posirot®
Magnetic Angle Sensors

PRDS5

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**
- **Redundant CAN version**
- **Optional CAN output with self diagnostics function**

Product versions

Incremental output

Digital output SSI

Digital output CANopen/SAE J1939 (optional redundant)



PRDS5 - Magnetic Angle Sensor

Version with Incremental output

Specifications

			Order options
Mechanical connection	Shaft 10 mm Contactless with external position magnet	1	**V** **K**
Measurement range	0 ... 360°		
Resolution	1, 2, 3 ... 1024 pulses per revolution	2	**1, 2, 3 ... 1024**
Linearity	±1% (typical)		
Output	Incremental encoder output RS422 compatible output with excitation 5 V DC Incremental encoder output RS422 compatible output with excitation 8 ... 36 V DC Incremental encoder output HTL compatible output with excitation 8 ... 36 V DC DC	3	**RS5VF** **RS24VF** **HT24VF**
Rated distance sensor / magnet	Depending on the position magnet (only version K)		
Connection	8-pin connector M12, axial 8-pin connector M12, radial Cable, standard length 2 m Deutsch connector, not shielded	4	**M12A8** **M12R8** **KAB2M**
Housing material	Stainless steel EN 1.4404 (AISI 316L)	5	**VA**
Mounting	Screws M8		
Protection class	IP67/IP69, IP68 optional		
Life cycle of bearings (shaft version)	100 x 10^6 revolutions (<1500 r.p.m.)		
Revolutions per minute (mechanical)	10,000 r.p.m.		
Allowable shaft load	120 N radial / 120 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		
Temperature range	-40 ... +85°C		
Weight	390 g approx., 890 g approx. with shaft (without cable)		
EMC	DIN EN 61326-1:2013		

Order code

PRDS5 – 1 – 2 – 3 – 4 – 5

Order example: PRDS5 – V – 1024 – RS24VF – M12A8 – VA

Accessories:

Connector cable (see page 31)
Position magnets (see from page 15)

SSI



PRDS5 - Magnetic Angle Sensor
Version with Digital output SSI

Specifications

			Order options
Mechanical connection	Shaft 10 mm Contactless with external position magnet	1	**V** **K**
Measurement range	0 ... 360°		
Output	Synchronous serial output with excitation 5 V DC Synchronous serial output with excitation 10 ... 36 V	2	**RSSI5V** **RSSI24V**
Code characteristics	Signal increasing CW, clockwise Signal increasing CCW, counterclockwise	3	**CW** **CCW**
Resolution	12 Bit (4096 steps) per revolution		
Repeatability	±0.1° (typical)		
Linearity	±1% (typical)		
Rated distance sensor / magnet	Depending on the position magnet (only version K)		
Connection	8-pin connector M12, axial 8-pin connector M12, radial Cable, standard length 2 m Deutsch connector, not shielded	4	**M12A8** **M12R8** **KAB2M**
Housing material	Stainless steel EN 1.4404 (AISI 316L)	5	**VA**
Mounting	Screws M8		
Protection class	IP67/IP69, IP68 optional		
Life cycle of bearings (shaft version)	100 x 10^6 revolutions (<1500 r.p.m.)		
Revolutions per minute (mechanical)	10,000 r.p.m.		
Allowable shaft load	120 N radial / 120 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		
Temperature range	-40 ... +85°C		
Weight	390 g approx., 890 g approx. with shaft (without cable)		
EMC	DIN EN 61326-1:2013		

Order code

PRDS5 – 1 – 2 – 3 – 4 – 5

Order example: PRDS5 – V – RSSI5V – CW – M12A8 – VA

Accessories:

Connector cable (see page 31)
Position magnets (see from page 15)



PRDS5 - Magnetic Angle Sensor

Version with Digital output CANopen/SAE J1939 (optional redundant)

Specifications

			Order options
Mechanical connection	Shaft 10 mm Contactless with external position magnet	1	**V** **K**
Measurement range	0 ... 360°		
Output	CANopen CAN SAE J1939 CANopen, redundant CAN SAE J1939, redundant	2	**CANOP** **CANJ1939** **CANOPR** **CANJ1939R**
Resolution	0.05° max.		
Linearity	±1% (typical)		
Rated distance sensor / magnet	Depending on the position magnet (only version K)		
Connection	5-pin connector M12 axial 5-pin connector M12 radial Deutsch connector, not shielded	3	**M12A5/CAN** **M12R5/CAN**
Housing material	Stainless steel EN 1.4404 (AISI 316L)	4	**VA**
Mounting	Screws M8		
Protection class	IP67/IP69, IP68 optional		
Life cycle of bearings (shaft version)	100 x 10^6 revolutions (<1500 r.p.m.)		
Revolutions per minute (mechanical)	10,000 r.p.m.		
Allowable shaft load	120 N radial / 120 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		
Temperature range	-40 ... +85°C		
Weight	390 g approx., 890 g approx. with shaft (without cable)		
EMC	DIN EN 61326-1:2013		

Order code

PRDS5 – 1 – 2 – 3 – 4

Order example: PRDS5 – V – CANOP – M12A5/CAN – VA

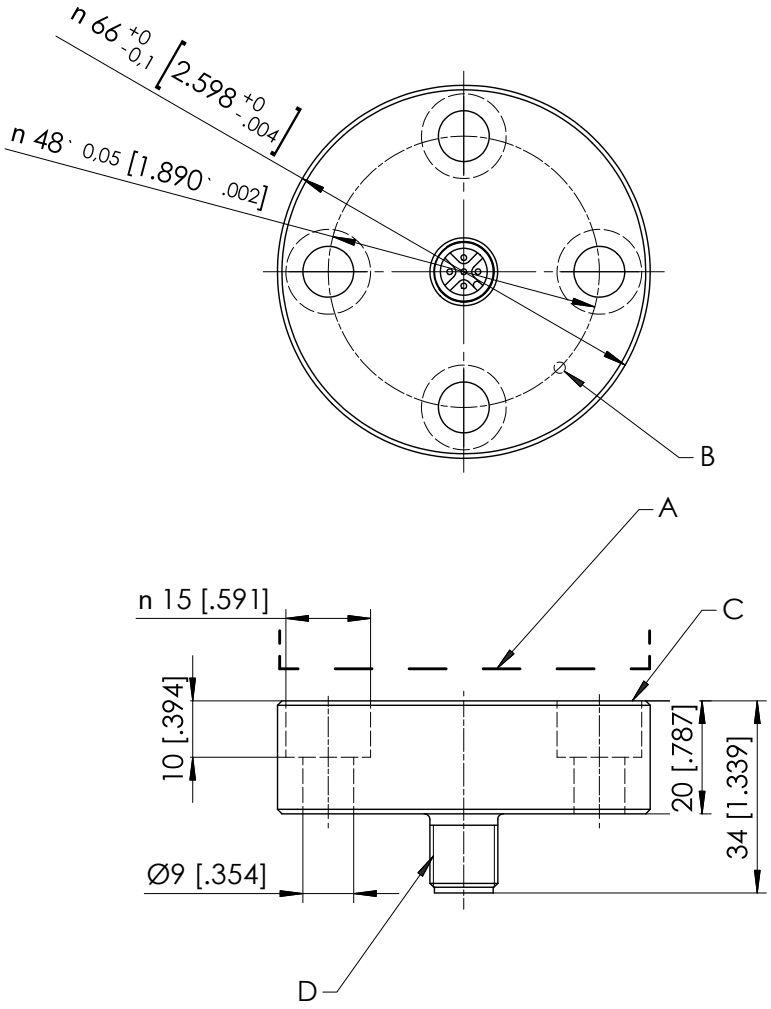
Accessories:

Connector cable (see page 32)

Position magnets (see from page 15)

Dimensions

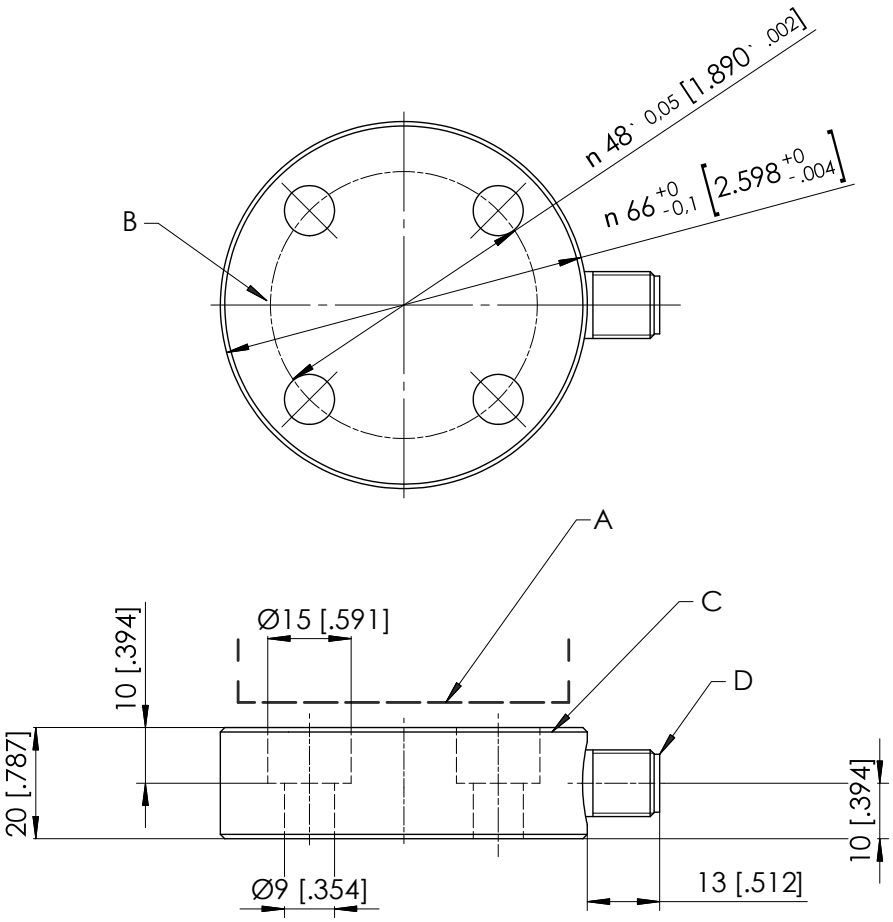
Contactless, connector M12, axial



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

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

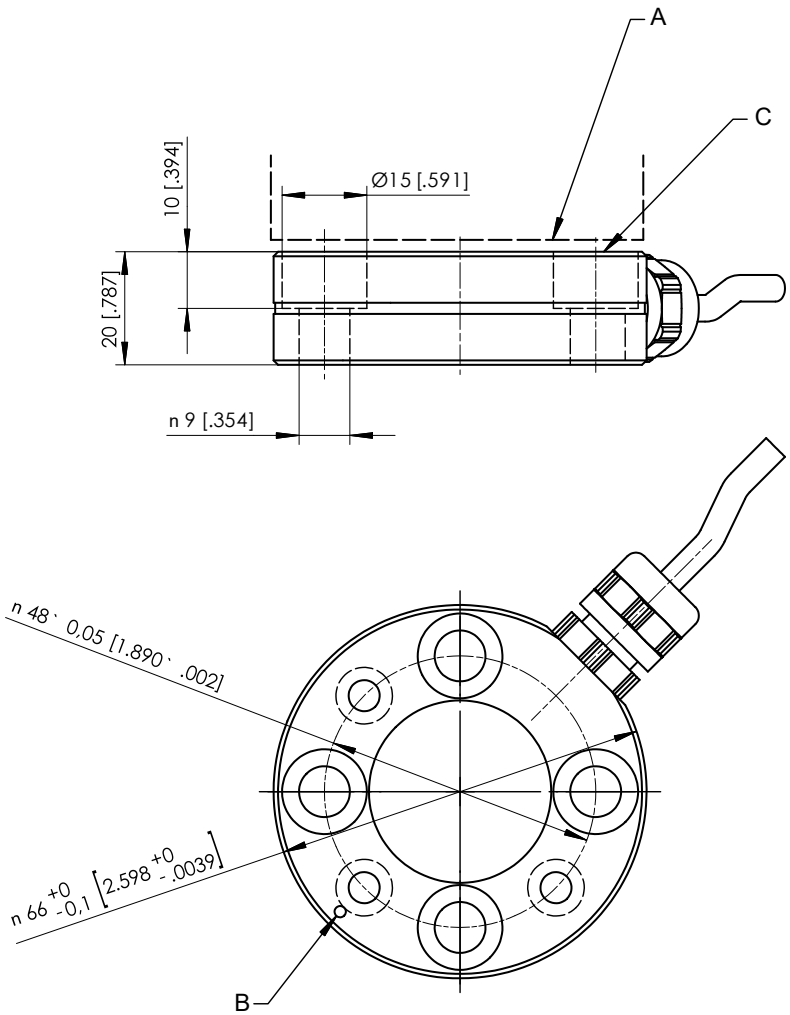
Contactless, connector M12, radial



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

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

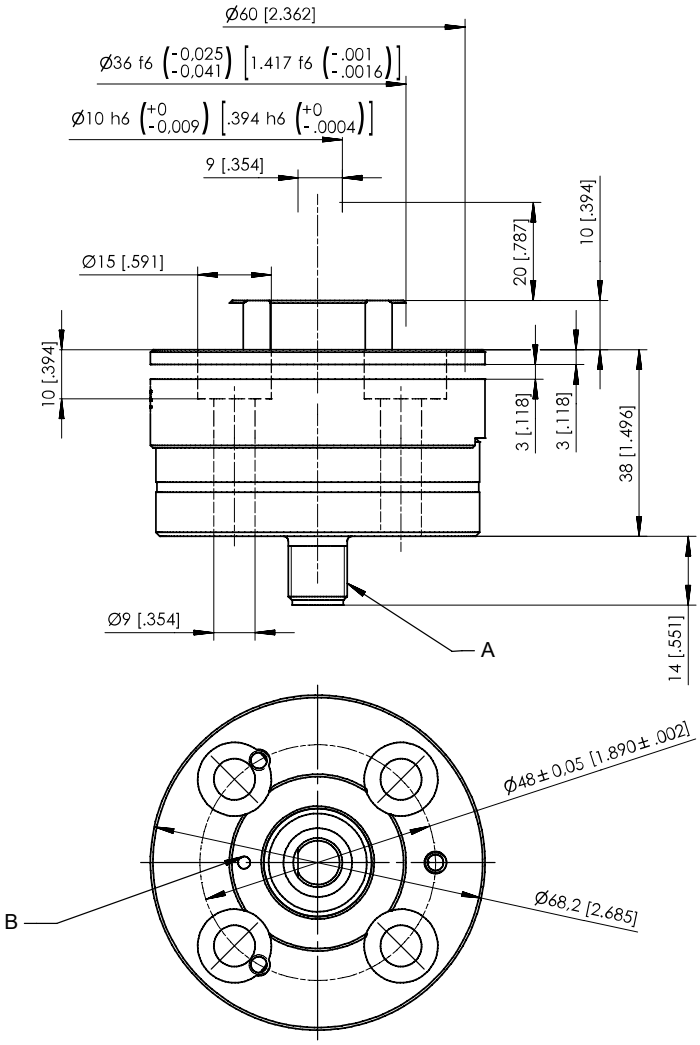
Cable version, contactless



A – Position magnet
B – Marking
C – Measurement area

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

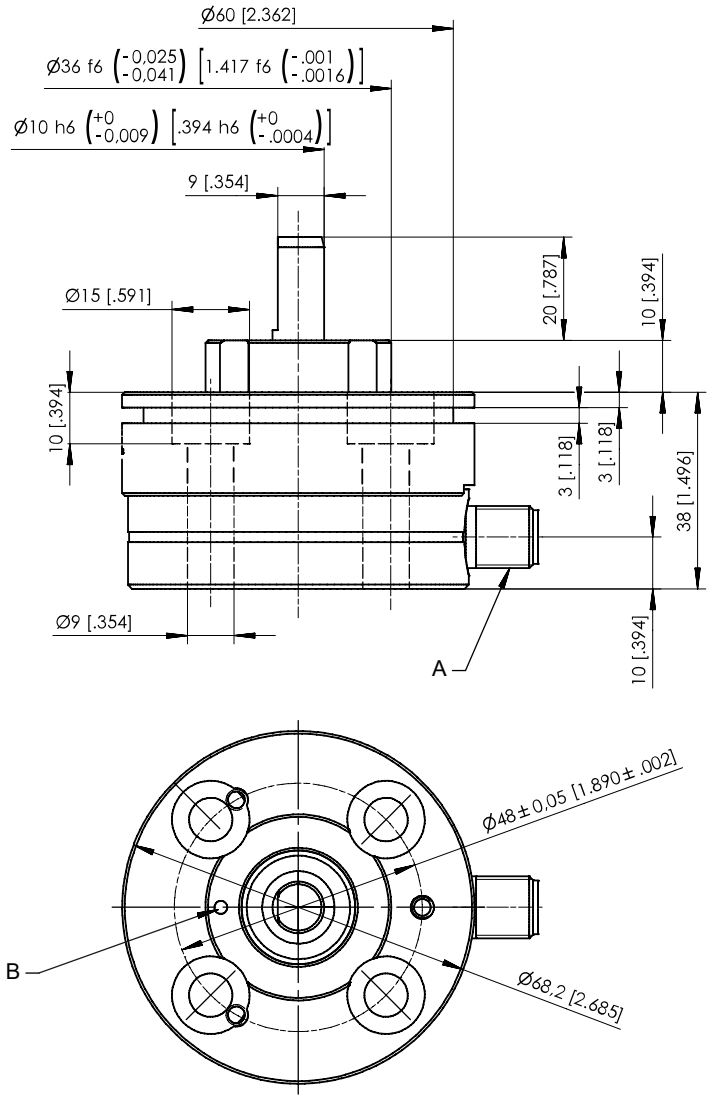
With shaft, connector M12, axial



A – Connector M12
B – Marking

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

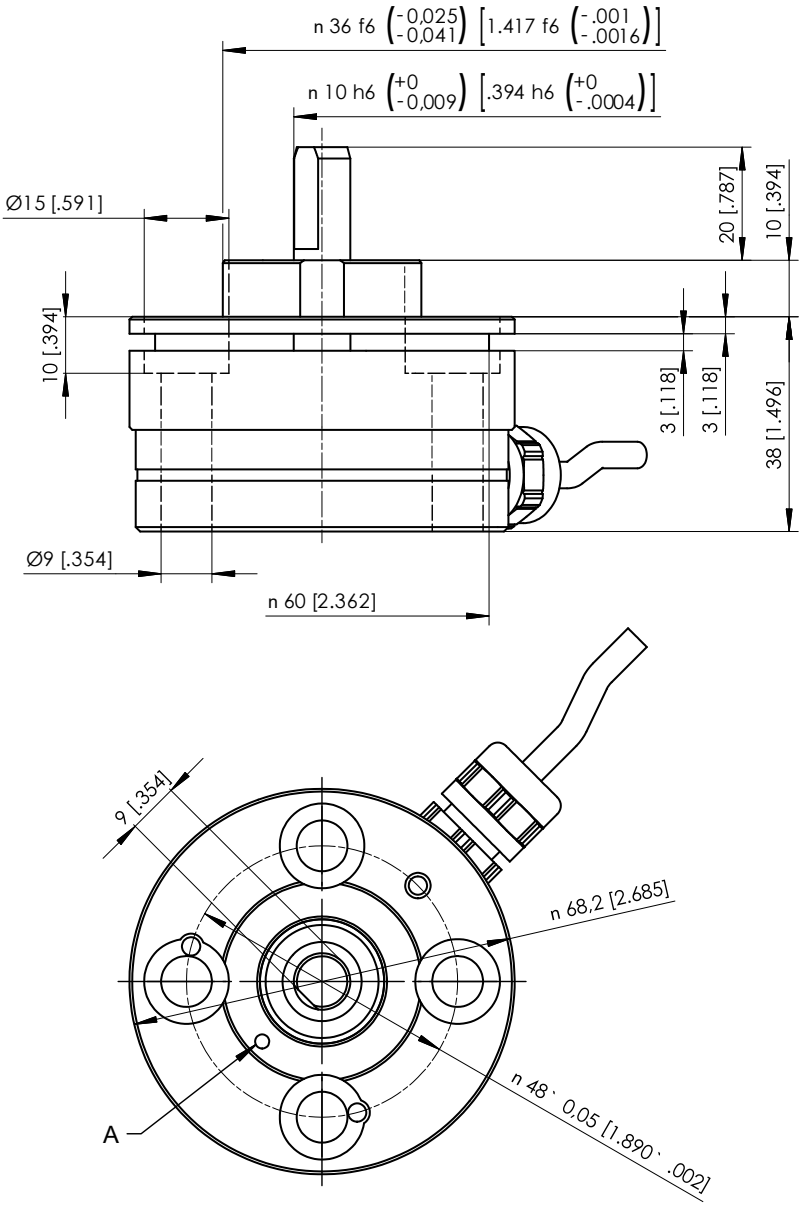
With shaft, connector M12, radial



A – Connector M12
B – Marking

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

Cable version, with shaft

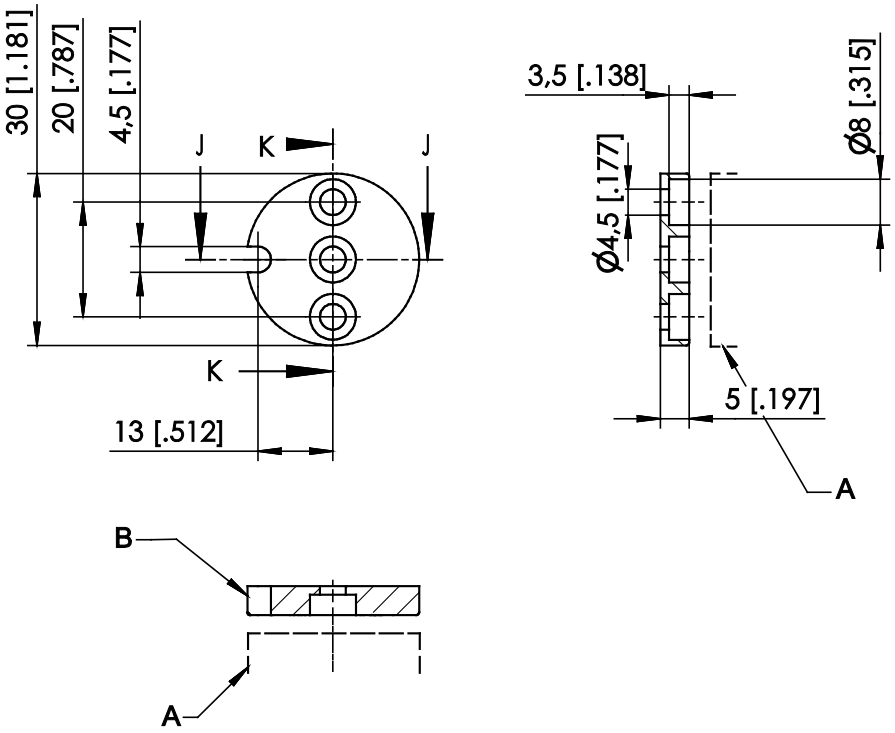


A – Marking

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

Position magnets

PRMAG20



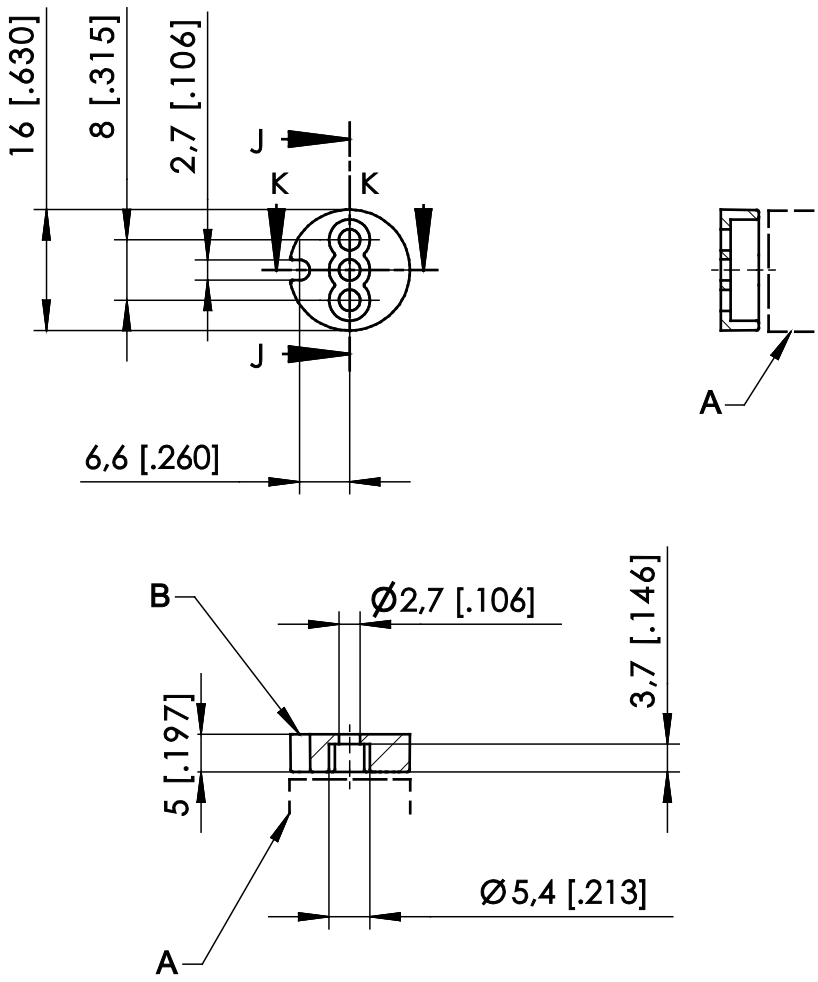
A – Sensor
B – Marking

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

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



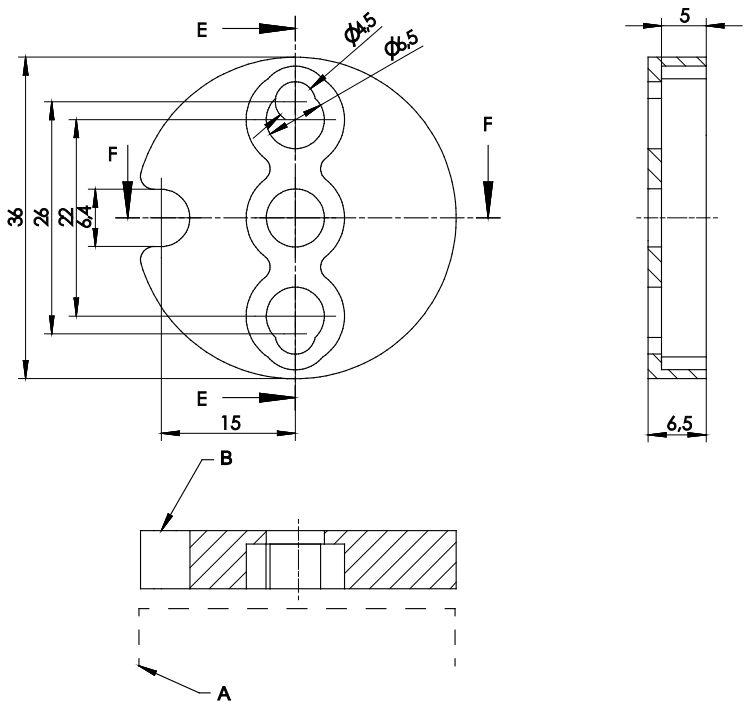
A – Sensor
B – Marking

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

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



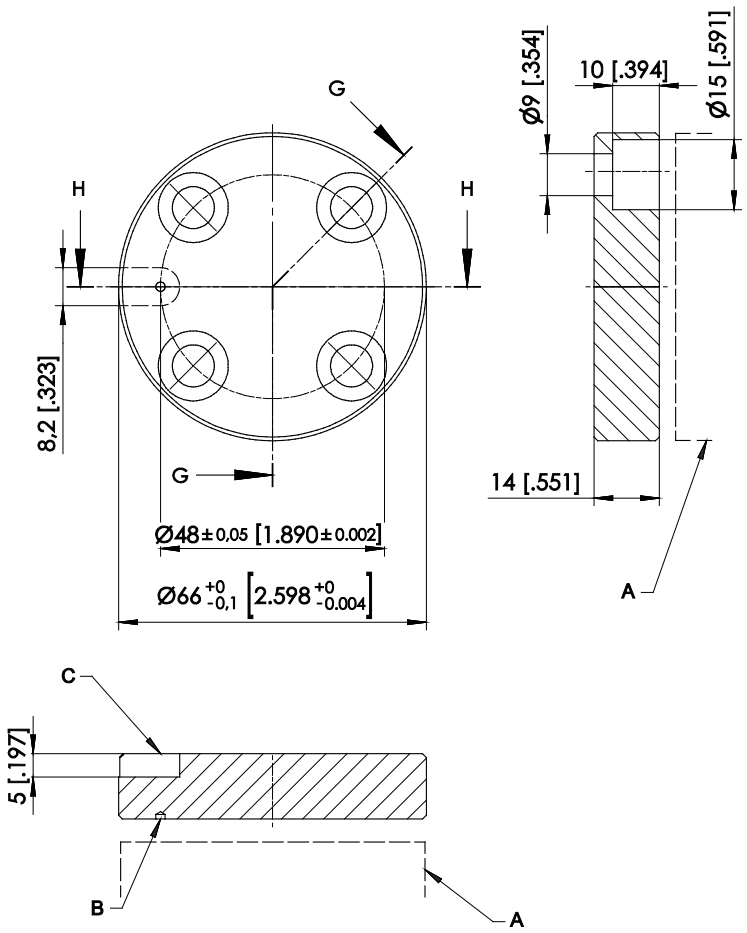
A – Sensor
B – Marking

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

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



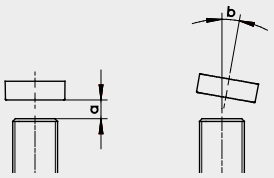
A – Sensor
B – Marking
C – Notch

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

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



Air gap (a)
Parallelism (b)
Lateral offset (c)

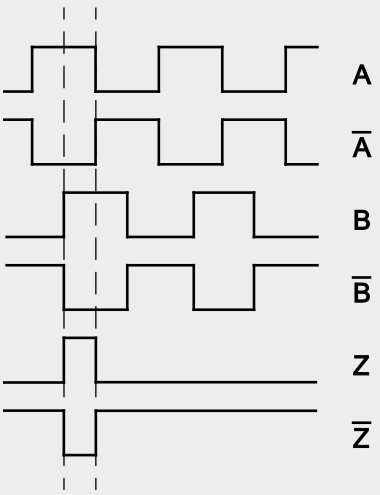
Sensor	Position magnet	Air gap [mm]	Parallelism [°]	Error by lateral offset [°]					
				0.2 mm	0.5 mm	1 mm	2 mm	3 mm	4 mm
PRAS5 PRDS5	PRMAG20	0 ... 5.5	0 ... 5	0.15	0.4	0.8	2.2	5	–
	PRMAG21	0 ... 3	0 ... 5	0.2	0.4	1	3.8	10	–
	PRMAG22	0 ... 8.5	0 ... 5	0.1	0.4	1	2.2	4.5	8
	PRMAG5-Z-(VA)	0 ... 7.5	0 ...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

Output specification

Incremental output

RS5VF /RS24VF Incremental	Interface	EIA RS-422
	Excitation voltage	RS5VF: 5 V DC ±10 % RS24VF: 8 ... 36 V DC
	Excitation current	100 mA max., depending on the load
	Max. 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

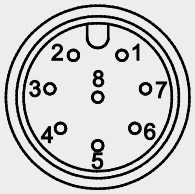
Output signals



Pulse sequence for clockwise rotation CW in view of shaft or active front of sensor.

A zero impulse Z, $\overline{Z}$ is generated at the reference position.

Signal wiring
Connector M12, 8 pin

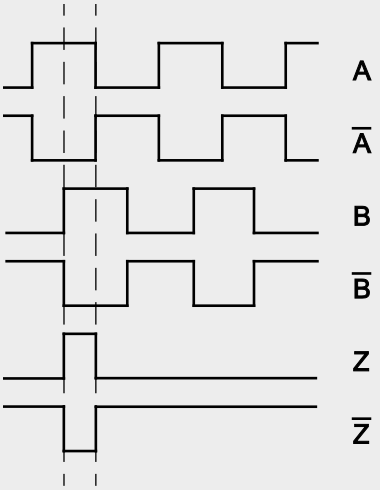


View to the sensor connector

Output signals	Connector pin no.	Cable color
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

HT24VF Incremental	Interface	HTL
	Excitation voltage	8 ... 36 V DC
	Excitation current	100 mA max., depending on the load
	Max. 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

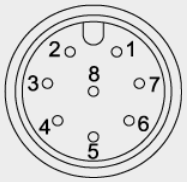
Output signals



Pulse sequence for clockwise rotation CW in view of shaft or active front of sensor.

A zero impulse Z, $\overline{Z}$ is generated at the reference position.

Signal wiring Connector M12, 8 pin



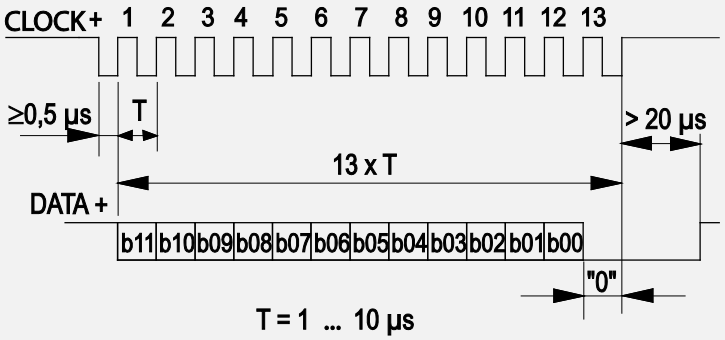
View to the sensor connector

Output signals	Connector pin no.	Cable color
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

SSI output

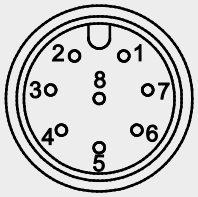
RSSI5V/RSSI24V Synchronous serial SSI SSI	Interface	EIA RS-422
	Excitation voltage	RSSI5V: 5 V DC ±10% RSSI24V: 10 ... 36 V DC
	Excitation current	100 mA max. without load
	Clock frequency	100 kHz ... 500 kHz
	Code	Gray-Code, continuous progression, 12 bit
	Delay between pulse trains	20 µs min.
	Stability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

Data format
(Train of 13 pulses)



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 /$\overline{\text{CLOCK}}$ and DATA/$\overline{\text{DATA}}$ must be connected in a twisted pair cable, shielded in pairs, the pairs also commonly shielded.
	100 m	100 - 300 kHz	

Signal wiring
Connector M12, 8 pin



View to the sensor connector

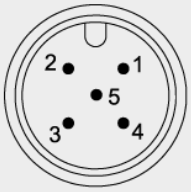
Output signals	Connector pin no.	Cable color
Excitation +	1	white
Excitation GND	2	brown
CLOCK	3	green
$\overline{\text{CLOCK}}$	4	yellow
DATA	5	grey
$\overline{\text{DATA}}$	6	pink
-	7	blue
-	8	red

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.
	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 **Connector M12, 5 pin**	**Output signals**	**Connector pin no.**
	Shield	1
	Excitation +	2
	GND	3
	CAN-H	4
	CAN-L	5



View to the sensor connector

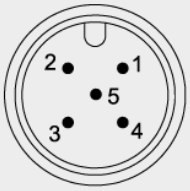
Digital output CANopen (cable output, seawater resistant submarine cable)

Signal wiring	Output signals	Cable color
	$+U_V$ (Excitation voltage)	red
	GND	black
	CAN-H	blue
	CAN-L	white

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.
	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
Connector M12, 5 pin



View to the sensor connector

Output signals	Connector pin no.
Shield	1
Excitation +	2
GND	3
CAN-H	4
CAN-L	5

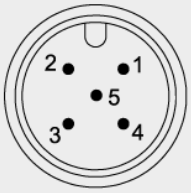
Digital output CANopen (cable output, seawater resistant submarine cable)

Signal wiring	Output signals	Cable color

	+U_V (Excitation voltage)	red
	GND	black
	CAN-H	blue
	CAN-L	white

Digital output CAN SAE J1939

CANJ1939 SAE J1939 CAN	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.	
	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 Connector M12, 5 pin	**Output signals**	**Connector pin no.**	
	Shield	1	
	Excitation +	2	
	GND	3	
	CAN-H	4	

 View to the sensor connector	CAN-L	5

Digital output CANJ1939 (cable output, seawater resistant submarine cable)

Signal wiring	Output signals	Cable color
	+U_V (Excitation voltage)	red
	GND	black
	CAN-H	blue
	CAN-L	white

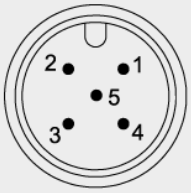
CANJ1939R CAN SAE J1939	CAN Specification	ISO 11898, Basic and Full CAN 2.0 B	
	Transceiver	24V-compliant, not isolated	
	Communication profile	SAE J1939	
	Baud Rate	250 kbit/s	
	Internal termination resistor	Adjustable by the customer	
	Address	Default 247d and 246d, configurable	

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.
	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 Connector M12, 5 pin	**Output signals**	**Connector pin no.**
	Shield	1
	Excitation +	2
	GND	3
	CAN-H	4
	CAN-L	5



View to the sensor connector

Digital output CANJ1939 (cable output, seawater resistant submarine cable)

Signal wiring	Output signals	Cable color
	$+U_V$ (Excitation voltage)	red
	GND	black
	CAN-H	blue
	CAN-L	white

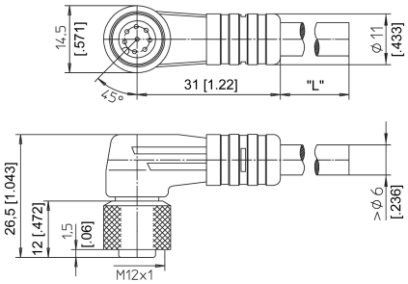
Accessories
Connector cable M12, 8 pin
(angular coupling)

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

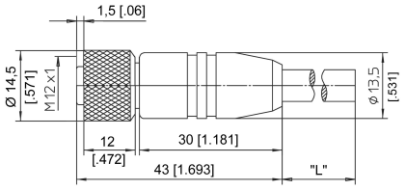
Connector cable M12, 8 pin
(straight coupling)

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

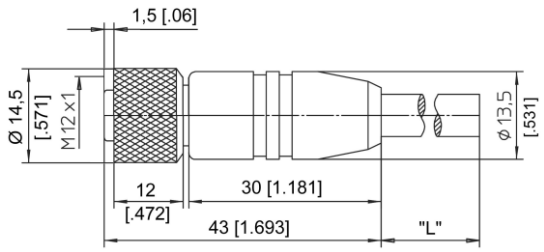
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s²
Minimum bending radius	10 x cable diameter

Connector/bus cable M12, 5 pin CAN-Bus

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

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

Cable diameter: 6.7 ±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

Applicable for cable carriers

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

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

