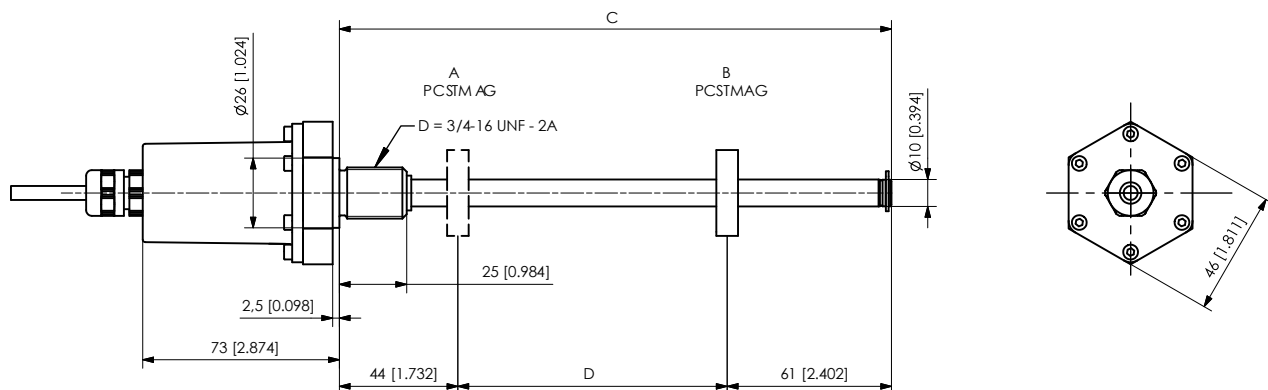
E – Measurement length (e.g. 100 [3.937])

Dimensions in mm [inch]

Dimensions informative only.

For guaranteed dimensions consult factory.

### Cable output, flange 3/4"



A – Start position

B – End position

C – Total length = Measurement length + 105 [4.134]

(e.g. 205 [8.071])

D – Flange 3/4"-16UNF-2A

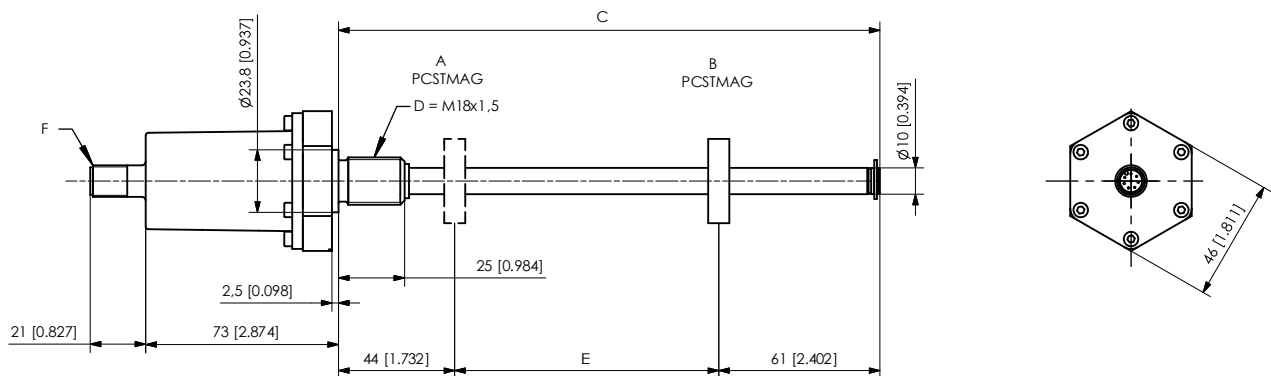
E – Measurement length (e.g. 100 [3.937])

Dimensions in mm [inch]

Dimensions informative only.

For guaranteed dimensions consult factory.

### Connector M12 output, flange M18



A – Start position

B – End position

C – Total length = Measurement length + 105 [4.134]

(e.g. 205 [8.071])

D – Flange M18 x 1.5

E – Measurement length (e.g. 100 [3.937])

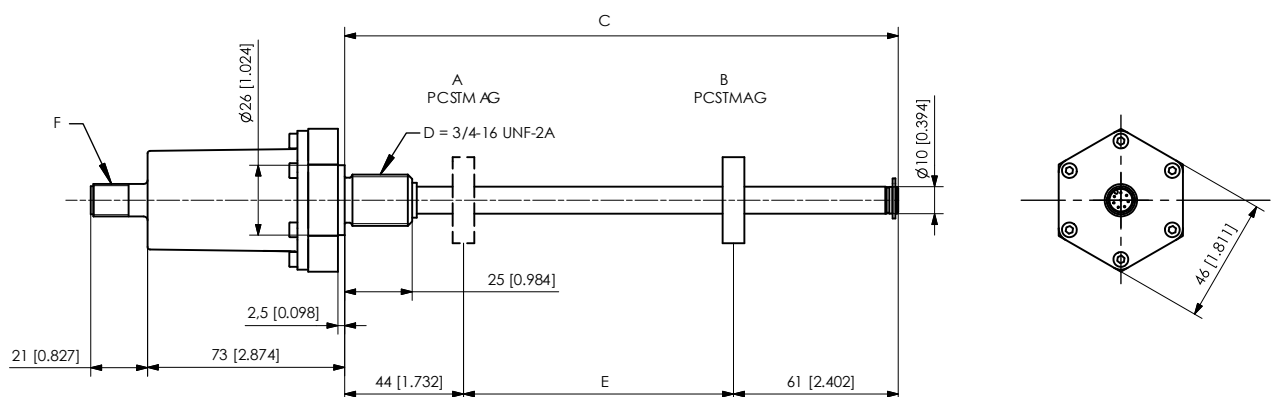
F – Connector M12

Dimensions in mm [inch]

Dimensions informative only.

For guaranteed dimensions consult factory.

### Cable output, flange 3/4"



A – Start position

B – End position

C – Total length = Measurement length + 105 [4.134]

(e.g. 205 [8.071])

D – Flange 3/4"-16UNF-2A

E – Measurement length (e.g. 100 [3.937])

Dimensions in mm [inch]

Dimensions informative only.

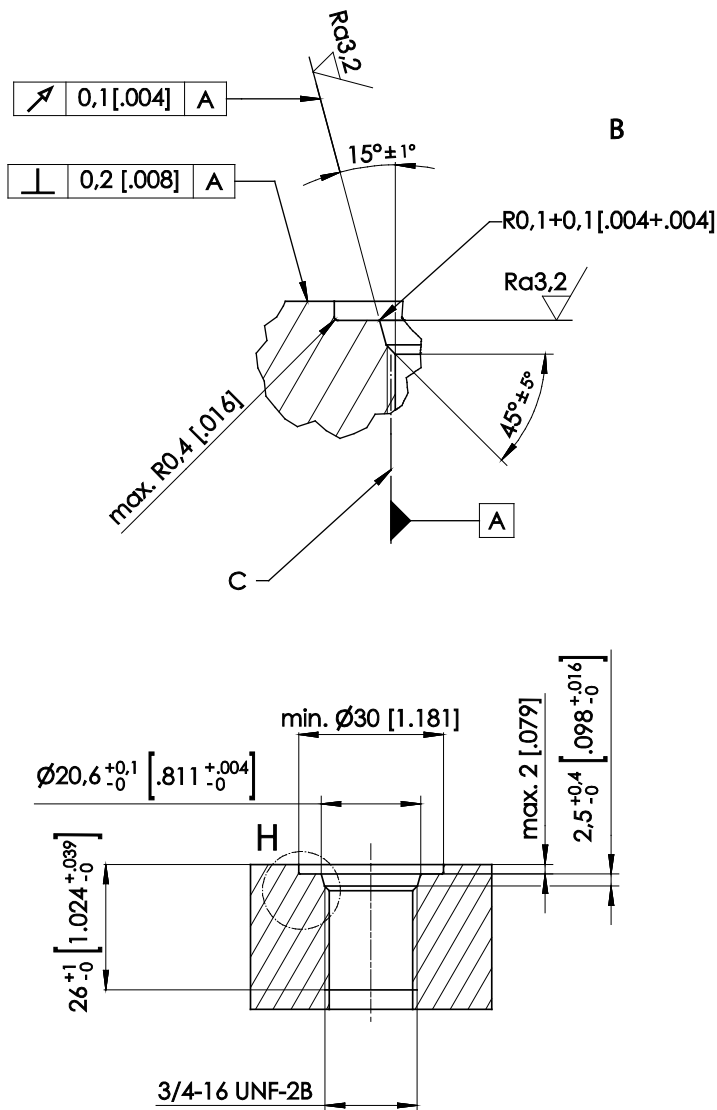
For guaranteed dimensions consult factory.

### Mounting hole M18



Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions consult factory.

## Mounting hole 3/4"



- B – Drive hole according to ISO 11926-1  
UN/UNF thread 2B according to ANSI B1.1/ISO 725  
Pivot according to ISO 11926-2 and 3  
UN/UNF thread 2A according to ANSI B1.1/ISO 725  
Sealing by O-ring
- C – Effective diameter

Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions consult factory.

## O-ring sealing

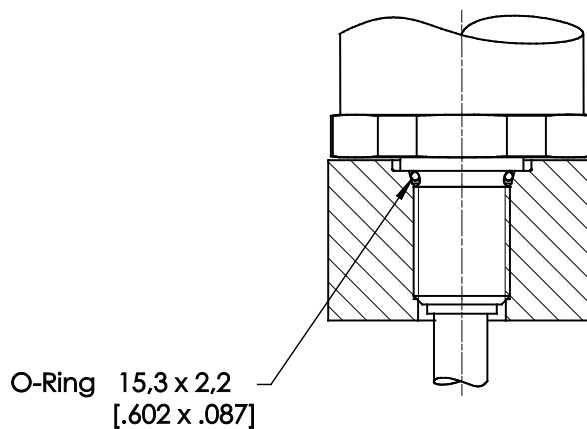
### O-ring sealing (M18)

for:

PCST24-M18...

PCST25-M18...

PCST27-M18...



Dimensions in mm [inch]

Dimensions informative only.

For guaranteed dimensions consult factory.

### Order code

PCST – OR – M18

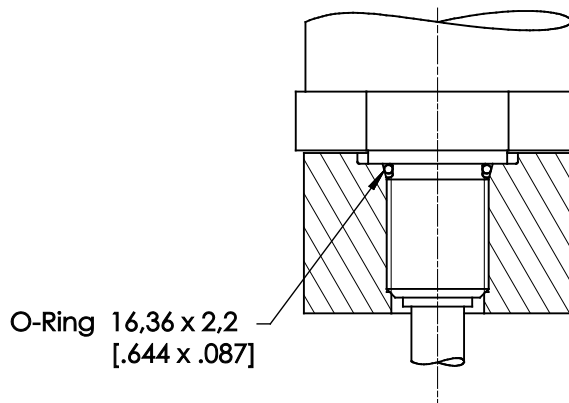
### O-ring sealing (Z3/4")

for:

PCST24-Z3/4...

PCST25-Z3/4...

PCST27-Z3/4...



Dimensions in mm [inch]

Dimensions informative only.

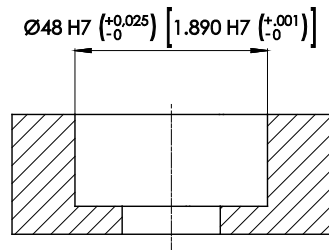
For guaranteed dimensions consult factory.

### Order code

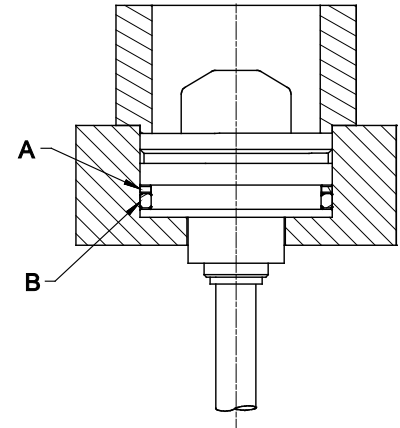
PCST – OR – Z3/4

## O-ring sealing (Plug-in version)

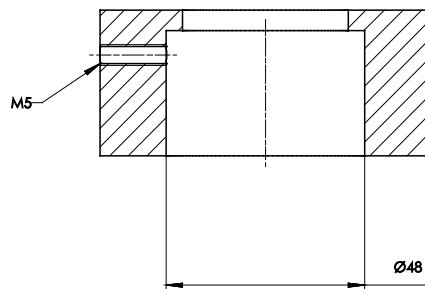
for:  
PCST25-SV



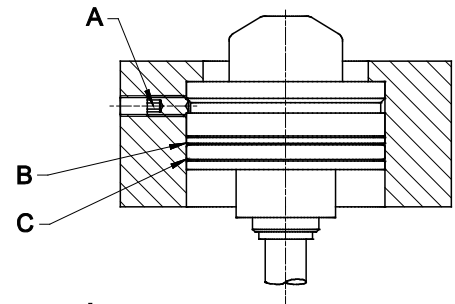
A – Supporting ring  
B – O-Ring



for:  
PCST25-SV



A – Threaded pin  
B – Supporting ring  
C – O-Ring



Dimensions in mm [inch]

Dimensions informative only.

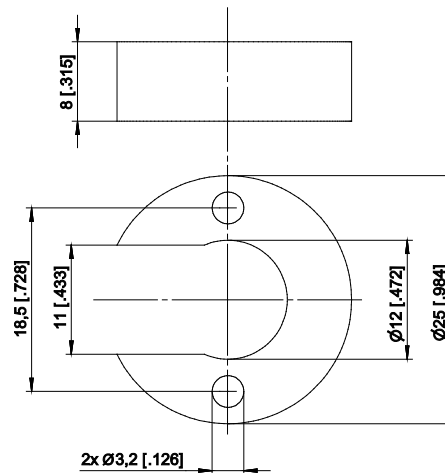
For guaranteed dimensions consult factory.

### Order code

PCST – OR – SV

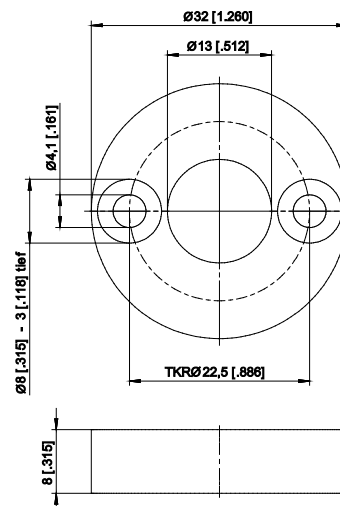
## Position magnets for posichron®-PCST

### PCSTMAG1

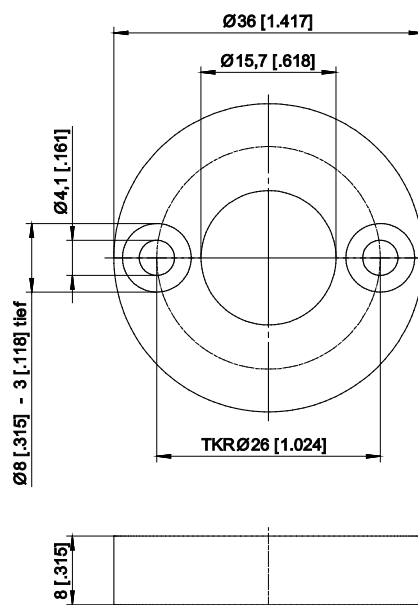


### PCSTMAG2

(Standard)

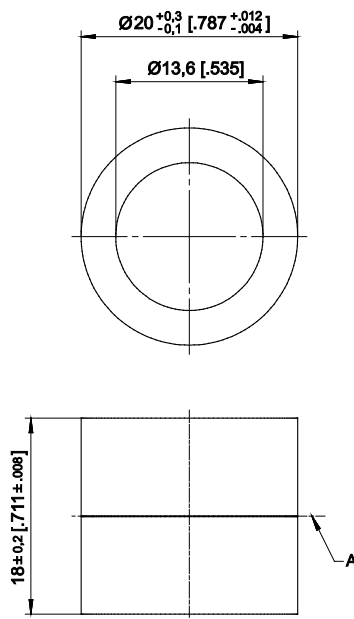


### PCSTMAG5



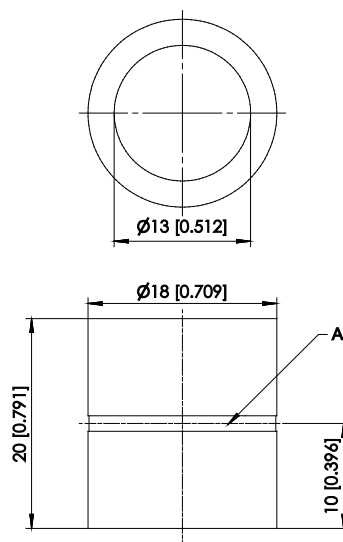
Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions consult  
factory.  
Other designs can be realized on  
request.

### PCSTMAG2-MH1



A – Center of magnet

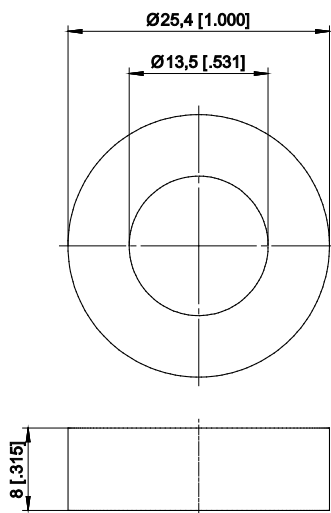
### PCSTMAG2-MH2



A – Center of magnet

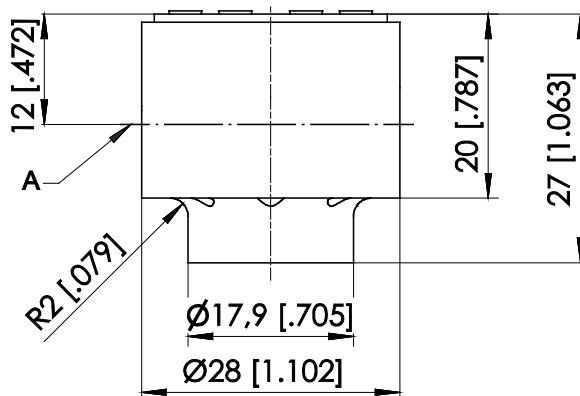
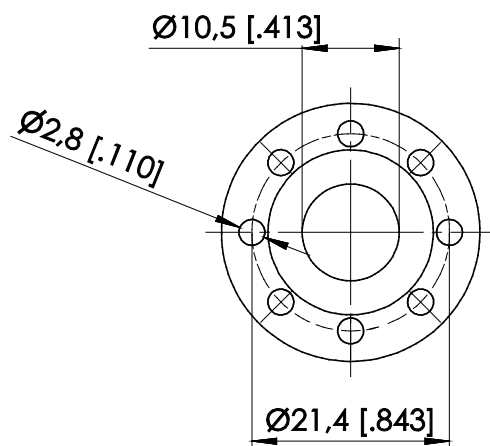
Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions consult  
factory.  
Other designs can be realized on  
request.

### PCSTMAG2-MH3



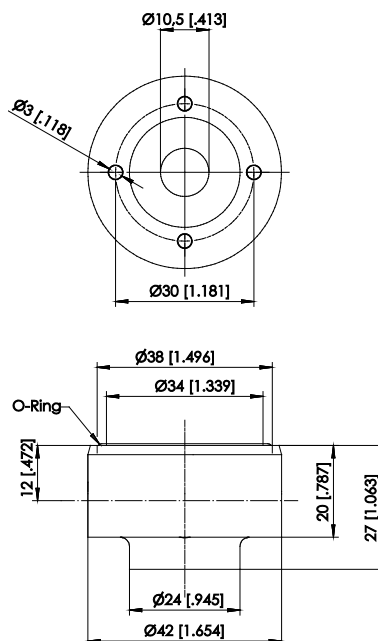
Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions consult  
factory.  
Other designs can be realized on  
request.

PCSTMAG2-G1



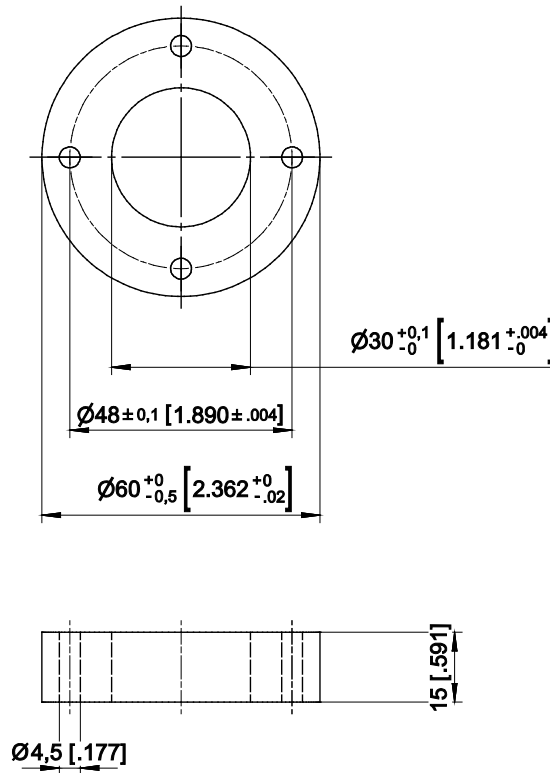
PCSTMAG2 - G1 / G2  
Sliding magnet with special  
self-lubricating and abrasion  
-resistant material.  
To be used if sensor  
is mounted in horizontal  
position and a mechanical  
support of the rod is not  
possible for measurement  
ranges >1000 mm.

PCSTMAG2-G2

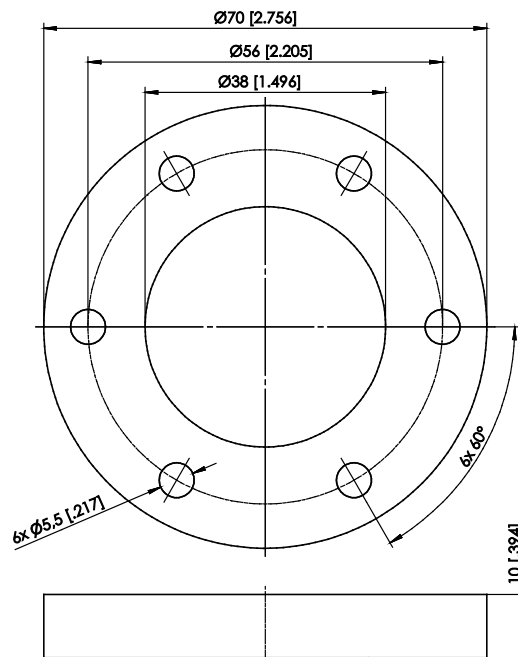


Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions  
consult factory.  
Other designs can be realized on  
request.

PCSTMAG7



PCSTMAG4

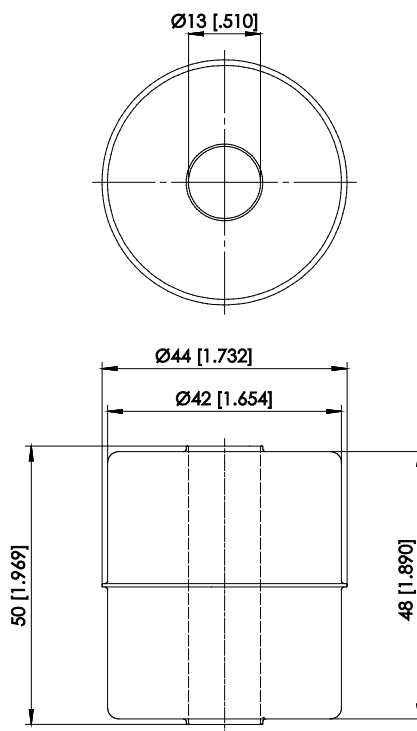


Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions  
consult factory.  
Other designs can be realized on  
request

### PCSTMAG3

(float, continuous  
pressure up to 9 bar, for  
media with a specific  
gravity of  
 $\geq 0,75 \text{ g/cm}^3$ )

Material: 1.4404



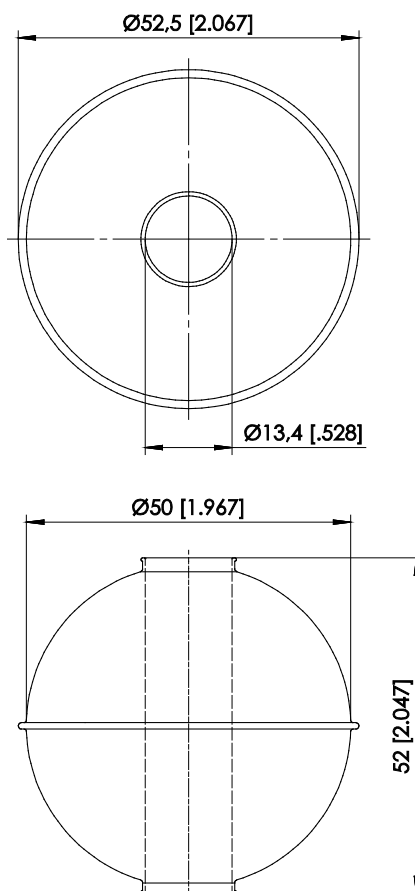
Note: Dependent on the  
design the available  
measurement range is  
reduced of 25 mm  
on both ends!

Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions  
consult factory.  
Other designs can be realized  
on request.

### PCSTMAG6

(float, continuous pressure up  
to 30 bar, for media with a  
specific gravity of  
 $\geq 0,7 \text{ g/cm}^3$ )

Material: 1.4571



Note: Dependent on the  
design the available  
measurement range is  
reduced of 25 mm on  
both ends!

Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions  
consult factory.  
Other designs can be realized  
on request.

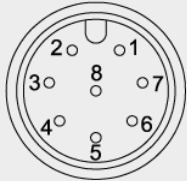
## Output specification

### Analog output

|                                                                                                                                    |                         |                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------------------------------------------|
| <b>U1</b><br>Voltage output<br>0 ... 10 V<br>     | Excitation voltage      | 18 ... 36 V DC                                                     |
|                                                                                                                                    | Excitation current      | typical 23 mA at 24 V DC<br>typical 46 mA at 12 V DC<br>max. 80 mA |
|                                                                                                                                    | Output voltage          | 0 ... 10 V DC                                                      |
|                                                                                                                                    | Output current          | 2 mA max.                                                          |
|                                                                                                                                    | Output load             | >5kΩ                                                               |
|                                                                                                                                    | Resolution              | 16 bit f.s. min. 10 μm                                             |
|                                                                                                                                    | Stability (temperature) | ±50 x 10 <sup>-6</sup> / °C f.s.                                   |
|                                                                                                                                    | Protection              | Reverse polarity, short circuit                                    |
|                                                                                                                                    | Output noise            | 0,5 mV <sub>RMS</sub>                                              |
|                                                                                                                                    | Operating temperature   | -40 ... +85°C                                                      |
|                                                                                                                                    | EMC                     | DIN EN 61326-1:2013                                                |
| <b>U2</b><br>Voltage output<br>0,5 ... 10 V<br> | Excitation voltage      | 18 ... 36 V DC                                                     |
|                                                                                                                                    | Excitation current      | typical 23 mA at 24 V DC<br>typical 46 mA at 12 V DC<br>max. 80 mA |
|                                                                                                                                    | Output voltage          | 0,5 ... 10 V DC                                                    |
|                                                                                                                                    | Output current          | 2 mA max.                                                          |
|                                                                                                                                    | Output load             | >5kΩ                                                               |
|                                                                                                                                    | Resolution              | 16 bit f.s., min. 10 μm                                            |
|                                                                                                                                    | Stability (temperature) | ±50 x 10 <sup>-6</sup> / °C f.s.                                   |
|                                                                                                                                    | Protection              | Reverse polarity, short circuit                                    |
|                                                                                                                                    | Output noise            | 0,5 mV <sub>RMS</sub>                                              |
|                                                                                                                                    | Operating temperature   | -40 ... +85°C                                                      |
|                                                                                                                                    | EMC                     | DIN EN 61326-1:2013                                                |

|                                                                                                                                   |                         |                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------|
| <b>U8</b><br>Voltage output<br>0.5 ... 4.5 V<br> | Excitation voltage      | 10 ... 36 V DC                                                  |
|                                                                                                                                   | Excitation current      | typical 23 at 24 V DC<br>typical 46 mA at 12 V DC<br>max. 80 mA |
|                                                                                                                                   | Output voltage          | 0.5 ... 4.5 V DC                                                |
|                                                                                                                                   | Output current          | 2 mA max.                                                       |
|                                                                                                                                   | Output load             | >5kΩ                                                            |
|                                                                                                                                   | Resolution              | 16 bit f.s., min. 10 μm                                         |
|                                                                                                                                   | Stability (temperature) | ±50 x 10 <sup>-6</sup> / °C f.s.                                |
|                                                                                                                                   | Protection              | Reverse polarity, short circuit                                 |
|                                                                                                                                   | Output noise            | 0,5 mV <sub>RMS</sub>                                           |
|                                                                                                                                   | Operating temperature   | -40 ... +85°C                                                   |
|                                                                                                                                   | EMC                     | DIN EN 61326-1:2013                                             |

|                                                                                                                                          |                              |                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------|
| <b>I1</b><br>Current output<br>4 ... 20 mA, 3 wire<br> | Excitation voltage           | 18 ... 36 V DC (10 ... 36 V for R <sub>L</sub> ≤ 250Ω)              |
|                                                                                                                                          | Excitation current           | Typical 36 mA at 24 V DC<br>Typical 66 mA at 12 V DC<br>100 mA max. |
|                                                                                                                                          | Load resistor R <sub>L</sub> | 350 Ω max.                                                          |
|                                                                                                                                          | Output current               | 4 ... 20 mA (max. 30 mA at failure)                                 |
|                                                                                                                                          | Resolution                   | 16 bit f.s. min. 10 μm                                              |
|                                                                                                                                          | Stability (temperature)      | ±50 x 10 <sup>-6</sup> / °C f.s.                                    |
|                                                                                                                                          | Protection                   | Reverse polarity, short circuit                                     |
|                                                                                                                                          | Output noise                 | 0,5 mV <sub>RMS</sub>                                               |
|                                                                                                                                          | Operating temperature        | -40 ... +85°C                                                       |
|                                                                                                                                          | EMC                          | DIN EN 61326-1:2013                                                 |

| Signal wiring                                                                                                                                    | Output signals                    | Connector pin no. | Cable color    |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------|----------------|
| <b>Connector M12, 8 pin</b><br><br>View to the sensor connector | Excitation +                      | 1                 | white          |
|                                                                                                                                                  | Excitation GND                    | 2                 | brown          |
|                                                                                                                                                  | Signal 1 +                        | 3                 | green          |
|                                                                                                                                                  | Signal GND                        | 4                 | yellow         |
|                                                                                                                                                  | Signal 2 + (optional*)            | 5                 | grey           |
|                                                                                                                                                  | SPAN/ZERO<br>(PMU only, optional) | 6                 | pink           |
|                                                                                                                                                  | -                                 | 7                 | do not connect |
|                                                                                                                                                  | -                                 | 8                 | do not connect |

\* When using two magnets, the distance between the magnets must be min. 70 mm to identify the single magnets definitely.

## Diagnostic on analog outputs

### Behaviour of the analog signal output in case of error

In case of error (magnet missing or outside the measuring range) the analog output signal will assume a state according to the following options:

#### Alarm\_HIGH

The output voltage resp. the output current is at HIGH level (overrange).

#### Alarm\_LOW

The output voltage resp. the output current is at LOW level (underrange).

#### Alarm\_HOLD

The output voltage resp. the output current will keep the last valid state.

|           | <b>Alarm_HIGH</b><br>(Standard) | <b>Alarm_LOW</b><br>(.../U)                             | <b>Alarm_HOLD</b><br>(.../H)                        |
|-----------|---------------------------------|---------------------------------------------------------|-----------------------------------------------------|
| <b>U1</b> | $U_{out} \geq 10.5 \text{ V}$   | —                                                       | keeps last valid state<br>(Order code <b>U1/H</b> ) |
| <b>U2</b> | $U_{out} \geq 10.5 \text{ V}$   | $U_{out} < 0.25 \text{ V}$<br>(Order code <b>U2/U</b> ) | keeps last valid state<br>(Order code <b>U2/H</b> ) |
| <b>U8</b> | $U_{out} \geq 10 \text{ V}$     | $U_{out} < 0,25 \text{ V}$<br>(Order code <b>U8/U</b> ) | keeps last valid state<br>(Order code <b>U8/H</b> ) |
| <b>I1</b> | $I_{out} \geq 21 \text{ mA}$    | $1.5 \dots 2 \text{ mA}$<br>(Order code <b>I1/U</b> )   | keeps last valid state<br>(Order code <b>I1/H</b> ) |

### Error signal for SSI output

If the sensor cannot detect a magnet, the position value will take the maximum value (0xFFFFF) for 24 bits and (0x1FFFFFF) for 25 bits.

### Option - PMU for analog output U1, U2, U8 and I1

#### Programming of the start and end value by the customer:

The option PMU allows to program the start value and the end value of the output range by a programming signal SPAN/ZERO available at the connector. This Signal SPAN/ZERO must be connected with GND via a push button, then position magnet of the sensor must be moved to the start resp. end position. Pushing the button between 2 and 4 seconds sets the actual position as start position, pushing the button more than 5 seconds sets the actual position as end position. The values will be stored and are available after switching off the sensor.

To reset the sensor to the factory values the button must be pushed for longer than two seconds when the sensor is switched on.

## Digital output

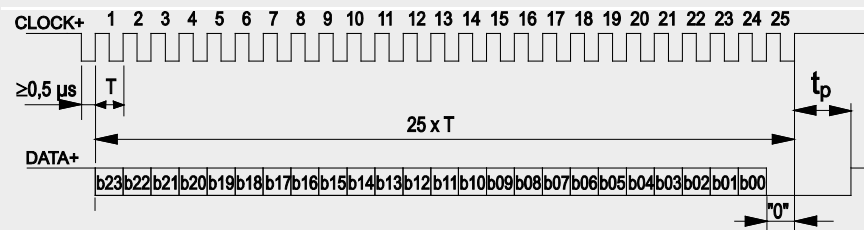
|                                                                                                                                     |                                              |                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------|
| <b>SSI</b><br>Synchronous serial interface SSI<br> | Interface                                    | EIA RS-422                                                          |
|                                                                                                                                     | Excitation voltage                           | 10 ... 36 V DC, residual ripple 10 mV <sub>ss</sub>                 |
|                                                                                                                                     | Excitation current                           | typical 22 mA at 24 V DC<br>typical 46 mA at 12 V DC<br>150 mA max. |
|                                                                                                                                     | Clock frequency                              | 100 kHz ... 1 MHz                                                   |
|                                                                                                                                     | Code                                         | Gray-Code, Dual-Code                                                |
|                                                                                                                                     | Delay between pulse trains (t <sub>p</sub> ) | >25 µs                                                              |
|                                                                                                                                     | Stability (temperature)                      | ±50 x 10 <sup>-6</sup> / °C f.s.                                    |
|                                                                                                                                     | Operating temperature                        | -40 ... +85°C                                                       |
|                                                                                                                                     | EMC                                          | DIN EN 61326-1:2013                                                 |

## Description

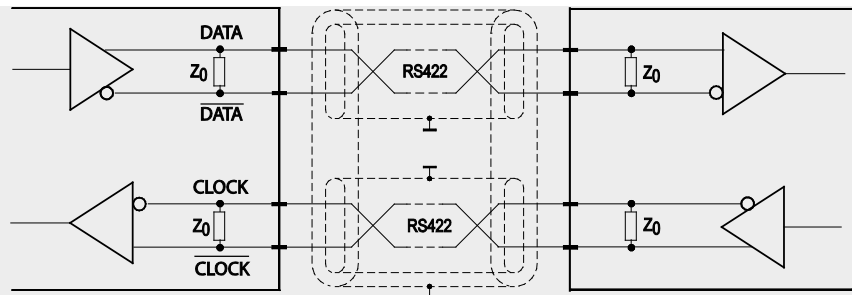
The data transmission takes place by means of the two signals CLOCK and DATA. The processing unit (PLC, microcomputer) sends pulse sequences which clock the data transmission at the required transfer rate. With the first falling edge of the pulse sequence the position of the sensor is recorded and stored. The following rising edges control the bit-by-bit transfer of the data word. After a delay time the next new position information can be transmitted.

### Data format

(Train of 26 pulses)

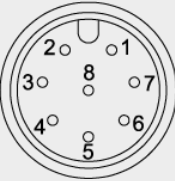


### Recommended processing circuit



## Transmission rate

| Cable length | Baud rate   | <b>Note:</b><br>Extension of the cable length will reduce the maximum transmission rate.<br><br>The signals CLOCK/CLOCK and DATA/DATA must be connected in a twisted pair cable, shielded in pairs, the pairs also commonly shielded. |
|--------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 50 m         | 100-400 kHz |                                                                                                                                                                                                                                       |
| 100 m        | 100-300 kHz |                                                                                                                                                                                                                                       |

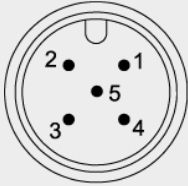
| Signal wiring<br>Connector M12, 8 pin                                                                                | Signal                    | Connector pin no. | Cable color |
|----------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------|-------------|
| <br>View to the sensor<br>connector | Excitation +              | 1                 | white       |
|                                                                                                                      | Excitation GND            | 2                 | brown       |
|                                                                                                                      | CLOCK                     | 3                 | green       |
|                                                                                                                      | $\overline{\text{CLOCK}}$ | 4                 | yellow      |
|                                                                                                                      | DATA                      | 5                 | grey        |
|                                                                                                                      | $\overline{\text{DATA}}$  | 6                 | pink        |
|                                                                                                                      | -                         | 7                 | blue        |
|                                                                                                                      | -                         | 8                 | red         |

## Description

CANopen interface with process data for position and cam functions, programmable are preset, resolution, filtering and cam switching points.

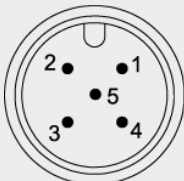
|                                                                                                                                |                                                |                                                                |
|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------------------------|
| <b>CANOP</b><br><b>CANOP/R</b><br>CANopen<br> | CAN specification                              | ISO 11898, Basic and Full CAN 2.0 B                            |
|                                                                                                                                | Communication profile                          | CANopen CiA 301 V 4.02, Slave                                  |
|                                                                                                                                | Encoder profile                                | Encoder CiA 406 V 3.2                                          |
|                                                                                                                                | Error Control                                  | Node Guarding, Heartbeat, Emergency Message                    |
|                                                                                                                                | Node ID                                        | Adjustable via LSS or via object dictionary                    |
|                                                                                                                                | PDO                                            | 4 TxPDO, 0 RxPDO, no linking, static mapping                   |
|                                                                                                                                | PDO Modes                                      | Event-/Time triggered, Remote-request, Sync cyclic/acyclic     |
|                                                                                                                                | SDO                                            | 1 Server, 0 Client                                             |
|                                                                                                                                | CAM                                            | 8 cams                                                         |
|                                                                                                                                | Certified                                      | yes                                                            |
|                                                                                                                                | Transmission rate                              | 50 kBit to 1 MBit, adjustable via LSS or via object dictionary |
|                                                                                                                                | Nodes                                          | 127 max.                                                       |
|                                                                                                                                | Bus-Anschluss                                  | M12 connector, 5 pin                                           |
|                                                                                                                                | Integrated bus terminating resistor (optional) | 120 Ω                                                          |
|                                                                                                                                | Bus, galvanic isolated                         | no                                                             |

|                       |                            |                                                                    |
|-----------------------|----------------------------|--------------------------------------------------------------------|
| <b>Specifications</b> | Excitation voltage         | 18 ... 36 V DC<br>11 ... 36 V DC for measurement length <1m        |
|                       | Excitation current         | typical 20 mA at 24 V DC<br>typical 40 mA at 12 V DC<br>max. 80 mA |
|                       | Number of position magnets | 1 ... 4                                                            |
|                       | Resolution                 | 50 µm                                                              |
|                       | Measuring rate             | 1 kHz (asynchronous)                                               |
|                       | Stability (temperature)    | ±50 x 10 <sup>-6</sup> / °C f.s.                                   |
|                       | Repeatability              | 1 LSB                                                              |
|                       | Operating temperature      | -40 ... +85 °C                                                     |
|                       | Protection                 | Reverse polarity, short circuit                                    |
|                       | Dielectric strength        | 500 V (V AC, 50 Hz, 1 min.)                                        |
|                       | EMC                        | DIN EN 61326-1:2013                                                |

| Signal wiring                                                                                                                                       | Output signals | Connector pin no. |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------|
| <b>Connector M12, 5 pin</b><br><br>View to the sensor<br>connector | Shield         | 1                 |
|                                                                                                                                                     | Excitation +   | 2                 |
|                                                                                                                                                     | GND            | 3                 |
|                                                                                                                                                     | CAN-H          | 4                 |
|                                                                                                                                                     | CAN-L          | 5                 |

When using multiple magnets, the distance between two magnets must be min. 70 mm to identify the single magnets definitely.

|                                                                                                                                                      |                                          |                                                                  |                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------------|
| <div>CANJ1939<br/>CANJ1939/R</div> <div>SAE J1939</div> <div></div> | CAN Specification                        | ISO 11898, Basic and Full CAN 2.0 B                              |                                                                         |
|                                                                                                                                                      | Transceiver                              | 24V-compliant, not isolated                                      |                                                                         |
|                                                                                                                                                      | Communication profile                    | SAE J1939                                                        |                                                                         |
|                                                                                                                                                      | Baud Rate                                | 250 kbit/s                                                       |                                                                         |
|                                                                                                                                                      | Internal termination resistor (optional) | 120 Ω                                                            |                                                                         |
|                                                                                                                                                      | Address                                  | Default 247d, configurable                                       |                                                                         |
|                                                                                                                                                      |                                          |                                                                  |                                                                         |
| NAME Fields                                                                                                                                          | Arbitrary address capable                | 1                                                                | no                                                                      |
|                                                                                                                                                      | Industry group                           | 0                                                                | Global                                                                  |
|                                                                                                                                                      | Vehicle system                           | 7Fh (127d)                                                       | Non specific                                                            |
|                                                                                                                                                      | Vehicle system instance                  | 0                                                                |                                                                         |
|                                                                                                                                                      | Function                                 | FFh (255d)                                                       | Non specific                                                            |
|                                                                                                                                                      | Function instance                        | 0                                                                |                                                                         |
|                                                                                                                                                      | ECU instance                             | 0                                                                |                                                                         |
|                                                                                                                                                      | Manufacturer                             | 145h (325d)                                                      | Manufacturer ID                                                         |
|                                                                                                                                                      | Identity number                          | 0nnn                                                             | Serial number 21 bit                                                    |
| Parameter Group Numbers (PGN)                                                                                                                        | Configuration data                       | PGN EF00h                                                        | Proprietary-A (PDU1 peer-to-peer)                                       |
|                                                                                                                                                      | Process data                             | PGN FFnnh                                                        | Proprietary-B (PDU2 broadcast);<br>nn Group Extension (PS) configurable |
| Specifications                                                                                                                                       | Excitation voltage                       | 18 ... 36 V DC<br>11 ... 36 V DC for measurement length <1m      |                                                                         |
|                                                                                                                                                      | Excitation current                       | 20 mA typical at 24 V DC<br>40 mA typical at 12 V DC, max. 80 mA |                                                                         |
|                                                                                                                                                      | Measuring rate                           | 1 kHz (asynchronous)                                             |                                                                         |
|                                                                                                                                                      | Stability (temperature)                  | ±50 x 10 <sup>-6</sup> /°C f.s. (typical)                        |                                                                         |
|                                                                                                                                                      | Repeatability                            | 1 LSB                                                            |                                                                         |
|                                                                                                                                                      | Operating temperature                    | -40 ... 85°C                                                     |                                                                         |
|                                                                                                                                                      | Protection                               | Reverse polarity, short circuit                                  |                                                                         |
|                                                                                                                                                      | Dielectric strength                      | 500 V (V AC, 50 Hz, 1 min.)                                      |                                                                         |
|                                                                                                                                                      | EMV                                      | DIN EN 61326-1:2013                                              |                                                                         |

| Signal wiring                                                                                                                                    | Output signals | Connector pin no. |
|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------|
| <b>Connector M12, 5 pin</b><br><br>View to the sensor connector | Shield         | 1                 |
|                                                                                                                                                  | Excitation +   | 2                 |
|                                                                                                                                                  | GND            | 3                 |
|                                                                                                                                                  | CAN-H          | 4                 |
|                                                                                                                                                  | CAN-L          | 5                 |

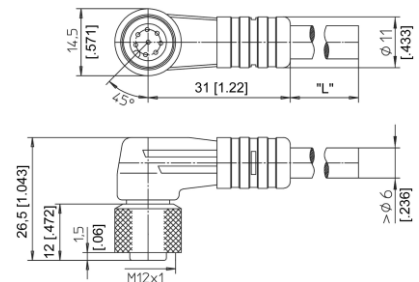
When using multiple magnets, the distance between two magnets must be min. 70 mm to identify the single magnets definitely.

## Connector cables

### Connector cable M12, 8 pin (angular coupling)

shielded connector

The 8-lead shielded cable is supplied with a mating 8-pin 90° M12 connector at one end and 8 wires at the other end. Available lengths are 2 m, 5 m and 10 m.  
Wire: cross sectional area 0.25 mm²  
Cable diameter: 6.3 ±0.2 mm



#### Order code

**KAB - xM - M12/8F/W - LITZE**

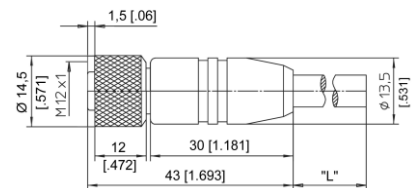
IP69: **KAB - xM - M12/8F/W/69K - LITZE**

xM = length in m

## Connector cable M12, 8 pin (straight coupling)

shielded connector

The 8-lead shielded cable is supplied with a mating 8-pin M12 connector at one end and 8 wires at the other end. Available lengths are 2 m, 5 m and 10 m.  
Wire: cross sectional area 0.25 mm²  
Cable diameter: 6.3 ±0.2 mm



#### Order code

**KAB - xM - M12/8F/G - LITZE**

IP69: **KAB - xM - M12/8F/G/69K - LITZE**

xM = length in m

| Signal wiring<br>M12, 8 pin | Plug connection / cable color |       |       |        |      |      |      |     |
|-----------------------------|-------------------------------|-------|-------|--------|------|------|------|-----|
|                             | 1                             | 2     | 3     | 4      | 5    | 6    | 7    | 8   |
|                             | white                         | brown | green | yellow | grey | pink | blue | red |

### Applicable for cable carriers

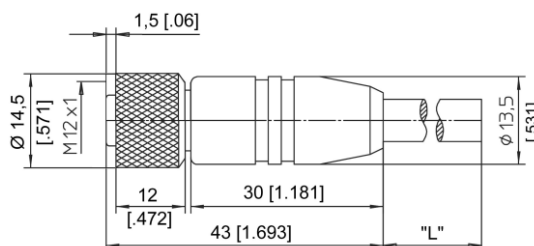
|                        |                     |
|------------------------|---------------------|
| Maximum movement speed | 3 m/s               |
| Maximum acceleration   | 5 m/s²              |
| Minimum bending radius | 10 x cable diameter |

## Connector/bus cable M12, 5 pin CAN-Bus

The 5-lead shielded cable is supplied with a female 5 pin M12 connector at one end and a male 5 pin M12 connector at the other end.

Available lengths are 0.3 m, 2 m, 5 and 10 m.

Cable diameter:  $6.7 \pm 0.2$  mm



### Order code

**KAB - xM - M12/5F/G - M12/5M/G - CAN**

IP69: **KAB - xM - M12/5F/G/69K - M12/5M/G/69K - CAN**

xM = length in m

## T-connector for bus cable M12, 5 pin CAN-Bus

### Order code

**KAB - TCONN - M12/5M - 2M12/5F - CAN**



## Terminating resistor M12, 5 pin CAN-Bus

### Order code

**KAB - RTERM - M12/5M/G - CAN**



## Applicable for cable carriers

|                        |                     |
|------------------------|---------------------|
| Maximum movement speed | 3 m/s               |
| Maximum acceleration   | 5 m/s <sup>2</sup>  |
| Minimum bending radius | 10 x cable diameter |