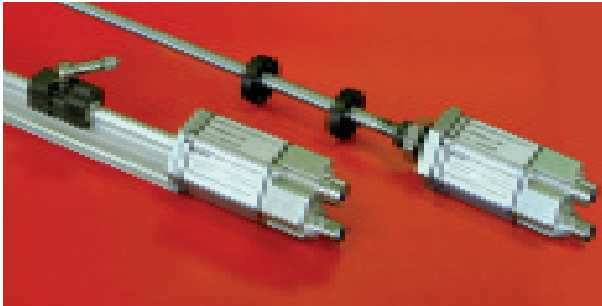# MAGNOSENS
Magnetostrictive Displacement Transducers
Model series MPD/MSD with PROFIBUS-interface

- **Model MPD: Profile version**

- **Model MSD: 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 12 MBaud**

- **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: MPD)
☐ Up to 7600 mm in 250 mm steps
   (rod version: MSD)

Profibus characteristics

The magnetostrictive displacement transducers, whose interface is based on the Siemens ASIC SPC3, meet all Profibus-DP requirements (EN 50170) and can be connected directly to the field bus. Their measured data are converted to displacement-proportionale, bus-capable output signals in the sensor and are transmitted directly to the control system.

The profibus interface is designed for serial, bit-synchronous data transmission of max. 12 MBaud according to the RS485 standard. In addition to useful data transmission, the software integrated into the sensor supports extensive monitoring and diagnostic functions, which can be configured using the GSD file during installation. The most important key data for the displacement sensors with Profibus-DP interface include:

Sensor output signals:
- 3 bytes of displacement data
- 1 byte of status and error messages (displacement)

Sensor input signals:
- Control byte
- Preset value

Selectable parameters:
- Errorhandling
- Measuring direction: Forwards/backwards
- Resolution
- Measuring cycle: Non-synchronised
  or synchronised (optional)
- Various data formats (Motorola, Intel)

Address setting:

The slave address is set by a class 2 master with the aid of the profibus service SetSlaveAddress via the bus. If this is not available the address can also be set with the TWK profibus hand-held programmer PMD-01 for connector M16 (data sheet No. 11190) or PMD-02 for connector M12 (datasheet No. 11450). The default address is **125**.

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.

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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, 1000
- Linearity: < ± 0.01 % (min. ± 50 µm)
- Repeatability: < ± 0.001 % (min. ± 2.5 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 + 75 °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: Profibus-DP to EN 50 170
- Signal transmission: Differential signal as per RS485
- Transmission rate: Max. 12 MBit/s
- Default address: 125

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.
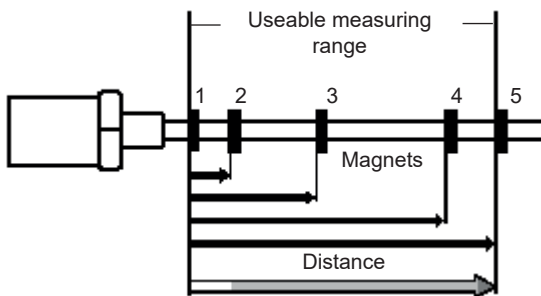
Green	Red	Meaning
On	Off	Normal function
On	Off	Magnet not in the setting range, incorrect number of magnets
Flashing	On	Programming mode
Flashing	Flashing	Waiting for master parameterisation

Blockdiagram
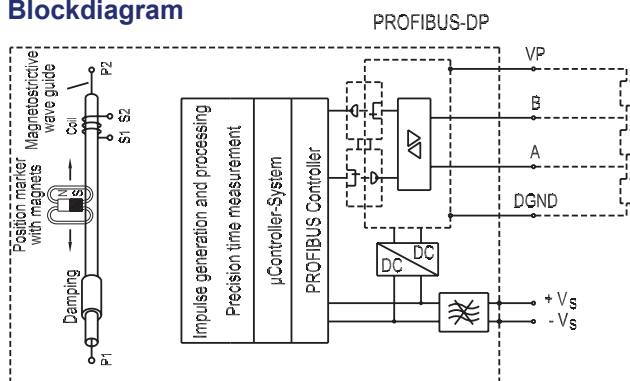
Multi-magnet measurement

Profibus sensor MSD enables max. 20 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.
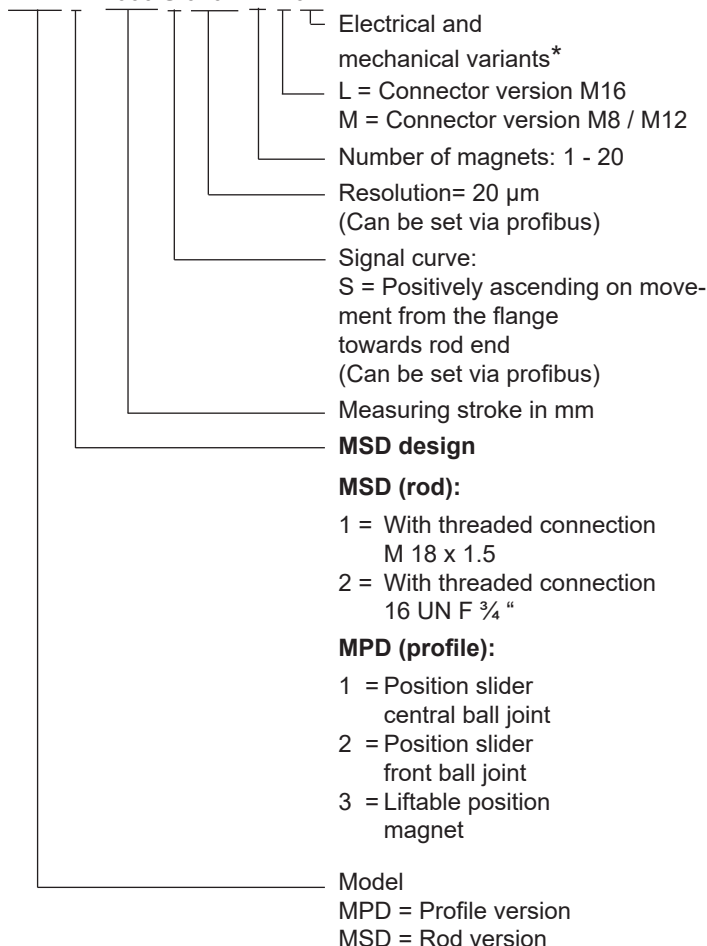
Order code format

Order code format

■ Displacement transducer

MPD 1 / 1000 S 020 - 1 L 01

Electrical and mechanical variants*

L = Connector version M16
M = Connector version M8 / M12

Number of magnets: 1 - 20

Resolution= 20 µm
(Can be set via profibus)

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

Measuring stroke in mm

MSD design

MSD (rod):

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

MPD (profile):

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

Model
MPD = Profile version
MSD = 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)
Profilw: Sensor, 1 position magnet, 2 mounting clamps up to 1250 mm + 1 clamp for each additional 500 mm.

Accessories:

■ Position magnets for MSD
  PR02   Standard position ring (ø 33 mm)
  PR03   Liftable position magnet
  PR04   Position ring up to 100 °C (ø 25.4 mm)

■ Position magnets for MPD
  PS01   Position slider, central ball joint
  PS02   Position slider, front ball joint
  PR03   Liftable position magnet

■ Available position magnets data sheet 11469

■ Mating connector version L (M16) (order separately)
  STK6GS47   Socket, straight
  STK6GP48   Pins, straight
  STK6WS51   Socket, angled 90°
  STK6WP65   Pins, angled 90°
  STK6GP49   Bus terminating connector (pins)

■ Mating connector straight version M (M8/M12) (order separately)
  STK5GS67   Socket (M12)
  STK5GP68   Pins (M12)
  STK5GP69   Bus terminating connector (pins M12)
  STK4GS64   24 VDC supply (M8)

■ Installation material
  MB-MP-01   Mounting clamps for profile version
  NT-MP-01   M5 sliding block for profile version

■ Programming devices
  PMD-03   Profibus hand-held programmer (data sheet 12439)

Electrical connections

Electrical connections version L (M16) *

Pins

Socket

Mating connector terminal side

Pin	Signal
1	RxD/TxD-N (bus)
2	RxD/TxD-P (bus)
3	DGND (with device socket, for terminal resistance)
4	VP (with device socket, for terminal resistance)
5	$+V_s$ (+24 VDC)
6	$-V_s$ (0 VDC)

Electrical connections version M (M8/M12) *
Connection M8 (24 VDC)

Socket

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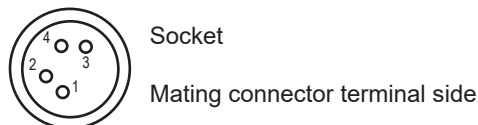
Pin	Signal
1	$+V_s$ (+24 VDC)
2	not connected
3	$-V_s$ (0 VDC)
4	not connected

Connection M12 (bus IN/OUT) *

Pins

Socket

Mating connector terminal side

Pin	Signal
1	VP + 5V (terminal resistance)
2	RxD/TxD-N (bus)
3	DGND (with device socket, for terminal resistance)
4	RxD/TxD-P (bus)
5	Screen

* The mating connector is always shown.

Installation drawings

Dimensions in mm

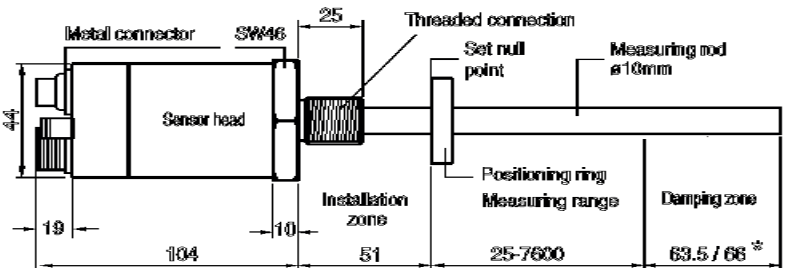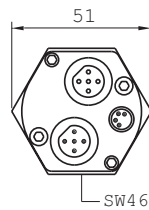**Model: MSD** (rod version)
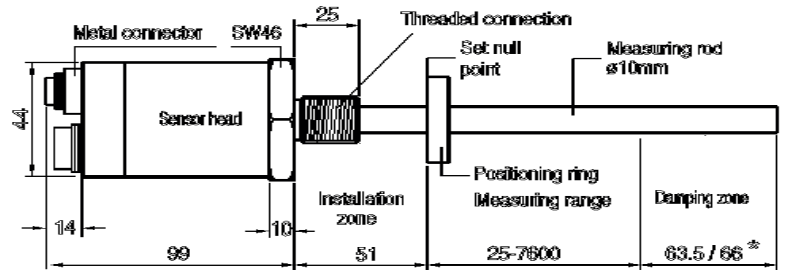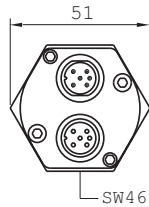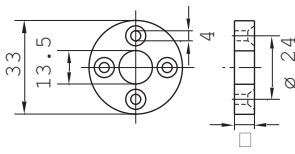
With measuring strokes of 1000 mm and over, mechanical rod support is recommended.

The sensor's fastening should be manufactured from non-magnetic materials (e.g.: brass, plastic). Note installation instruction **MWA10318** on installation in magnetisable materials.
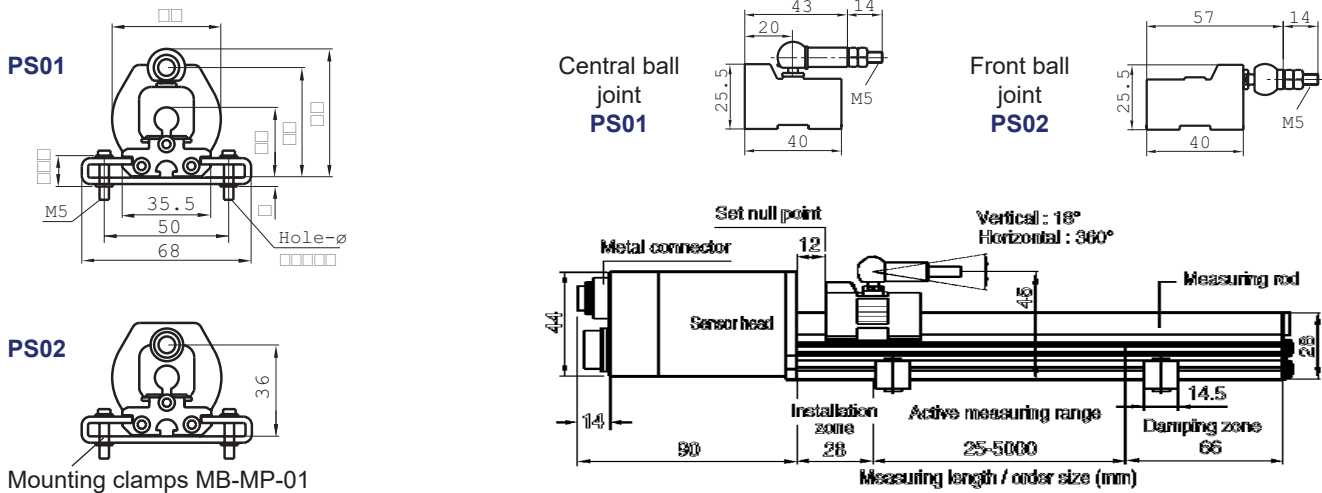
SUPREME SENSORING

TWK

Installation drawings

Dimensions in mm

Modell: MPD (Profilversion)

PS01

PS02

Mounting clamps MB-MP-01

Central ball joint
PS01

Front ball joint
PS02

Set null point
Metal connector
Sensor head
Vertical : 18°
Horizontal : 360°
Measuring rod
Installation zone 28
Active measuring range 25-5000
Damping zone 66
Measuring length / order size (mm)
44
14
90
12

Liftable position magnet PR03

Max. air gap 3 mm, ±1 mm
120°
140°
ø 13.5
25.5
20.7
ø 4 mm
ø 24
ø 33

Set null point
Metal connector
Sensor head
M4
Measuring rod
Installation zone 32
Active measuring range 50-5000
Mounting bracket
Damping zone 66
44
19
100
20
14.5

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 MAGNOSENS, careful 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 **twk.de/en**.