

Magnetostrictive Linear Position Sensors Model series CHM/CPM with EtherCAT - Interface



- Model CPM: Profile version
- Model CHM: Rod version
- Measuring strokes from 25 to 7600 mm
- Contactless, robust system
- Resolution up to 1 µm
- Up to 20 positions measurable simultaneously
- Transmission rate up to 100 Mbits/s
- Parameterisable via the bus
- Rod version pressure stability up to 350 bar

Structure and operation

The displacement transducers operate according to the principle of run time measurement between two points of a magnetostrictive waveguide. One point is determined by a moveable position magnet, whose distance from the null point corresponds to the section to be measured. The run time of an emitted impulse is directly proportionate to this section. Conversion to a digital measuring signal takes place in the downstream electronics.

The waveguide is housed in a pressure-resistant stainless steel tube or extruded profile. To the rear of this is a die-cast aluminium housing containing the electronics in SMD technology.

In the rod version, the position magnet is located in a ring, which is guided over the rod without contact. In the profile version, it is located either in a slider, which is linked to the moving part of the machine via a ball joint, or it moves as a liftable position magnet, without wear, over the profile.

Standard measuring strokes

- Up to 1000 mm in 50 mm steps
- Up to 5000 mm in 250 mm steps (profile version: CPM)
- Up to 7600 mm in 250 mm steps (rod version: CHM)

EtherCAT characteristics

EtherCAT®'s key functional principle lies in how its nodes process Ethernet frames:

each node reads the data addressed to it and writes its data back to the frame all while the frame is moving downstream. This leads to improved bandwidth utilization (one frame per cycle is often sufficient for communication) while also eliminating the need for switches or hubs.

The unique way EtherCAT® process frames makes it the fastest Industrial Ethernet Technology; no other technology can top EtherCAT®'s bandwidth utilization or the corresponding performance.

Interface

- EtherCAT Ethernet Control Automation Technology

Data protocol

- EtherCAT 100 Base – TX, Fast Ethernet

Measured value

- Position
- Velocity/option:
- Simultaneous multi-position
- Simultaneous multi-velocity
- Magnet ring to 9
- Acceleration

ESI detail:

The ESI file for integrating the sensor into the ethercat master system and the ethernet manual in PDF format are contained in the enclosed diskette.

Technical data

Technical data

■ Supply voltage range V_s :	24VDC (+20/-15 %)
■ Supply current I_s :	90 mA (typical)
■ Resolution	
□ Displacement in μm :	1, 5, 10, 20, 50, 100, 200, 500
■ Linearity:	$< \pm 0.01$ % (min. $\pm 50 \mu\text{m}$)
■ Repeatability:	$< \pm 0.001$ % (min. $\pm 1.0 \mu\text{m}$)
■ Hysteresis:	$< 4 \mu\text{m}$
■ Temperature drift:	$< 15 \text{ ppm}/^\circ\text{C}$
■ Measuring cycle time:	0.5 ms (for 500 mm) to 3.1 ms (for 7600 mm) for 1 magnet, each further magnet + 0.05 ms
■ Operating temperature range:	- 40 $^\circ\text{C}$ to + 85 $^\circ\text{C}$
■ Dew point, humidity:	90 % rel. humidity, no condensation
■ Shock test:	100 g to IEC Standard 68-2-27
■ Vibration test:	15 g/10 to 2000 Hz to IEC Standard 68-2-6
■ Protection type	
□ Profile:	IP 65
□ Rod:	IP 67
■ Operating pressure for rod:	Max. 350 bar
■ EMC test:	Interference emission according to EN 61000-6-4 Interference immunity according to EN 61000-6-2

Output

■ Interface:	EtherCAT
■ Data protocol:	EtherCAT 100 Base – TX
■ Transmission rate:	Max. 1000 Mbit/s
■ Default address:	IP set

Mating connector M16

■ Connection type:	2 x 6-pin connector M 16
■ Housing:	Metal (straight or angled 90°)
■ Contacts:	1 x socket and 1 x pins, Ag
■ Wire connection:	Soldering
■ Connection cross-section:	Max. 0.75 mm ²
■ Cable strain relief:	Pg 9
■ Max. cable diameter:	8 mm

Mating connector M8 / M12

■ Connection type:	2 x 5-pin M12x1, B-coded 1 x 4-pin M8 x 1
■ Housing:	Nickel-plated brass, straight
■ Contacts:	CuZn, CuSn
■ Wire connection:	Screws
■ Connection cross-section:	M8, max. 0.5 mm ² M 12, max. 0.75 mm ²
■ Max. cable diameter:	M8 = 5 mm ; M12 = 8 mm

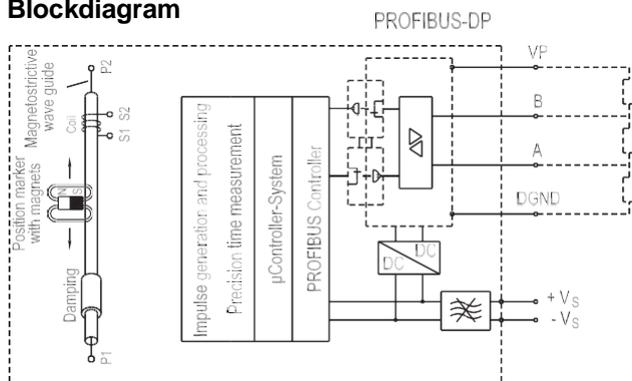
Technical data

Diagnosis

The LEDs (green/red) in the sensor head are used for adjustment and additionally provide information on the sensor status.

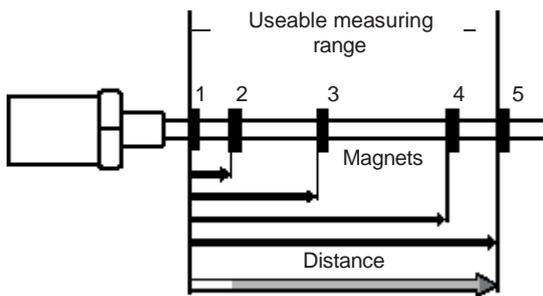
Green	Red	Meaning
On	Off	Normal function
On	On	Magnet not in the setting range, incorrect number of magnets
On	Flashing	Programming mode
Flashing	x	Error status

Blockdiagram



Multi-magnet measurement

Profibus sensor CHM enables max. 10 positions to be measured simultaneously with one sensor. Please note that the distance between the individual magnets must be at least 75 mm in this case.

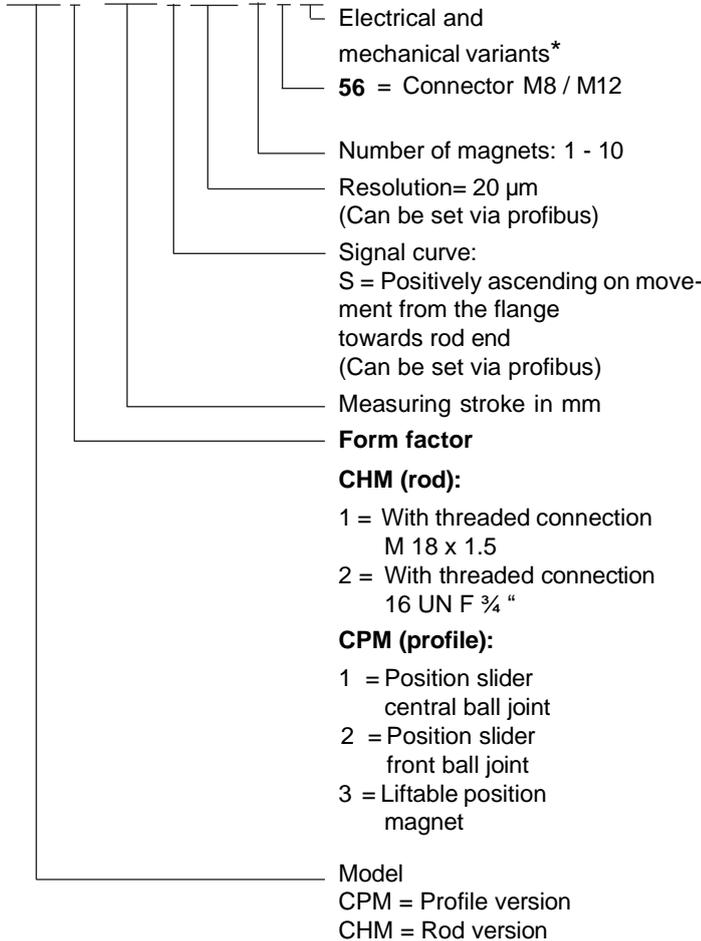


Order code format

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■ Displacement transducer

CHM 1 / 1000 S 020 - 1 56 01



Scope of delivery:

- Rod:** Sensor, nut (order magnet separately)
- Profile:** Sensor, 1 position magnet, 2 mounting clamps up to 1250 mm + 1 clamp for each additional 500 mm.

* The basic versions according to the data sheet bear the number 01. Deviations are identified with a variant number and are documented in the factory.

Cable outlet on request.

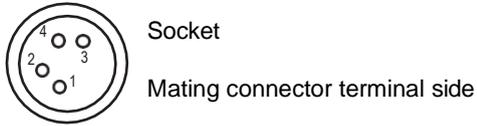
Accessories:

- Position magnets for CHM
 - CPR02** Standard position ring (ø 33 mm)
 - CPR03** Lifiable position magnet
 - CPR04** Position ring up to 100 °C (ø 25.4 mm)
- Position magnets for CPM
 - CPS01** Position slider, central ball joint
 - CPS02** Position slider, front ball joint
 - CPR03** Lifiable position magnet
- Available position magnets data sheet 11469
- Mating connector version L (M16) (order separately)
 - CSTK6GS47** Socket, straight
 - CSTK6GP48** Pins, straight
 - CSTK6WS51** Socket, angled 90°
 - CSTK6WP65** Pins, angled 90°
 - CSTK6GP49** Bus terminating connector (pins)
- Mating connector straight version M (M8/M12) (order separately)
 - CSTK5GS67** Socket (M12)
 - CSTK5GP68** Pins (M12)
 - CSTK5GP69** Bus terminating connector (pins M12)
 - CSTK4GS64** 24 VDC supply (M8)
- Installation material
 - CMB-MP-01** Mounting clamps for profile version
 - CNT-MP-01** M5 sliding block for profile version
- Programming devices
 - CPMD-03** Profibus hand-held programmer (data sheet 12439)

Electrical connections

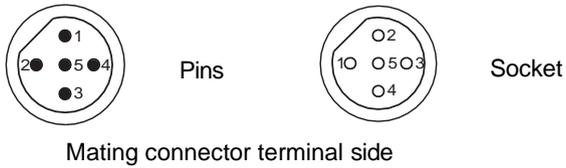
Electrical connections version M (M8/M12) *

Connection M8 (Power supply)



Pin	Signal
1	+V _s (+24 VDC)
2	not connected
3	-V _s (0 VDC)
4	not connected

Connection M12 (Port-1 & Port-2)



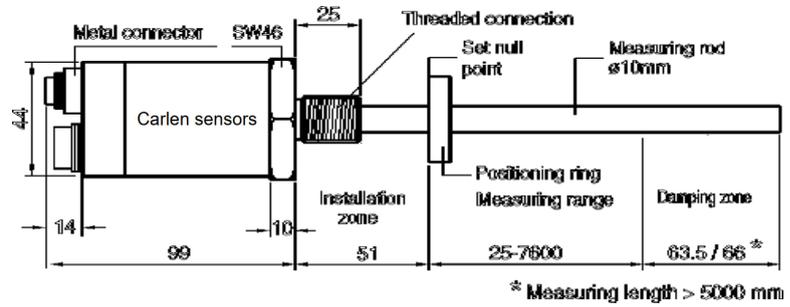
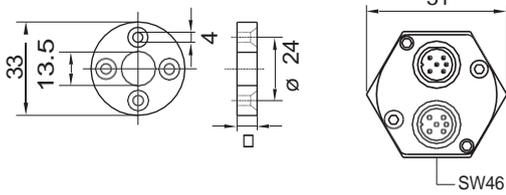
Pin	Signal
1	Tx +
2	Rx +
3	Tx -
4	Rx -

* The mating connector is always shown.

Installation drawings

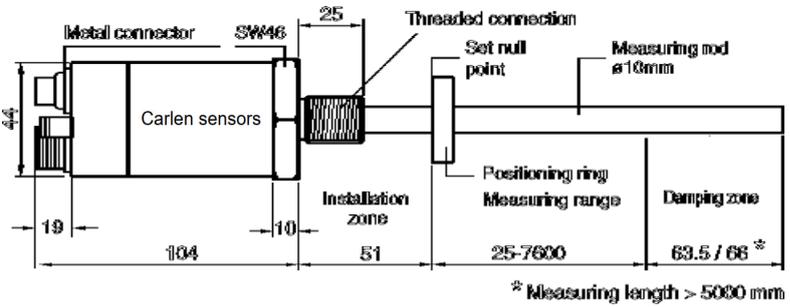
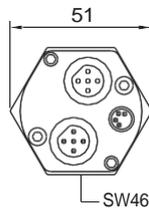
Dimensions in mm

Model: CHM (rod version)



With measuring strokes of 1000 mm and over, mechanical rod support is recommended.

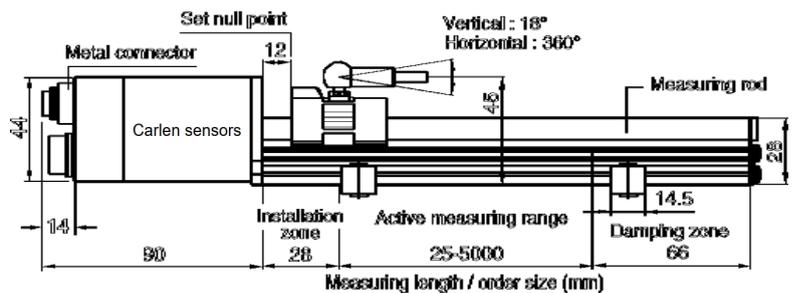
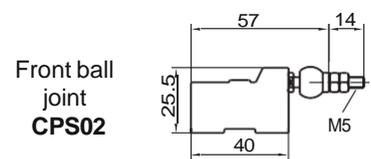
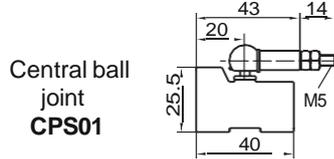
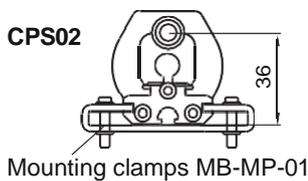
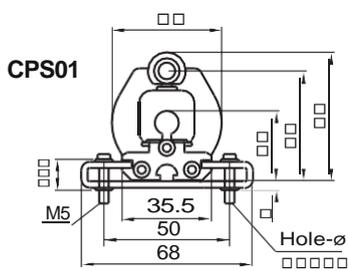
The sensor's fastening should be manufactured from non-magnetic materials (e.g.: brass, plastic). Note installation instruction **MWA22318** on installation in magnetisable materials.



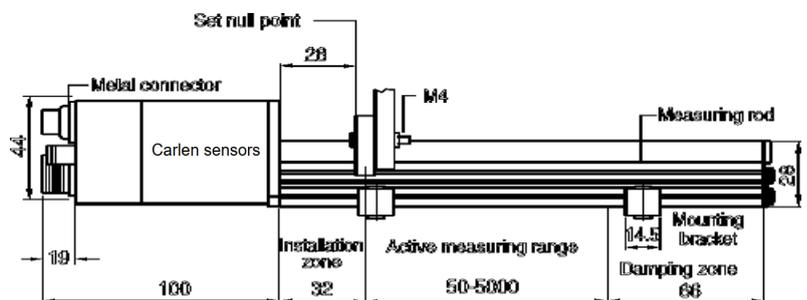
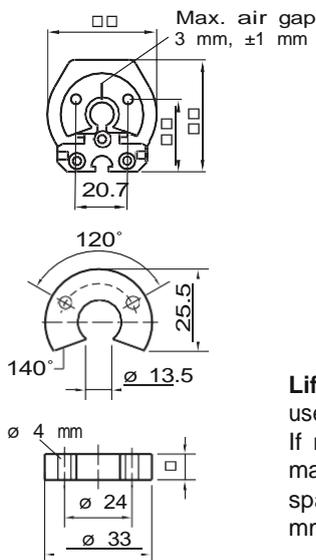
Installation drawings

Dimensions in mm

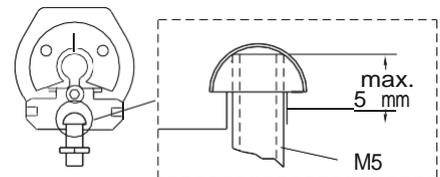
Modell: CPM (Profile version)



Liftable position magnet CPR03



Liftable position magnet Wherever possible, use non-magnetisable material for fastening this. If magnetisable material is used, the position magnet must be mounted via a non-magnetisable spacer washer with a minimum thickness of 5 mm using non-magnetisable bolts.



M5 Sliding block (NT-MP-01):
Studded nut in T slot

Note: On installation of the Carlen sensors shielding from magnetic and electromagnetic fields must be ensured. The cable shield must be mounted on the connector and connected to ground at the evaluation electronics. All data sheets and manuals are also available in the Internet under Carlen-sensors.com