

 **PRAS5**

Angle sensor for heavy duty applications



- **Measurement range 0°... 360°**
- **Protection class IP67/IP69, IP68 optional**
- **Hermetically sealed stainless steel housing**
- **Longitudinal water barrier; potted electronics**
- **Measurement with 10 mm shaft or contactless**
- 

### Product versions



**Analog output**



**Analog output, redundant**



## PRAS5 - Magnetic Angle Sensor Version with Analog output

### Specifications

|                                               |                                                                                                                                                                                              | Order options |                                  |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------|
| <b>Mechanical connection</b>                  | Shaft 10 mm<br>Contactless with external position magnet                                                                                                                                     | <b>1</b>      | V<br>K                           |
| <b>Measurement range</b>                      | 0 ... 15° to 0 ... 360° (in 15° increments)                                                                                                                                                  | <b>2</b>      | 15 / 30 / 45 / ... / 345 / 360   |
| <b>Output</b>                                 | Voltage 0.5 ... 10 V<br>Voltage 0.5 ... 4.5 V ratiometric<br>Voltage 0.5 ... 4.5 V<br>Current 4 ... 20 mA, 3 wire                                                                            | <b>3</b>      | U2 / U2B<br>U6<br>U8<br>I1 / I1B |
| <b>Signal characteristics</b>                 | Signal increasing CW, clockwise<br>Signal increasing CCW, counterclockwise                                                                                                                   | <b>4</b>      | CW<br>CCW                        |
| <b>Resolution</b>                             | 0.03% (60 ... 360°); 0.1% (15 ... 45°)                                                                                                                                                       |               |                                  |
| <b>Repeatability</b>                          | ±0.03% (60 ... 360°); ±0.1% (15 ... 45°)                                                                                                                                                     |               |                                  |
| <b>Linearity</b>                              | ±0.3% f.s. (typical)                                                                                                                                                                         |               |                                  |
| <b>Connection</b>                             | 5-pin connector M12 axial (compatible with 4-pin connector)<br>5-pin connector M12 radial (compatible with 4-pin connector)<br>Cable, standard length 2 m<br>Deutsch connector, not shielded | <b>5</b>      | M12A5<br>M12R5<br>KAB2M          |
| <b>Housing material</b>                       | Stainless steel EN 1.4404 (AISI 316L)                                                                                                                                                        | <b>6</b>      | VA                               |
| <b>Mounting</b>                               | Screws M8                                                                                                                                                                                    |               |                                  |
| <b>Protection class</b>                       | IP67/IP69, IP68 optional                                                                                                                                                                     |               |                                  |
| <b>Life cycle of bearings (shaft version)</b> | 100 x 10 <sup>6</sup> revolutions (<1500 r.p.m.)                                                                                                                                             |               |                                  |
| <b>Revolutions per minute (mechanical)</b>    | 10,000 r.p.m.                                                                                                                                                                                |               |                                  |
| <b>Allowable shaft load</b>                   | 120 N radial / 120 N axial                                                                                                                                                                   |               |                                  |
| <b>Shock</b>                                  | DIN EN 60068-2-27:2010, 100 g/11 ms, 100 shocks                                                                                                                                              |               |                                  |
| <b>Vibration</b>                              | DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles                                                                                                                                           |               |                                  |
| <b>Temperature range</b>                      | -40 ... +85°C                                                                                                                                                                                |               |                                  |
| <b>Weight</b>                                 | 390 g approx., 890 g approx. with shaft (without cable)                                                                                                                                      |               |                                  |
| <b>EMC</b>                                    | DIN EN 61326-1:2013                                                                                                                                                                          |               |                                  |

### Order code

|       |   |          |   |          |   |          |   |          |   |          |   |          |
|-------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|
| PRAS5 | – | <b>1</b> | – | <b>2</b> | – | <b>3</b> | – | <b>4</b> | – | <b>5</b> | – | <b>6</b> |
|-------|---|----------|---|----------|---|----------|---|----------|---|----------|---|----------|

**Order example:** PRAS5 – V – 360 – I1 – CW – M12A5 – VA

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**Accessories:**

**Connector cable (see page 24)**

**Position magnets (see from page 12)**



## PRAS5 - Magnetic Angle Sensor

### Version with Analog output, redundant

#### Specifications

|                                               |                                                                                                                                                                                                                 | Order options |                                |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------|
| <b>Mechanical connection</b>                  | Shaft 10 mm<br>Contactless with external position magnet                                                                                                                                                        | <b>1</b>      | V<br>K                         |
| <b>Measurement range</b>                      | 0 ... 15° to 0 ... 360° (in 15° increments)                                                                                                                                                                     | <b>2</b>      | 15 / 30 / 45 / ... / 345 / 360 |
| <b>Output</b>                                 | Voltage 0.5 ... 10 V, redundant<br>Voltage 0.5 ... 4.5 V ratiometric, redundant<br>Voltage 0.5 ... 4.5 V, redundant<br>Current 4... 20 mA, 3 wire, redundant                                                    | <b>3</b>      | U2R<br>U6R<br>U8R<br>I1R       |
| <b>Signal characteristics</b>                 | Signal 1 increasing clockwise, signal 2 increasing counterclockwise<br>Signal 1 and signal 2 increasing clockwise*<br>Signal 1 and signal 2 increasing counterclockwise*<br><br>* not available with output I1R | <b>4</b>      | CW/CCW<br><br>CW/CW<br>CCW/CCW |
| <b>Resolution</b>                             | 0.03% (60 ... 360°); 0.1% (15 ... 45°)                                                                                                                                                                          |               |                                |
| <b>Repeatability</b>                          | ±0.03% (60 ... 360°); ±0.1% (15 ... 45°)                                                                                                                                                                        |               |                                |
| <b>Linearity</b>                              | ±0.3% f.s. (typical)                                                                                                                                                                                            |               |                                |
| <b>Connection</b>                             | 8-pin connector M12 axial<br>8-pin connector M12 radial<br>Cable, standard length 2 m<br>Deutsch connector, not shielded                                                                                        | <b>5</b>      | M12A8<br>M12R8<br>KAB2M        |
| <b>Housing material</b>                       | Stainless steel EN 1.4404 (AISI 316L)                                                                                                                                                                           | <b>6</b>      | VA                             |
| <b>Mounting</b>                               | Screws M8                                                                                                                                                                                                       |               |                                |
| <b>Protection class</b>                       | IP67/IP69, IP68 optional                                                                                                                                                                                        |               |                                |
| <b>Life cycle of bearings (shaft version)</b> | 100 x 10 <sup>6</sup> revolutions (<1500 r.p.m.)                                                                                                                                                                |               |                                |
| <b>Revolutions per minute (mechanical)</b>    | 10,000 r.p.m.                                                                                                                                                                                                   |               |                                |
| <b>Allowable shaft load</b>                   | 120 N radial / 120 N axial                                                                                                                                                                                      |               |                                |
| <b>Shock</b>                                  | DIN EN 60068-2-27:2010, 100 g/11 ms, 100 shocks                                                                                                                                                                 |               |                                |
| <b>Vibration</b>                              | DIN EN 60068-2-6:2008, 20 g 10 Hz-2 kHz, 10 cycles                                                                                                                                                              |               |                                |
| <b>Temperature range</b>                      | -40 ... +85°C                                                                                                                                                                                                   |               |                                |
| <b>Weight</b>                                 | 390 g approx., 890 g approx. with shaft (without cable)                                                                                                                                                         |               |                                |
| <b>EMC</b>                                    | DIN EN 61326-1:2013                                                                                                                                                                                             |               |                                |

#### Order code

PRAS5 – **1** – **2** – **3** – **4** – **5** – **6**

**Order example:** PRAS5 – V – 360 – U2R – CW/CCW – M12R8 – VA

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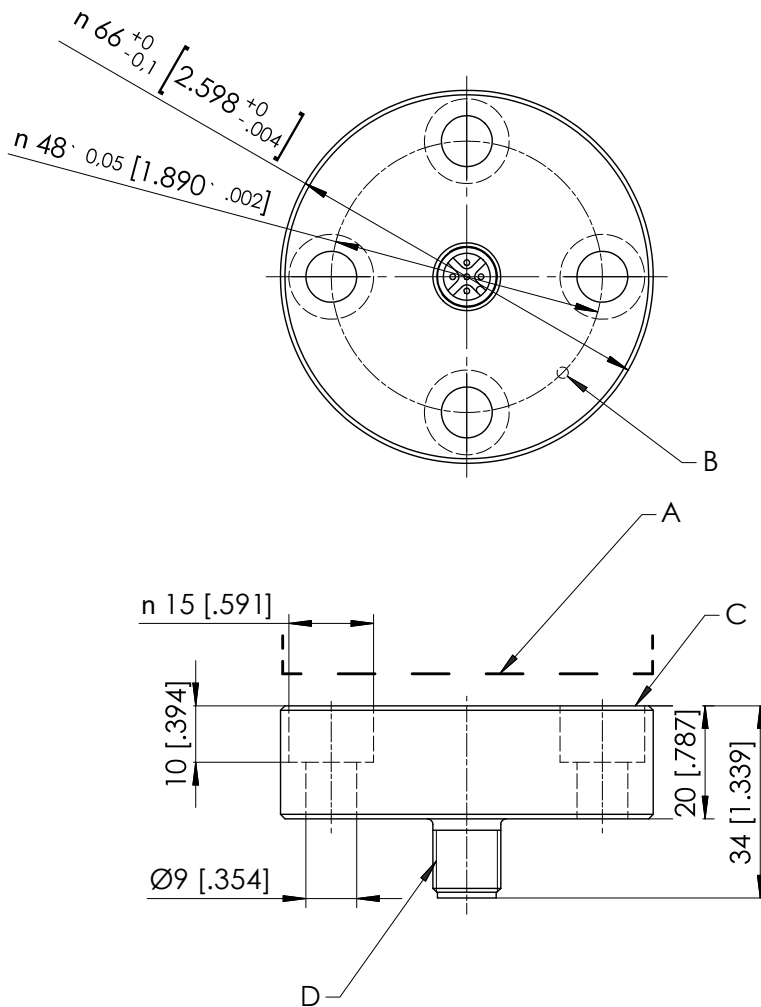
**Accessories:**

**Connector cable (see page 25)**

**Position magnets (see from page 12)**

## Dimensions

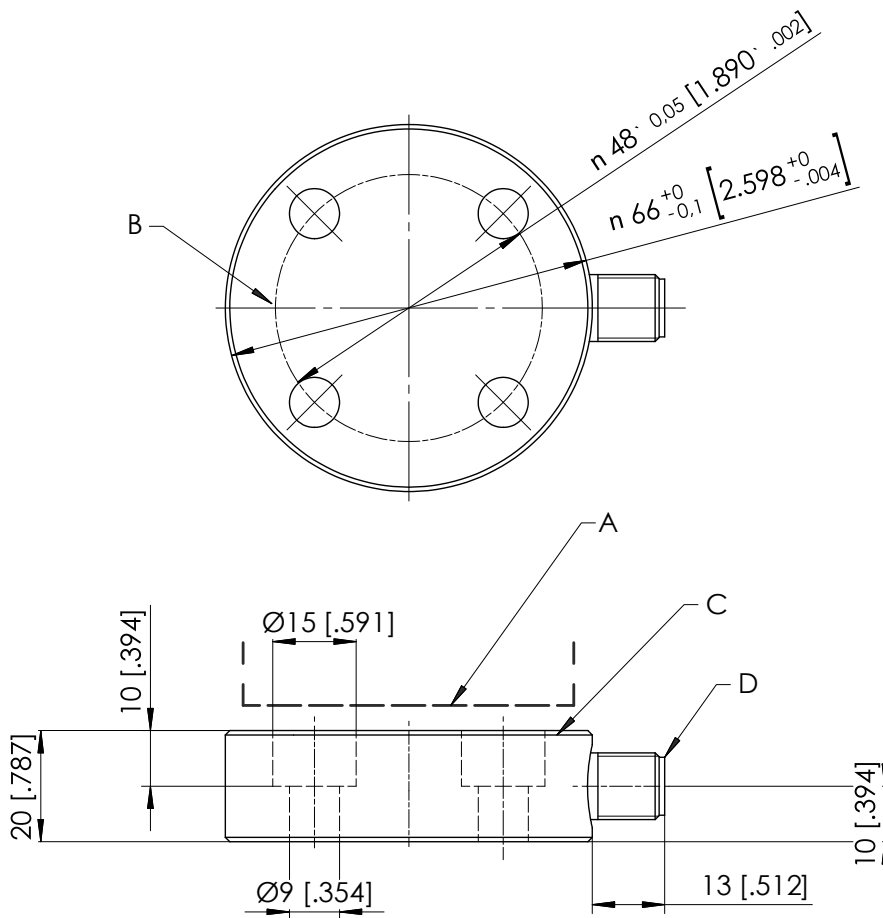
Contactless, connector M12, axial



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

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

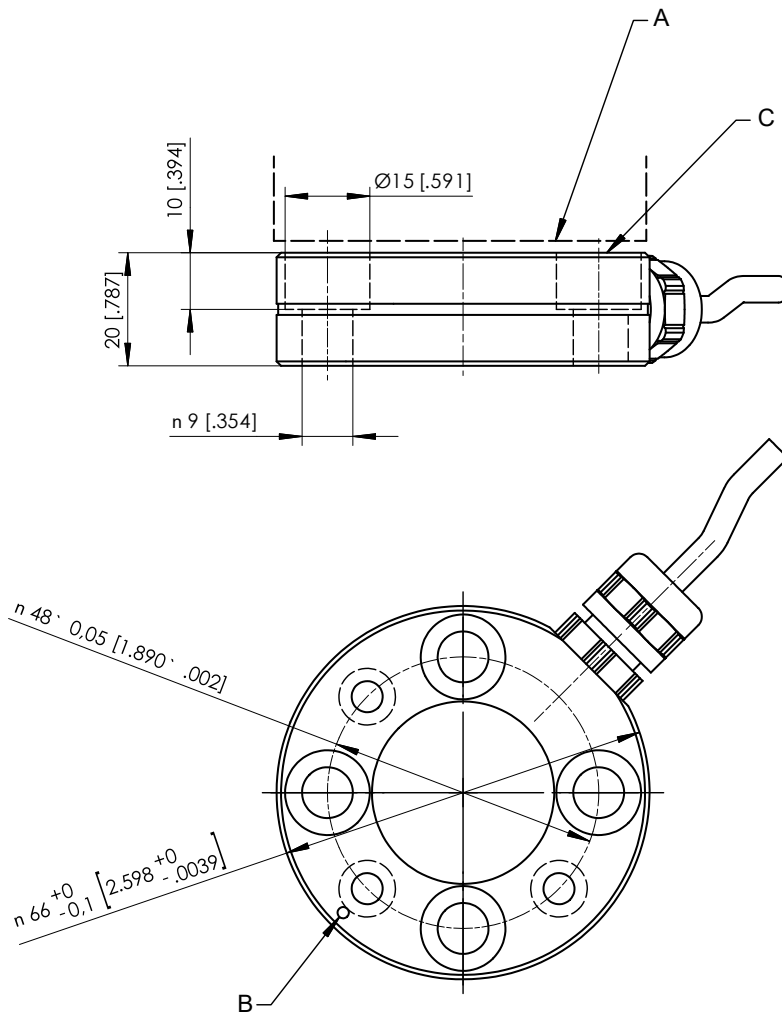
Contactless, connector M12, radial



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

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

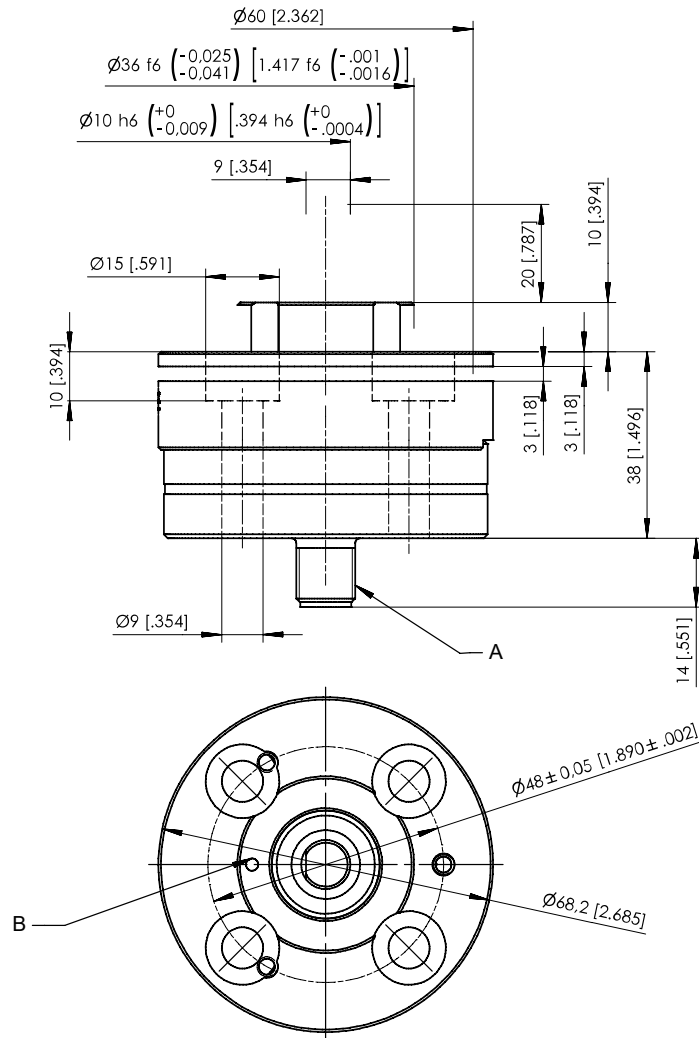
## Cable version, contactless



- A – Position magnet
- B – Marking
- C – Measurement area

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

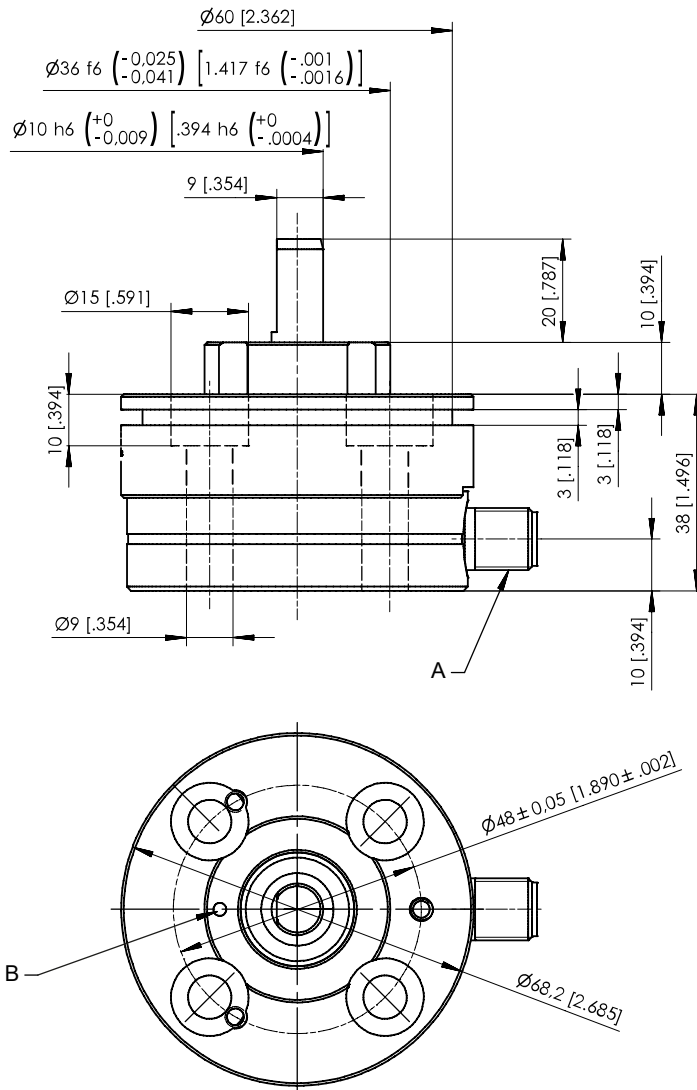
With shaft, connector M12, axial



A – Connector M12  
B – Marking

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

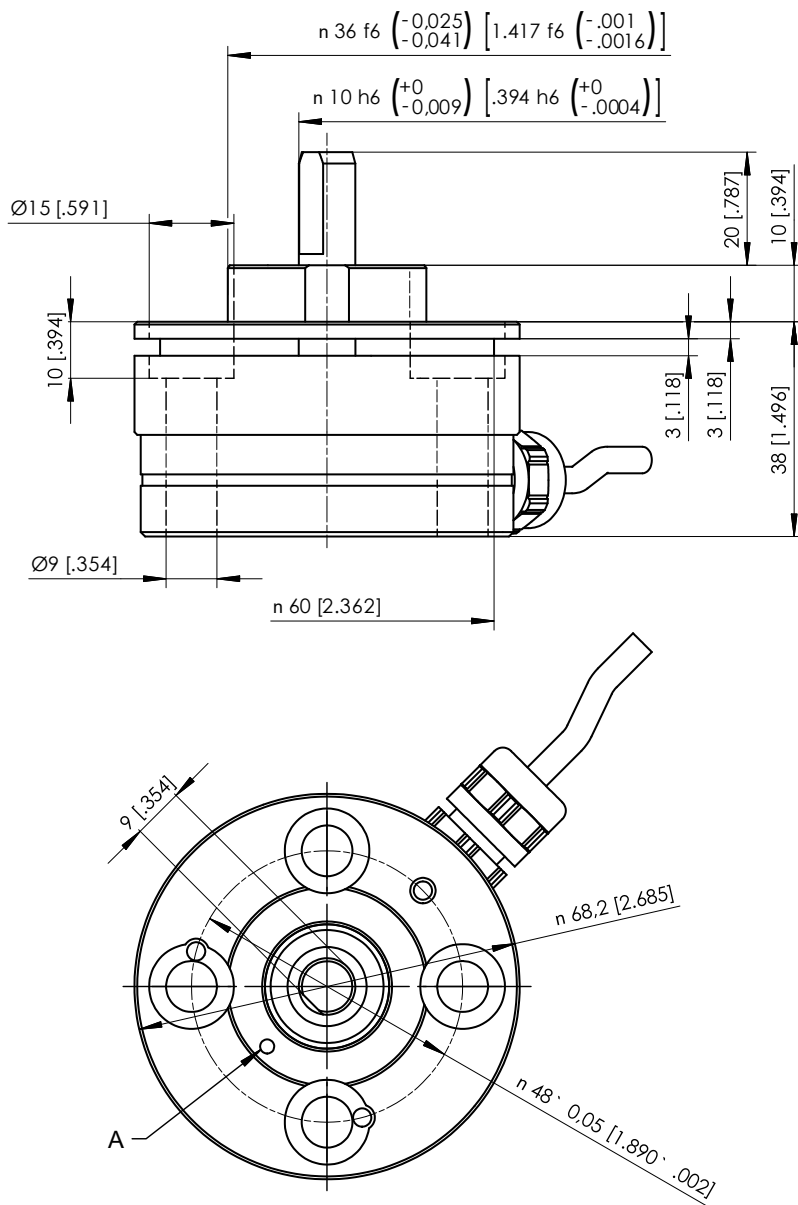
With shaft, connector M12, radial



A – Connector M12  
B – Marking

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

## Cable version, with shaft

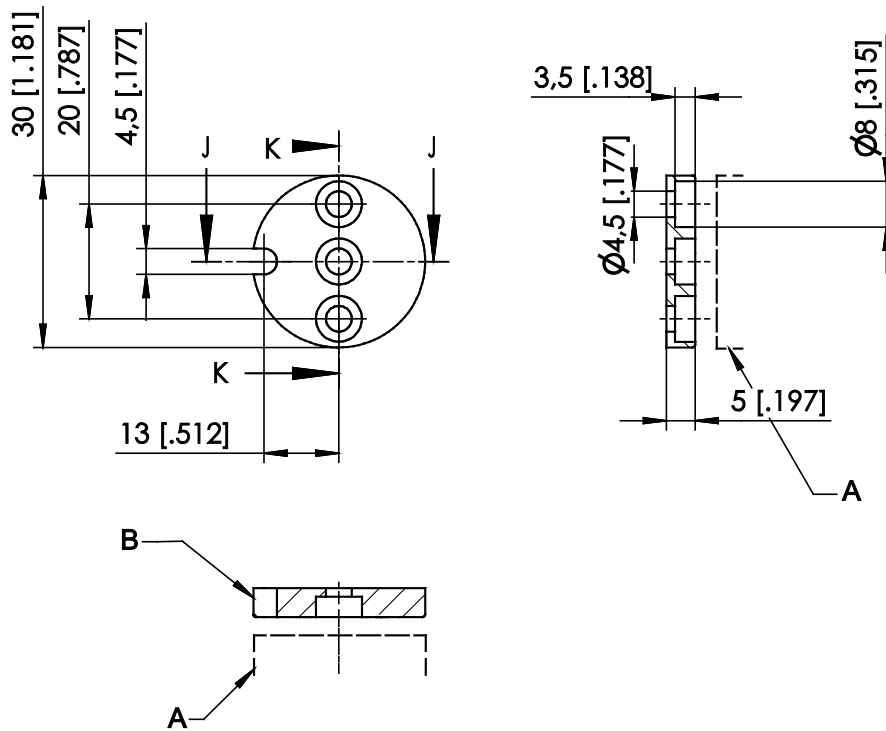


A – Marking

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

## Position magnets

### PRMAG20



A – Sensor  
B – Marking

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

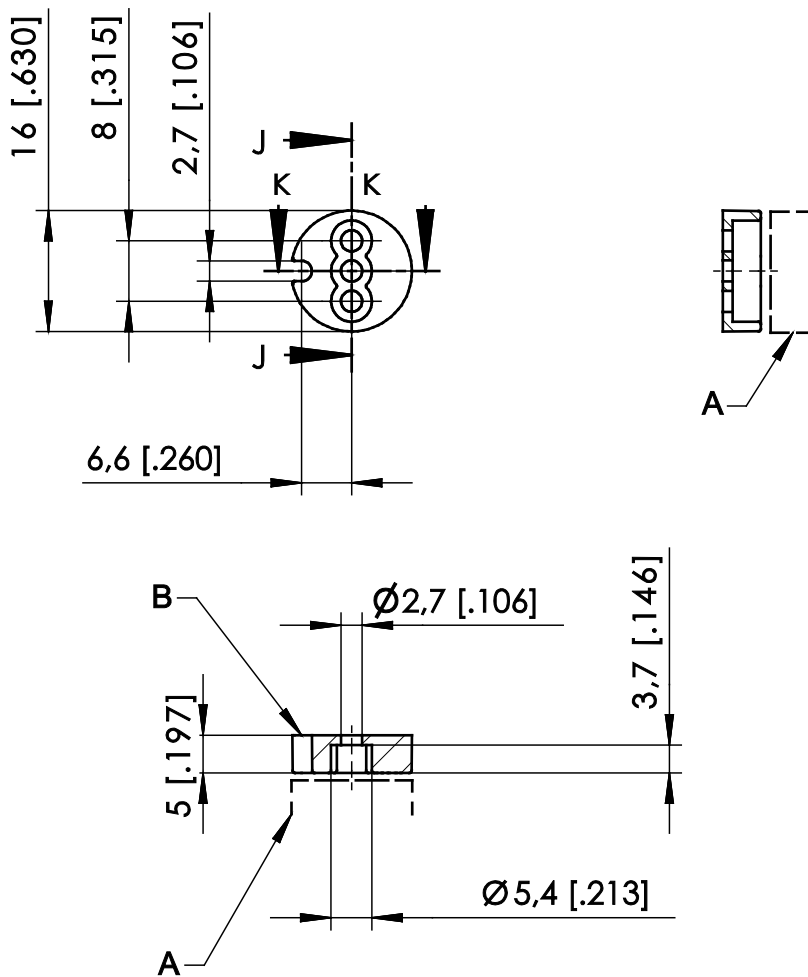
A misalignment of the position magnet has an effect on the linearity.

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> |

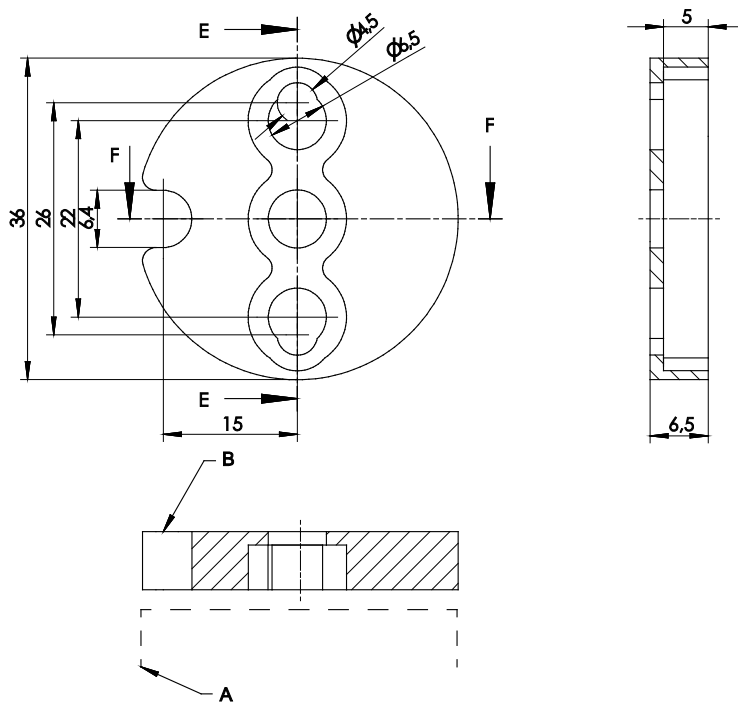
A misalignment of the position magnet has an effect on the linearity.

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> |

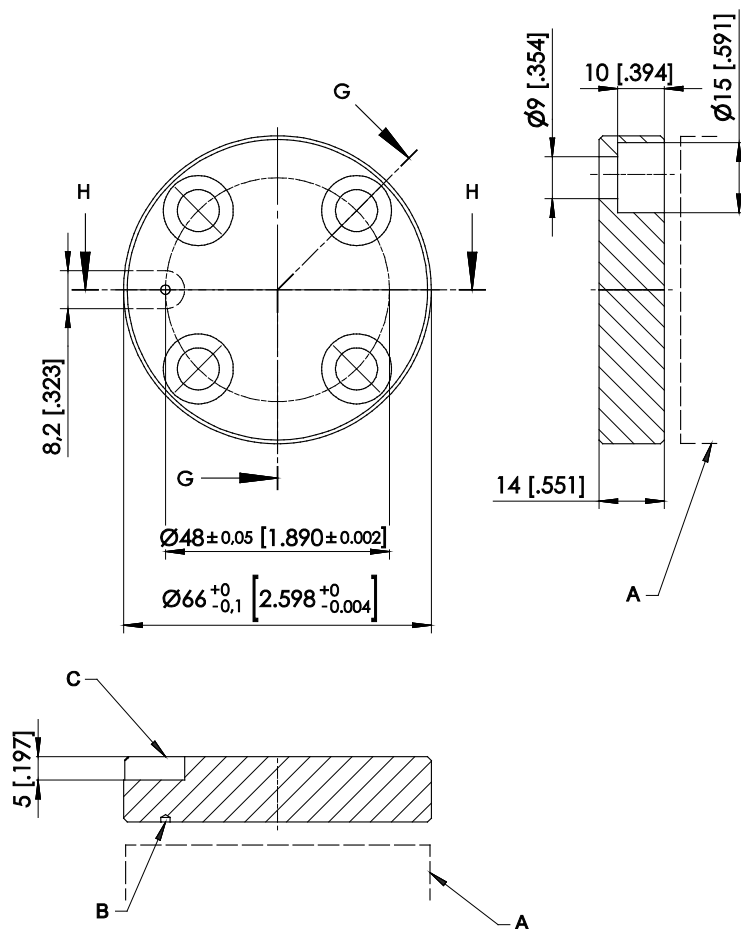
A misalignment of the position magnet has an effect on the linearity.

Dimensions in mm [inch].

Dimensions informative only

For guaranteed dimensions please consult factory.

PRMAG5-Z / PRMAG5-Z-VA



A – Sensor  
B – Marking  
C – Notch

| Order code         | Weight        | Material                                 | Moment of inertia       |
|--------------------|---------------|------------------------------------------|-------------------------|
| <b>PRMAG5-Z</b>    | approx. 110 g | AlMgSi1                                  | 59,9 kgmm <sup>2</sup>  |
| <b>PRMAG5-Z-VA</b> | approx. 275 g | stainless steel<br>EN 1.4404 (AISI 316L) | 149,9 kgmm <sup>2</sup> |

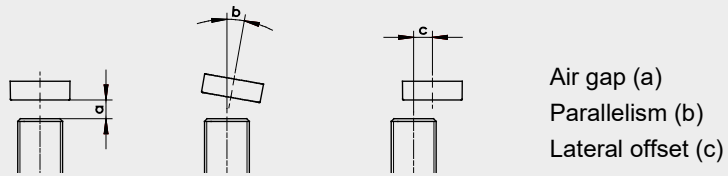
A misalignment of the position magnet has an effect on the linearity.

Dimensions in mm [inch].

Dimensions informative only.

For guaranteed dimensions please consult factory.

### Measuring error by misalignment of the position magnet

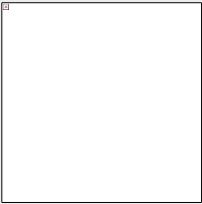


| Sensor | Position magnet | Air gap<br>[mm] | Parallelism<br>[°] | Error by lateral offset [°] |        |      |      |      |      |
|--------|-----------------|-----------------|--------------------|-----------------------------|--------|------|------|------|------|
|        |                 |                 |                    | 0.2 mm                      | 0.5 mm | 1 mm | 2 mm | 3 mm | 4 mm |
| PRAS5  | PRMAG20         | 0 ... 5.5       | 0 ... 5            | 0.15                        | 0.4    | 0.8  | 2.2  | 5    | –    |
| PRDS5  | PRMAG21         | 0 ... 3         | 0 ... 5            | 0.2                         | 0.4    | 1    | 3.8  | 10   | –    |
|        | PRMAG22         | 0 ... 8.5       | 0 ... 5            | 0.1                         | 0.4    | 1    | 2.2  | 4.5  | 8    |
|        | PRMAG5-Z-(VA)   | 0 ... 7.5       | 0 ... 5            | 0.1                         | 0.2    | 0.6  | 1.5  | 4.5  | 8.5  |

## Output specification

### Analog output

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

|                                                                                                                                     |                         |                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>U2B</b><br>Voltage output<br>0.5 ... 10 V<br> | Excitation voltage      | 11.5 ... 27 V DC                                                                                                      |
|                                                                                                                                     | Excitation current      | typical 12 mA<br>max. 16 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°)<br>$\pm 100 \times 10^{-6}$ / °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><br>Voltage output<br>10 ... 90 % ratiometric<br> | Excitation voltage      | 5 V DC ±10 %                                                                                                        |
|                                                                                                                                             | Excitation current      | typical 8 mA<br>max. 12 mA                                                                                          |
|                                                                                                                                             | Output voltage          | 10 ... 90 % of the excitation voltage                                                                               |
|                                                                                                                                             | Output current          | 2 mA max.                                                                                                           |
|                                                                                                                                             | Measuring rate          | 1 kHz standard                                                                                                      |
|                                                                                                                                             | Stability (temperature) | ±50 x 10 <sup>-6</sup> / °C f.s. (typical for 90° ... 360°)<br>±100 x 10 <sup>-6</sup> / °C f.s. (typical for <90°) |
|                                                                                                                                             | Protection              | Reverse polarity, short circuit                                                                                     |
|                                                                                                                                             | Operating temperature   | -40 ... +85 °C                                                                                                      |
|                                                                                                                                             | EMC                     | DIN EN 61326-1:2013                                                                                                 |

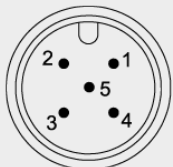
  

|                                                                                                                                    |                         |                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>U8</b><br>Voltage output<br>0.5 ... 4.5 V<br> | Excitation voltage      | 11 ... 36 V DC                                                                                                      |
|                                                                                                                                    | Excitation current      | typical 10 mA<br>max. 20 mA                                                                                         |
|                                                                                                                                    | Output voltage          | 0.5 ... 4.5 V DC                                                                                                    |
|                                                                                                                                    | Output current          | 2 mA max.                                                                                                           |
|                                                                                                                                    | Measuring rate          | 1 kHz standard                                                                                                      |
|                                                                                                                                    | Stability (temperature) | ±50 x 10 <sup>-6</sup> / °C f.s. (typical for 90° ... 360°)<br>±100 x 10 <sup>-6</sup> / °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><br>Current output<br>4 ... 20 mA, 3 wires<br> | Excitation voltage      | 18 ... 36 V DC                                                                                                        |
|                                                                                                                                          | Excitation current      | typical 30 mA<br>max. 35 mA                                                                                           |
|                                                                                                                                          | Load $R_L$              | 500 $\Omega$ 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°)<br>$\pm 100 \times 10^{-6}$ / °C f.s. (typical for <90°) |
|                                                                                                                                          | Protection              | Reverse polarity, short circuit                                                                                       |
|                                                                                                                                          | Operating temperature   | -40 ... +85 °C                                                                                                        |
|                                                                                                                                          | EMC                     | DIN EN 61326-1:2013                                                                                                   |

|                                                                                                                                            |                         |                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>I1B</b><br>Current output<br>4 ... 20 mA, 3 wires<br> | Excitation voltage      | 10 ... 27 V DC                                                                                                        |
|                                                                                                                                            | Excitation current      | typical 32 mA<br>max. 36 mA                                                                                           |
|                                                                                                                                            | Load $R_L$              | 250 $\Omega$ 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°)<br>$\pm 100 \times 10^{-6}$ / °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 output)

| Signal wiring                                                                                                                                      | Output signals  | Connector pin no. | Cable color |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|-------------|
| <b>Connector M12, 5 pin</b><br><br>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!

#### Analog output (cable output, seawater resistant submarine cable)

| Signal wiring | Output signals  | Cable color |
|---------------|-----------------|-------------|
|               | Excitation +    | white       |
|               | Signal          | green       |
|               | GND             | brown       |
|               | Do not connect! | grey        |
|               | Do not connect! | -           |

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

### Analog output, redundant

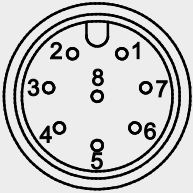
|                                                                                                                                   |                         |                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>U2R</b><br>Voltage output<br>0.5 ... 10 V<br> | Excitation voltage      | 18 ... 36 V DC                                                                                                        |
|                                                                                                                                   | Excitation current      | typical 10 mA<br>max. 15 mA per channel                                                                               |
|                                                                                                                                   | 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°)<br>$\pm 100 \times 10^{-6}$ / °C f.s. (typical for <90°) |
|                                                                                                                                   | Protection              | Reverse polarity, short circuit                                                                                       |
|                                                                                                                                   | Operating temperature   | -40 ... +85 °C                                                                                                        |
|                                                                                                                                   | EMC                     | DIN EN 61326-1:2013                                                                                                   |

|                                                                                                                                               |                         |                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>U6R</b><br>Voltage output<br>10 ... 90 % ratiometric<br> | Excitation voltage      | 5 V DC $\pm 10$ %                                                                                                     |
|                                                                                                                                               | Excitation current      | typical 8 mA<br>max. 12 mA per channel                                                                                |
|                                                                                                                                               | 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°)<br>$\pm 100 \times 10^{-6}$ / °C f.s. (typical for <90°) |
|                                                                                                                                               | Protection              | Reverse polarity, short circuit                                                                                       |
|                                                                                                                                               | Operating temperature   | -40 ... +85 °C                                                                                                        |
|                                                                                                                                               | EMC                     | EN 61326-1:2013                                                                                                       |

|                                                                                                                                    |                         |                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>U8R</b><br>Voltage output<br>0.5 ... 4.5 V<br> | Excitation voltage      | 11 ... 36 V DC                                                                                                        |
|                                                                                                                                    | Excitation current      | typical 10 mA<br>max. 20 mA per channel                                                                               |
|                                                                                                                                    | 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°)<br>$\pm 100 \times 10^{-6}$ / °C f.s. (typical for <90°) |
|                                                                                                                                    | Protection              | Reverse polarity, short circuit                                                                                       |
|                                                                                                                                    | Operating temperature   | -40 ... +85 °C                                                                                                        |
|                                                                                                                                    | EMC                     | DIN EN 61326-1:2013                                                                                                   |

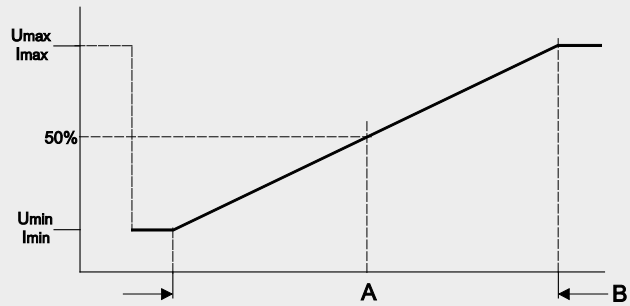
|                                                                                                                                            |                         |                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>I1R</b><br>Current output<br>4 ... 20 mA, 3 wires<br> | Excitation voltage      | 18 ... 36 V DC                                                                                                        |
|                                                                                                                                            | Excitation current      | typical 30 mA<br>max. 35 mA per channel                                                                               |
|                                                                                                                                            | Load $R_L$              | 500 $\Omega$ 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°)<br>$\pm 100 \times 10^{-6}$ / °C f.s. (typical for <90°) |
|                                                                                                                                            | Protection              | Reverse polarity, short circuit                                                                                       |
|                                                                                                                                            | Operating temperature   | -40 ... +85 °C                                                                                                        |
|                                                                                                                                            | EMC                     | DIN EN 61326-1:2013                                                                                                   |

#### Analog output, 2 channels, redundant (connector and cable output)

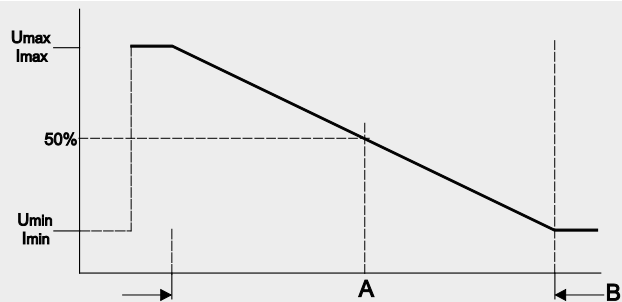
| Signal wiring                                                                                                                                         | Channel | Output signals  | Connector pin no. | Cable color |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------|-------------------|-------------|
| <b>Connector M12, 8 pin</b><br><br>View to the<br>sensor connector | 1       | Excitation +    | 1                 | white       |
|                                                                                                                                                       |         | Signal          | 2                 | brown       |
|                                                                                                                                                       |         | GND             | 3                 | green       |
|                                                                                                                                                       |         | Do not connect! | 4                 | yellow      |
|                                                                                                                                                       | 2       | Excitation +    | 5                 | grey        |
|                                                                                                                                                       |         | Signal          | 6                 | pink        |
|                                                                                                                                                       |         | GND             | 7                 | blue        |
|                                                                                                                                                       |         | Do not connect! | 8                 | red         |

## Characteristics for magnetic angle sensors

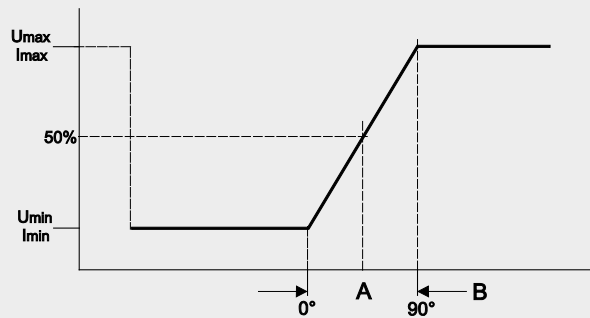
### Output signal CW (clockwise increasing)



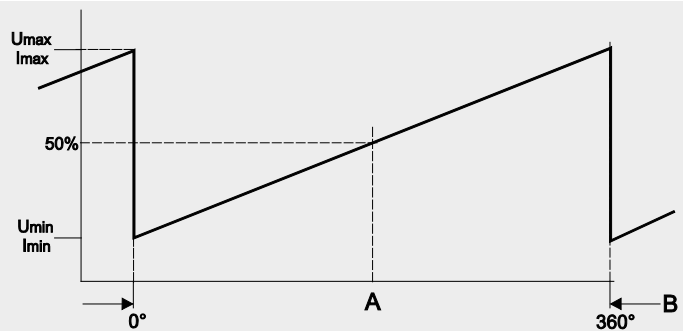
### Output signal CCW (counterclockwise increasing)



### Example angular range 90°



### Example angular range 360°



A – Marking

B – Measurement range [°]

## Accessories

### Connector cable M12, 4 pin

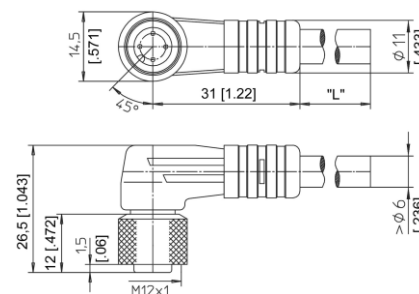
#### (angular coupling)

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 mm²  
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

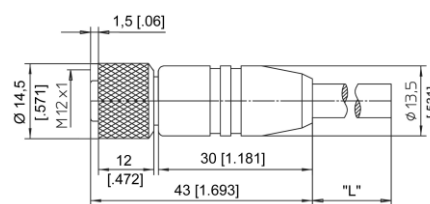
#### (straight coupling)

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 mm²  
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<br>M12, 4 pin | Plug connection / cable color |       |      |       |
|-----------------------------|-------------------------------|-------|------|-------|
|                             | 1                             | 2     | 3    | 4     |
|                             | brown                         | white | blue | black |

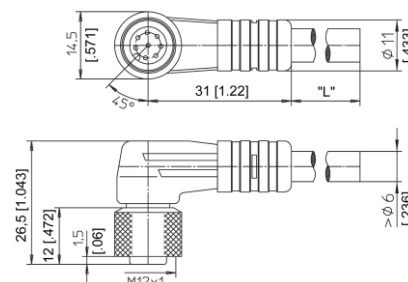
#### Applicable for cable carriers

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

## 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



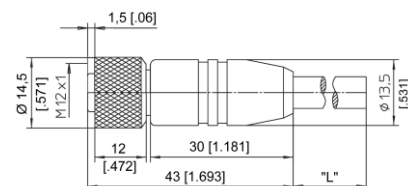
### Order code

|                  |                                        |
|------------------|----------------------------------------|
|                  | <b>KAB - xM - M12/8F/W - LITZE</b>     |
| IP69:            | <b>KAB - xM - M12/8F/W/69K - LITZE</b> |
| 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

|                  |                                        |
|------------------|----------------------------------------|
|                  | <b>KAB - xM - M12/8F/G - LITZE</b>     |
| IP69:            | <b>KAB - xM - M12/8F/G/69K - LITZE</b> |
| 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 |



