

## PRAS1

Angle sensor for standard industrial applications



- Measurement range 0°... 360°
- Protection class IP67/IP69
- Stainless steel round housing
- Diameter 12 mm
- Contactless with external position magnet, wear-free

### Product version

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Analog output



PRAS1 - Magnetic Angle Sensor  
Version with analog output

Specifications

		Order options
Measurement range	0 ... 15° to 0 ... 360° (in 15° increments)	<b>1</b> 15 / 30 / 45 / ... / 345 / 360
Output	Voltage 0.5 ... 10 V Voltage 0.5 ... 4.5 V ratiometric Voltage 0.5 ... 4.5 V Current 4 ... 20 mA, 3 wire	<b>2</b> U2 U6 U8 I1
Signal characteristics	Signal increasing CW, clockwise Signal increasing CCW, counterclockwise	<b>3</b> CW CCW
Resolution	0.03% (60 ... 360°); 0.1% (15 ... 45°)	
Repeatability	±0.03% (60 ... 360°); ±0.1% (15 ... 45°)	
Linearity	±0.3% f.s. (typical)	
Rated distance sensor / magnet	Depending on the position magnet	
Housing material	Stainless steel	
Mounting	M12 x 1	
Protection class	IP67/IP69	
Connection	5-pin connector M12 (compatible to 4-pin connector)	<b>4</b> M12A5
Shock	DIN EN 60068-2-27:2010, 100 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	
Weight	35 g approx.	
EMC	DIN EN 61326-1:2013	

Order code

PRAS1	-	<b>1</b>	-	<b>2</b>	-	<b>3</b>	-	<b>4</b>
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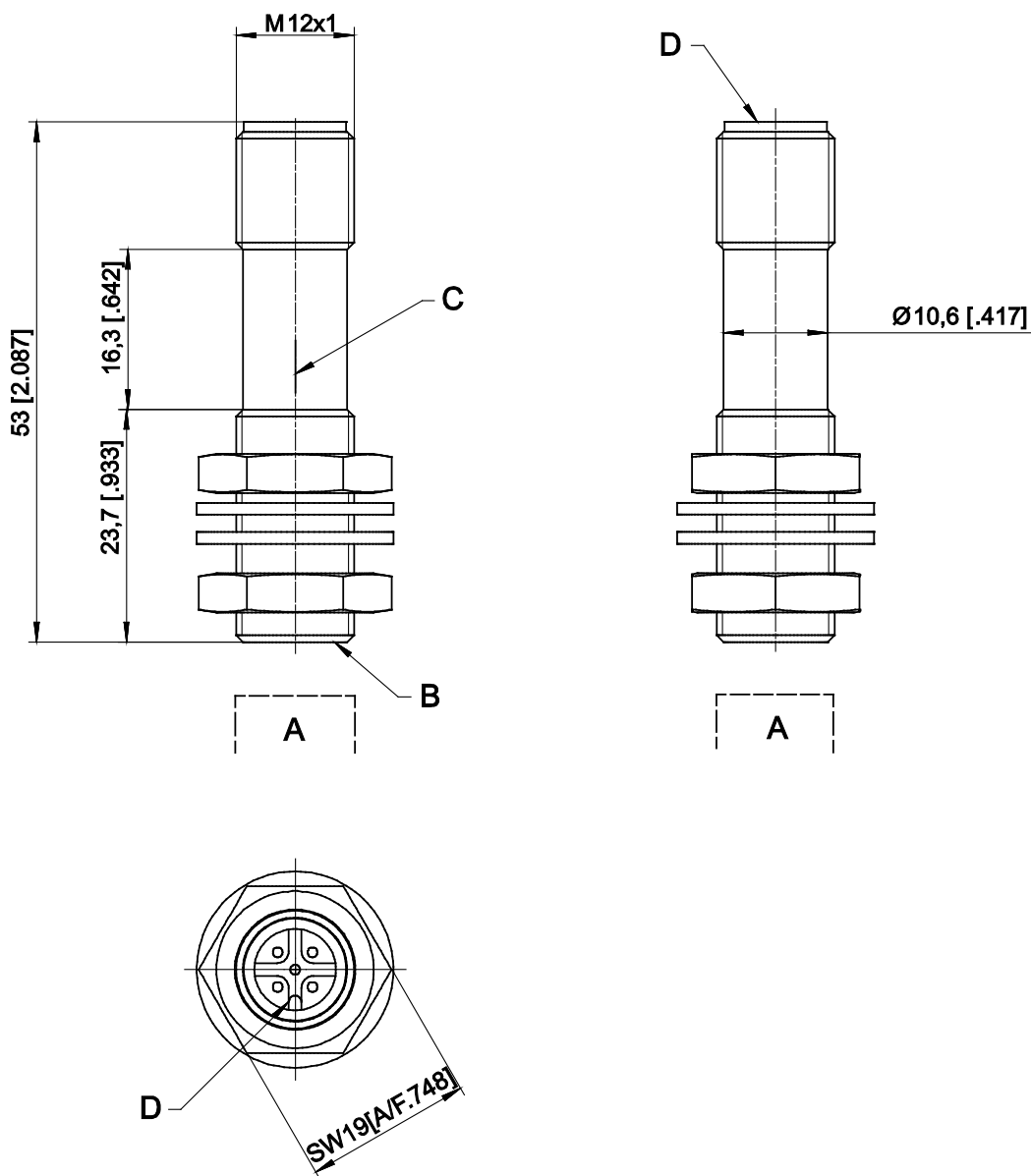
Order example: PRAS1 – 360 – I1 – CW – M12A5

Accessories:

Connector cable (see page 12)

Position magnets (see from page 4)

## Dimensions

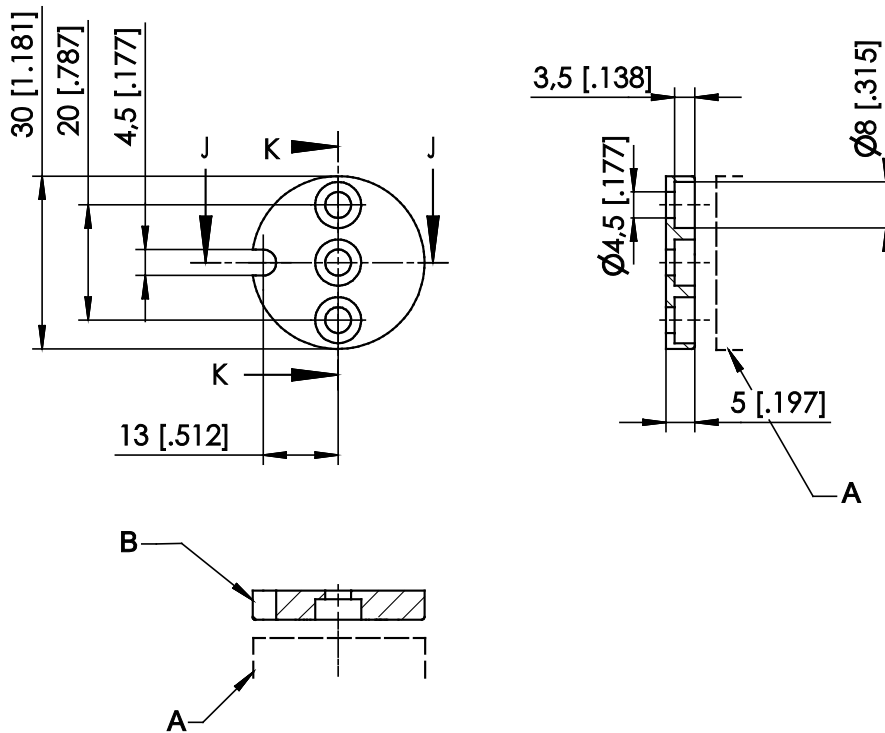


- A – Position magnet
- B – Measuring area
- C – Marking
- D – Connector M12

Dimensions in mm [inch]. Weight approx. 35 g.  
Dimensions informative only.  
For guaranteed dimensions consult factory.

## Position magnets

### PRMAG20



A – Sensor  
B – Marking

Order code	Weight	Material	Moment of inertia
PRMAG20	approx. 12 g	zinc coated steel, plastic	1.3 kgmm <sup>2</sup>

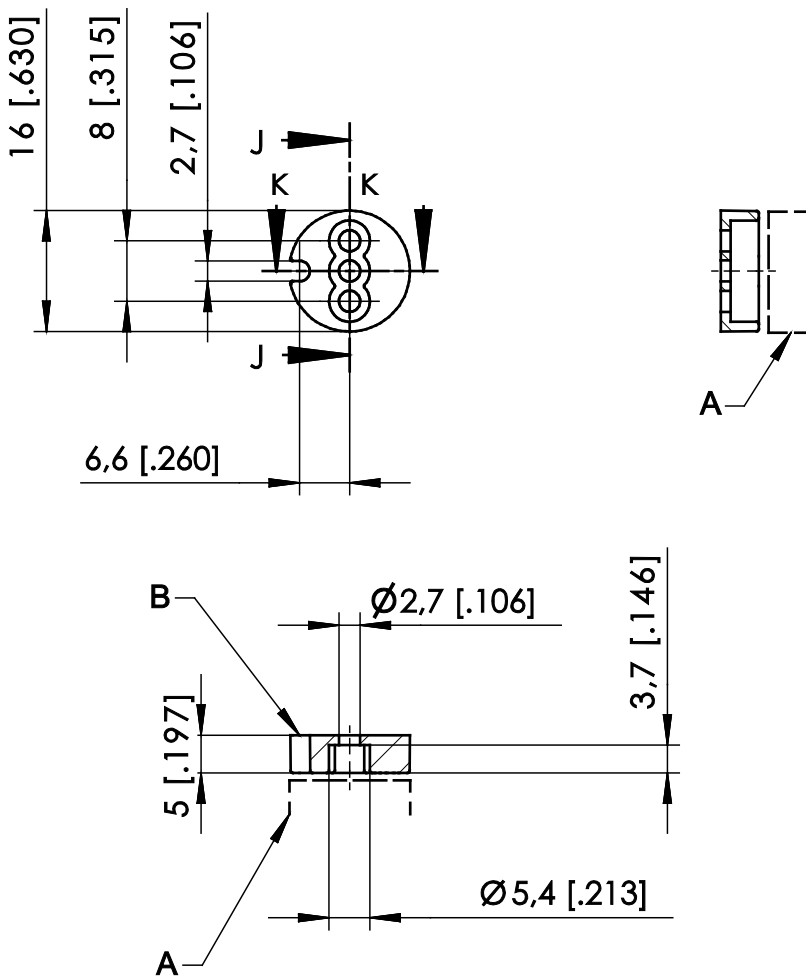
A misalignment of the position magnet has an effect on the linearity.

Dimensions in mm [inch].

Dimensions informative only.

For guaranteed dimensions please consult factory.

PRMAG21



A – Sensor  
B – Marking

Order code	Weight	Material	Moment of inertia
PRMAG21	approx. 3 g	zinc coated steel; plastic	0.1 kgmm <sup>2</sup>

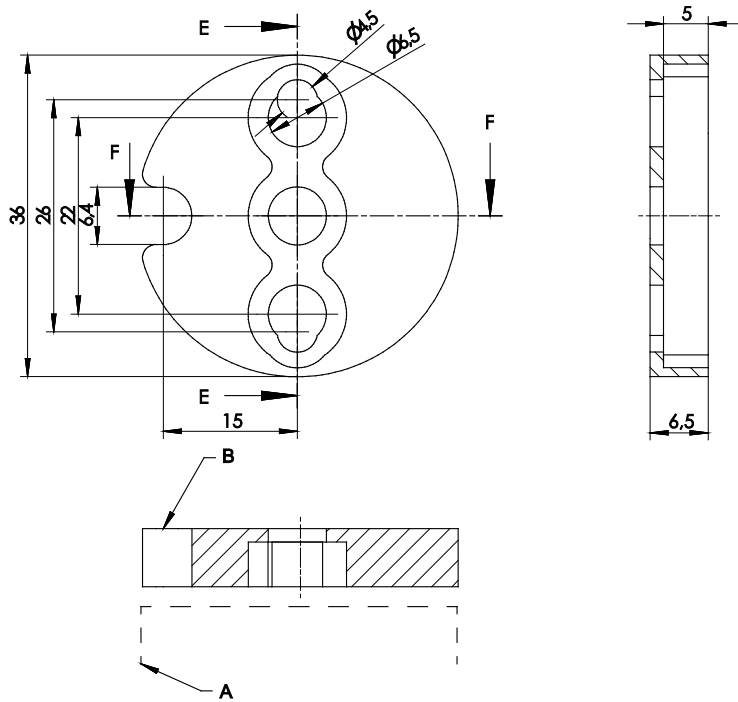
A misalignment of the position magnet has an effect on the linearity.

Dimensions in mm [inch]

Dimensions informative only.

For guaranteed dimensions please consult factory.

PRMAG22



A – Sensor  
B – Marking

Order code	Weight	Material	Moment of inertia
PRMAG22	approx. 19 g	zinc coated steel, plastic	3 kgmm <sup>2</sup>

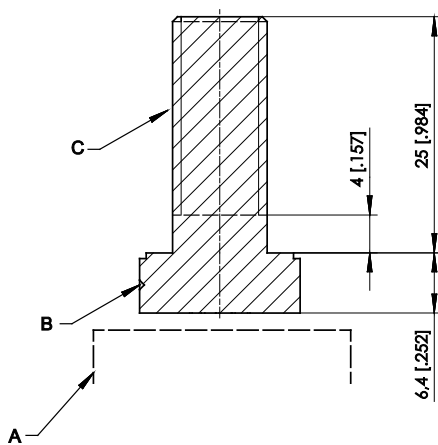
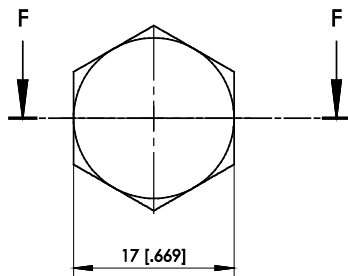
A misalignment of the position magnet has an effect on the linearity.

Dimensions in mm [inch].

Dimensions informative only

For guaranteed dimensions please consult factory.

PRMAG-M10



- A – Sensor
- B – Marking
- C – Thread M10

Order code	Weight	Material	Moment of inertia
PRMAG-M10	approx. 30 g	stainless steel A2	1.3 kgmm <sup>2</sup>

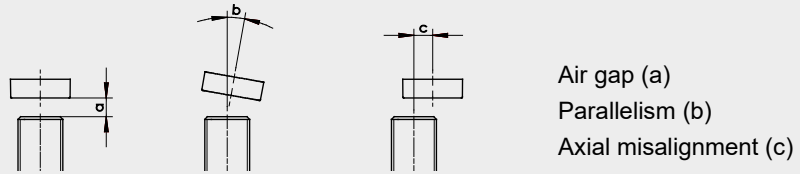
A misalignment of the position magnet has an effect on the linearity.

Dimensions in mm [inch].

Dimensions informative only.

For guaranteed dimensions please consult factory.

Measuring error by misalignment of the position magnet





Sensor	Position magnet	Air gap [mm]	Parallelism [°]	Error by axial misalignment [°]					
				0.2 mm	0.5 mm	1 mm	2 mm	3 mm	4 mm
PRAS1	PRMAG20	0 ... 6.5	0 ... 5	0.15	0.4	0.8	2.2	5.0	–
PRDS1	PRMAG21	0 ... 4	0 ... 5	0.2	0.4	1	3.8	10	–
	PRMAG22	0 ... 9.5	0 ... 5	0.1	0.4	1	2.2	4.5	8
	PRMAG-M10	0 ... 5	0 ... 5	0.1	0.1	0.5	2.0	7	–





## Output specification

### Analog output

<b>U2</b> Voltage output 0.5 ... 10 V 	Excitation voltage	18 ... 36 V DC
	Excitation current	typical 10 mA max. 15 mA
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}$ / °C f.s. (typical for 90° ... 360°) $\pm 100 \times 10^{-6}$ / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
	EMC	DIN EN 61326-1:2013

<b>U6</b> Voltage output 10 ... 90 % ratiometric 	Excitation voltage	5 V DC $\pm 10$ %
	Excitation current	typical 8 mA max. 12 mA
	Output voltage	10 ... 90 % of the excitation voltage
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}$ / °C f.s. (typical for 90° ... 360°) $\pm 100 \times 10^{-6}$ / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
	EMC	DIN EN 61326-1:2013

<b>U8</b> Voltage output 0.5 ... 4.5 V 	Excitation voltage	11 ... 36 V DC
	Excitation current	typical 10 mA max. 20 mA
	Output voltage	0.5 ... 4.5 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}$ / °C f.s. (typical for 90° ... 360°) $\pm 100 \times 10^{-6}$ / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
	EMC	DIN EN 61326-1:2013

<b>I1</b> Current output 4 ... 20 mA, 3 wires 	Excitation voltage	18 ... 36 V DC
	Excitation current	typical 30 mA max. 35 mA
	Load R <sub>L</sub>	500 Ω max.
	Output current	4 ... 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	$\pm 50 \times 10^{-6}$ / °C f.s. (typical for 90° ... 360°) $\pm 100 \times 10^{-6}$ / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 ... +85 °C
	EMC	DIN EN 61326-1:2013

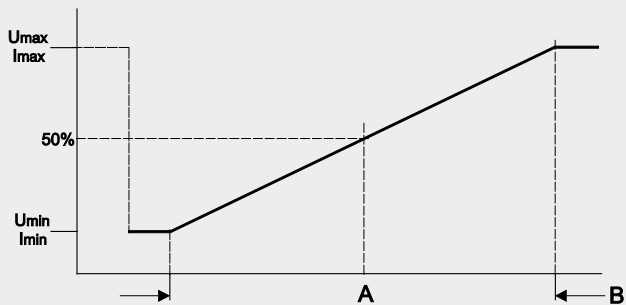
**Analog output, 1 channel (connector and cable output)**

Signal wiring	Output signals	Connector pin no.	Cable color
<b>Connector M12, 5 pin</b>  View to the sensor connector	Excitation +	1	brown
	Signal	2	white
	GND	3	blue
	Do not connect!	4	black
	Do not connect!	5	grey

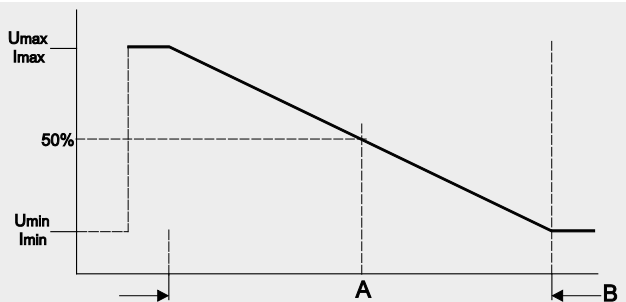
3-wire current 4...20 mA interface: GND has to be connected!

## Characteristics for magnetic angle sensors

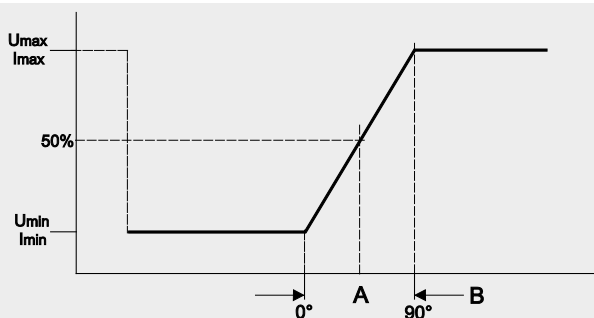
**Output signal CW**  
(clockwise increasing)



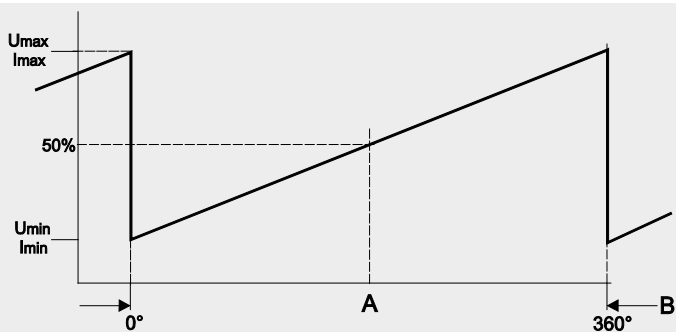
**Output signal CCW**  
(counterclockwise increasing)



Example angular range 90°



Example angular range 360°



A – Marking

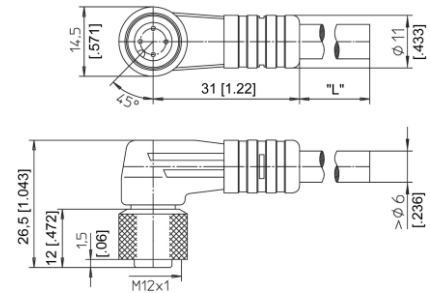
B – Measurement range [°]

## Accessories

### Connector cable M12, 4 pin (angular coupling)

shielded connector  
Suitable for 5-pin  
sensor connectors

The 4-core screened cable is supplied with a mating 4-pin 90° M12 connector at one end and 4 wires at the other end. Available lengths are 2 m, 5 m and 10 m.  
Wire: cross sectional area 0.34 mm<sup>2</sup>  
Cable diameter: 5.6 ±0.2 mm



#### Order code

**KAB - xM - M12/4F/W - LITZE**

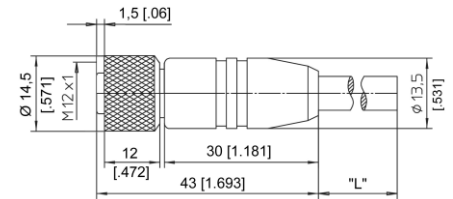
IP69: **KAB - xM - M12/4F/W/69K - LITZE**

xM = length in m

### Connector cable M12, 4 pin (straight coupling)

shielded connector  
Suitable for 5-pin  
sensor connectors

The 4-core screened cable is supplied with a mating 4-pin M12 connector at one end and 4 wires at the other end. Available lengths are 2 m, 5 m and 10 m.  
Wire: cross sectional area 0.34 mm<sup>2</sup>  
Cable diameter: 5.6 ±0.2 mm



#### Order code

**KAB - xM - M12/4F/G - LITZE**

IP69: **KAB - xM - M12/4F/G/69K - LITZE**

xM = length in m

Signal wiring M12, 4 pin	Plug connection / cable color			
	1	2	3	4
	brown	white	blue	black

#### 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