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Magnetic Angle Sensors

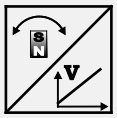
PRAS3
Magnetic Angle Sensor

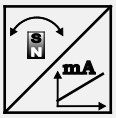
Datasheet

Analog output

Sensor features

- **Measurement range 0 ... 360°**
- **Protection class IP67/IP69**
- **Analog output**
- **Magnetic measurement principle**
- **With 10 mm shaft or 6 mm hollow shaft**
- **Housing: Aluminium**





Specifications

Output	Voltage 0.5 ... 10 V Voltage 0.5 ... 4.5 V Current 4 ... 20 mA, 3 wire
Measurement range	0 ... 15° to 0 ... 360° (in 15° increments)
Resolution	0.03% (60 ... 360°); 0.1% (15 ... 45°)
Repeatability	±0.03% (60 ... 360°); ±0.1% (15 ... 45°)
Linearity	±0.3% f.s. (typical)
Protection class	IP67/IP69 (connector output with IP67/IP69 connector cable) IP67 (cable output)
Housing material	Aluminium
Mounting	Clamps, mounting plate
Connection	5-pin connector M12 (compatible to 4-pin connector) Cable, standard length 2 m Cable with Deutsch connector DT04
Temperature range	-40 ... +85°C
Life cycle of bearings	100 x 10^6 revolutions (<1500 r.p.m.)
Revolutions per minute (mech.)	10.000 r.p.m.
Allowable shaft load	100 N radial / 100 N axial
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
Weight	250 g approx. (without cable)
EMC	DIN EN 61326-1:2013

Order code

PRAS3 – 1 – 2 – 3 – 4 – 5

1 Shaft

V	= 10 mm shaft
H	= 6 mm hollow shaft

2 Measurement range (0 ... 15° to 0 ... 360°, in 15° increments)

15 / 30 / 45 / ... / 345 / 360

3 Output

U2	= Voltage 0.5 ... 10 V (excitation voltage 18 ... 36 V DC)
U2B	= Voltage 0.5 ... 10 V (excitation voltage 11.5 ... 27 V DC)
U6	= Voltage 0.5 ... 4.5 V ratiometric (excitation voltage 5 V DC)
U8	= Voltage 0.5 ... 4.5 V (excitation voltage 11 ... 36 V DC)
I1	= Current 4 ... 20 mA, 3 wire (excitation voltage 18 ... 36 V DC)
I1B	= Current 4 ... 20 mA, 3 wire (excitation voltage 10 ... 27 V DC)

4 Signal characteristics

CW	= Signal increasing CW, clockwise
CCW	= Signal increasing CCW, counterclockwise

5 Connection

M12A5	= 5-pin connector M12 axial (compatible with 4-pin connector)
M12R5	= 5-pin connector M12 radial (compatible with 4-pin connector)
KAB2M	= Cable, standard length 2 m
KAB2M-DT04/3P/A*	= Cable 2 m with Deutsch connector DT04, 3 pin
KAB2M-DT04/3P/A-S*	= Cable 2 m with Deutsch connector DT04, 3 pin, with protective tube
KAB2M-DT04/4P/A	= Cable 2 m with Deutsch connector DT04, 4 pin
KAB2M-DT04/4P/A-S	= Cable 2 m with Deutsch connector DT04, 4 pin, with protective tube

* only for output U6

Order example

PRAS3 – V – 360 – I1 – CW – M12A5

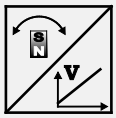
Accessories:

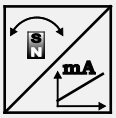
Connector cable (see page 19)
Mounting plates (see page 10)

Analog output, redundant

Sensor features

- **Measurement range 0 ... 360°**
- **Protection class IP67/IP69**
- **Analog output, redundant**
- **Magnetic measurement principle**
- **With 10 mm shaft or 6 mm hollow shaft**
- **Housing: Aluminium**





Specifications

Output	Voltage 0.5 ... 10 V, redundant Voltage 0.5 ... 4.5 V, redundant Current 4 ... 20 mA, 3 wire, redundant
Measurement range	0 ... 15° to 0 ... 360° (in 15° increments)
Resolution	0.03% (60 ... 360°); 0.1% (15 ... 45°)
Repeatability	±0.03% (60 ... 360°); ±0.1% (15 ... 45°)
Linearity	±0.3% f.s. (typical)
Protection class	IP67/IP69 (connector output with IP67/IP69 connector cable) IP67 (cable output)
Signal characteristics	CW, CCW
Housing material	Aluminium
Mounting	Clamps, mounting plate
Connection	8-pin connector M12 Cable, standard length 2 m Cable with Deutsch connector DT04
Temperature range	-40 ... +85°C
Life cycle of bearings	100 x 10^6 revolutions (<1500 r.p.m.)
Revolutions per minute (mech.)	10.000 r.p.m.
Allowable shaft load	100 N radial / 100 N axial
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
Weight	250 g approx. (without cable)
EMC	DIN EN 61326-1:2013

Order code

PRAS3 – **1** – **2** – **3** – **4** – **5**

1 Shaft

V	= 10 mm shaft
H	= 6 mm hollow shaft

2 Measurement range (0 ... 15° to 0 ... 360°, in 15° increments)

15 / 30 / 45 / ... / 345 / 360

3 Output

U2R	= Voltage 0.5 ... 10 V, redundant (excitation voltage 18 ... 36 V DC)
U6R	= Voltage 0.5 ... 4.5 V ratiometric, redundant (excitation voltage 5 V DC)
U8R	= Voltage 0.5 ... 4.5 V, redundant (excitation voltage 11 ... 36 V DC)
I1R	= Current 4... 20 mA, 3 wire, redundant (excitation voltage 18 ... 36 V DC) (output I1R possible only with CW/CCW signal characteristics)

4 Signal characteristics

CW/CCW	= Signal 1 increasing clockwise, signal 2 increasing counterclockwise
CW/CW*	= Signal 1 and signal 2 increasing clockwise
CCW/CCW*	= Signal 1 and signal 2 increasing counterclockwise

* not available with output I1R

5 Connection

M12A8	= 8-pin connector M12 axial
M12R8	= 8-pin connector M12 radial
KAB2M	= Cable, standard length 2 m
KAB2M-DT04/6P/A*	= Cable 2 m with Deutsch connector DT04, 6 pin
KAB2M-DT04/6P/A-S*	= Cable 2 m with Deutsch connector DT04, 6 pin, with protective tube
KAB2M-DT04/8P/A	= Cable 2 m with Deutsch connector DT04, 8 pin
KAB2M-DT04/8P/A-S	= Cable 2 m with Deutsch connector DT04, 8 pin, with protective tube

* only for output U6R

Order example

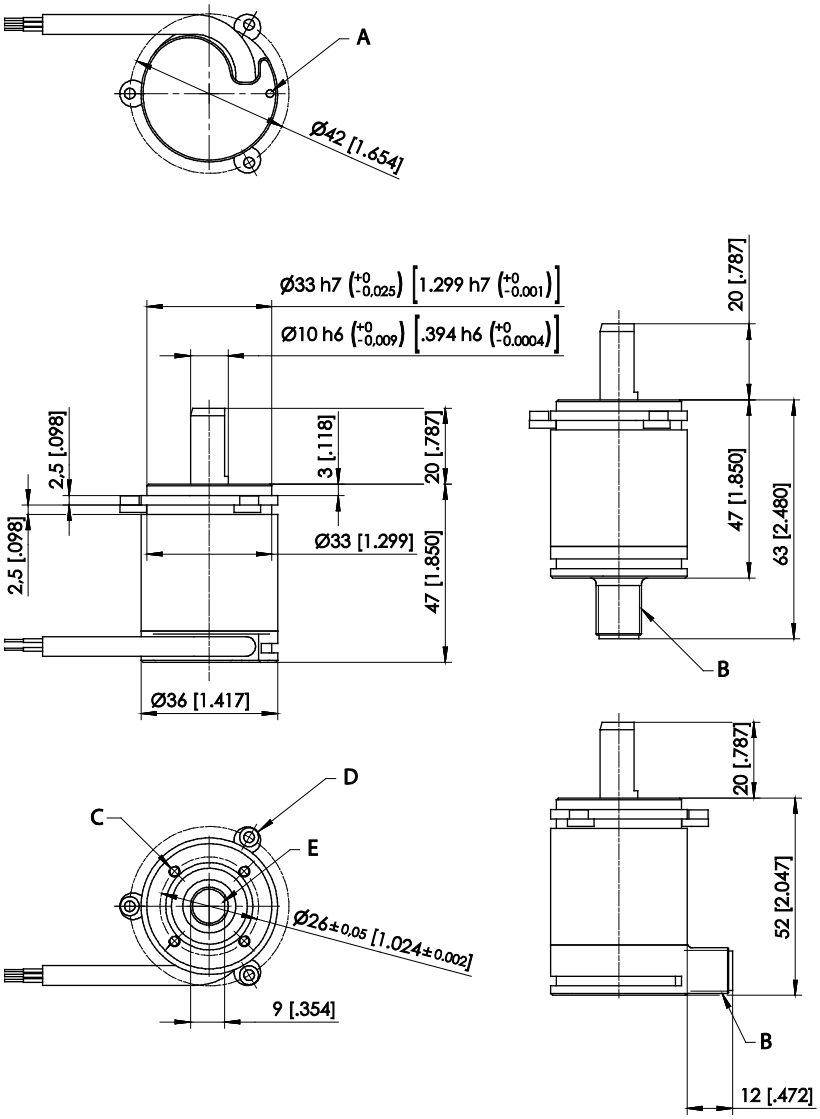
PRAS3 – V – 360 – U2R – CW/CCW – M12R8

Accessories:

Connector cable (see page 20)
Mounting plates (see page 10)

Dimensions

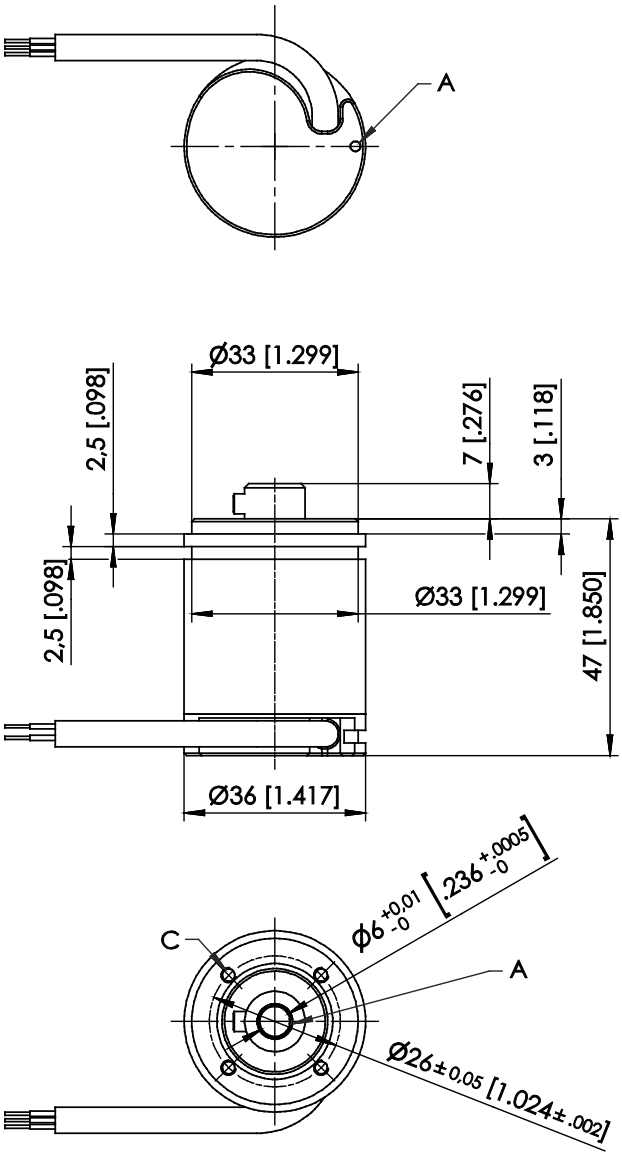
Version with shaft

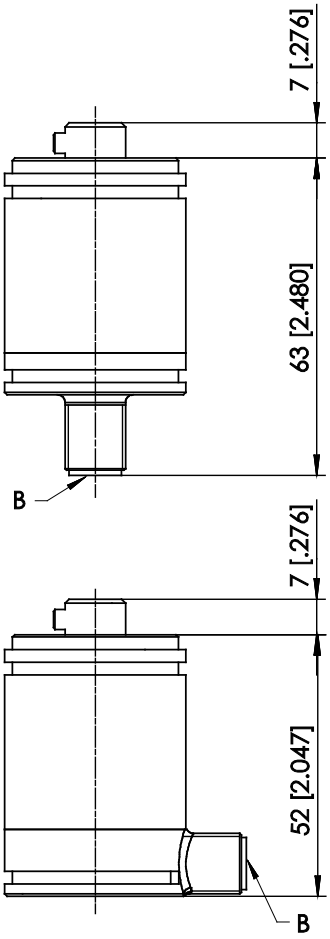


A – Marking
B – Connector M12
C – 4x M3 – 5 [.197] deep
screw hole orientation to marking not defined!
D - Mounting clamps PRPT-BFS1
E - Flat

Dimensions in mm [inch].
Weight approx. 250 g.
Dimensions informative only.
For guaranteed dimensions consult factory.

Version with hollow shaft



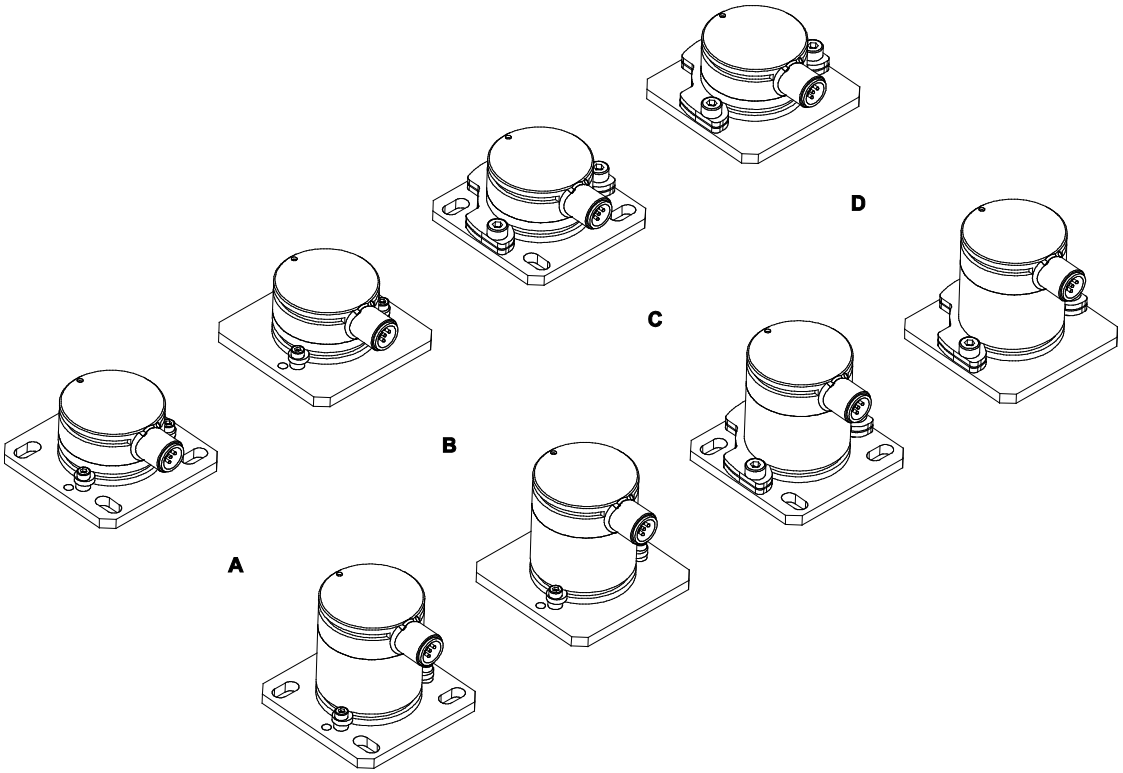


A – Marking
B – Connector M12
C – 4x M3 – 5 [.197] deep
screw hole orientation to marking not defined!

Dimensions in mm [inch].
Weight approx. 250 g.
Dimensions informative only.
For guaranteed dimensions consult factory.

Mounting plates

Mounting possibilities PRAS2/PRDS2 and PRAS3/PRDS3



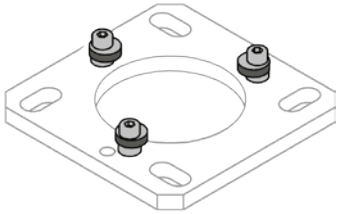
A. **PRPT-BPL1 + PRPT-BFS1**
(Mounting plates for screw mounting + mounting clamp)

B. **PRPT-BPL2 + PRPT-BFS1**
(Mounting plates for welding assembly + mounting clamp)

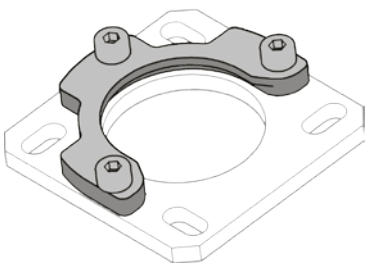
C. **PRPT-BPL1 + PRPT-BFS2**
(Mounting plates for screw mounting + mounting bracket)

D. **PRPT-BPL2 + PRPT-BFS2**
(Mounting plates for welding assembly + mounting bracket)

Mounting clamp BFS1



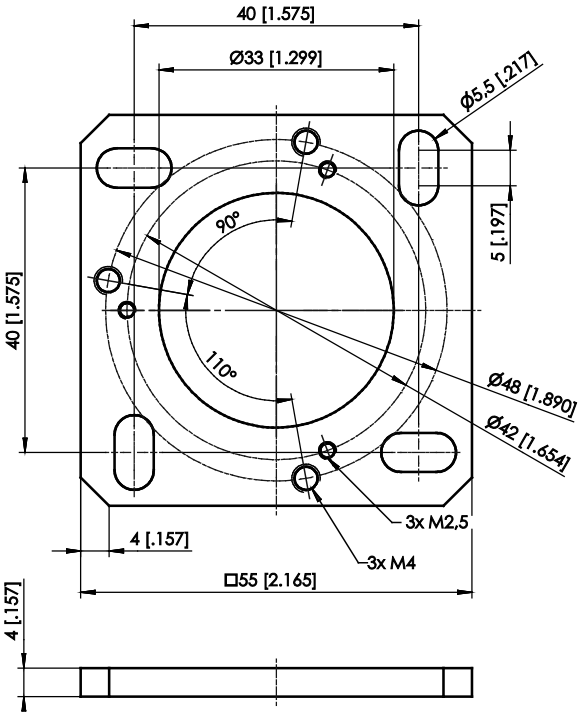
Mounting bracket BFS2



PRPT-BPL1

(Screw mounting)

In combination with the mounting clamps PRPT-BFS1 (3 x M2.5) or in combination with the mounting bracket PRPT-BFS2 (3 x M4).

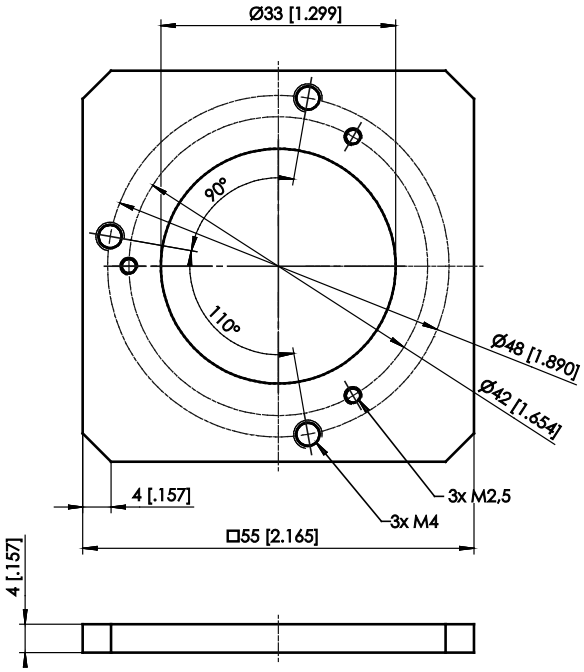


Dimensions in mm [inch]. Weight 30 g approx.
Dimensions informative only.
For guaranteed dimensions please consult factory.

PRPT-BPL2

(Welding assembly)

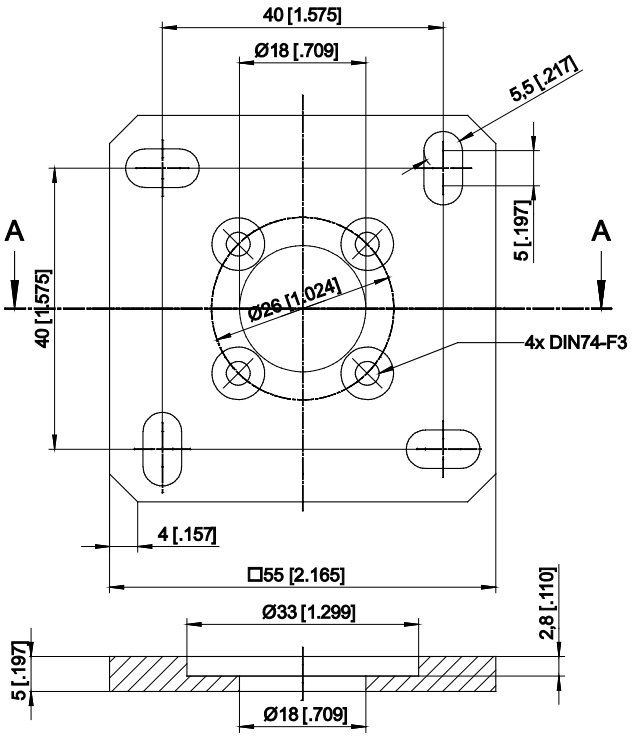
In combination with the mounting clamps PRPT-BFS1 (3 x M2.5) or in combination with the mounting bracket PRPT-BFS2 (3 x M4).



Dimensions in mm [inch]. Weight 30 g approx.
Dimensions informative only.
For guaranteed dimensions please consult factory.

PRPT-BPL3

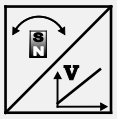
In combination with PRAS3/PRDS3 and frontal mounting.



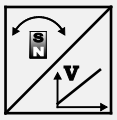
Dimensions in mm [inch]. Weight 30 g approx.
Dimensions informative only.
For guaranteed dimensions please consult factory.

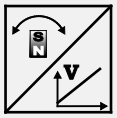
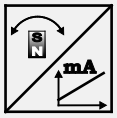
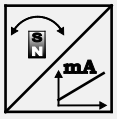
Output specification

Analog output

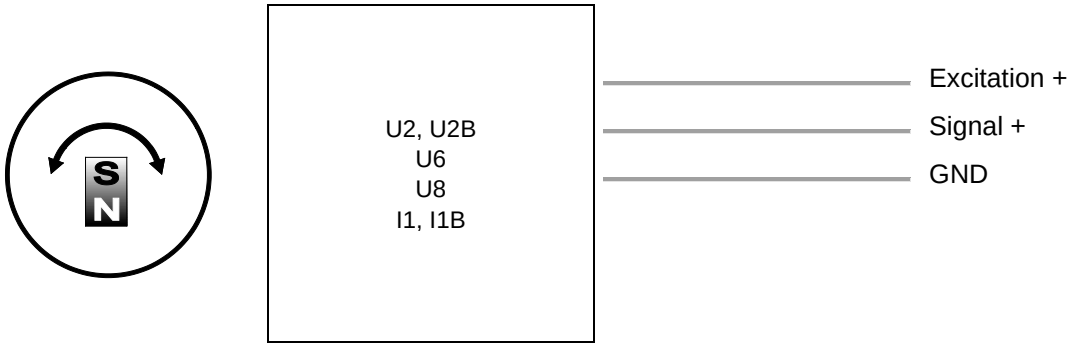
U2 Voltage output 0.5 ... 10 V 	Excitation voltage	18 … 36 V DC
	Excitation current	typical 10 mA max. 15 mA
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical for 90° … 360°) ±100 x 10^{-6} / °C f.s. (typical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

U2B Voltage output 0.5 ... 10 V 	Excitation voltage	11.5 … 27 V DC
	Excitation current	typical 12 mA max. 16 mA
	Output voltage	0,5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical for 90° … 360°) ±100 x 10^{-6} / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 … +85 °C
	EMC	DIN EN 61326-1:2013

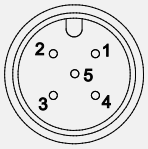
U6 Voltage output 10 … 90 % ratiometric 	Excitation voltage	5 V DC ±10 %
	Excitation current	typical 8 mA max. 12 mA
	Output voltage	10 … 90 % of the excitation voltage
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical for 90° … 360°) ±100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

U8 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)	±50 x 10^{-6} / °C f.s. (typical for 90° … 360°) ±100 x 10^{-6} / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 … +85 °C
	EMC	DIN EN 61326-1:2013
I1 Current output 4 … 20 mA, 3 wires 	Excitation voltage	18 … 36 V DC
	Excitation current	typical 30 mA max. 35 mA
	Load R_L	500 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical for 90° … 360°) ±100 x 10^{-6} / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 … +85 °C
	EMC	DIN EN 61326-1:2013
I1B Current output 4 … 20 mA, 3 wires 	Excitation voltage	10 … 27 V DC
	Excitation current	typical 32 mA max. 36 mA
	Load R_L	250 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical for 90° … 360°) ±100 x 10^{-6} / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 … +85 °C
	EMC	DIN EN 61326-1:2013

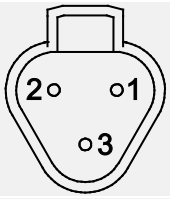
Signal diagram



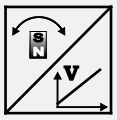
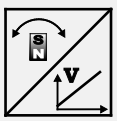
Signal wiring
(connector and cable output)

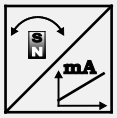
Signal	Connector pin no.	Cable color	View to the sensor connector
Excitation +	1	brown	
Signal	2	white	
GND	3	blue	
Do not connect!	4	black	
Do not connect!	5	grey	

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

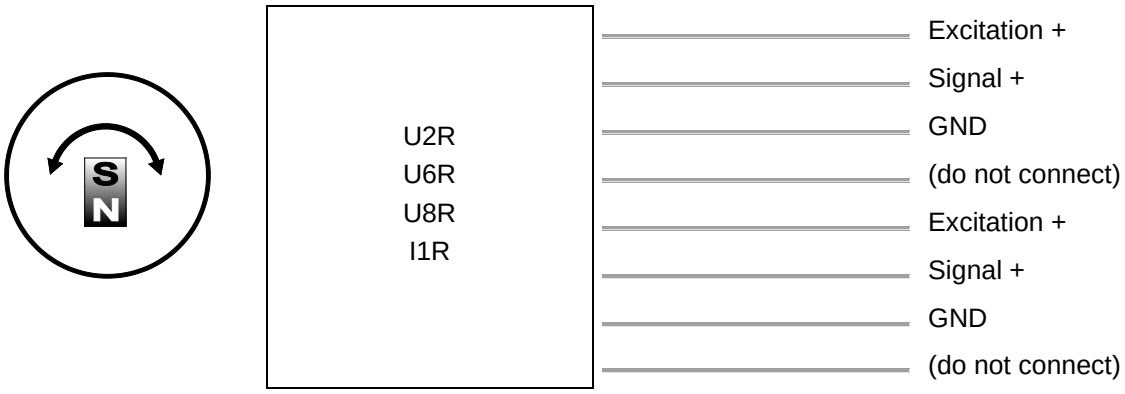
Deutsch connector DT04		
		
	DT04/3P/A	**DT04/4P/A**

Analog output, redundant

U2R Voltage output 0.5 ... 10 V 	Excitation voltage	18 … 36 V DC
	Excitation current	typical 10 mA max. 15 mA per channel
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz Standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical for 90° … 360°) ±100 x 10^{-6} / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 … +85 °C
	EMC	DIN EN 61326-1:2013
U6R Voltage output 10 … 90 % ratiometric 	Excitation voltage	5 V DC ±10 %
	Excitation current	typical 8 mA 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)	±50 x 10^{-6} / °C f.s. (typical for 90° … 360°) ±100 x 10^{-6} / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 … +85 °C
	EMC	EN 61326-1:2013
U8R Voltage output 0.5 … 4.5 V 	Excitation voltage	11 … 36 V DC
	Excitation current	typical 10 mA 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)	±50 x 10^{-6} / °C f.s. (typical for 90° … 360°) ±100 x 10^{-6} / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 … +85 °C
	EMC	DIN EN 61326-1:2013

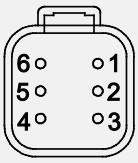
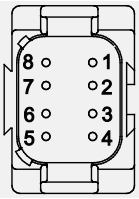
I1R Current output 4 … 20 mA, 3 wires 	Excitation voltage	18 … 36 V DC
	Excitation current	typical 30 mA max. 35 mA per channel
	Load R_L	500 Ω max.
	Output current	4 … 20 mA
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical for 90° … 360°) ±100 x 10^{-6} / °C f.s. (typical for <90°)
	Protection	Reverse polarity, short circuit
	Operating temperature	-40 … +85 °C
	EMC	DIN EN 61326-1:2013

Signal diagram



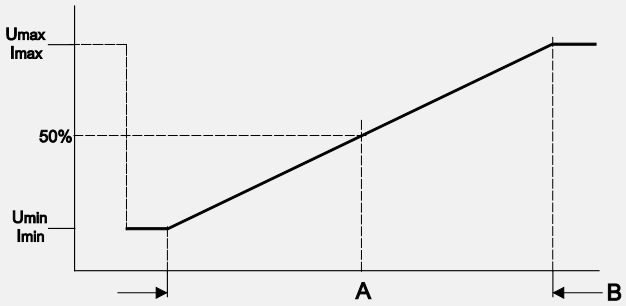
Signal wiring
2 channels, redundant (connector and cable output)

Channel	Signal	Connector pin no.	Cable color	View to the sensor connector
1	Excitation +	1	white	
1	Signal	2	brown	
1	GND	3	green	
1	Do not connect!	4	yellow	
2	Excitation +	5	grey	
2	Signal	6	pink	
2	GND	7	blue	
2	Do not connect!	8	red	

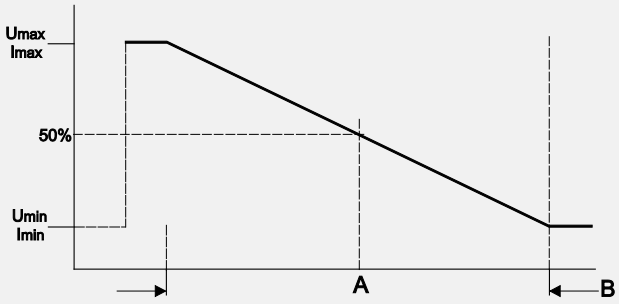
Deutsch connector DT04		
	DT04/6P/A	**DT04/8P/A**

Characteristics for magnetic angle sensors

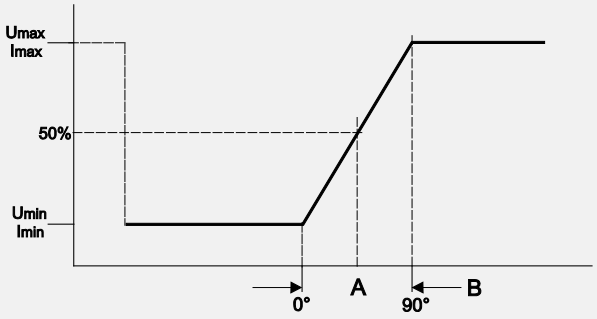
Output signal CW
(clockwise increasing)



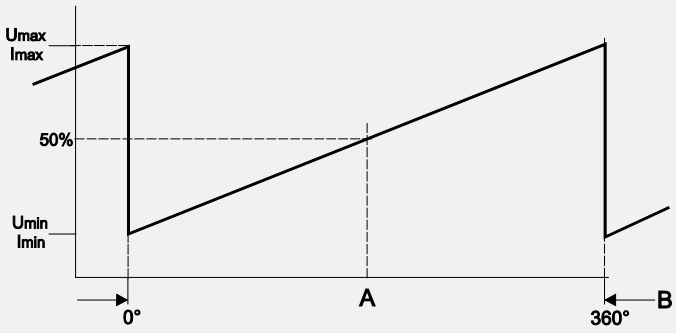
Output signal CCW
(counterclockwise increasing)



Example angular range 90°



Example angular range 360°



A – Marking
B – Measurement range [°]

Accessories

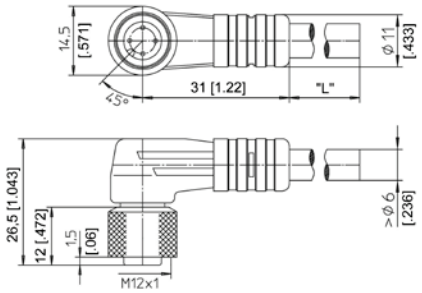
Connector cable M12, 4 pin

(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^2
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

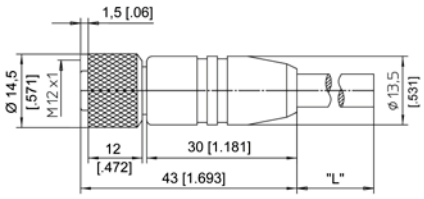
Connector cable M12, 4 pin

(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^2
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

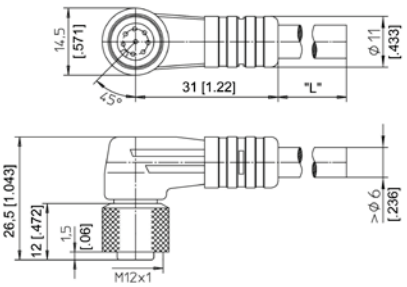
Applicable for cable carriers

Maximum movement speed	3 m/s
Maximum acceleration	5 m/s^2
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

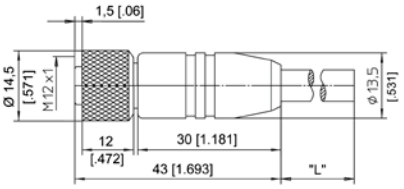
	KAB - xM - M12/8F/W - LITZE
IP69:	**KAB - xM - M12/8F/W/69K - LITZE**

xM = length in m

Connector cable M12, 8 pin
(straight coupling)

shielded connector

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



Order code

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

xM = length in m

Signal wiring 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

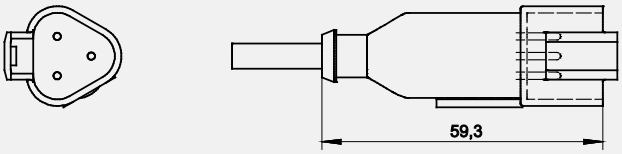
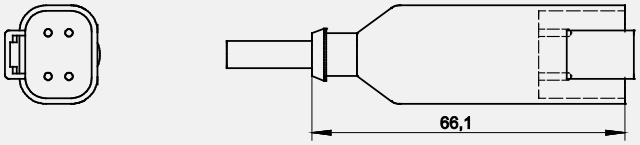
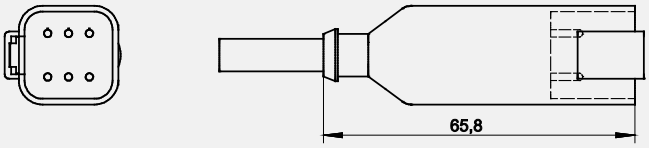
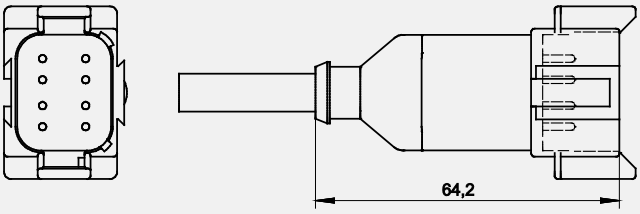
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s²
Minimum bending radius	10 x cable diameter

Deutsch connector

Sensors with cable output can be delivered with Deutsch connector.

Protection class:	IP67 (while plugged)
Connection:	3, 4, 6, 8 poles – depending on output, see table below
Wire cross sectional area:	0.5 mm^2
Standard cable length:	2 m
Protective cable tube:	for a better mechanical protection the cable can be delivered with a protective tube

Deutsch connector – table

Number of poles	Deutsch connector DT04	Output
3 pin		U6
4 pin		U2, U2B, U8 I1, I1B CANOP(R), CANJ1939(R)
6 pin		U6R RSSI5V RSSI24V
8 pin		U2R, U8R I1R RS5VF, RS24VF HT24VF

ASM®
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POSIROT®

Magnetic Angle Encoders

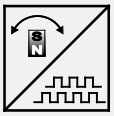
PRDS3
Magnetic Angle Encoder

Datasheet

Incremental output

Sensor features

- **Measurement range 0 ... 360°**
- **Protection class IP67/IP69**
- **Incremental output**
- **Magnetic measurement principle**
- **With 10 mm shaft or 6 mm hollow shaft**
- **Housing: Aluminium**



Specifications

Output	Incremental encoder output RS422-/HTL compatible, filtered output
Measurement range	0 ... 360°
Resolution (pulses per revolution)	25 / 50 / 100 / 200 / 256 / 300 / 400 / 500 / 512 / 1000 / 1024
Linearity	±1% (typical)
Protection class	IP67/IP69 (connector output with IP67/IP69 connector cable) IP67 (cable output)
Housing material	Aluminium
Mounting	Clamps, mounting plate
Connection	8-pin connector M12 Cable, standard length 2 m Cable with Deutsch connector DT04
Temperature range	-40 ... +85°C
Life cycle of bearings	100 x 10^6 revolutions (<1500 r.p.m.)
Revolutions per minute (mech.)	10.000 r.p.m.
Allowable shaft load	100 N radial / 100 N axial
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
Weight	250 g approx. (without cable)
EMC	DIN EN 61326-1:2013

Order code

PRDS3	–	1	–	2	–	3	–	4

1 Shaft

V	= Shaft 10 mm
H	= Hollow shaft 6 mm

2 Resolution (pulses per revolution)

25 / 50 / 100 / 200 / 256 / 300 / 400 / 500 / 512 / 1000 / 1024

3 Output

RS5VF	= RS422 compatible output with excitation 5 V DC, filtered output
RS24VF	= RS422 compatible output with excitation 10 ... 36 V, filtered output
HT24VF	= HTL compatible output with excitation 18 ... 36 V, filtered output

4 Connection

M12A8	= 8-pin connector M12, axial
M12R8	= 8-pin connector M12, radial
KAB2M	= Cable, standard length 2 m
KAB2M-DT04/8P/A	= Cable 2 m with Deutsch connector DT04, 8 pin
KAB2M-DT04/8P/A-S	= Cable 2 m with Deutsch connector DT04, 8 pin, with protective tube

Order example

PRDS3 – V – 1024 – HT24VF – M12R8

Accessories:

Connector cable (see page 28)
Mounting plates (see page 12)

Digital output SSI

Sensor features

- **Measurement range 0 ... 360°**
- **Protection class IP67/IP69**
- **Digital output SSI**
- **Magnetic measurement principle**
- **With 10 mm shaft or 6 mm hollow shaft**
- **Housing: Aluminium**

Specifications

Output	Synchronous serial SSI
Measurement range	0 ... 360°
Resolution	12 Bit (4096 steps) per revolution
Repeatability	±0.1° (typical)
Linearity	±1% (typical)
Protection class	IP67/IP69 (connector output with IP67/IP69 connector cable) IP67 (cable output)
Material	Aluminium
Mounting	Clamps, mounting plate
Connection	8-pin connector M12 Cable, standard length 2 m Cable with Deutsch connector DT04
Temperature range	-40 ... +85°C
Life cycle of bearings	100 x 10^6 revolutions (<1500 r.p.m.)
Revolutions per minute (mech.)	10.000 r.p.m.
Allowable shaft load	100 N radial / 100 N axial
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
Weight	250 g approx. (without cable)
EMC	DIN EN 61326-1:2013

Order code

PRDS3	–	1	–	2	–	3	–	4

1 Shaft

V	= Shaft 10 mm
H	= Hollow shaft 6 mm

2 Output

RSSI5V	= Synchronous serial output with excitation 5 V DC
RSSI24V	= Synchronous serial output with excitation 10 ... 36 V

3 Code characteristics

CW	= Signal increasing CW, clockwise
CCW	= Signal increasing CCW, counterclockwise

4 Connection

M12A8	= 8-pin connector M12, axial
M12R8	= 8-pin connector M12, radial
KAB2M	= Cable, standard length 2 m
KAB2M-DT04/6P/A	= Cable 2 m with Deutsch connector DT04, 6 pin
KAB2M-DT04/6P/A-S	= Cable 2 m with Deutsch connector DT04, 6 pin, with protective tube

Order example

PRDS3 – V – RSSI24V – CW – M12R8

Accessories:
Connector cable (see page 28)
Mounting plates (see page 12)

Digital output CAN

Sensor features

- **Measurement range 0 ... 360°**
- **Protection class IP67/IP69**
- **Digital output CAN**
- **Magnetic measurement principle**
- **With 10 mm shaft or 6 mm hollow shaft**
- **Housing: Aluminium**

Specifications

Output	CANopen (CiA 301-V4.02/406-V3.2) CAN SAE J1939
Measurement range	0 ... 360°
Resolution	0.05° max.
Linearity	±1% (typical)
Protection class	IP67/IP69 (connector output with IP67/IP69 connector cable) IP67 (cable output)
Material	Aluminium
Mounting	Clamps, mounting plate
Connection	5-pin connector M12 Cable with Deutsch connector DT04
Temperature range	-40 ... +85°C
Life cycle of bearings	100 x 10^6 revolutions (<1500 r.p.m.)
Revolutions per minute (mech.)	10.000 r.p.m.
Allowable shaft load	100 N radial / 100 N axial
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
Weight	250 g approx. (without cable)
EMC	DIN EN 61326-1:2013

Order code

PRDS3 – **1** – **2** – **3**

1 Shaft

V	= Shaft 10 mm
H	= Hollow shaft 6 mm

2 Output

CANOP	= CANopen
CANJ1939	= CAN SAE J1939
CANOPR	= CANopen, redundant
CANJ1939R	= CAN SAE J1939, redundant

3 Connection

M12A5/CAN	= 5-pin connector M12 axial
M12R5/CAN	= 5-pin connector M12 radial
KAB0,3M-DT04/4P/A	= Cable 0.3 m with Deutsch connector DT04, 4 pin
KAB0,3M-DT04/4P/A-S	= Cable 0.3 m with Deutsch connector DT04, 4 pin, with protective tube

Order example

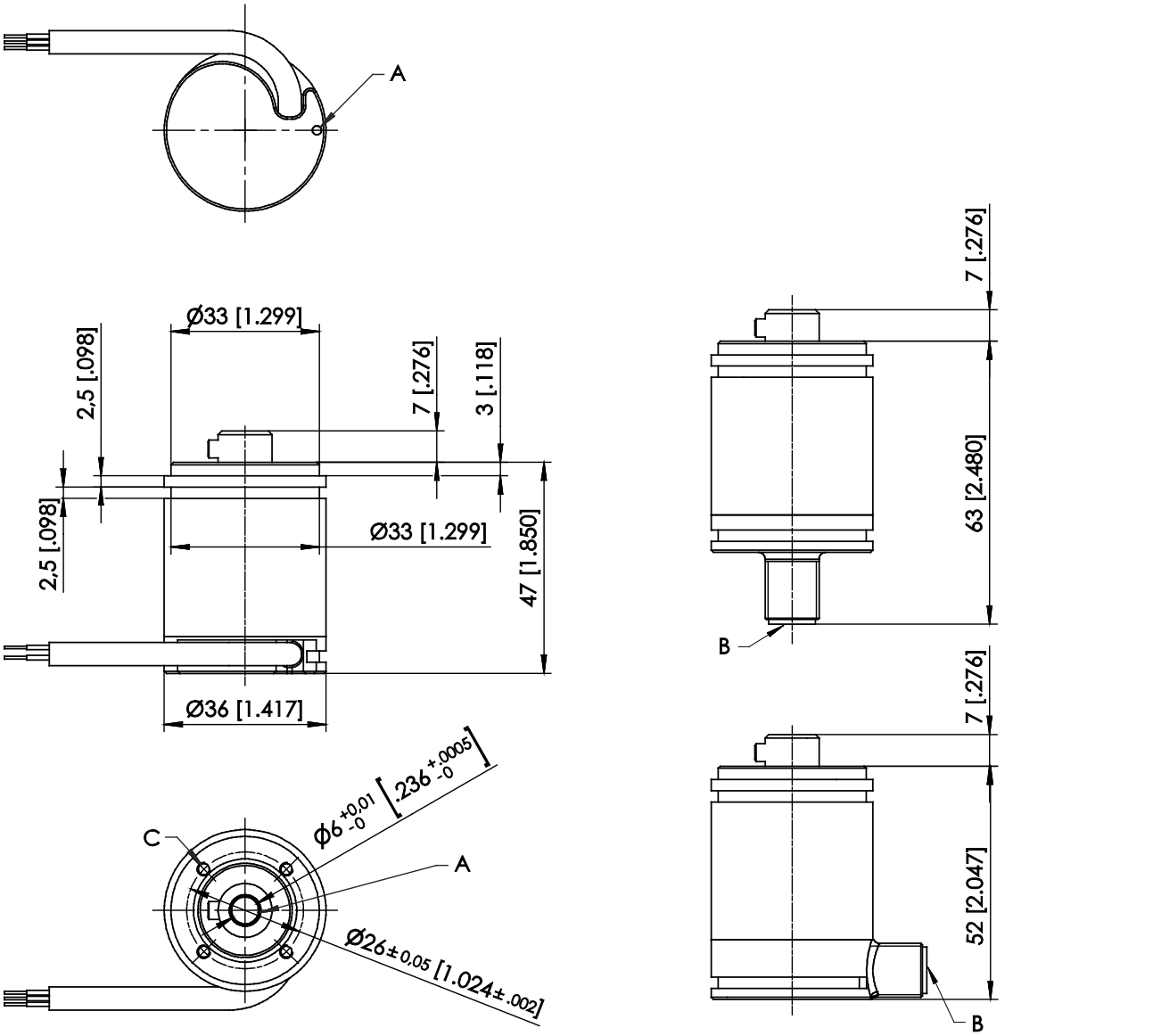
PRDS3 – V – CANOP – M12A5/CAN

Accessories:

Connector cable (see page 29)
Mounting plates (see page 12)

Dimensions

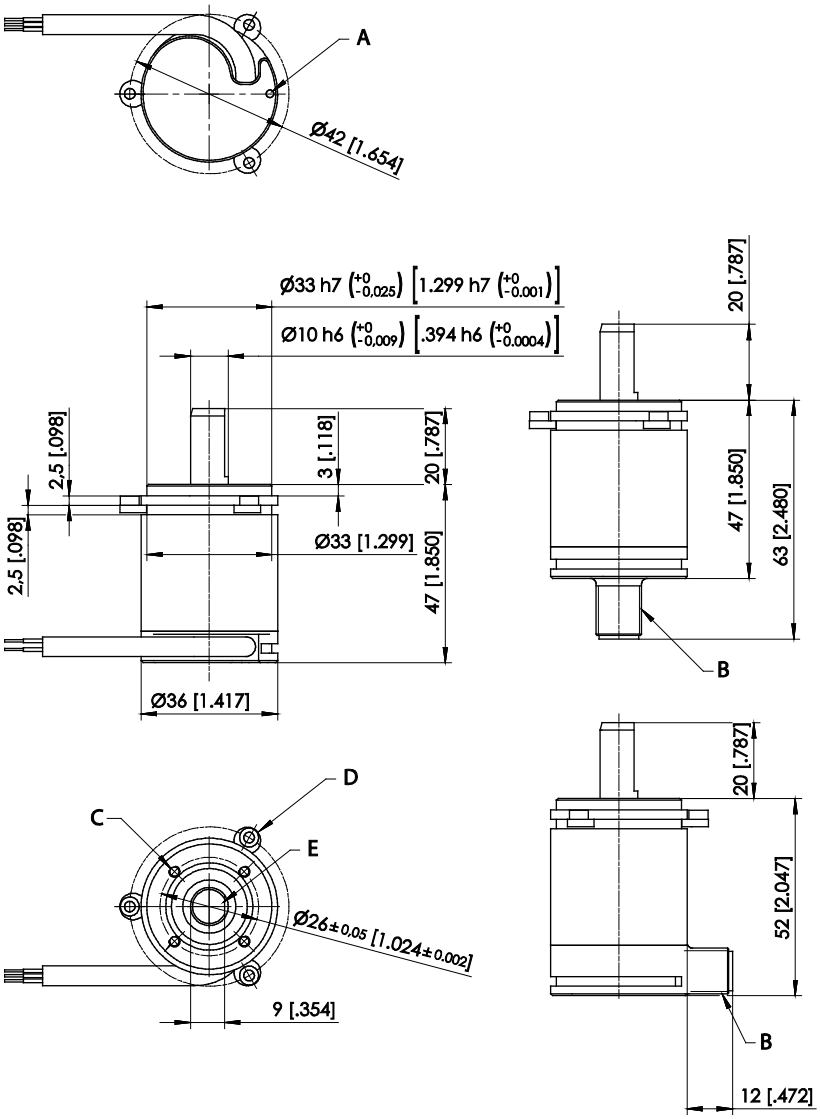
Version with hollow shaft



A – Marking
B – Connector M12
C – 4x M3 – 5 [.197] deep
screw hole orientation to marking not defined!

Dimensions in mm [inch].
Weight approx. 250 g.
Dimensions informative only.
For guaranteed dimensions consult factory.

Version with shaft

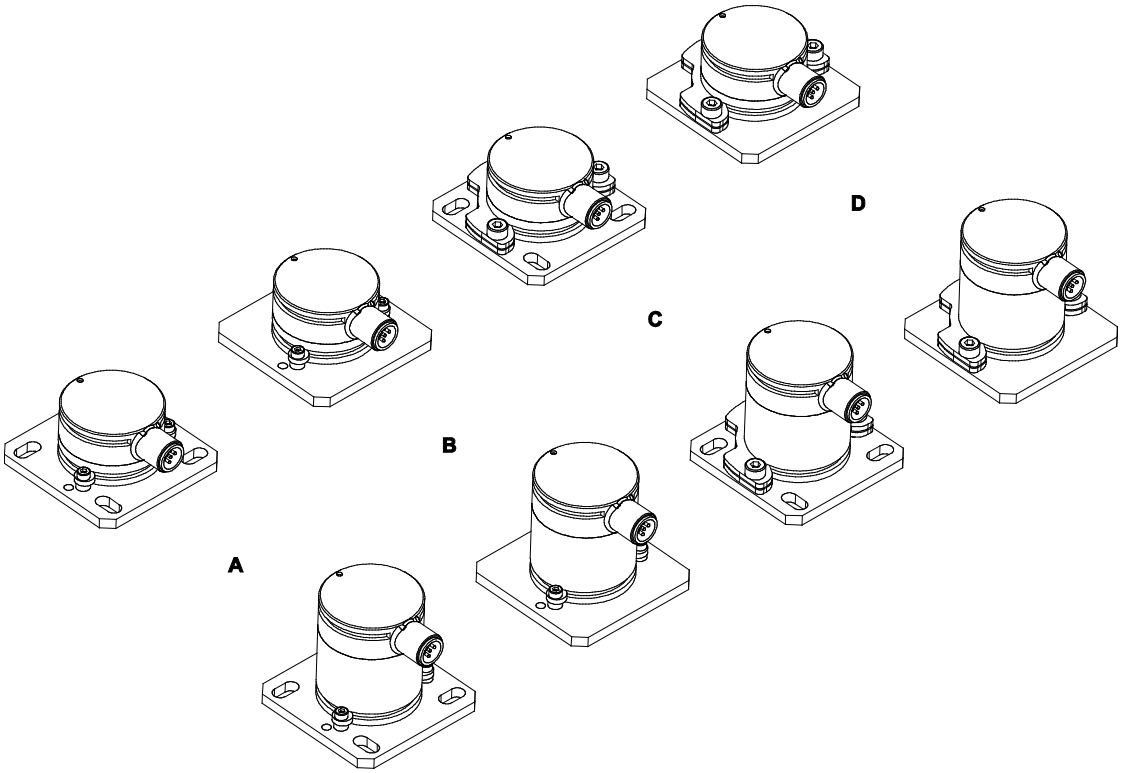


A – Marking
B – Connector M12
C – 4x M3 – 5 [.197] deep
screw hole orientation to marking not defined!
D - Mounting clamps PRPT-BFS1
E - Flat

Dimensions in mm [inch].
Weight approx. 250 g.
Dimensions informative only.
For guaranteed dimensions consult factory.

Mounting plates

Mounting possibilities PRAS2/PRDS2 and PRAS3/PRDS3



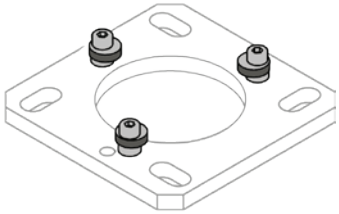
A. **PRPT-BPL1 + PRPT-BFS1**
(Mounting plates for screw mounting + mounting clamp)

B. **PRPT-BPL2 + PRPT-BFS1**
(Mounting plates for welding assembly + mounting clamp)

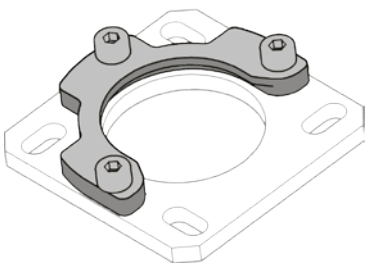
C. **PRPT-BPL1 + PRPT-BFS2**
(Mounting plates for screw mounting + mounting bracket)

D. **PRPT-BPL2 + PRPT-BFS2**
(Mounting plates for welding assembly + mounting bracket)

Mounting clamp BFS1



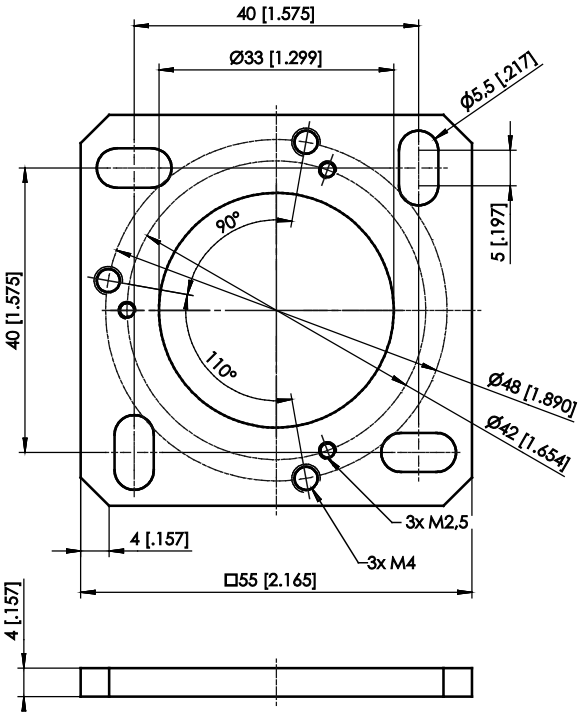
Mounting bracket BFS2



PRPT-BPL1

(Screw mounting)

In combination with the mounting clamps PRPT-BFS1 (3 x M2.5) or in combination with the mounting bracket PRPT-BFS2 (3 x M4).

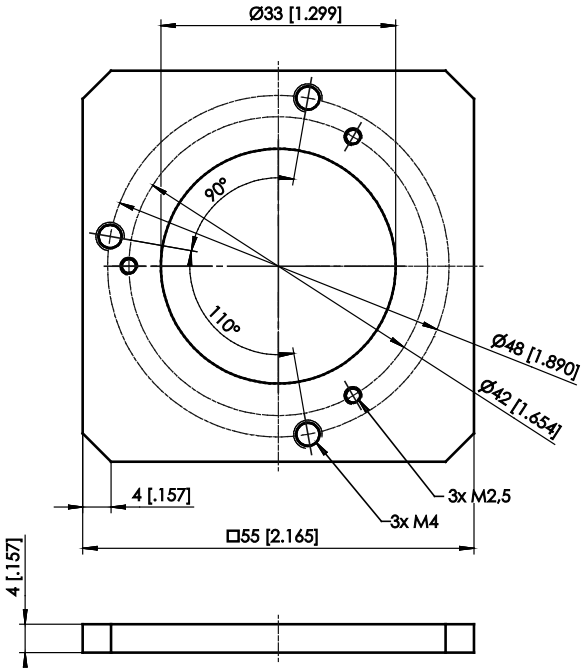


Dimensions in mm [inch]. Weight 30 g approx.
Dimensions informative only.
For guaranteed dimensions please consult factory.

PRPT-BPL2

(Welding assembly)

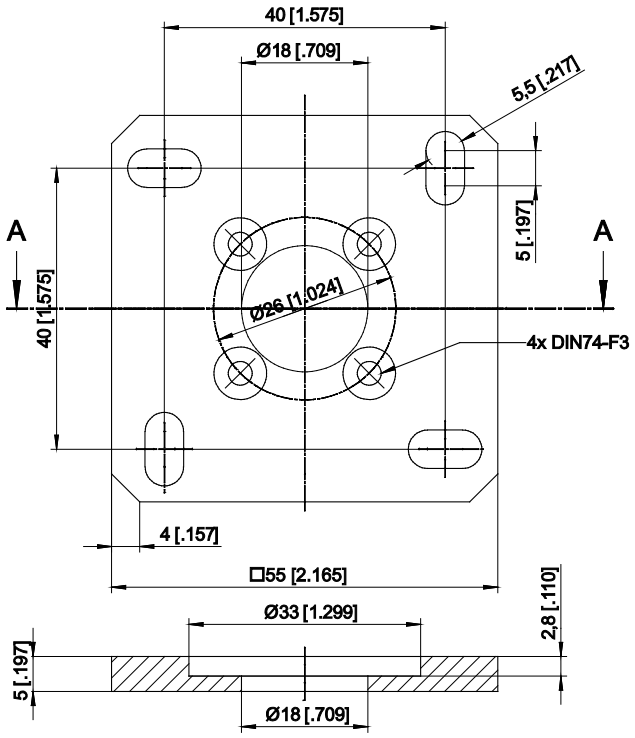
In combination with the mounting clamps PRPT-BFS1 (3 x M2.5) or in combination with the mounting bracket PRPT-BFS2 (3 x M4).



Dimensions in mm [inch]. Weight 30 g approx.
Dimensions informative only.
For guaranteed dimensions please consult factory.

PRPT-BPL3

In combination with PRAS3/PRDS3 and frontal mounting.

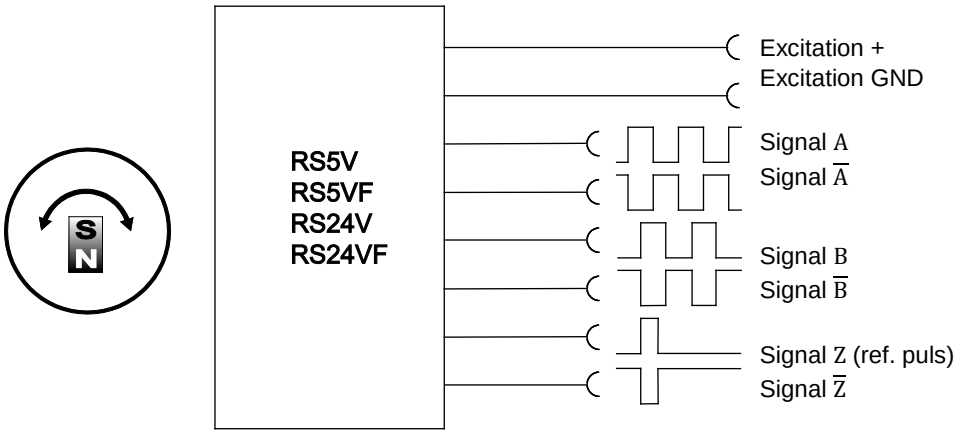


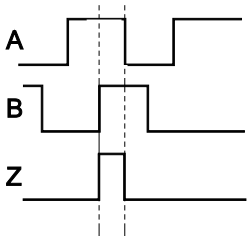
Dimensions in mm [inch]. Weight 30 g approx.
Dimensions informative only.
For guaranteed dimensions please consult factory.

Incremental output

RS5V(F)/RS24V(F) Incremental	Interface	EIA RS-422
	Excitation voltage	RS5V(F): 5 V DC ±10 % RS24V(F): 10 ... 36 V DC
	Excitation current	100 mA max., depending on the load
	Pulse frequency	<500 kHz
	Output signals	A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ Push-Pull
	Output current	10 mA max.
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Operating temperature	-40 ... +85 °C
	Protection	Short circuit
	EMC	DIN EN 61326-1:2013

Output signals





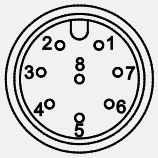
Unfiltered output RS5V / RS24V

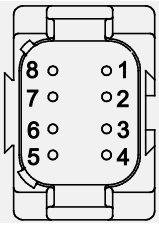
A preferred maximum pulse frequency has to be defined within the product code. This will take account for limited bandwidth of downstream counter.

Filtered output RS5VF / RS24VF

Option for filtered jitter free position value. The filter does not introduce velocity or acceleration error.

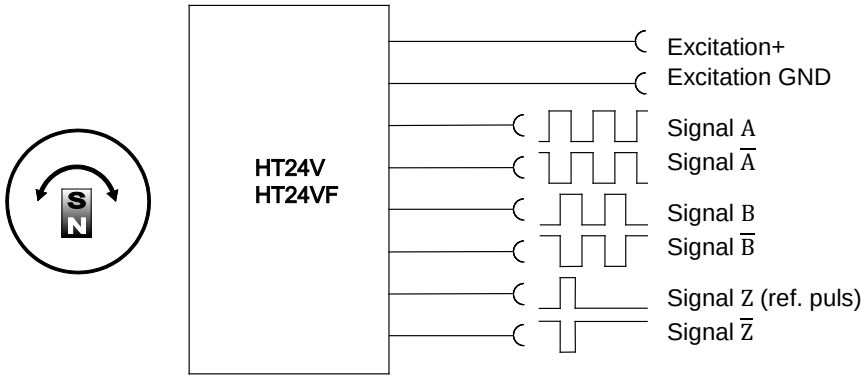
Signal wiring

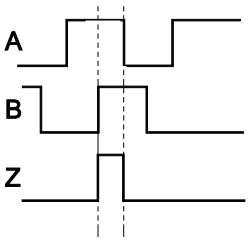
Signal	Connector pin no.	Cable color	View to the sensor connector
Excitation +	1	white	
Excitation GND	2	brown	
A	4	yellow	
$\overline{A}$	6	pink	
B	3	green	
$\overline{B}$	5	grey	
Z	7	blue	
$\overline{Z}$	8	red	

Deutsch connector DT04/8P/A	
	

HT24V(F) Incremental	Interface	EIA RS-422
	Excitation voltage	18 ... 36 V DC
	Excitation current	100 mA max., depending on the load
	Pulse frequency	<500 kHz
	Output signals	A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ Push-Pull
	Output current	10 mA max.
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Operating temperature	-40 ... +85 °C
	Protection	Short circuit
	EMC	DIN EN 61326-1:2013

Output signals





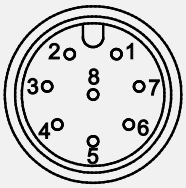
Unfiltered output HT24V

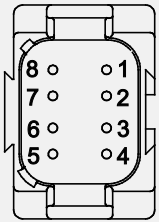
A preferred maximum pulse frequency has to be defined within the product code. This will take account for limited bandwidth of downstream counter.

Filtered output HT24VF

Option for filtered jitter free position value. The filter does not introduce velocity or acceleration error.

Signal wiring

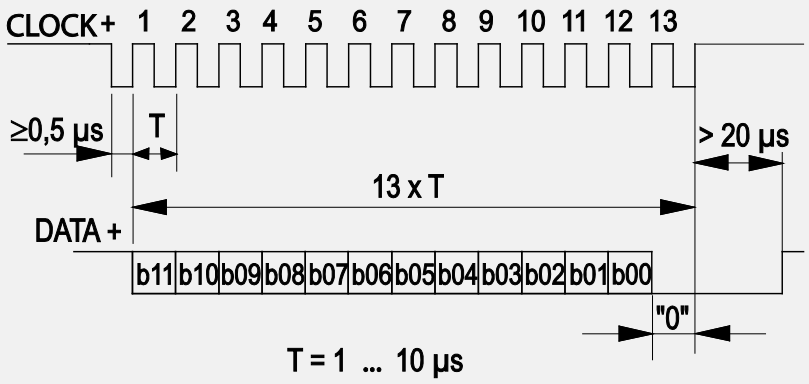
Output signals	Connector pin no.	Cable color	View to the sensor connector
Excitation +	1	white	
Excitation GND	2	brown	
A	4	yellow	
$\overline{A}$	6	pink	
B	3	green	
$\overline{B}$	5	grey	
Z	7	blue	
$\overline{Z}$	8	red	

Deutsch connector DT04/8P/A	
	

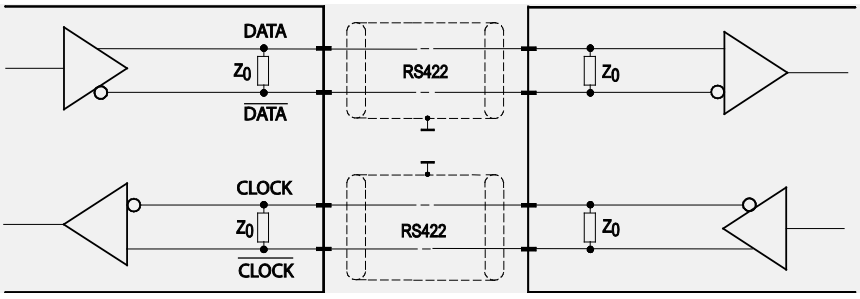
SSI output

RSSI5V/RSSI24V Synchronous serial SSI	Interface	EIA RS-422
	Excitation voltage	RSSI5V: 5 V DC ±10% RSSI24V: 10 ... 36 V DC
	Excitation current	100 mA max. without load
	Clock frequency	100 kHz ... 500 kHz
	Code	Gray-Code, continuous progression, 12 bit
	Delay between pulse trains	20 µs min.
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Operating temperature	-40 ... +85 °C
	Protection	Short circuit
	EMC	EN 61326-1:2013

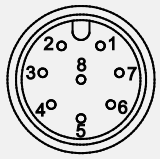
Data format
(Train of 13 pulses)

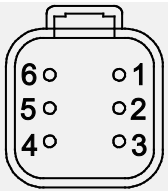


Recommended processing circuit



Transmission rate	Cable length	Baud rate	Note:
	50 m	100 - 1000 kHz	Extension of the cable length will reduce the maximum transmission rate. The signals CLOCK /CLOCK and DATA/DATA must be connected in a twisted pair cable, shielded per pair and common.
	100 m	100 - 300 kHz	

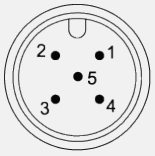
Signal wiring	Connector pin no.	Cable color	View to the sensor connector
Excitation +	1	brown	
Excitation GND	2	white	
CLOCK	3	green	
$\overline{\text{CLOCK}}$	4	yellow	
DATA	5	grey	
$\overline{\text{DATA}}$	6	pink	
-	7	blue	
-	8	red	

Deutsch connector DT04/6P/A	
	

Digital output CANopen

CANOP CANopen	CAN Specification	ISO 11898, Basic and Full CAN 2.0 B
	Communication profile	CANopen CiA 301 V 4.02, Slave
	Device profile	Encoder CiA 406 V 3.2
	Configuration services	Layer Setting Service (LSS), CiA Draft Standard 305 (transmission rate, node id)
	Error Control	Node Guarding, Heartbeat, Emergency Message
	Node ID	Default: 127; programmable via LSS or SDO
	PDO	3 TxPDO, 0 RxPDO, static mapping
	PDO Modes	Event-/Time triggered, Remote-request, Sync cyclic/acyclic
	SDO	1 server, 0 Client
	CAM	8 cams
	Certified	Yes
	Transmission rates	50 kBaud to 1 MBaud, default: 125 kBaud; programmable via LSS or SDO
	Bus connection	M12 connector, 5 pin
	Integrated bus terminating resistor	Adjustable by the customer
	Bus, galvanic isolated	No

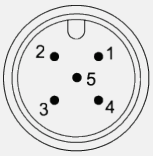
Specifications	Excitation voltage	8 ... 36 V DC
	Excitation current	20 mA typical at 24 V DC 40 mA typical at 12 V DC, 80 mA max.
	Resolution	0.05° max.
	Linearity	1° (optional 0.25°)
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	±50 x 10^{-6}/°C f.s. (typical)
	Repeatability	1 LSB
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMC	DIN EN 61326-1:2013

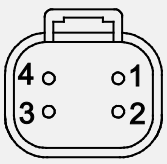
Signal wiring	**Signal**	**Connector pin no.**	**Cable color**	**View to the sensor connector**
	Shield	1	brown	
	Excitation +	2	white	
	GND	3	blue	
	CAN-H	4	black	
	CAN-L	5	grey	

Signal wiring Deutsch connector DT04/4P/A	**Signal**	**Connector pin no.**	**View to the sensor connector**
	Excitation+	1	
	CAN-H	2	
	GND	3	
	CAN-L	4	

CANOPR CANopen	CAN Specification	ISO 11898, Basic and Full CAN 2.0 B
	Communication profile	CANopen CiA 301 V 4.02, Slave
	Device profile	Encoder CiA 406 V 3.2
	Configuration services	Layer Setting Service (LSS), CiA Draft Standard 305 (transmission rate, node id)
	Error Control	Node Guarding, Heartbeat, Emergency Message
	Node ID	Default: 127 and 126; programmable via LSS or SDO
	PDO	3 TxPDO, 0 RxPDO, static mapping
	PDO Modes	Event-/Time triggered, Remote-request, Sync cyclic/acyclic
	SDO	1 server, 0 Client
	CAM	8 cams
	Certified	Yes
	Transmission rates	50 kBaud to 1 MBaud, default: 125 kBaud; programmable via LSS or SDO
	Bus connection	M12 connector, 5 pin
	Integrated bus terminating resistor	adjustable by the customer
	Bus, galvanic isolated	No

Specifications	Excitation voltage	8 ... 36 V DC
	Excitation current	40 mA typical at 24 V DC 80 mA typical at 12 V DC, 120 mA max.
	Resolution	0.05° max.
	Linearity	1° (0.25° optional)
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	±50 x 10^{-6}/°C f.s. (typical)
	Repeatability	1 LSB
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMC	DIN EN 61326-1:2013

Signal wiring	**Signal**	**Connector pin no.**	**Cable color**	**View to the sensor connector**
	Shield	1	brown	
	Excitation +	2	white	
	GND	3	blue	
	CAN-H	4	black	
	CAN-L	5	grey	

Signal wiring Deutsch connector DT04/4P/A	**Signal**	**Connector pin no.**	**View to the sensor connector**
	Excitation+	1	
	CAN-H	2	
	GND	3	
	CAN-L	4	

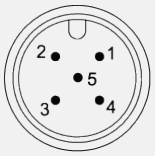
Digital output CAN SAE J1939

CANJ1939 CAN 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		adjustable by the customer
	Address		Default 247d, configurable

NAME Fields	Arbitrary address capable	1	Yes
	Industry group	0	Global
	Vehicle system	7Fh (127d)	Non specific
	Vehicle system instance	0	
	Function	FFh (255d)	Non specific
	Function instance	0	
	ECU instance	0	
	Manufacturer	145h (325d)	Manufacturer ID
	Identity number	0nnn	Serial number 21 bit

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

Specifications	Excitation voltage	8 ... 36 V DC
	Excitation current	20 mA typical at 24 V DC 40 mA typical at 12 V DC, 80 mA max.
	Resolution	0.05° max.
	Linearity	1° (0.25° optional)
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	±50 x 10^{-6}/°C f.s. (typical)
	Repeatability	1 LSB
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMV	DIN EN 61326-1:2013

Signal wiring	**Signal**	**Connector pin no.**	**View to the sensor connector**
	Shield	1	
	Excitiation +	2	
	GND	3	
	CAN-H	4	
	CAN-L	5	

Signal wiring Deutsch connector DT04/4P/A	Signal	Connector pin no.	View to the sensor connector
	Excitation+	1	
	CAN-H	2	
	GND	3	
	CAN-L	4	

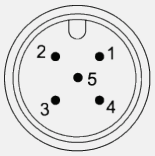
CANJ1939R CAN SAE J1939	CAN Specification	ISO 11898, Basic and Full CAN 2.0 B
	Transceiver	24V-compliant, not isolated
	Communication profile	SAE J1939
	Baud Rate	250 kbit/s
	Internal termination resistor	Adjustable by the customer
	Address	Default 247d and 246d, configurable

NAME Fields	Arbitrary address capable	1	Yes
	Industry group	0	Global
	Vehicle system	7Fh (127d)	Non specific
	Vehicle system instance	0	
	Function	FFh (255d)	Non specific
	Function instance	0	
	ECU instance	0	
	Manufacturer	145h (325d)	Manufacturer ID
	Identity number	0nnn	Serial number 21 bit

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

Specifications	Excitation voltage	8 ... 36 V DC
	Excitation current	40 mA typical at 24 V DC 80 mA typical at 12 V DC, 120 mA max.
	Resolution	0.05° max.
	Linearity	1° (0.25° optional)
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	±50 x 10^{-6}/°C f.s. (typical)
	Repeatability	1 LSB
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMV	DIN EN 61326-1:2013

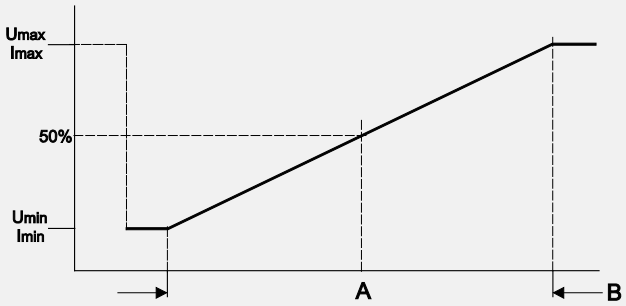
Signal wiring

Signal	Connector Pin no.	Cable color	View to the sensor connector
Shield	1	brown	
Excitiation +	2	white	
GND	3	blue	
CAN-H	4	black	
CAN-L	5	grey	

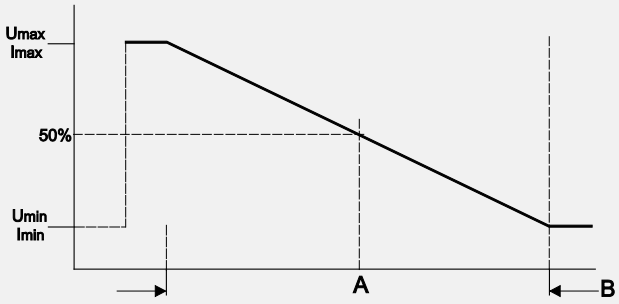
Signal wiring Deutsch connector DT04/4P/A	Signal	Connector pin no.	View to the sensor connector
	Excitation+	1	
	CAN-H	2	
	GND	3	
	CAN-L	4	

Characteristics for magnetic angle sensors

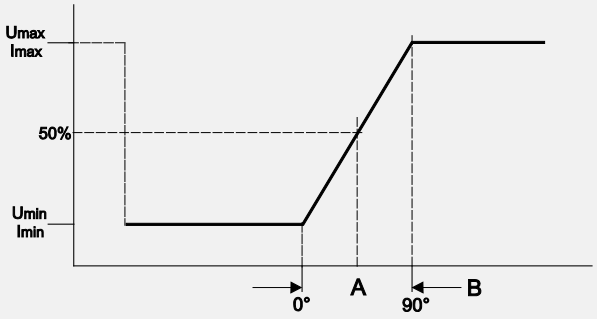
Output signal CW
(clockwise increasing)



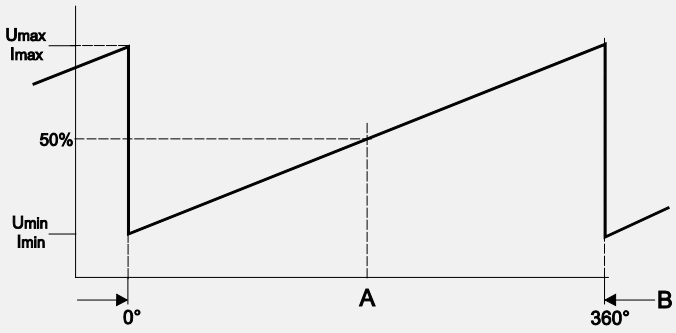
Output signal CCW
(counterclockwise increasing)



Example angular range 90°



Example angular range 360°



A – Marking
B – Measurement range [°]

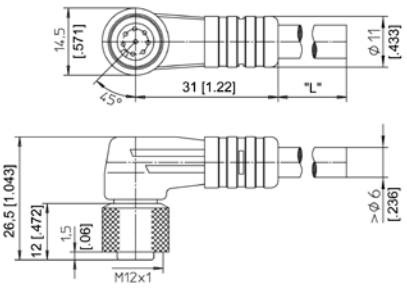
Accessories

Connector cable M12, 8 pin

(angular coupling)

shielded connector

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



Order code

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

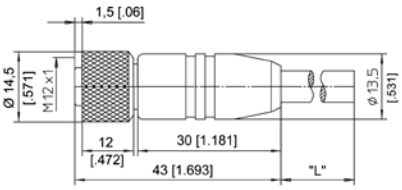
xM = length in m

Connector cable M12, 8 pin

(straight coupling)

shielded connector

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



Order code

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

xM = length in m

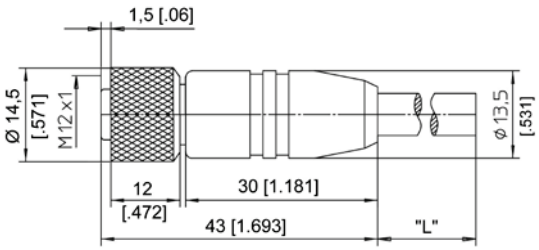
Signal wiring M12, 8 pin	**Plug connection / cable color**							
	1	2	3	4	5	6	7	8
	white	brown	green	yellow	grey	pink	blue	red

Applicable for cable carriers

Maximum movement speed	3 m/s
Maximum acceleration	5 m/s^2
Minimum bending radius	10 x cable diameter

Connector/bus cable M12, 5 pin CAN-Bus

The 5-lead shielded cable is supplied with a female 5 pin M12 connector at one end and a male 5 pin M12 connector at the other end.
Available lengths are 0.3 m, 2 m, 5 and 10 m.
Cable diameter: 6.7 ±0.2 mm



Order code:

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

xM = length in m

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

Order code:

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

Terminating resistor M12, 5 pin CAN-Bus

Order code:

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

Applicable for cable carriers

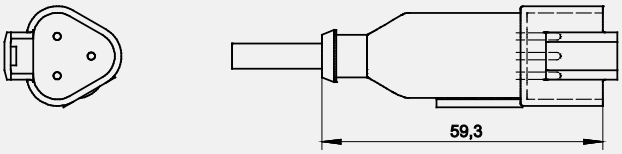
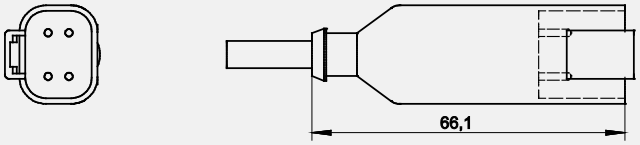
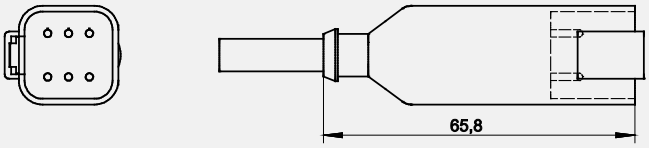
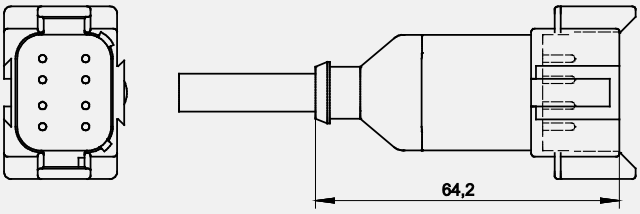
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s^2
Minimum bending radius	10 x cable diameter

Deutsch connector

Sensors with cable output can be delivered with Deutsch connector.

Protection class:	IP67 (while plugged)
Connection:	3, 4, 6, 8 poles – depending on output, see table below
Wire cross sectional area:	0.5 mm^2
Standard cable length:	2 m
Protective cable tube:	for a better mechanical protection the cable can be delivered with a protective tube

Deutsch connector – table

Number of poles	Deutsch connector DT04	Output
3 pin		U6
4 pin		U2, U2B, U8 I1, I1B CANOP(R), CANJ1939(R)
6 pin		U6R RSSI5V RSSI24V
8 pin		U2R, U8R I1R RS5VF, RS24VF HT24VF