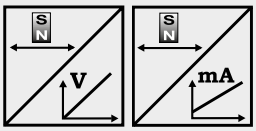
POSICHRON®
PCQA24
Square Profile Housing with Analog Output

POSICHRON® position sensor in square profile

- **Protection class IP67/69K**
- **Measurement range 0 ... 100 to 0 ... 5750 mm**
- **Absolute position measurement**
- **Easy installation with mounting brackets**
- **Wire-free position magnet**
- **Contact-free**
- **Also available with guided position magnet**
- **Analog output**



Specifications	Output	Voltage Current
	Resolution	Refer to output specification
	Sampling rate	Up to 1 kHz, depending on the measurement range
	Linearity	Ranges >500 mm: L10 = ±0.10 % f.s. L02 = ±0.02 % f.s. Ranges ≤500 mm: L10 = ±0.5 mm L02MM = ±0.2 mm
	Repeatability	±3 µm
	Housing material	AlMgSi1 / Zn / V4A
	Protection class	IP67/69K (connector version: with IP67/69K mating connector only)
	Shock	EN 60068-2-27:1993, 50 g 11 ms, 100 shocks
	Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
	Connection	8 pin socket M12 / cable 2 m (standard)
	EMC, temperature	Refer to output specification

Order code mounting set (see page 7) **PCQA-BFS1**

Order code position magnet/slider (see page 8) **PCMAG ...**

Order code mating connecting cable (see page 14/15) **KAB-...M-M12/8F/G-LITZE**

POSICHRON®
PCQA24
Square Profile Housing with Analog Output

Order Code PCQA24

1 or 2 channel, configurable

PCQA24 – □ – □ – □ – ⬚ – □ – □

Model name

Measurement range (in mm)
100 ... 5750 in 10 mm increments

Output
U2 = 0.5 ... 10 V signal conditioner
U2/U, U2/H = U2 with AlarmLOW, U2 with AlarmHOLD (see page 77)
U8 = 0.5 ... 4.5 V signal conditioner
I1 = 4 ... 20 mA signal conditioner (3 wire)
I1/U, I1/H = I1 with AlarmLOW, I1 with AlarmHOLD (see page 77)

Function and characteristics output 1
P1A = Position magnet 1, increasing
P1D = Position magnet 1, decreasing
PMU = Start value, direction & end value adjustable by the customer (1 channel only)
DA = Difference magnet 1/2, increasing (2 magnets required)
DD = Difference magnet 1/2, decreasing (2 magnets required)

Function and characteristics output 2 (option)
P2A = Position magnet 2, increasing
P2D = Position magnet 2, decreasing
DA = Difference magnet 1/2, increasing
DD = Difference magnet 1/2, decreasing
} 2 magnets required

VZx.x = Velocity with direction detection (with 1 magnet only)

VZx.x = Velocity in steps of 0.1 m/s

Example: VZ1.5	towards start position		towards end position
	-1.5 m/s	0	+1.5 m/s
Output U2:	0.5 V	5.25 V	10 V
Output I1:	4 mA	12 mA	20 mA

VAx.x = Velocity without direction detection (with 1 magnet only)

VAx.x = Velocity in steps of 0.1 m/s

Example: VA1.5	towards start position		towards end position
	-1.5 m/s	0	+1.5 m/s
Output U2:	10 V	0.5 V	10 V
Output I1:	20 mA	4 mA	20 mA

Linearity
L02 / L02MM / L10 (for definition see "Specifications" above)

Connection
M12 = Connector M12, 8 pin
KAB2M = Cable, standard length 2 m, other lengths upon request

1. Order example: PCQA24 - 1000 - U1 - P1D - L10 - M12
Square profile, measurement range 1000 mm, 1 voltage output 0.5 ... 10 V (U2)
Output 1: Position magnet 1, decreasing signal (P1D)
Output 2: Not used

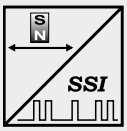
2. Order example: PCQA24 - 1000 - I1 - P1A - P2D - L10 - M12
Square profile, measurement range 1000 mm, 2 current outputs 4 ... 20 mA (I1)
Output 1: Position magnet 1, increasing signal (P1A)
Output 2: Position magnet 2, decreasing signal (P2D)

3. Order example: PCQA24 - 1000 - U1 - P1A - VZ1.0 - L10 - M12
Square profile, measurement range 1000 mm, 2 voltage outputs 0.5 ... 10 V (U2)
Output 1: Position magnet 1, increasing signal (P1A)
Output 2: Velocity magnet 1, -1 m/s ... 1 m/s for range 0.5 ... 10 V (VZ1.0)

POSICHRON®
PCQA24
Square Profile Housing with SSI Output

POSICHRON® position sensor in square profile

- **Protection class IP67/69K**
- **Measurement range 0 ... 100 to 0 ... 5750 mm**
- **Absolute position measurement**
- **Easy installation with mounting brackets**
- **Wire-free position magnet**
- **Contact-free**
- **Also available with guided position magnet**
- **Synchronous serial interface (SSI)**



Specifications

Output	Synchronous serial interface (SSI)
Resolution	5, 10, 20, 50, 100 µm
Sampling rate	Up to 1 kHz, depending on the measurement range
Linearity	Ranges >500 mm: L10 = ±0.10 % f.s. L02 = ±0.02 % f.s. Ranges ≤500 mm: L10 = ±0.5 mm L02MM = ±0.2 mm
Repeatability	±3 µm
Housing material	AlMgSi1 / Zn / V4A
Protection class	IP67/69K (with mating connector only)
Shock	EN 60068-2-27:1993, 50 g 11 ms, 100 shocks
Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
Connection	8 pin socket / cable 2 m (standard)
EMC, temperature	Refer to output specification

Order Code PCQA24

PCQA24 – □ – □ – / / / – □ – □

Model name

Measurement range (in mm)
100 ... 5750 in 10 mm increments

Resolution (in µm)
5 / 10 / 20 / 50 / 100

Output
SSI = Synchronous serial interface

Average determination (filter, number of measurements)
F1 / F2 / F4 / F8

Code
G / D = Gray / Dual

Number of data bits
24 / 25

Linearity
L02 / L02MM / L10 (for definition see "Specifications" above)

Connection
M12 = Connector M12, 8 pin
KAB2M = Cable, standard length 2 m, other lengths upon request

Order code mounting set (see page 7) **PCQA-BFS1**

Order code position magnet/slider (see page 8) **PCMAG ...**

Order code mating connecting cable (see page 14/15) **KAB-...M-M12/8F/G-LITZE**

Order example: PCQA24 - 2500 - 10 - SSI/F8/G/24 - L10 - M12

POSICHRON®
PCQA24
Square Profile Housing with CANopen Output

POSICHRON® position sensor in square profile

- **Protection class IP67/69K**
- **Measurement range 0 ... 100 to 0 ... 5750 mm**
- **Absolute position measurement**
- **Easy installation with mounting brackets**
- **Wire-free position magnet**
- **Contact-free**
- **Also available with guided position magnet**
- **CANopen bus or CAN SAE J1939 output**

Specifications

Output	CANopen bus; CAN SAE J1939
Resolution	50 µm
Sampling rate	Up to 1 kHz, depending on the measurement range
Linearity	Ranges >500 mm: L10 = ±0.10 % f.s. L02 = ±0.02 % f.s. Ranges ≤500 mm: L10 = ±0.5 mm L02MM = ±0.2 mm
Repeatability	±3 µm
Housing material	AlMgSi1 / Zn / V4A
Protection class	IP67/69K (with mating connector only)
Shock	EN 60068-2-27:1993, 50 g 11 ms, 100 shocks
Vibration	EN 60068-2-6:1995, 20 g 10 Hz-2 kHz, 10 cycles
Connection	5 pin socket M12
EMC, temperature	Refer to output specification

Order Code PCQA24

PCQA24 – □ – □ – □ – □

Model name

Measurement range (in mm)
100 ... 5750 in 10 mm increments
Other ranges on request

Output
CANOP = CANopen bus
CANOP/R = CANopen bus with integrated terminating resistor
CANJ1939 = CAN SAE J1939

Linearity
L02 / L02MM / L10 (for definition see "Specifications" above)

Connection
M12/CAN = Connector M12, 5 pin

Order code mounting set (see page 7) **PCQA-BFS1**

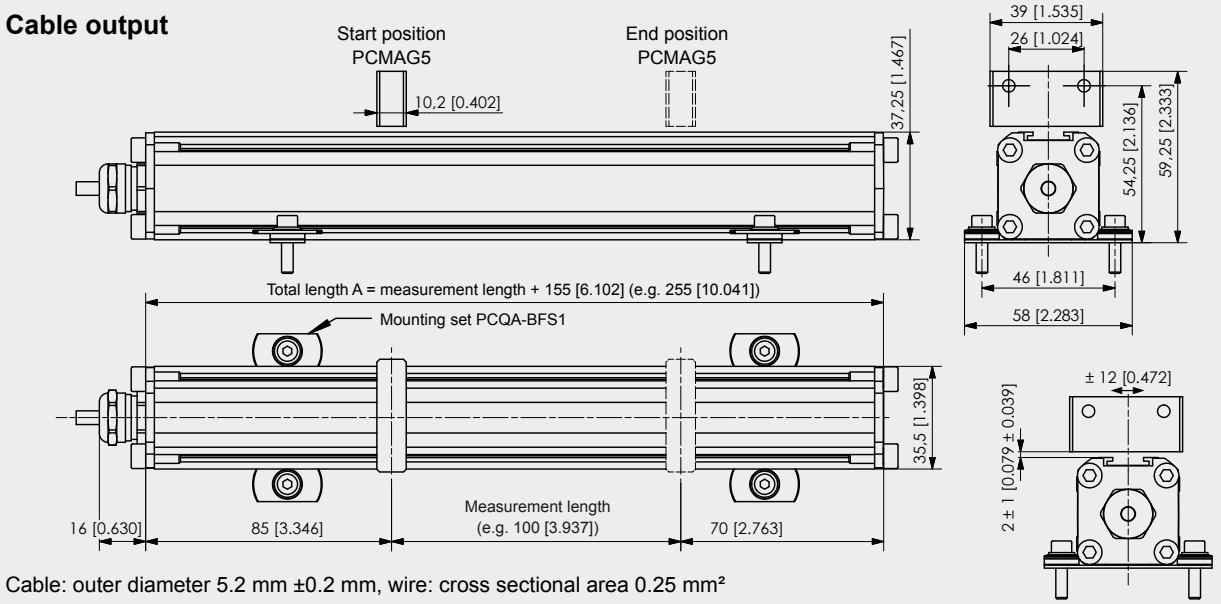
Order code position magnet/slider (see page 8) **PCMAG ...**

Order code bus cable (see page 15) **KAB-...M-M12/5F/G-M12/5M/G - CAN**

Order example: PCQA24 - 1000 - CANOP - L10 - M12/CAN

POSICHRON®
PCQA24
Square Profile Housing

Cable output

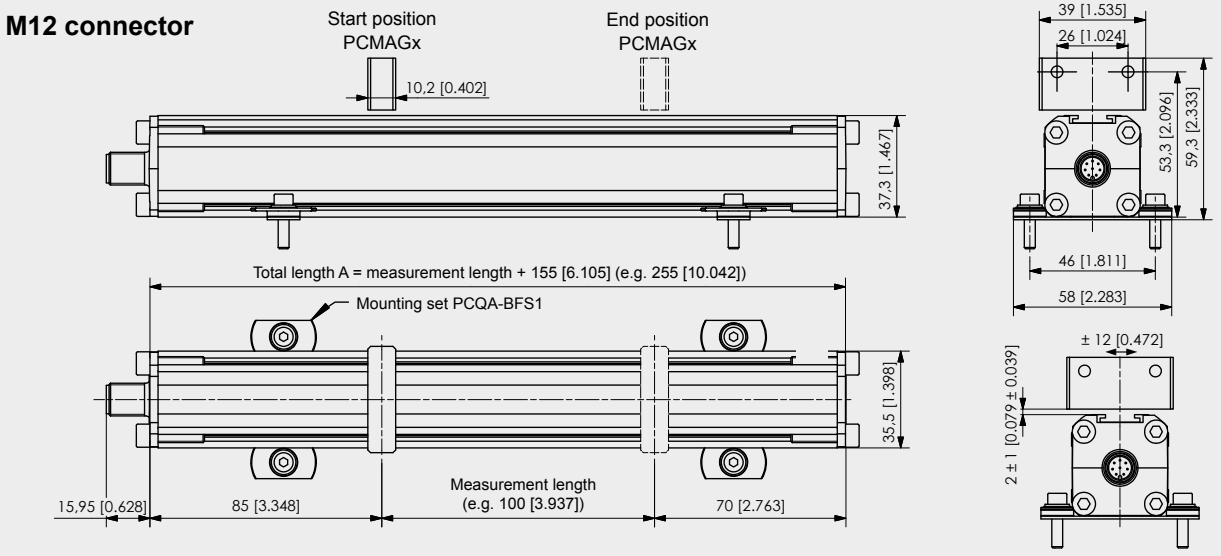


Cable: outer diameter 5.2 mm ±0.2 mm, wire: cross sectional area 0.25 mm²

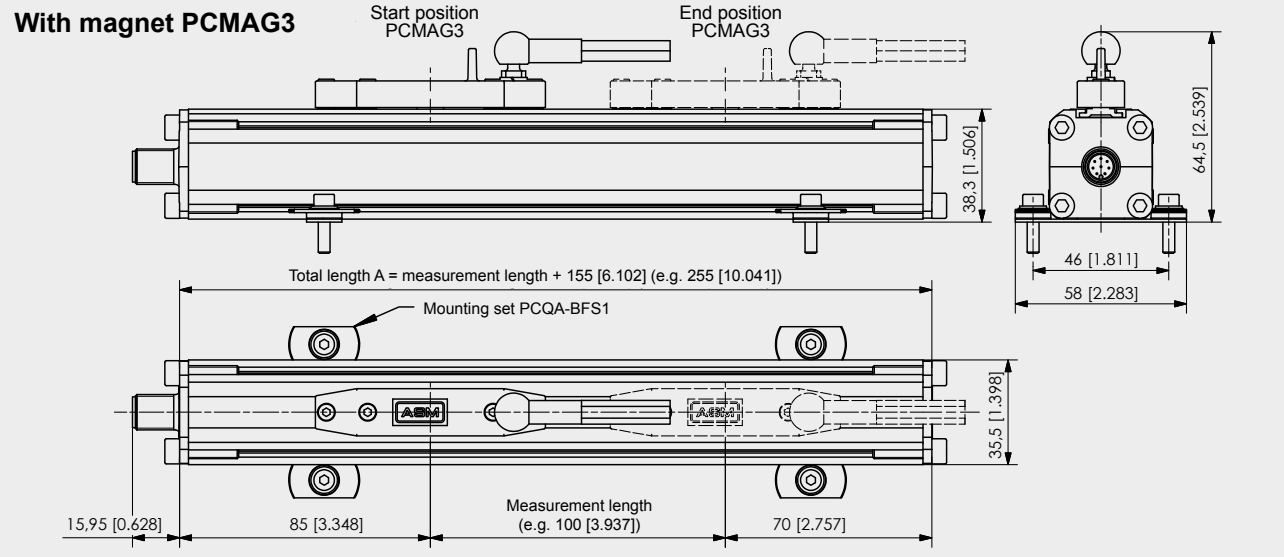
Dimensions in mm [inch]

Dimensions informative only. For guaranteed dimensions consult factory.

M12 connector



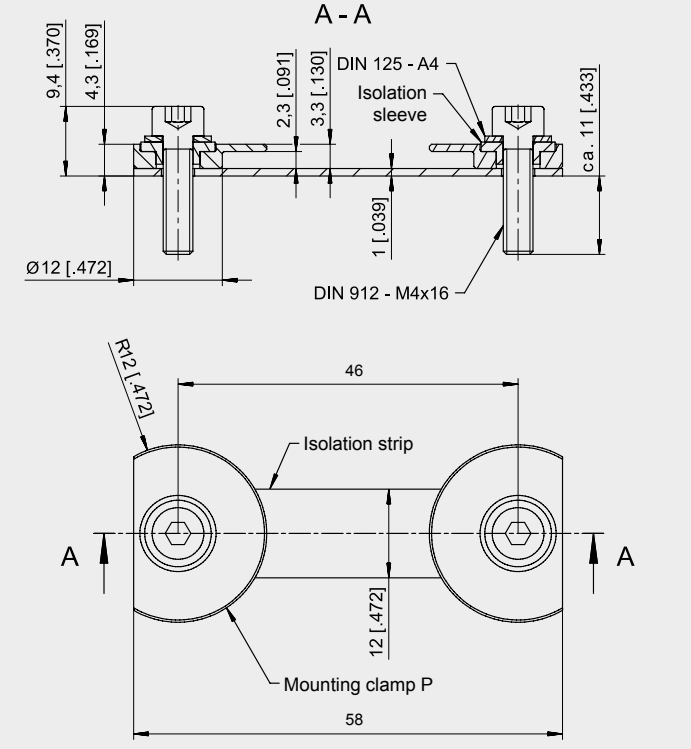
POSICHRON®
PCQA24
Square Profile Housing



Dimensions in mm [inch]

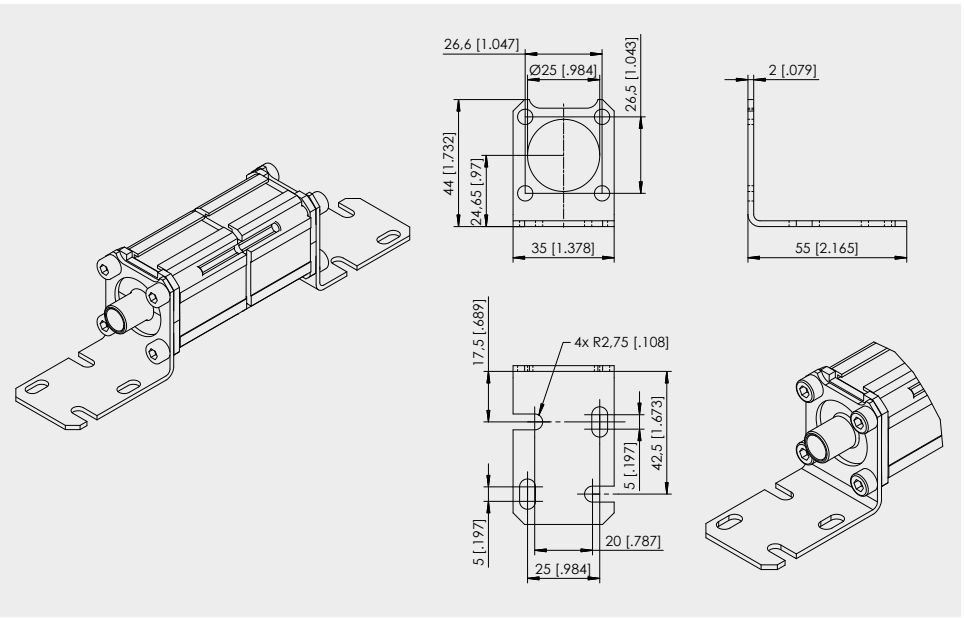
Dimensions informative only. For guaranteed dimensions consult factory.

Mounting set PCQA-BFS1 with mounting clamps



Option -BFW Mounting brackets for PCQA22 and PCQA24

Note: The option -BFW can only be ordered with a new sensor, not separately! Applicable for sensor lengths up to 1000 mm.

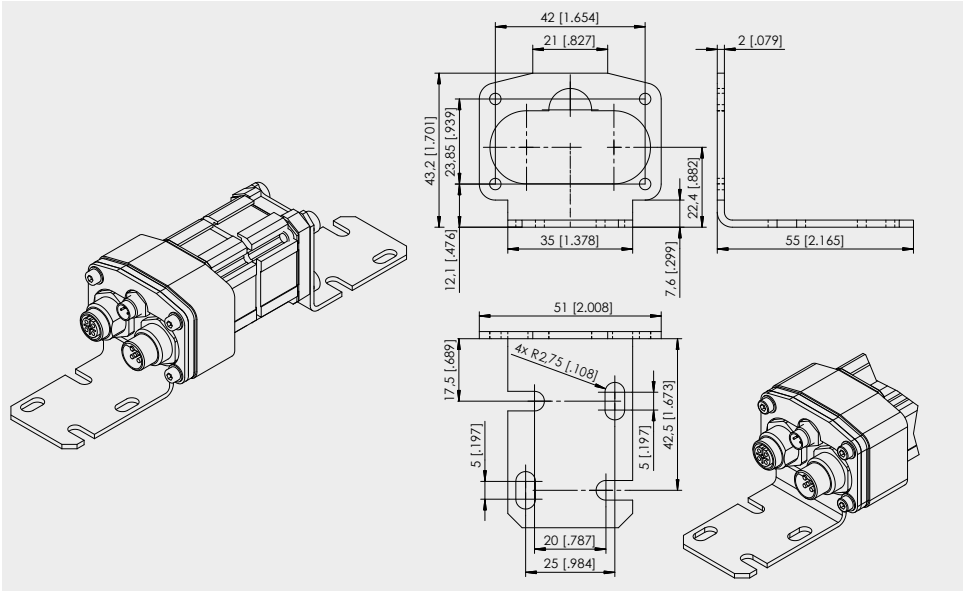


Dimensions in mm [inch]

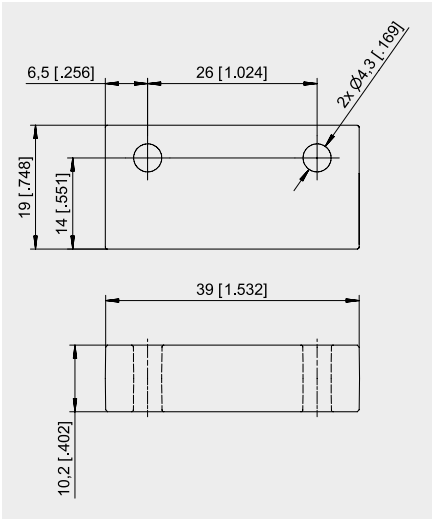
Dimensions informative only.
For guaranteed dimensions consult factory.

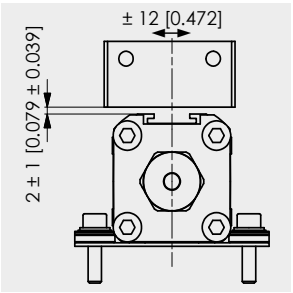
Order example: PCQA24 - 1000 - STSP - L10 - M12 - BFW

Option -BFW
Mounting brackets for PCQA23

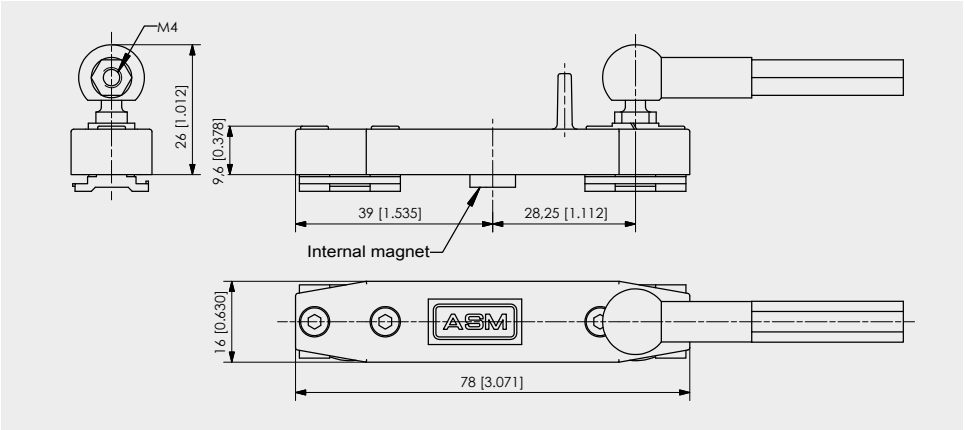


PCMAG5
Standard magnet





PCMAG3
Guided magnet slider with internal position magnet

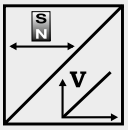


Dimensions in mm [inch]

Dimensions informative only.
For guaranteed dimensions consult factory.

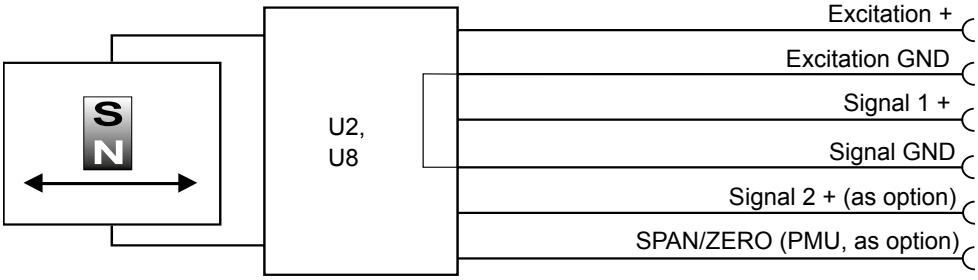
POSICHRON®
Output Specification U2, U8 and I1
Configurable, 1 or 2 channels

Signal conditioner U2, U8
Voltage output

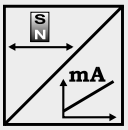


Excitation voltage	U2: 18 ... 27 V DC; U8: 10 ... 36 V
Excitation current	Typ. 35 mA, 80 mA max.
Output voltage	U2: 0.5 ... 10 V; U8: 0.5 ... 4.5 V
Output current	2 mA max.
Output load	> 5 kΩ
Resolution	16 bit
Stability (temperature)	±50 x 10^{-6} / °C f.s.
Protection	Reverse polarity, short circuit
Output noise	0.5 mV_{RMS}
Operating temperature	-40 ... +85 °C
Immunity to interference (EMC)	According to EN 61326:2004

Signal diagram

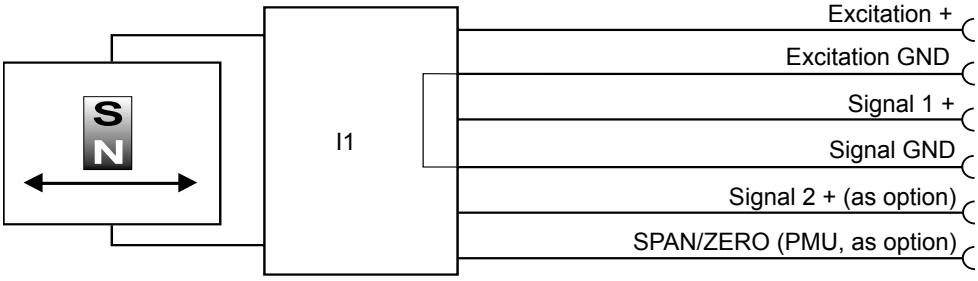


Signal conditioner I1
Current output (3 wire)



Excitation voltage	18 ... 27 V DC
Excitation current	Typ. 60 mA, 80 mA max.
Load resistor	350 Ω max.
Output current	4 ... 20 mA, 30 mA max (at failure)
Resolution	16 bit
Stability (temperature)	±50 x 10^{-6} / °C f.s.
Protection	Reverse polarity, short circuit
Output noise	0.5 mV_{RMS}
Operating temperature	-40 ... +85 °C
Immunity to interference (EMC)	According to EN 61326:2004

Signal diagram



Signal wiring

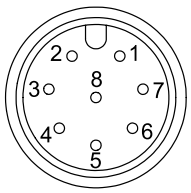
Output sigals U2, U8, I1	Connector pin	Cable output, wire color (not for PCST27 and PCRP32)
Excitation +	1	white
Excitation GND	2	brown
Signal 1 +	3	green
Signal GND	4	yellow
Signal 2 + (as option *)	5	grey
SPAN/ZERO (PMU **, as option)	6	pink

* When using multiple magnets the distance between two magnets must be min. 70 mm to identify the single magnets definitely.

** Description page 59

Connection
Mating connector

View to sensor connector



CONN-M12-8M

Option - PMU for analog output U2, U8 and I1

Programming of the start and end value by the customer:

The option PMU allows to program the start value and the end value of the output range by a programming signal SPAN/ZERO available at the connector. This Signal SPAN/ZERO must be connected with GND via a push button, then position magnet of the sensor must be moved to the start resp. end position. Pushing the button between 1 and 4 seconds sets the actual position as start position, pushing the button more than 5 seconds sets the actual position as end position. The values will be stored and are available after switching off the sensor.
To reset the sensor to the factory values the button must be pushed when the sensor is switched on.

Diagnostic signal on error for U2 and I1

The analog signal output in case of error

In case of error (e.g. magnet missing) the analog output signal will assume a state according to the following options:

Standard (w/o marking): Alarm_HIGH:	The output voltage resp. the output current is at HIGH level (overrange)
Option /U: Alarm_LOW:	The output voltage resp. the output current is at LOW level (underrange)
Option /H: Alarm_HOLD:	The output voltage resp. the output current will keep the last valid state

Option F1/F2/F4/F8 for SSI output

Filter function of the SSI interface

The option „Filter“ Fn calculates the floating average over a sample of measurement values. With the sample size the settling time of the measured value will be extended. Suitable sample sizes are 2, 4 and 8.

Error signal for SSI output

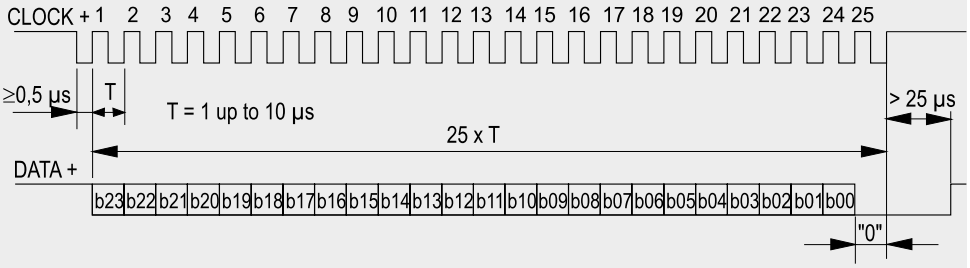
If the sensor cannot detect a magnet the position value will assume the maximum value (0xFFFFFFF)

POSICHRON®
Output Specification SSI

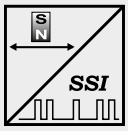
Description

The data transmission takes place by means of the two signals CLOCK and DATA. The processing unit (PLC, microcomputer) sends pulse sequences which clock the data transmission at the required transfer rate. With the first falling edge of the pulse sequence the position of the sensor is recorded and stored. The following rising edges control the bit-by-bit transfer of the data word. After a delay time the next new position information can be transmitted.

Data format
(Train of 26 pulses)

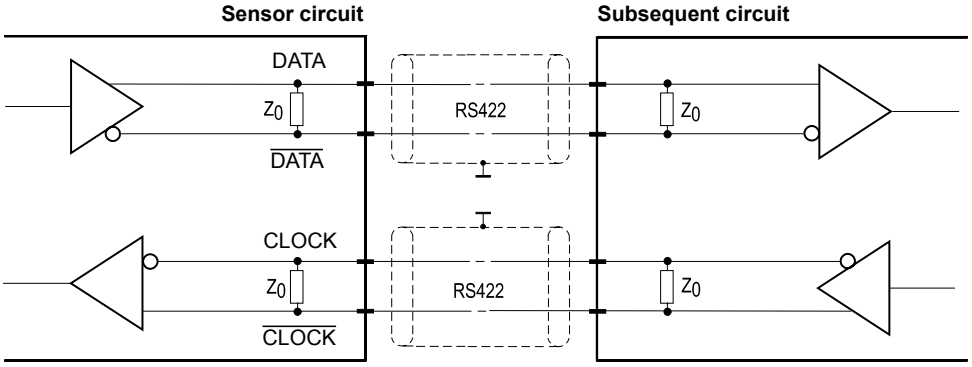


Synchronous serial interface SSI



Output	RS422
Excitation voltage	18 ... 27 V DC, residual ripple 10 mV_{SS}
Excitation current	Typ. 80 mA, 150 mA max.
Clock frequency	100 kHz ... 1 MHz
Code	Gray code, dual code
Resolution	≥ 5 µm
Delay between pulse trains	>25 µs
Filter	Average determination, see page 59
Stability (temperature)	±50 x 10^{-6} / °C f.s.
Operating temperature	-40 ... +85 °C
Immunity to interference EMC	According to EN 61326:2004

Signal diagram



Cable length	Baud rate
50 m	100-1000 kHz
100 m	100-300 kHz

Note:
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, common shielded.

Signal wiring

Signal name	Connector pin	Cable output color (not for PCST27 and PCRP32)
Excitation +	1	white
Excitation GND	2	brown
CLOCK	3	green
$\overline{\text{CLOCK}}$	4	yellow
DATA	5	grey
$\overline{\text{DATA}}$	6	pink

View to sensor connector

CONN-M12-8M

Filter option F1/F2/F4/F8 and error indication see page 10.

POSICHRON®
Output Specification CANopen

Description

CANopen interface with process data for position and cam functions, programmable are preset, resolution, filtering and cam switching points.

Interface CANOP

Communication profile	CANopen CiA 301 V 4.02, Slave
Encoder profile	Encoder CiA 406 V 3.2
Error Control	Node Guarding, Heartbeat, Emergency Message
Node ID	Adjustable via LSS or via object dictionary
PDO	4 TxPDO, 0 RxPDO, no linking, static mapping
PDO Modes	Event-/Time triggered, Remote-request, Sync cyclic/acyclic
SDO	1 server, 0 client
CAM	2 cams
Certified	Yes
Transmission rates	50 kBaud to 1 MBaud, adjustable via LSS or via object dictionary
Nodes	127 max.
Bus connection	M12 connector, 5 pins
Integrated bus terminating resistor	As option (output CANOP/R)
Bus, galvanic isolated	No

Specifications

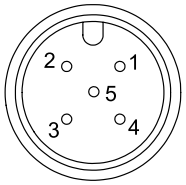
Excitation voltage	18 ... 36 V DC
Excitation current	Typ. 20 mA for 24 V, max. 100 mA
Number of position magnets	1 ... 4
Resolution	50 µm
Measuring rate	1 kHz (asynchronous)
Stability (temperature)	±50 x 10^{-6} / °C f.s.
Repeatability	1 LSB
Operating temperature	-40 ... +85 °C
Protection	Reverse polarity, short circuit
Dielectric strength	500 V (V AC, 50 Hz, 1 min.)
Environment - EMC Automation	EN 61326-1:2006

When using multiple magnets the distance between two magnets must be min. 70 mm to identify the single magnets definitely.

Signal wiring / connection

Signal name	Connector pin (color)
Shield	1 (grey)
Excitation +	2 (white)
GND	3 (brown)
CAN-H	4 (green)
CAN-L	5 (yellow

View to sensor connector



POSICHRON®
Output Specification CAN SAE J1939

Interface 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 temination resistor	120 Ω
	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

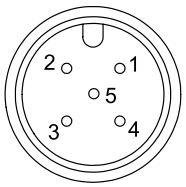
Parameter Group Numbers (PGN)	Configuration data	PGN EF00h	Proprietary-A (PDU1 peer-to-peer)
	Process data	PGN FFnnh	Proprietary-B (PDU2 broadcast); nn Group Extension (PS) configurable

Specifications	Excitation voltage	18 ... 36 V DC
	Excitation current	Typ. 20 mA for 24 V, max. 100 mA
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	±50 x 10^{-6} / °C f.s.
	Repeatability	1 LSB
	Operating temperature	-40 ... +105 °C
	Protection	Reverse polarity, short circuit
	Dielectric strength	500 V (V AC, 50 Hz, 1 min.)
	EMC	EN 61326-1:2006

Signal wiring / connection

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

View to sensor connector



POSICHRON®
Accessories
Connector Cables

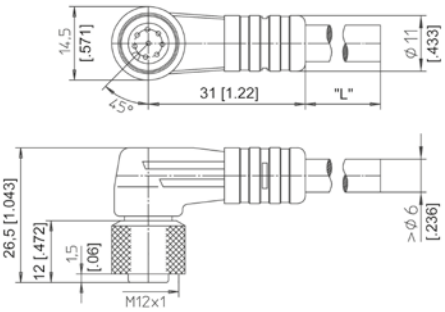
Connector cable for POSICHRON® position sensors
8 pin M12

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, 5 and 10 m. Wire: cross sectional area 0.25 mm².

Order code:

	KAB - XM - M12/8F/W - LITZE
IP69K:	**KAB - XM - M12/8F/W/69K - LITZE**

Length in m



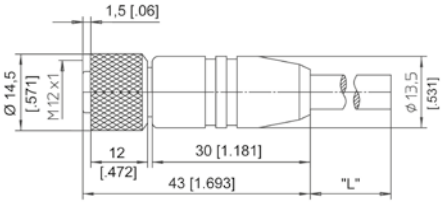
Connector cable for POSICHRON® position sensors
8 pin M12

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, 5 and 10 m. Wire: cross sectional area 0.25 mm².

Order code:

	KAB - XM - M12/8F/G - LITZE
IP69K:	**KAB - XM - M12/8F/G/69K - LITZE**

Length in m



Connector cable wiring - M12, 8 pin	**Connector pin / cable color**							
	1	2	3	4	5	6	7	8
	White	Brown	Green	Yellow	Grey	Pink	Blue	Red

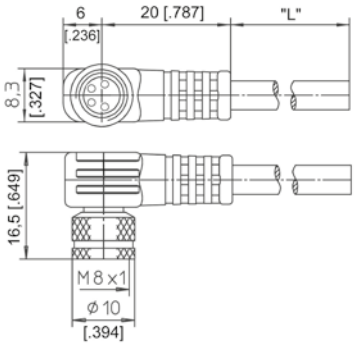
Connector cable for POSICHRON® position sensors
4 pin M8

The 4-lead shielded cable is supplied with a mating 4-pin 90° M8 connector at one end and 4 wires at the other end. Available lengths are 2, 5 and 10 m. Wire: cross sectional area 0.14 mm².

Order code:

	KAB - XM - M8/4F/W - LITZE
IP69K:	**KAB - XM - M8/4F/W/69K - LITZE**

Length in m



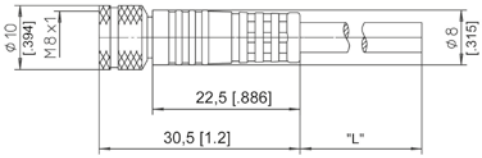
Connector cable for POSICHRON® position sensors
4 pin M8

The 4-lead shielded cable is supplied with a mating 4-pin M8 connector at one end and 4 wires at the other end. Available lengths are 2, 5 and 10 m. Wire: cross sectional area 0.14 mm².

Order code:

	KAB - XM - M8/4F/G - LITZE
IP69K:	**KAB - XM - M8/4F/G/69K - LITZE**

Length in m

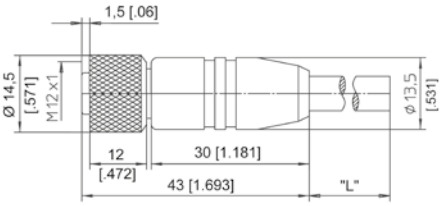


Connector cable wiring - M8, 4 pin	**Connector pin / cable color**			
	1	2	3	4
	Brown	White	Blue	Black

POSICHRON®
Accessories
Connector Cables

Connector/bus cable for POSICHRON® position sensors
5 pin M12
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 m and 10 m.



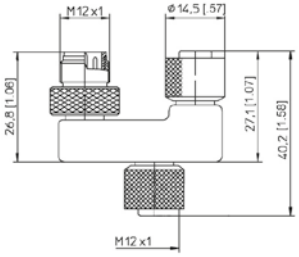
Order code:

KAB - XM - M12/5F/G - M12/5M/G - CAN

IP69K: **KAB - XM - M12/5F/G/69K - M12/5M/G/69K - CAN**

Length in m

T-piece for bus cable
5 pin M12
CAN bus



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

Terminating resistance
5 pin M12
CAN bus

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