posihall®
Magnetic Multiturn Encoders

PH36

Encoder with measurement range
up to 31 revolutions



- **Housing diameter 36 mm**
- **Protection class up to IP67/IP69**
- **True-absolute measurement principle**
- **Wear and maintenance free**

Product versions

Analog output

Analog output, programmable / tare function

Digital output SSI

Digital output CANopen

V / mA



PH36 - Magnetic Multiturn Encoder

Version with analog output

Specifications

			Order options
Shaft	Shaft 6 mm Shaft 10 mm	1	**V01** **V02**
Measurement range	up to 31 x 360° (31 revolutions) 1 revolution, 2 revolutions ... up to 31 revolutions	2	 **1T** **2T ...** **31T**
Output	Voltage 0.5 ... 10 V Voltage 0.5 ... 4.5 V Voltage 0.5 ... 4.5 V Current 4 ... 20 mA, 3 wire	3	**U2** **U6** **U8** **I1**
Resolution	Up to 16 bit		
Repeatability	0.1°		
Linearity	±(2°+ 0.015% f.s.)		
Housing material	Aluminum (housing), stainless steel (shaft)		
Mounting	Clamps, mounting plate		
Protection class	IP67 shaft IP67/69 housing (with IP69 compatible connector)		
Signal characteristics	Signal increasing CW Signal increasing CCW	4	**CW** **CCW**
Connection	Connector M12 axial, 5 pin	5	**M12A5**
Revolutions per minute (mechanical)	10,000 r.p.m. max.		
Allowable shaft load	20 N radial, 10 N axial		
Life cycle of bearings	1.5 x 10^9 rev. (4500 h per 6000 r.p.m)		
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	approx. 120 g		
EMC	DIN EN 61326-1:2013		

Order code

PH36 – 1 – 2 – 3 – 4 – 5

Order example: PH36 – V01 – 31T – I1 – CW – M12A5







PH36 - Magnetic Multiturn Encoder

Version with analog output, programmable / tare function

Specifications

			Order options
Shaft	Shaft 6 mm Shaft 10 mm	1	**V01** **V02**
Measurement range	up to 31 x 360° (31 revolutions) 1 revolution, 2 revolutions ... up to 31 revolutions	2	 **1T** **2T ...** **31T**
Output	Voltage 0.5 ... 10 V, programmable Voltage 0.5 ... 4.5 V, programmable Voltage 0.5 ... 4.5 V, programmable Current 4 ... 20 mA, 3 wire, programmable Voltage 0.5 ... 10 V, tare function Voltage 0.5 ... 4.5 V, tare function Voltage 0.5 ... 4.5 V, tare function Current 4 ... 20 mA, 3 wire, tare function	3	**U2/PMU** **U6/PMU** **U8/PMU** **I1/PMU** **U2/PMZ** **U6/PMZ** **U8/PMZ** **I1/PMZ**
Resolution	Up to 16 bit		
Repeatability	0.1°		
Linearity	±(2°+ 0.015% f.s.)		
Housing material	Aluminum (housing), stainless steel (shaft)		
Mounting	Clamps, mounting plate		
Protection class	IP67 shaft IP67/69 housing (with IP69 compatible connector)		
Signal characteristics	Signal increasing CW Signal increasing CCW	4	**CW** **CCW**
Connection	Connector M12 axial, 5 pin	5	**M12A5**
Revolutions per minute (mechanical)	10,000 r.p.m. max.		
Allowable shaft load	20 N radial, 10 N axial		
Life cycle of bearings	1.5 x 10^9 rev. (4500 h per 6000 r.p.m)		
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	approx. 120 g		
EMC	DIN EN 61326-1:2013		

Order code

PH36 – 1 – 2 – 3 – 4 – 5

Order example: PH36 – V01 – 31T – U2/PMU – CW – M12A5

SSI



PH36 - Magnetic Multiturn Encoder
Version with digital output SSI

Specifications

			Order options
Shaft	Shaft 6 mm Shaft 10 mm	1	**V01** **V02**
Measurement range	up to 31 x 360° (31 revolutions) 1 revolution, 2 revolutions ... up to 31 revolutions	2	 **1T** **2T ...** **31T**
Output	Synchronous serial SSI, Gray-Code, 24 bit	3	**MSSI/G/24**
Resolution	2^{14} x 31 (16384 x 31)		
Repeatability	0.1° or 1 LSB		
Linearity	±(2°+ 0.015% f.s.)		
Housing material	Aluminum (housing), stainless steel (shaft)		
Mounting	Clamps, mounting plate		
Protection class	IP67 shaft IP67/69 housing (with IP69 compatible connector)		
Signal characteristics	Signal increasing CW Signal increasing CCW	4	**CW** **CCW**
Connection	Connector M12 axial, 8 pin	5	**M12A8**
Revolutions per minute (mechanical)	10,000 r.p.m. max.		
Allowable shaft load	20 N radial, 10 N axial		
Life cycle of bearings	1.5 x 10^9 rev. (4500 h per 6000 r.p.m)		
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	approx. 120 g		
EMC	DIN EN 61326-1:2013		

Order code

PH36 – 1 – 2 – 3 – 4 – 5

Order example: PH36 – V01 – 31T – MSSI/G/24 – CW – M12A8

CAN



PH36 - Magnetic Multiturn Encoder

Version with digital output CANopen

Specifications

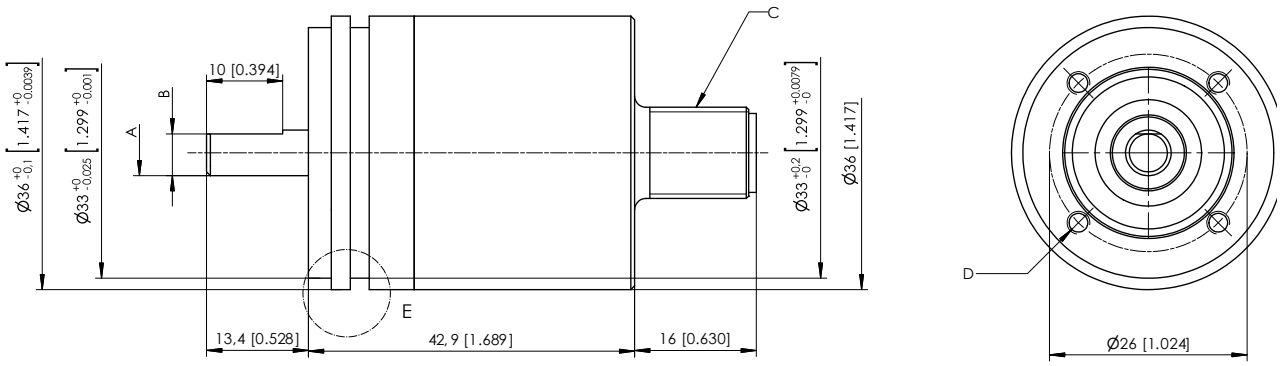
			Order options
Shaft	Shaft 6 mm Shaft 10 mm	1	**V01** **V02**
Measurement range	up to 31 x 360° (31 revolutions) 1 revolution, 2 revolutions ... up to 31 revolutions	2	 **1T** **2T ...** **31T**
Output	CANopen (CiA 301-V4.02/406-V3.2) CAN SAE J1939	3	**MCANOP** **MCANJ1939**
Resolution	14 bit per revolution		
Repeatability	0.1°		
Linearity	±1°		
Housing material	Aluminum (housing), stainless steel (shaft)		
Mounting	Clamps, mounting plate		
Protection class	IP67 shaft IP67/69 housing (with IP69 compatible connector)		
Connection	Connector M12 axial, 5 pin	4	**M12A5/CAN**
Revolutions per minute (mechanical)	10,000 r.p.m. max.		
Allowable shaft load	20 N radial, 10 N axial		
Life cycle of bearings	1.5 x 10^9 rev. (4500 h per 6000 r.p.m)		
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	approx. 120 g		
EMC	DIN EN 61326-1:2013		

Order code

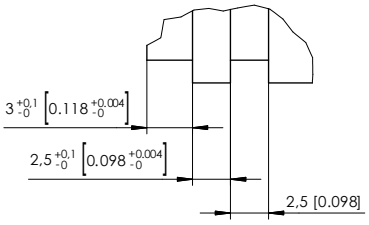
PH36 – 1 – 2 – 3 – 4

Order example: PH36 – V01 – 31T – MCANOP – M12A5/CAN

Dimensions



E (4 : 1)



C – Connector M12
D – 4 x M3 – 5 [0.197] deep

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

Dimensions shaft

Dim.	V01	V02
A	Ø6f6 -0,01 -0,018	Ø10f6 -0,013 -0,022
	[0.236 -0.0004 -0.0007]	[0.394 -0.0005 -0.0009]
B	5,5 [0.217]	9 [0.354]

Output specification

Analog output

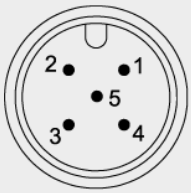
U2 Voltage output 0.5 ... 10 V 	Excitation voltage	8 … 36 V DC
	Excitation current	20 mA typical at 24 V DC 38 mA typical at 12 V DC max. 50 mA
	Output voltage	0.5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

U6 Voltage output 0.5 … 4.5 V 	Excitation voltage	5 V DC ±5%
	Excitation current	typical 140 mA max.
	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)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

U8 Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC 50 mA max.
	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)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

I1 Current output 4 … 20 mA, 3 wires 	Excitation voltage	8 … 36 V DC
	Excitation current	typical 36 mA at 24 V DC typical 70 mA at 12 V DC 120 mA max.
	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)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

Signal wiring
Connector M12, 5 pin



View to the sensor connector

Output signals	Connector pin no.	Cable color
Excitation +	1	brown
Signal	2	white
GND	3	blue
Do not connect!	4	black
Do not connect!	5	(grey)

Analog output, programmable / tare function

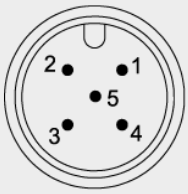
U2/PMU programmable **U2/PMZ tare function** Voltage output 0.5 ... 10 V 	Excitation voltage	8 … 36 V DC
	Excitation current	20 mA typical at 24 V DC 38 mA typical at 12 V DC max. 50 mA
	Output voltage	0,5 ... 10 V DC
	Output current	2 mA max.
	Measuring rate	1 kHz standard
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

U6/PMU programmable **U6/PMZ tare function** Voltage output 0.5 … 4.5 V 	Excitation voltage	5 V DC ±5%
	Excitation current	typical 140 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)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

U8/PMU programmable **U8/PMZ tare function** Voltage output 0.5 … 4.5 V 	Excitation voltage	8 … 36 V DC
	Excitation current	17 mA typical at 24 V DC 32 mA typical at 12 V DC max. 50 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)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

I1/PMU programmable **I1/PMZ tare function** Current output 4 … 20 mA, 3 wire 	Excitation voltage	8 … 36 V DC
	Excitation current	typical 36 mA at 24 V DC typical 70 mA at 12 V DC max. 120 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)
	Protection	Reverse polarity, short circuit
	Operating temperature	See specification of the respective sensor
	EMC	DIN EN 61326-1:2013

Signal wiring
Connector M12, 5 pin



View to the sensor connector

Output signals	Connector pin no.	Cable color
Excitation +	1	brown
Signal	2	white
GND	3	blue
Do not connect!	4	black
SPAN/ZERO	5	grey

Output …/PMU

Programming of the start and end value by the customer (programmable)

Teach-In of start and end value for the analog outputs U2/PMU, U8/PMU, I1/PMU is provided by a binary signal SPAN/ZERO. At the start position connect signal SPAN/ZERO for a period of 2 ... 3 seconds to GND via push button. At the end position connect signal SPAN/ZERO for a period of 5 ... 6 seconds to GND via a push button. The scaling range will be stored non-volatile.

To reset the sensor to factory default ZERO/END must be connected to ground while powering up the sensor for 2 … 3 seconds.

Output …/PMZ

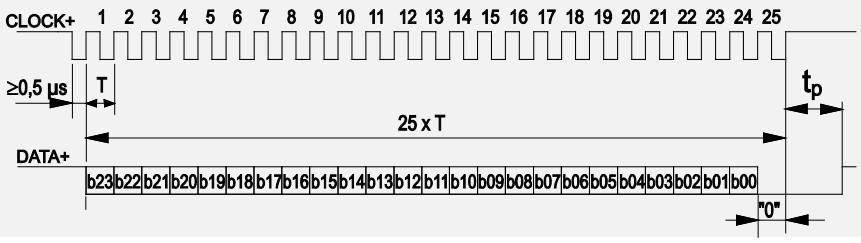
Programming of the zero point by the customer (tare function)

Teach-In of the zero point for the analog outputs U2/PMZ, U6/PMZ, U8/PMZ and I1/PMZ is provided by a binary signal SPAN/ZERO. At the start position connect signal SPAN/ZERO for a period of 2 ... 3 seconds to GND via push button. The sensitivity of the output signal remains unchanged. The programmed position will be stored non-volatile. To reset the sensor to the factory values the button must be pushed for a period of 2 ... 3 seconds when the sensor is switched on.

Digital output

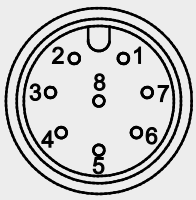
MSSI Synchronous serial SSI SSI	Interface	EIA RS-422
	Excitation voltage	8 ... 36 V DC
	Excitation current	19 mA typical at 24 V DC 35 mA typical at 12 V DC max. 80 mA
	Clock frequency	100 kHz ... 500 kHz
	Code	Gray-Code, continuous progression
	Delay between pulse trains (t_p)	30 µs min.
	Stability (temperature)	±50 x 10^{-6} / °C f.s. (typical)
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	EMC	DIN EN 61326-1:2013

Data format
(Train of 26 pulses)



Transmission rate	**Cable length**	**Baud rate**	**Note:**
	50 m	100-400 kHz	Extension of the cable length will reduce the maximum transmission rate.
	100 m	100-300 kHz	

Signal wiring
Connector M12, 8 pin



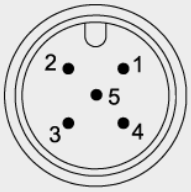
View to the sensor connector

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

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



View to the sensor connector

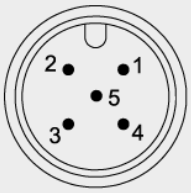
Output signals	Connector pin no.	Cable color
Shield	1	brown
Excitation +	2	white
GND	3	blue
CAN-H	4	black
CAN-L	5	grey

MCANJ1939 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	120 Ω 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 max. 80 mA
	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	EN 61326-1:2013

Signal wiring Connector M12, 5 pin	Output signals	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

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

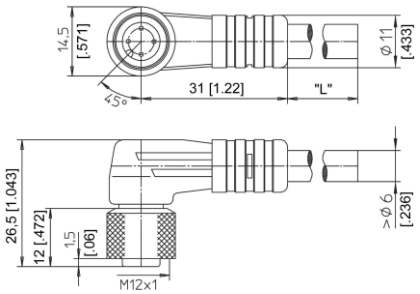
shielded connector

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)

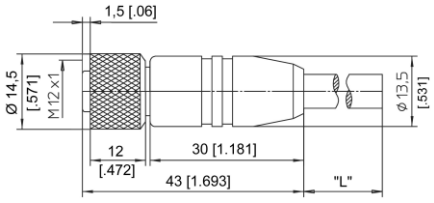
shielded connector

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 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

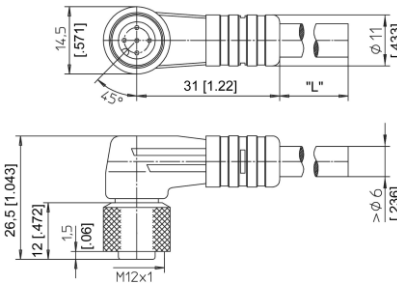
Connector cable M12, 5 pin
(angular coupling)

shielded connector

The 5-core screened cable is supplied with a mating 5-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 - M12/5F/W - LITZE
IP69:	**KAB - xM - M12/5F/W/69K - LITZE**

xM = length in m

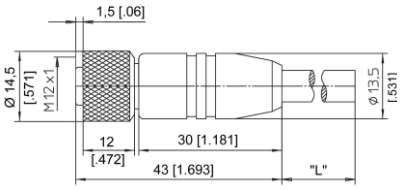
Connector cable M12, 5 pin
(straight coupling)

shielded connector

The 5-core screened cable is supplied with a mating 5-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 - M12/5F/G - LITZE
IP69:	**KAB - xM - M12/5F/G/69K - LITZE**

xM = length in m

Signal wiring M12, 5 pin	**Plug connection / Cable color**				
	1	2	3	4	5
	brown	white	blue	black	grey

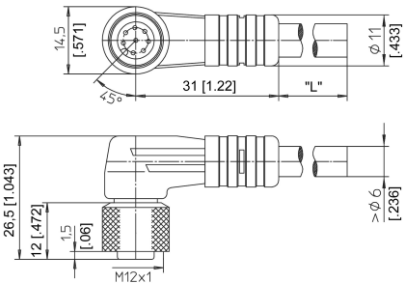
Applicable for cable carriers

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

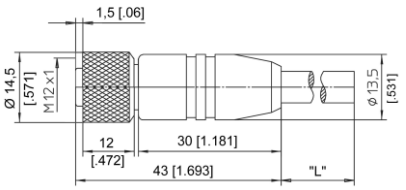
	KAB - xM - M12/8F/W - LITZE
IP69:	**KAB - xM - M12/8F/W/69K - LITZE**

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

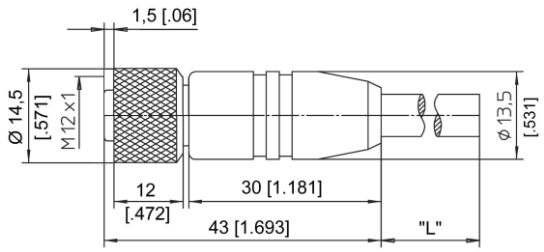
Maximum movement speed	3 m/s
Maximum acceleration	5 m/s²
Minimum bending radius	10 x cable diameter

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

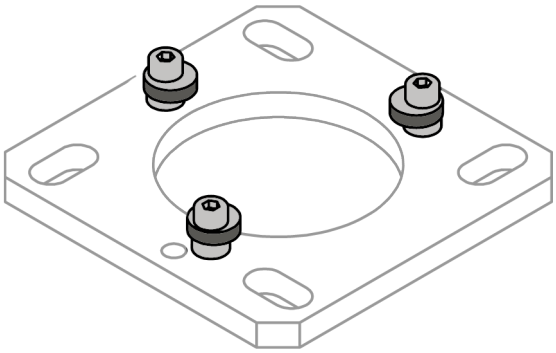
KAB - RTERM - M12/5M/G - CAN



Accessories

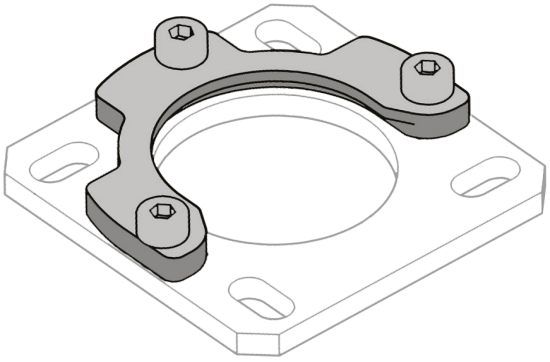
Mounting clamps (PH36)

Mounting clamp BFS1



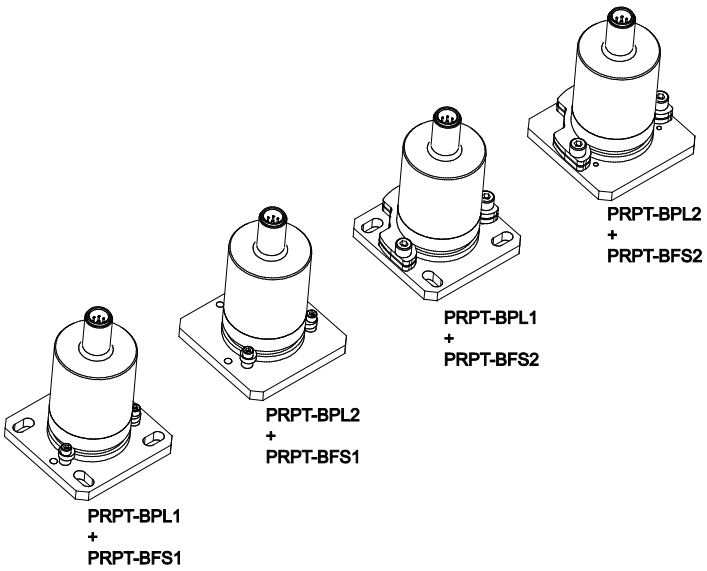
Order code:
PRPT- BFS1

Mounting clamp BFS2



Order code:
PRPT- BFS2

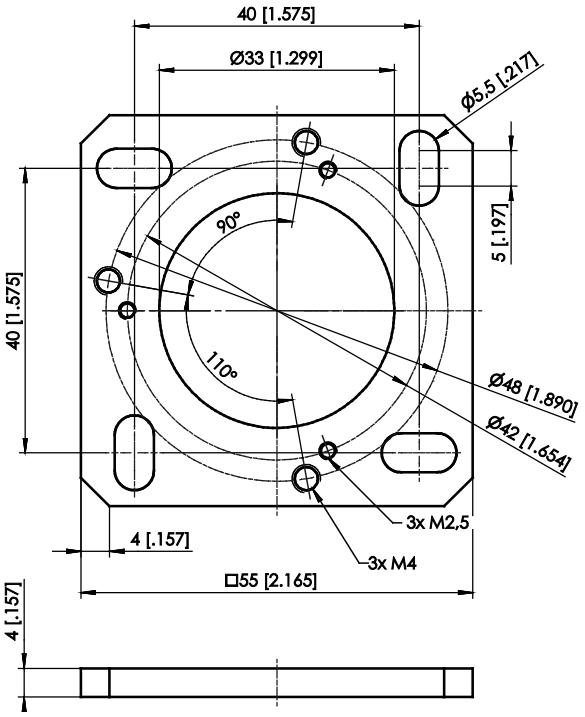
Mounting possibilities (PH36)



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.

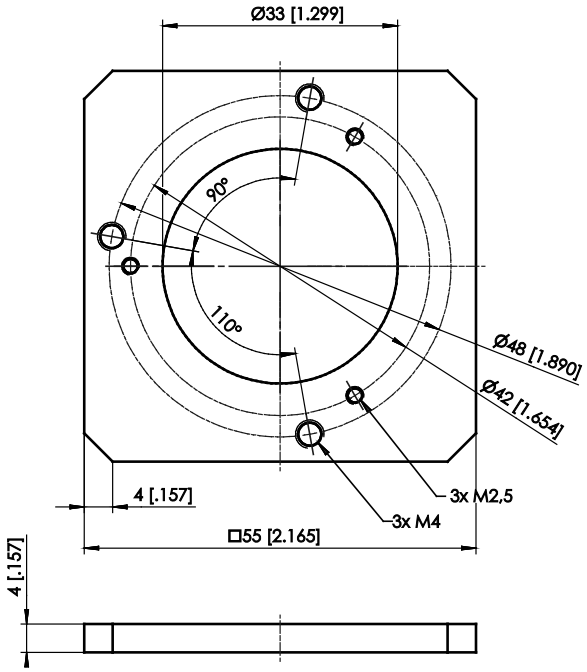
Dimensions informative only.

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].

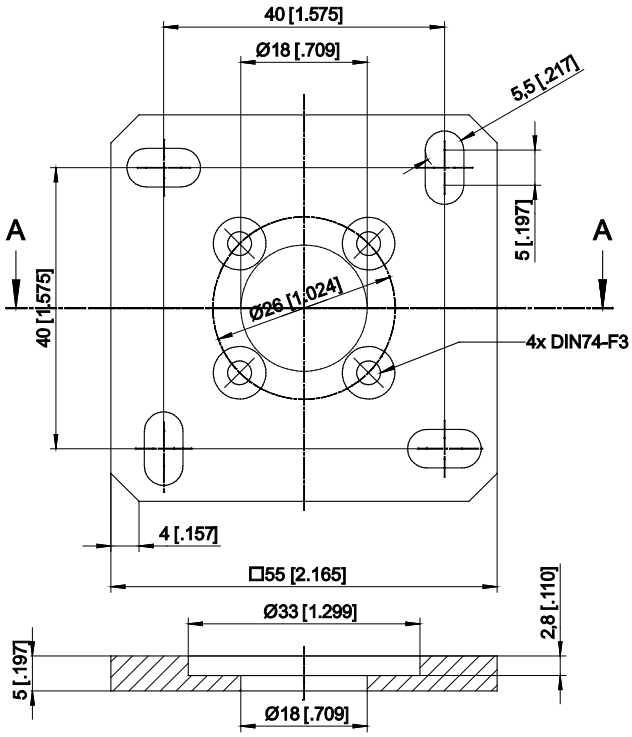
Weight 30 g approx.

Dimensions informative only.

For guaranteed dimensions please consult factory.

PRPT-BPL3

In combination with PH36
and frontal mounting.



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