

 **PCST27**

Rod-style displacement sensor for underwater applications, hydraulic cylinders, level indicators



- Protection class IP68/IP69, pressure-proof up to 15 bar, water-proof cable seal
- 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





**Order code**

PCST27    –    **1**    –    **2**    –    **3**    –    **4**    –    **5**    –    **6**    –    **7**

**Order example:** PCST27 – M18 – 1000 – I1 – P1A – VZ1.0 – L10 – KAB2M

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:**

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



PCST27 - Rod-style Magnetostrictive Position Sensor  
Version with digital output SSI

Specifications

			Order options
Mounting	Thread M18 x 1,5 Thread ¾"-16UNF	<b>1</b>	M18 Z3/4
Working pressure	400 bar, other values on request		
Measurement range	100 ... 5750 (in 10 mm increments) other lengths upon request	<b>2</b>	100 ... 5750
Resolution	5 / 10 / 20 / 50 / 100	<b>3</b>	5 / 10 / 20 / 50 / 100
Output	Synchronous serial interface (SSI)	<b>4</b>	SSI
Output code	Gray Dual	<b>5</b>	G D
Number of data bits	24 bit 25 bit	<b>6</b>	24 25
Sampling rate	Up to 1 kHz, depending on the measurement range		
Linearity	Ranges >500 mm: ±0.10 % f.s. ±0.02 % f.s. Ranges ≤500 mm: ±0.5 mm ±0.2 mm	<b>7</b>	L10 L02 L10 L02MM
Repeatability	±3 µm		
Housing material	Stainless steel EN 1.4404 (AISI 316L)		
Protection class	IP68/IP69 (permanent pressure-proof up to 15 bar)		
Connection	Cable, standard length 2 m; other lengths upon request	<b>8</b>	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

PCST27	-	<b>1</b>	-	<b>2</b>	-	<b>3</b>	-	<b>4</b>	/	<b>5</b>	/	<b>6</b>	-	<b>7</b>	-	<b>8</b>
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Order example: PCST27 – M18 – 1000 – 5 – SSI / G / 24 – L10 – KAB2M

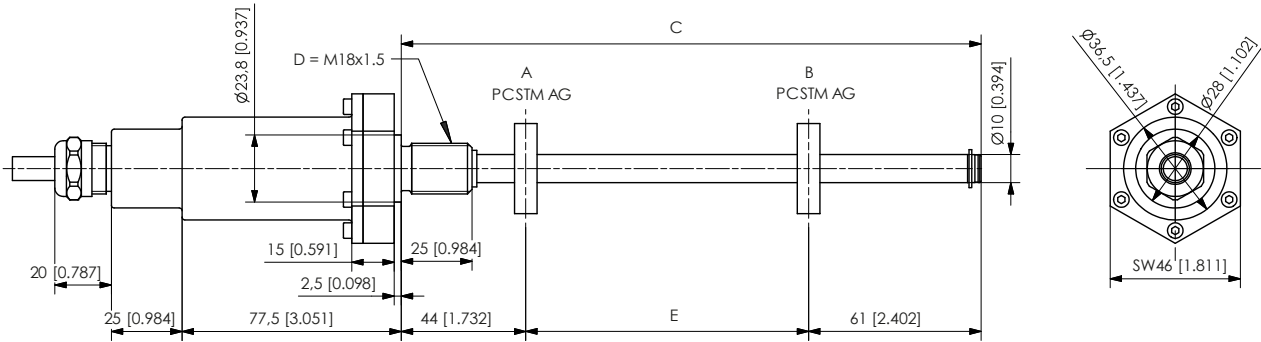
Accessories:

Position magnets (see from page 13)



## Dimensions

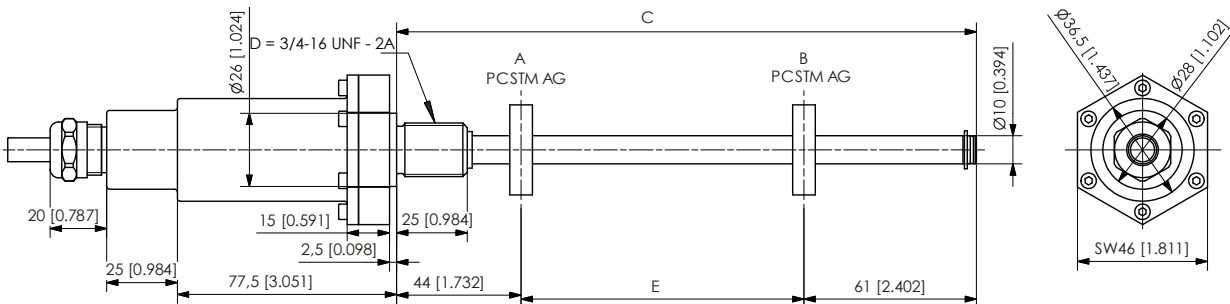
### Cable output, M18 flange



- 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.

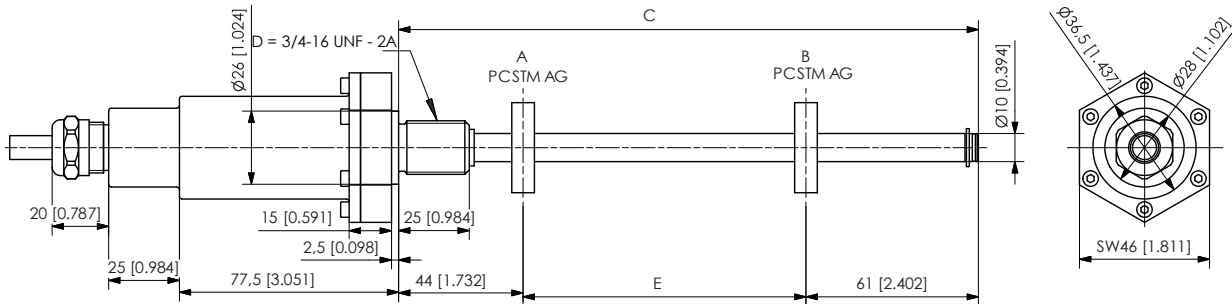
### Cable output, flange 3/4"



- 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.

**With hydraulic tube as cable protector**



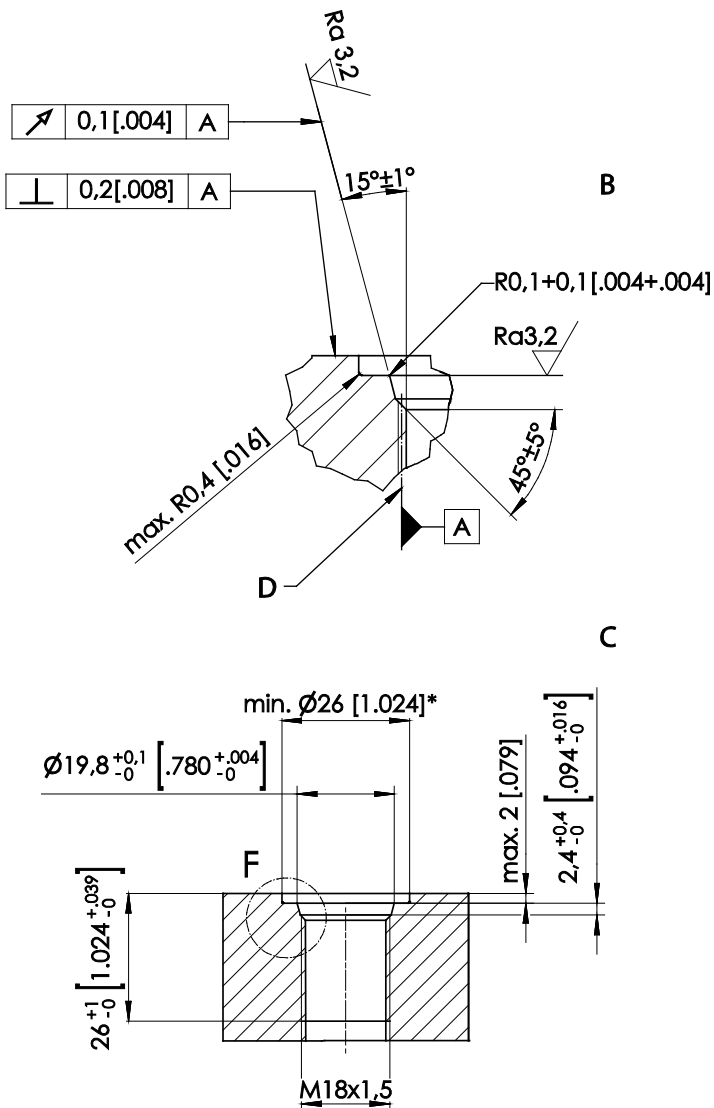
- A – Start position
- B – End position
- C – Total length = Measurement length + 105 [4.134]  
(e.g. 205 [8.071])
- D – Flange M18x1.5
- E – Measurement length (e.g. 100 [3.937])
- F – With hydraulic tube as cable protector  
(hydraulic tube not included in delivery)

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



## Mounting sets

### Mounting hole M18



B – Drive hole and pivot M18 x 1.5 according to ISO 6149

C – Diameter of the plane area without marking ring

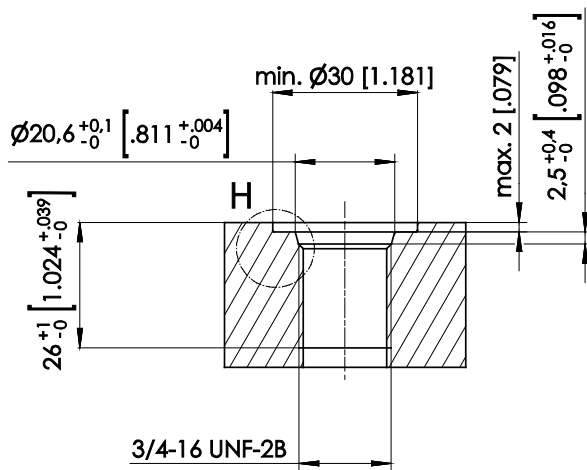
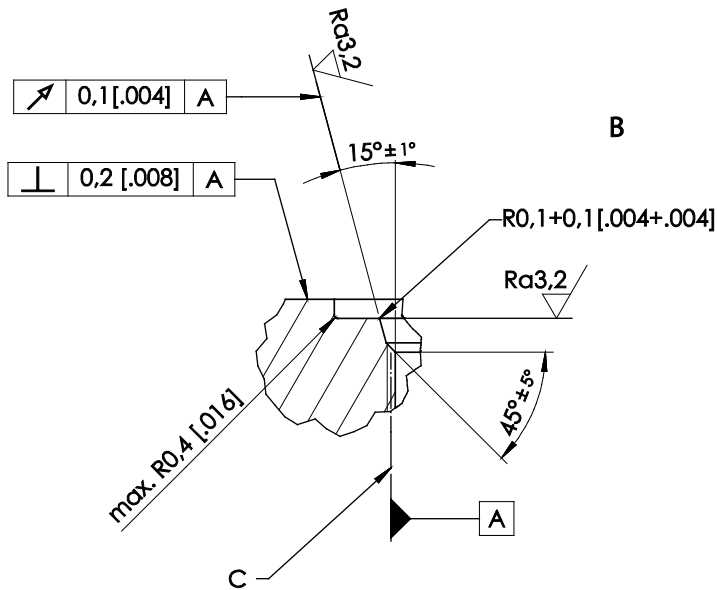
D – Effective diameter

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

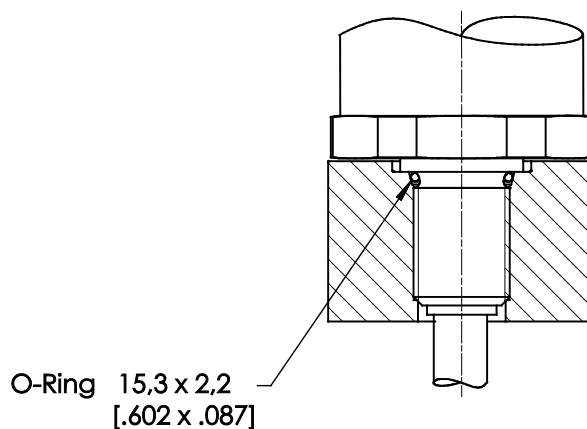
### O-ring sealing (M18)

for:

PCST24-M18...

PCST25-M18...

PCST27-M18...



Dimensions in mm [inch]

Dimensions informative only.

For guaranteed dimensions consult factory.

### Order code

PCST – OR – M18

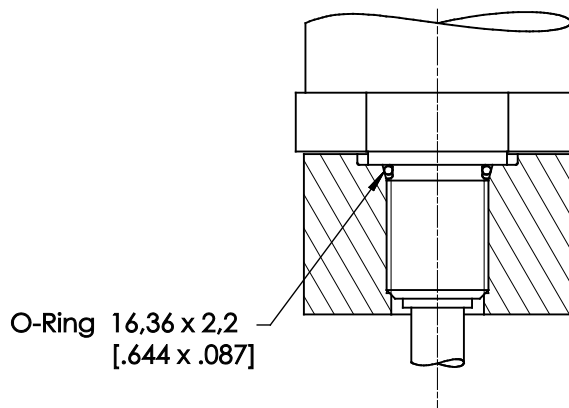
### O-ring sealing (Z3/4")

for:

PCST24-Z3/4...

PCST25-Z3/4...

PCST27-Z3/4...



Dimensions in mm [inch]

Dimensions informative only.

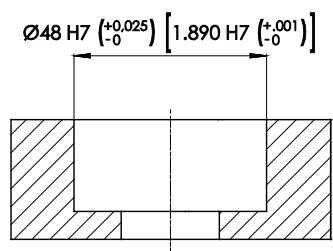
For guaranteed dimensions consult factory.

### Order code

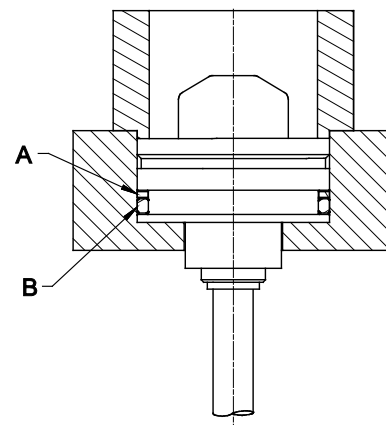
PCST – OR – Z3/4

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

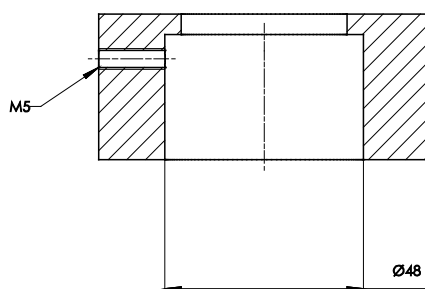
for:  
PCST25-SV



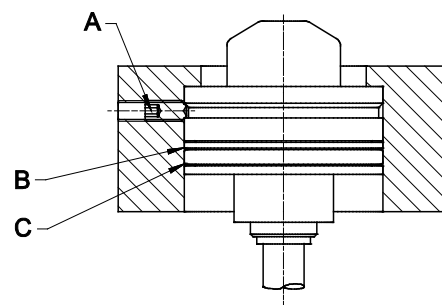
A – Supporting ring  
B – O-Ring



for:  
PCST25-SV



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



Dimensions in mm [inch]

Dimensions informative only.

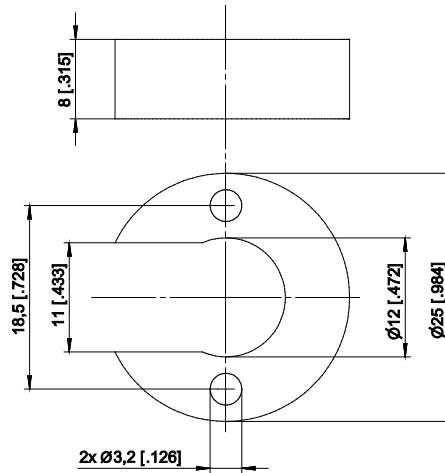
For guaranteed dimensions consult factory.

### Order code

PCST – OR – SV

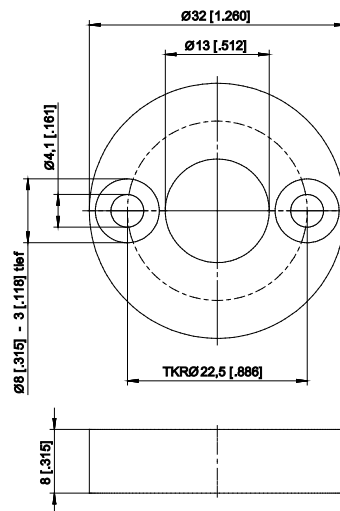
Position magnets for posichron®-PCST

PCSTMAG1

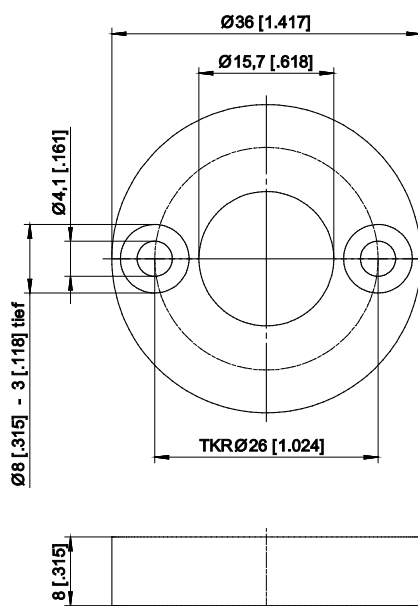


PCSTMAG2

(Standard)

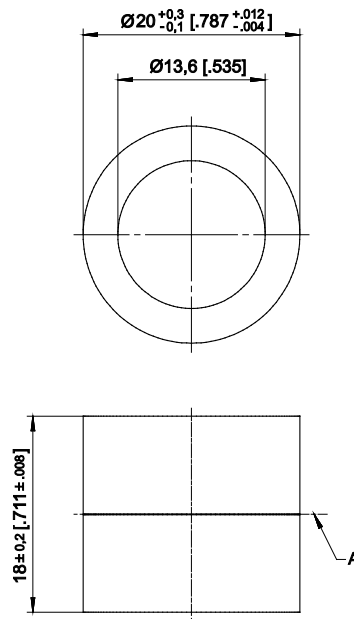


PCSTMAG5



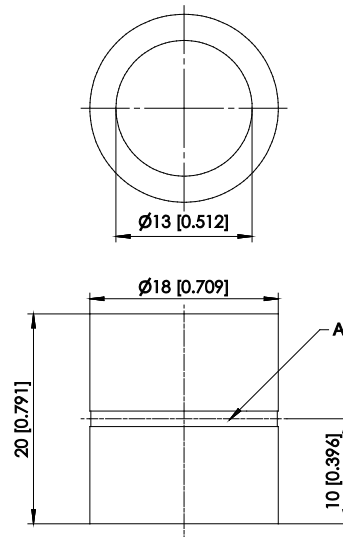
Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions consult  
factory.  
Other designs can be realized on  
request.

PCSTMAG2-MH1



A – Center of magnet

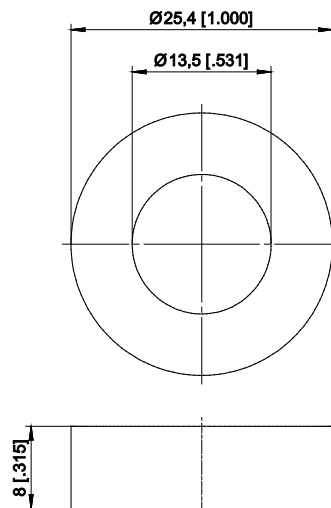
PCSTMAG2-MH2



A – Center of magnet

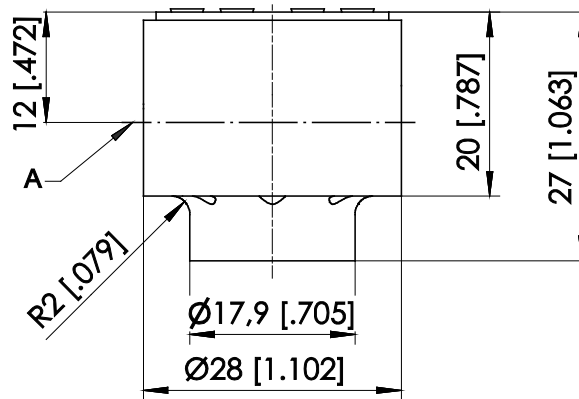
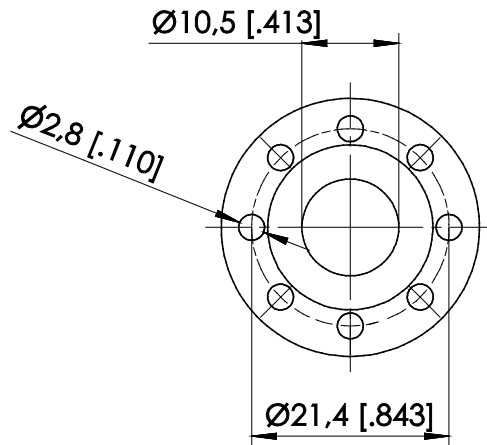
Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions consult factory.  
Other designs can be realized on request.

PCSTMAG2-MH3



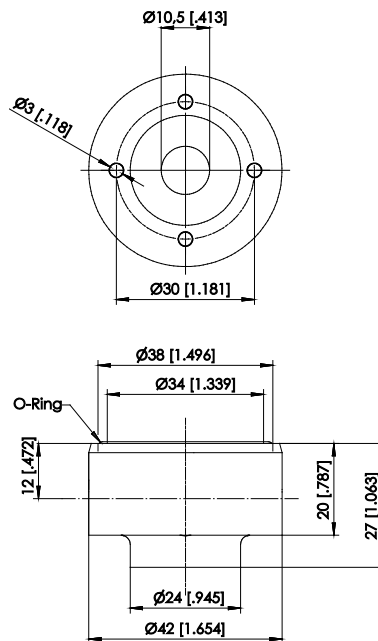
Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions consult factory.  
Other designs can be realized on request.

PCSTMAG2-G1



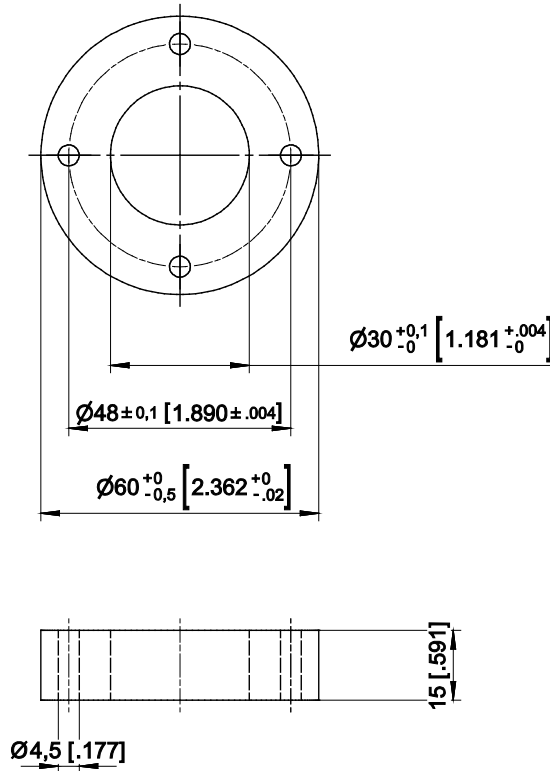
PCSTMAG2 - G1 / G2  
Sliding magnet with special self-lubricating and abrasion-resistant material.  
To be used if sensor is mounted in horizontal position and a mechanical support of the rod is not possible for measurement ranges >1000 mm.

PCSTMAG2-G2

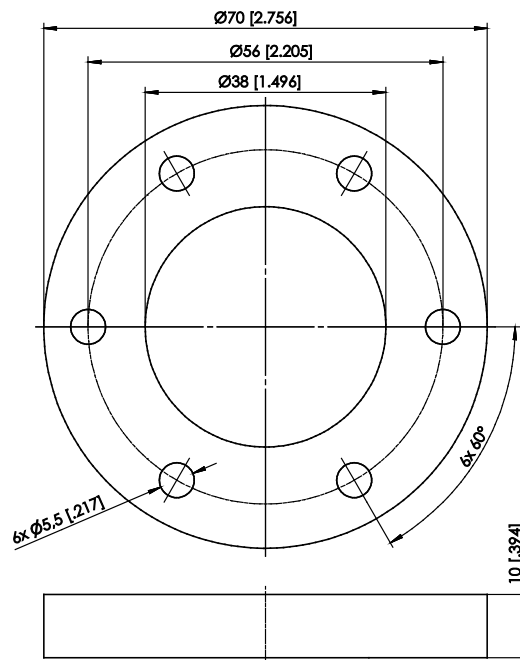


Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions consult factory.  
Other designs can be realized on request.

PCSTMAG7



PCSTMAG4

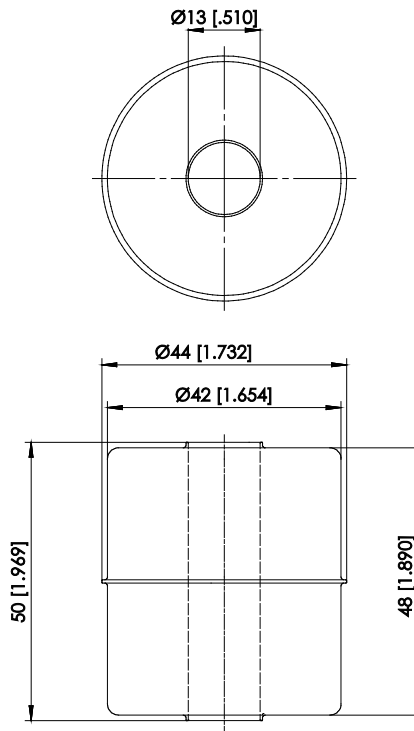


Dimensions in mm [inch]  
Dimensions informative only.  
For guaranteed dimensions  
consult factory.  
Other designs can be realized on  
request



**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

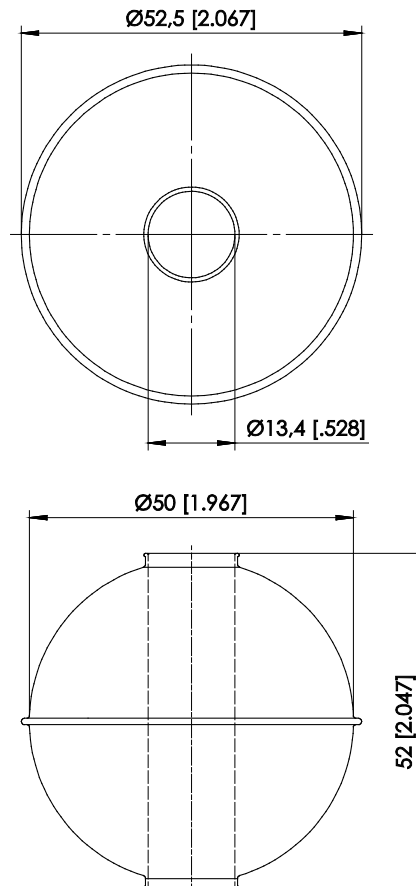


Note: Dependent on the design the available measurement range is reduced of 25 mm on both ends!

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> Voltage output 0 ... 10 V 	Excitation voltage	18 ... 36 V DC
	Excitation current	typical 23 mA at 24 V DC typical 46 mA at 12 V DC 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> Voltage output 0,5 ... 10 V 	Excitation voltage	18 ... 36 V DC
	Excitation current	typical 23 mA at 24 V DC typical 46 mA at 12 V DC 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> Voltage output 0.5 ... 4.5 V 	Excitation voltage	10 ... 36 V DC
	Excitation current	typical 23 at 24 V DC typical 46 mA at 12 V DC 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> Current output 4 ... 20 mA, 3 wire 	Excitation voltage	18 ... 36 V DC (10 ... 36 V for R <sub>L</sub> ≤ 250Ω)
	Excitation current	Typical 36 mA at 24 V DC Typical 66 mA at 12 V DC 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

## 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> (Standard)	<b>Alarm_LOW</b> (.../U)	<b>Alarm_HOLD</b> (.../H)
<b>U1</b>	$U_{out} \geq 10.5 \text{ V}$	—	keeps last valid state (Order code <b>U1/H</b> )
<b>U2</b>	$U_{out} \geq 10.5 \text{ V}$	$U_{out} < 0.25 \text{ V}$ (Order code <b>U2/U</b> )	keeps last valid state (Order code <b>U2/H</b> )
<b>U8</b>	$U_{out} \geq 10 \text{ V}$	$U_{out} < 0,25 \text{ V}$ (Order code <b>U8/U</b> )	keeps last valid state (Order code <b>U8/H</b> )
<b>I1</b>	$I_{out} \geq 21 \text{ mA}$	1.5 ... 2 mA (Order code <b>I1/U</b> )	keeps last valid state (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 (0xFFFFFFF) for 24 bits and (0x1FFFFFFF) 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

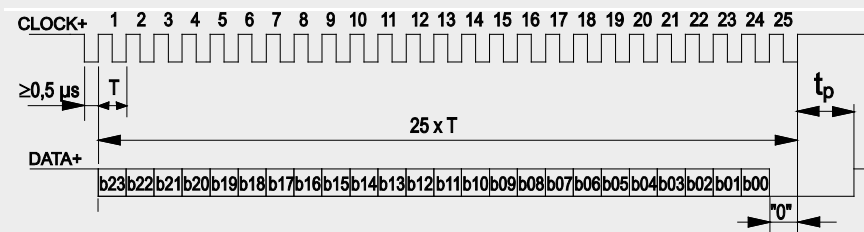
<b>SSI</b> Synchronous serial interface SSI 	Interface	EIA RS-422
	Excitation voltage	10 ... 36 V DC, residual ripple 10 mV <sub>ss</sub>
	Excitation current	typical 22 mA at 24 V DC typical 46 mA at 12 V DC 150 mA max.
	Clock frequency	100 kHz ... 1 MHz
	Code	Gray-Code, Dual-Code
	Delay between pulse 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

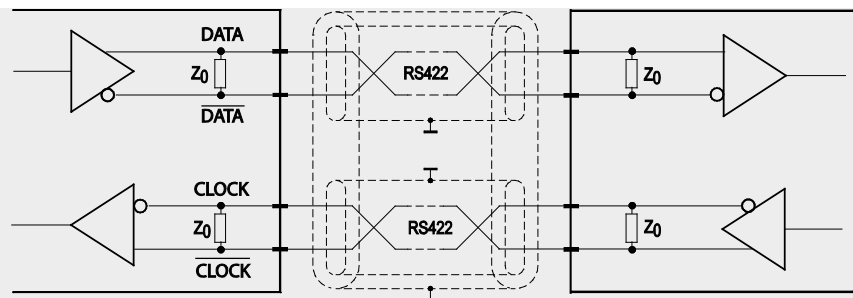
The data transmission takes place by means of the two signals CLOCK and DATA. The processing unit (PLC, microcomputer) sends pulse sequences which clock the data transmission at the required transfer rate. With the first falling edge of the pulse sequence the position of the sensor is recorded and stored. 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)

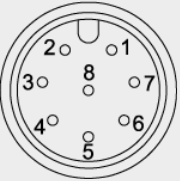


### Recommended processing circuit




### Transmission rate

Cable length	Baud rate	Note:
50 m	100-400 kHz	Extension of the cable length will reduce the maximum transmission rate.  The signals CLOCK/ $\overline{\text{CLOCK}}$ and DATA/ $\overline{\text{DATA}}$ must be connected in a twisted pair cable, shielded in pairs, the pairs also commonly shielded.
100 m	100-300 kHz	

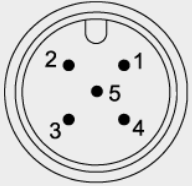
Signal wiring	Signal	Connector pin no.	Cable color
<b>Connector M12, 8 pin</b>  View to the sensor connector	Excitation +	1	white
	Excitation GND	2	brown
	CLOCK	3	green
	$\overline{\text{CLOCK}}$	4	yellow
	DATA	5	grey
	$\overline{\text{DATA}}$	6	pink
	-	7	blue
	-	8	red

## Description

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


<b>CANOP</b> <b>CANOP/R</b> CANopen 	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 11 ... 36 V DC for measurement length <1m
	Excitation current	typical 20 mA at 24 V DC typical 40 mA at 12 V DC 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>  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.

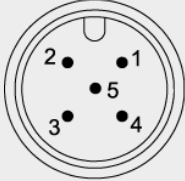


<b>CANJ1939</b> <b>CANJ1939/R</b> SAE J1939 	CAN Specification	ISO 11898, Basic and Full CAN 2.0 B
	Transceiver	24V-compliant, not isolated
	Communication profile	SAE J1939
	Baud Rate	250 kbit/s
	Internal termination resistor (optional)	120 Ω
	Address	Default 247d, configurable

<b>NAME Fields</b>	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

<b>Parameter Group Numbers (PGN)</b>	Configuration data	PGN EF00h	Proprietary-A (PDU1 peer-to-peer)
	Process data	PGN FFnnh	Proprietary-B (PDU2 broadcast); nn Group Extension (PS) configurable

<b>Specifications</b>	Excitation voltage	18 ... 36 V DC 11 ... 36 V DC for measurement length <1m
	Excitation current	20 mA typical at 24 V DC 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>  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.