

MPS 01.2

Metal Particle Sensor



Instruction manual

Version 2.1

Serial-no.:
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1. Safety information

1.1. Dangers of maloperation

The **MPS 01.2** underwent a safety check according to IEC 1010-1/ EN 61010 – 1, part 1. Integrated hydraulic and electronic safety elements ensure safe operation if the device is used as it was intended.

In case of maloperation or abuse, as well as in case of insensitivity for application limits and safety regulations, the following threats can occur for:

- Life or physical condition of the operator,
- the **MPS 01.2**, as well as connected machines and systems connected,
- the accuracy of measurements of the **MPS 01.2**,
- the environment.

This manual contains information and safety advice, which ensure risk free operations and which help to keep the device in an ideal condition.

Therefore it is necessary that all people involved in operating and maintaining the device do note this manual unconditionally.

1.2. Intended applications

The **MPS 01.2** is an efficient and robust inline diagnostic measuring system for detecting ferromagnetic particles > 200 µm in oil.

It works very reliably and does fulfil all requirements of daily measurements.

The set is intended and tested to operate with all usual hydraulic and gear fluids as well as synthetic esters.



**GL certification (Germanischer Lloyd Industrial Services GmbH, Business Segment Wind Energy),
Wind order no.: 4800/07/40562/254.**

Application limits:

Maximum acceptable pressure on the sensor element	20 bar / 290 psi
Maximum oil temperature	85° C / 185 °F

Generally, the **MPS 01.2** has to be operated with 24 V DC (ripple < 300 mV_{pp}).

2. Operation and Installation

2.1. General informations

The metal particle sensor MPS 01.2 serves the purpose of detecting metal particles in moving hydraulic and lubricating fluids (also see fluid compatibility in chapter 3.4). Therefore, the sensor has to be installed permanently into the hydraulic or the lubricating cycle, so that the fluid, which is being monitored, is permanently flowing through the measuring channel of the sensor.

A standard signal indicates that a metal particle was detected and has passed through the channel. The exact size or the type of metal detected can not be distinguished explicitly by this signal.

The minimum particle size which can be detected is defined as iron balls with a diameter of 200 μm at a volume flow within the channel of 50 l / min.

Interpretation of measurements is up to the operator, e.g. number of particles per time unit.

Typical applications of the sensor are:

- Inexpensive, continuous monitoring of large-scale gears for incipient heavy wear with the increasing number of particles per time unit.
- Monitoring component cleanliness, e.g. on flushing test stands.

2.2. Measuring principle of the MPS 01.2

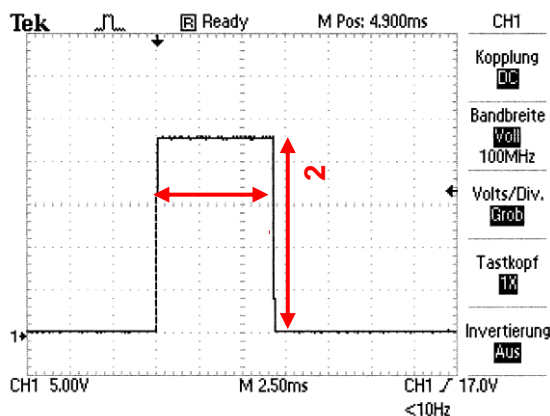
The measurement is based on a multiple inductor technique.

If passing through the system of inductors, metal particles will be detected by the high frequency magnetic field.

2.3. Output signal of the sensor

Metal particles flowing through the system of inductors induce a signal. If this signal reaches a certain amplitude, a standard signal is triggered and emitted at the output of the sensor.

The standard signal is a square pulse with an amplitude of 24 V and a pulse length of 7 ms at a sensor operating voltage of 24 V DC.



A second, dual output signal serves the purpose of self-diagnostics of the sensor's electronic circuit.

A „high“-level of 24V DC indicates proper condition. Corresponding to this, a „low“-level indicates faulty condition. The diagnostic signal doesn't give an information if the oil is actually flowing through the sensor. The operator has to take care of this.

2.4. Sensor installation

The **MPS 01.2** is installed at an appropriate point of the system. All specified pressure and volume flow requirements have to be met.

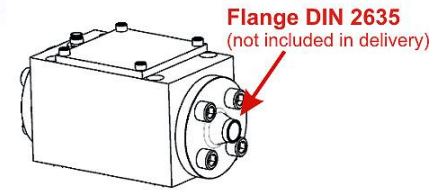
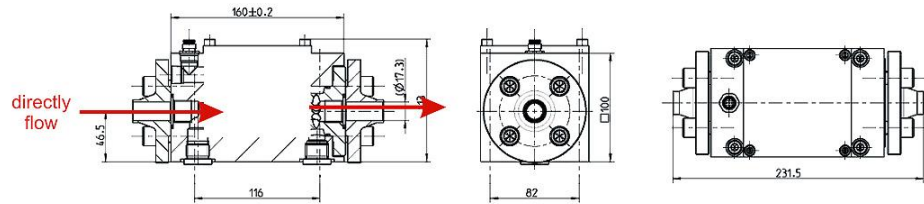
Doing so, it has to be made absolutely sure that all maximum values for physical parameters are not exceeded. (see technical data, chapter 3.1).

There are different possibilities to insert the sensor into the system (see also chapter 2.5 Connection type variants):

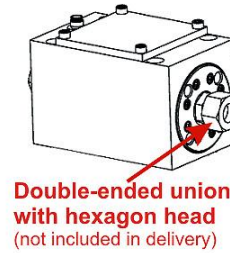
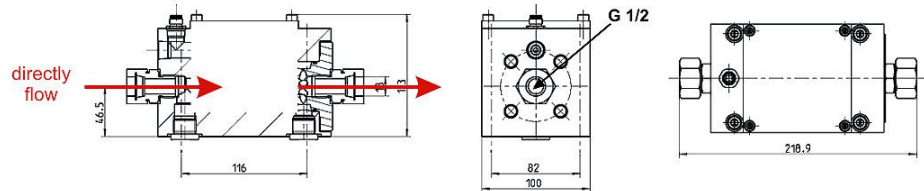
- a) Mounting of DIN flanges (DIN 2635 sizes 15) for welding the connecting tubes.
Screw M12 for the flange connection, locking torque: 60 Nm \pm 6 Nm
(equal to the variant 2 of the dimension sheet 1632 A.)
 - b) Direct thread screwing with G ½".
Plug screw G ½, locking torque: 65 Nm \pm 6,5 Nm
(equal to variant 2 of the dimension sheet 1632 A.)
 - c) Mounting over the rear side of the sensor (manifold mounting)
Screw M8 for the mounting of the MPS 01.2, locking torque: 20 Nm \pm 3 Nm
(equal variant 1 of the dimension sheet 1632 A.)
 - d) Manifold mounting P.5 with block G1 on the rear side of the sensor.
Screw M8 for the mounting of the MPS 01.2, locking torque: 20 Nm \pm 3 Nm
(equal variant 3 of the dimension sheet 1632 A.)
- Connect MPS 01.2 to cable.
 - After connecting the MPS 01.2 – sensors and the power cable to your system, the sensor is ready for operation.

2.5. Connection type variants

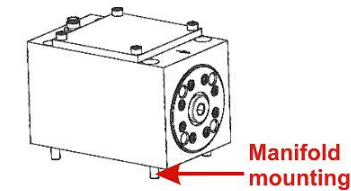
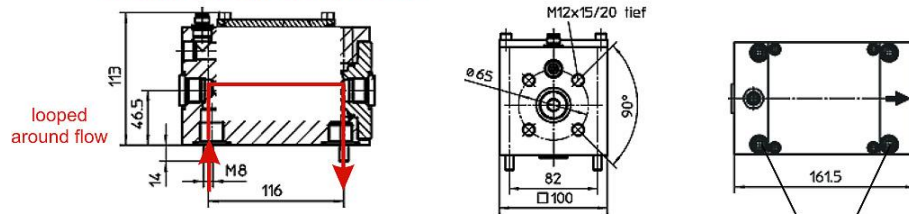
Variant 1: Pipe mounting with flange DIN 2635, design E DIN 2526 with O-ring cut-in



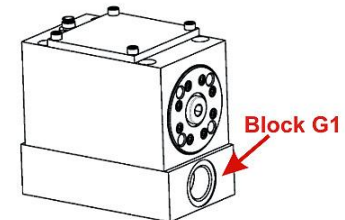
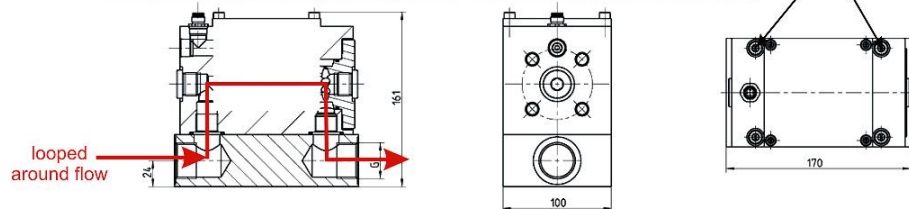
Variant 2: Pipe mounting with screw thread G 1/2



Variant 3: Manifold mounting

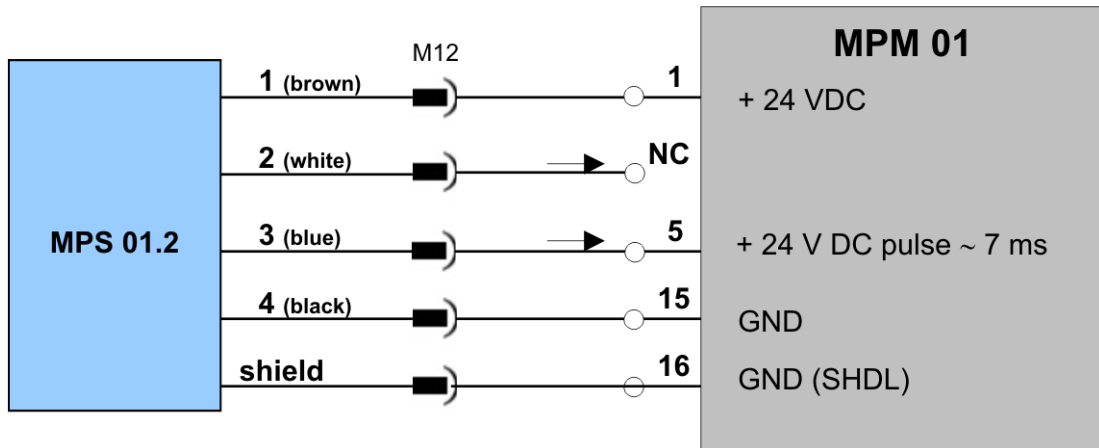


Variant 4: Manifold mounting P.5 - block 170x100x48.G.5 (G1)



2.6. Electrical connection of the MPS 01.2

- The MPS 01.2 can be coupled with every PLC that is equipped with 24 V capable digital input channels.
- The MPS 01 is equipped with an electrical standard connection M12. With the help of this it can be connected to the MPM 01 display unit or other examination devices. (see 3.2 Pin assignment)



3. Appendix

3.1. Technical Data

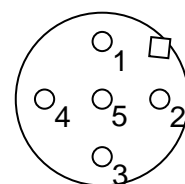
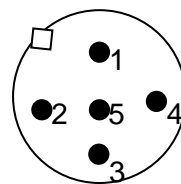
Measuring range:	> 200 µm Fe
Limit of measurement:	max. 100 particles/ s
Operating pressure:	≤ 20 bar / ≤ 290 psi
Ambient temperature:	- 40...+ 70 °C / - 40...158 °F
Fluid temperature range:	- 30*...+ 85 °C / - 22...185 °F
Survival temperature range:	- 40...+ 85 °C / - 40...185 °C
Max. volume flow:	50 l/min / 13,3 gal/ min
Min. volume flow:	10 l/min / 2,67 gal/ min
Power supply:	+ 24 V DC
Ripple:	< 300 mV _{pp}
Electrical power consumption:	max. 4 W
Analogue outputs:	1 x Signal output (24 V impulses ~ 7 ms) 1 x Diagnostic output (24 V DC, if no malfunctions)
Max. electric current on analogue outputs:	10 mA
Fluids:	Mineral oil based hydraulic- and lubricating fluids (see separate list of fluid compatibility 3.4).

* The minimum flow rate has to be ensured!

Note: The working temperature range of the MPS 01.2 depends also on the VT - behavior of the fluid. For applications with very high viscous fluids a regular operation of the sensor is only possible within a temperature range in which a sufficient oil flow (10 l/ min.) can be ensured!

3.2. Pin assignment

Pin 1	+ 24 V DC
Pin 2	Diagnostic
Pin 3	Output
Pin 4	GND
Pin 5	-----



Cable colour (Connection cable):

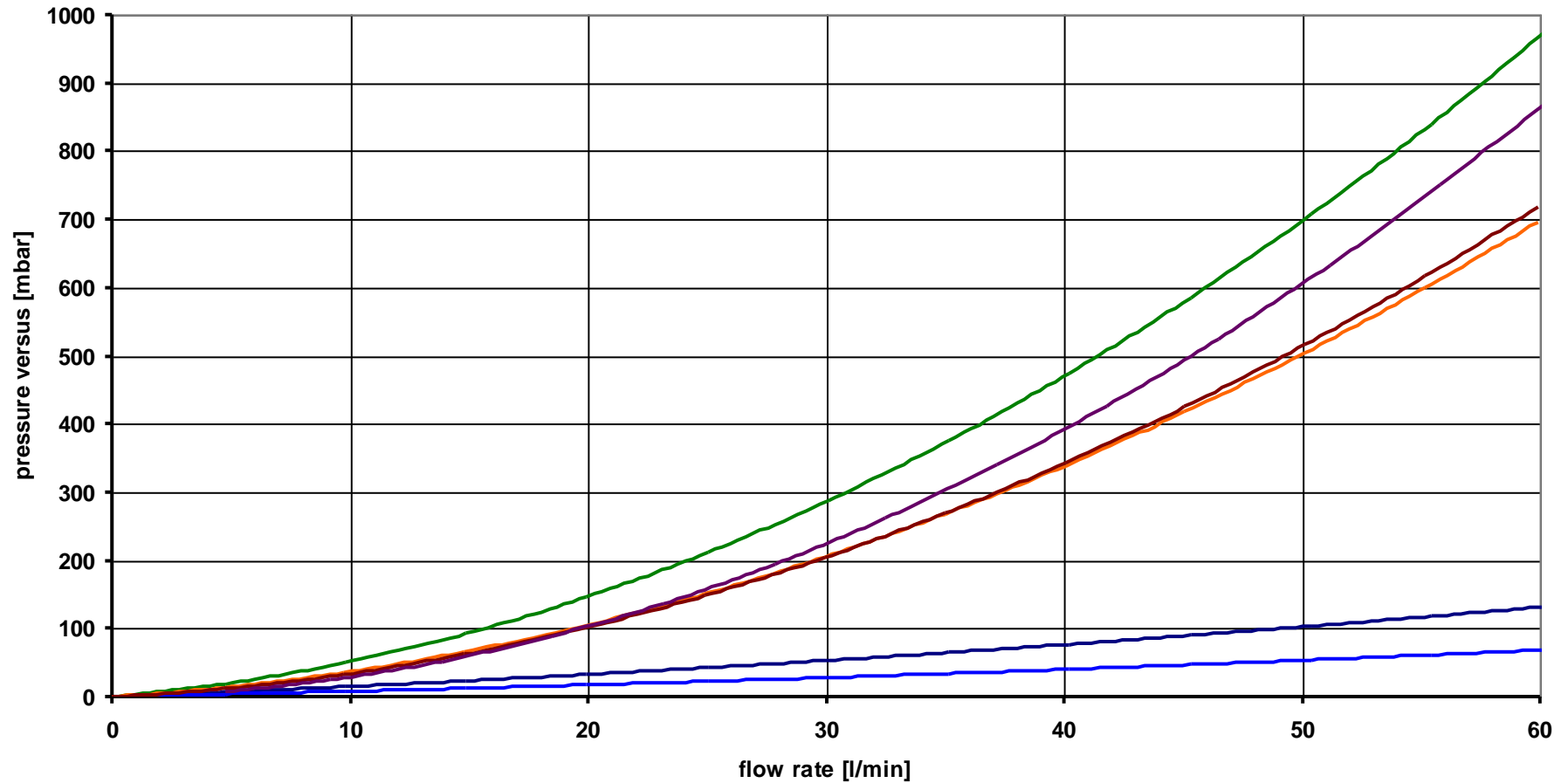
1: brown	(+ 24 V DC)
2: white	(+ 24 V DC, if no malfunctions)
3: blue	(+ 24 V DC impulses ~ 7 ms)
4: black	GND
Shield:	GND

Power supply
Diagnostic output
Output
Ground

3.3. Characteristic curve MPS 01.2

MPS 01.2 - $\Delta p = f(Q)$ of the differential connections

— characteristic at 100 mm²/s with horizontal flow — characteristic at 30 mm²/s with horizontal flow — characteristic at 100 mm²/s with vertical flow
— characteristic at 30 mm²/s with vertical flow — characteristic at 30 mm²/s with flange plate — characteristic at 100 mm²/s with flange plate



3.4. Application areas - Compatibility

- Hydraulic oils H, HL, HLP, and HV
- Gear oils C, CL, CLP
- Motor oils, gas oils
- MIL-H-5606 E
- Vegetable oils (HTG, Triglyceride)
- Synthetic ester (HEES)
- Polyalphaolefin (PAO)
- Polyglycol (PG)

3.5. Trouble shooting

No settings of the MPS 01.2 are done by the operator.

In case of malfunctions, please contact **INTERNORMEN Technology GmbH**.

To check your warranty and to answer questions by phone we need the serial number and the date of purchase of the instrument.

3.6. Shipment/ spare parts



- (1) Sensor MPS 01.2
- (2) Sensor cable, L = 5 m
- (3) O-Ring 26 x 3 (2 pcs)
- (4) Instruction manual
- (5) Plug screw G 1/2"
- (6) Cylinder head screw M8 x 100
- (7) Block G1

Connection type variants:

- variant 1 - 4
- variant 1 - 4
- variant 1 - 4
- variant 1 - 4
- variant 1 - 4
- variant 3 and 4
- variant 4

Article No.:

- 330694
- 332597
- 304379
- 304678
- 305299
- 327059

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