CARLEN

Magnetostrictive Linear Position Sensors
Model series CHM/CPM with Profinet - interface

PROFI NET INDUSTRIAL ETHERNET ®

- ■ **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

Profinet characteristics

PROFINET is an Industrial Ethernet standard merging plant automation with other enterprise IT resources.

It provides comparable functionality to PROFIBUS with techniques used by engineering, IT, and management personnel.

Established IT standards are employed as basis of communication: TCP, UDP, IP. XML is used as description language for device profiles (GSDML files).

Two ways of using PROFINET are available: PROFINET IO, similar to PROFIBUS DP as a distributed I/O system and PROFINET CBA as a modular component-based system for larger systems.

Interface
- Profinet IO RT
- Profinet IRT (optional)

Data protoco
- Carlen profile and Encoder Profile V4.1

Meaured value
- Position
- Vlocity/option:
- Simultaneous multi-position
- Simultaneous multi-vlocity
- Magnet ring up to 9
- Various data formats (Motorola, Intel)

GSD-Datei:

The GSD file for integrating the sensor into the profibus master system and the profibus 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: < ± 0.01 % (min. ± 50 µm)
- Repeatability: < ± 0.001 % (min. ± 1.0 µm)
- Hysteresis: < 4 µm
- Temperature drift: < 15 ppm/°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 °C to + 85 °C
- Dew point, humidity: 90 % rel. humidity, no condensation
- Shock test: 100 g to IEC Standard 68-2-27
- Viration 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: Profnet IO RT
- Signal transmission: Differential signal as per RS485
- Transmission rate: Max. 100 Mbit/s
- Default address: IP address

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
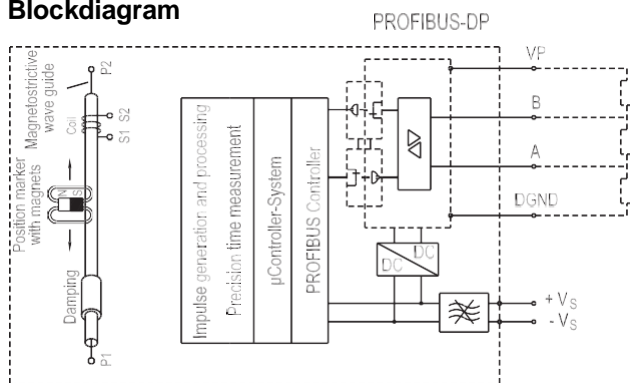
Technichal data

Diagnosis

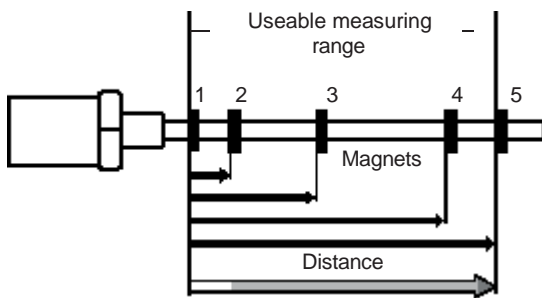The LEDs (green/red) in the sensor head are used for adjustment and additionally provide information on the sensor status.

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. 10positions 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

Order code format

■ Displacement transducer

CHM M /1000 S 020 - 1 58 01

Electrical and
mechanical variants*

58 = Connector M8 / M12

Number of magnets: 1 - 10

Resolution= 20 µm
(Can be set via profibus)

Signal curve:
S = Positively ascending on move-
ment from the flange
towards rod end
(Can be set via profibus)

Measuring stroke in mm

Form factor

CHM (rod):

1 = With threaded connection
M 18 x 1.5
2 = With threaded connection
16 UN F ¾ "

CPM (profile):

1 = Position slider
central ball joint
2 = Position slider
front ball joint
3 = Liftable position
magnet

Model
CPM = Profile version
CHM = Rod version

* 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.

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.

Accessories:

■ Position magnets for CHM
CPR02 Standard position ring (ø 33 mm)
CPR03 Liftable 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 Liftable 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)
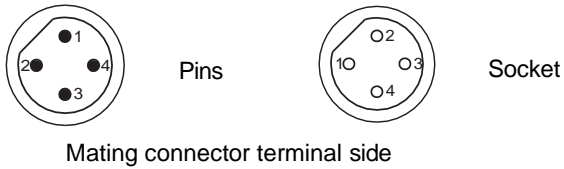
Electrical connections

Electrical connections version M (M8/M12) *
Connection M8 (Power supply)

Socket

Mating connector terminal side
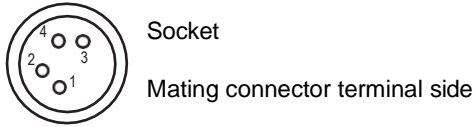
Pin	Signal
1	$+V_s$ (+24 VDC)
2	not connected
3	$-V_s$ (0 VDC)
4	not connected

Connection M12 (Port-1 & Port-2)

Pins   Socket

Mating connector terminal side

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)
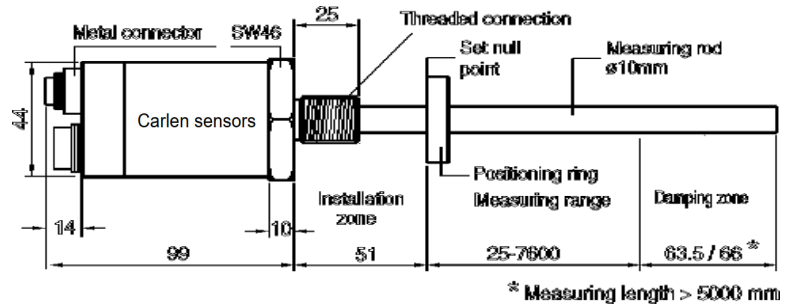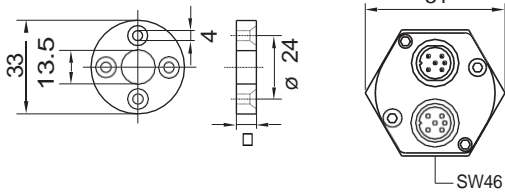
With measuring strokes of 1000 mm and over, mechanical rod support is recommended.
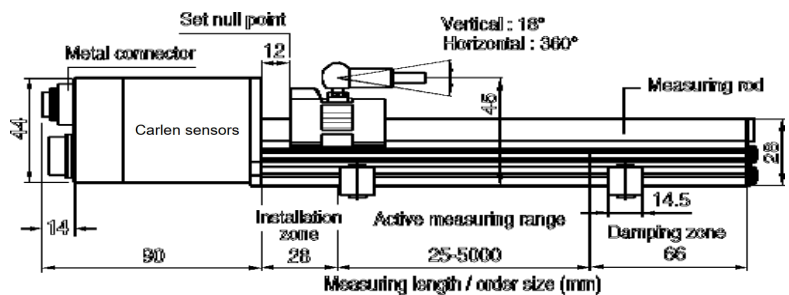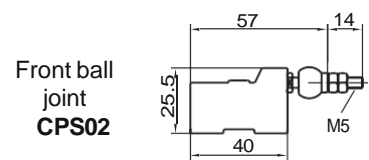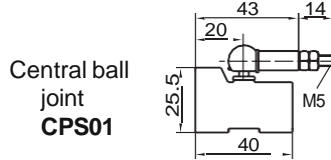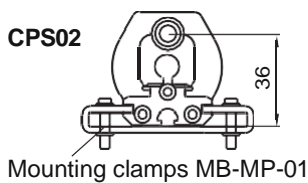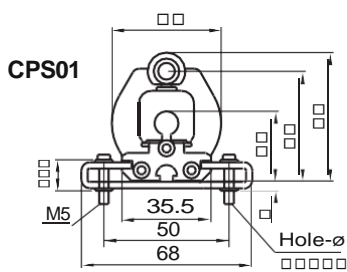
The sensor's fastening should be manufactured from non-magnetic materials (e.g.: brass, plastic). Note installation instruction **MWA10318** on installation in magnetisable materials.
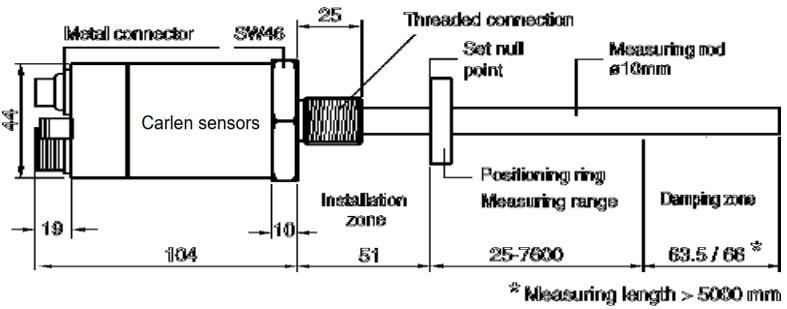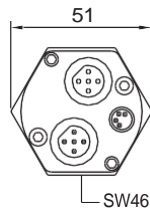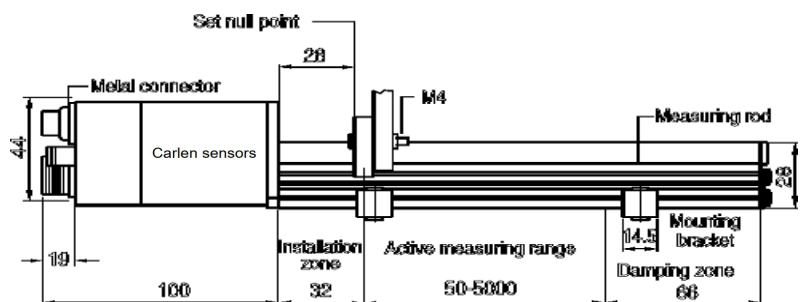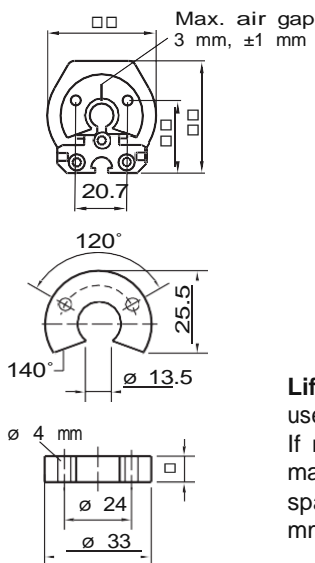
Installation drawings

Dimensions in mm

Modell: CPM   (Profile version)

CPS01

M5
35.5
50
68
Hole-ø

Central ball
joint
CPS01

43   14
20
25.5
M5
40

Front ball
joint
CPS02

57   14
25.5
M5
40

CPS02

36

Mounting clamps MB-MP-01

Set null point
Vertical : 18°
Horizontal : 360°
Measuring rod

Metal connector
12
44
Carlen sensors
14
90

Installation
zone
28

Active measuring range
25-5000

Damping zone
66

14.5

Measuring length / order size (mm)

Liftable position magnet CPR03

Max. air gap
3 mm, ±1 mm

20.7

120°
25.5

140°   ø 13.5

ø 4 mm
ø 24
ø 33

Set null point
28

Metal connector
M4
44
Carlen sensors
19
100

Installation
zone
32

Active measuring range
50-5000

Measuring rod

Mounting
bracket
14.5

Damping zone
66

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.

max.
5 mm

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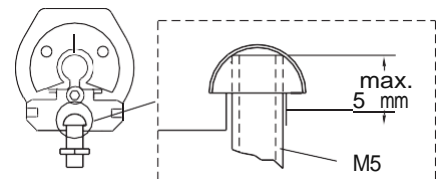
M5 Sliding block (NT-MP-01):
Studded nut in T slot

Note: On installation of the carlensensor 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**