

# MPS 03.1

## Metal Particle Sensor



### *Instruction manual*

### **Version 1.2**

Serial-no.: .....

Version valid from: 31.05.2012

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# 1. Safety information

## 1.1. Dangers of maloperation

The **MPS 03.1** underwent a safety check according to IEC 1010-1/ EN 61010 – 1, part 1. Integrated 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 03.1**, as well as connected machines and systems connected,
- the accuracy of measurements of the **MPS 03.1**,
- 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 03.1** is an efficient and robust inline diagnostic measuring system for detecting ferromagnetic particles > 350 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.

### Application limits:

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

Generally, the **MPS 03.1** has to be operated with 24 V DC (ripple < 300 mV<sub>pp</sub>).

## 2. Operation and Installation

### 2.1. General informations

The metal particle sensor MPS 03.1 serves the purpose of detecting metal particles in moving hydraulic and lubricating fluids (also see fluid compatibility in chapter 3.3). 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 350  $\mu\text{m}$  at a volume flow within the channel of 60 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.

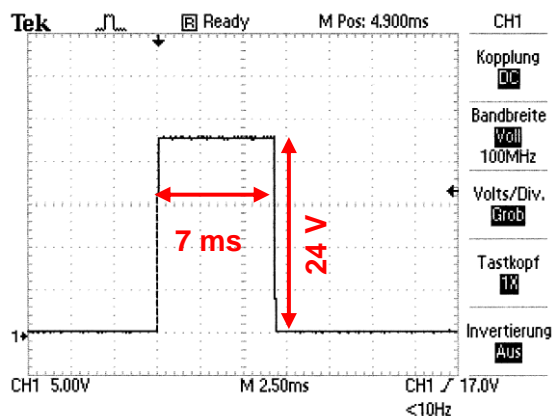
### 2.2. Measuring principle of the MPS 03.1

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.

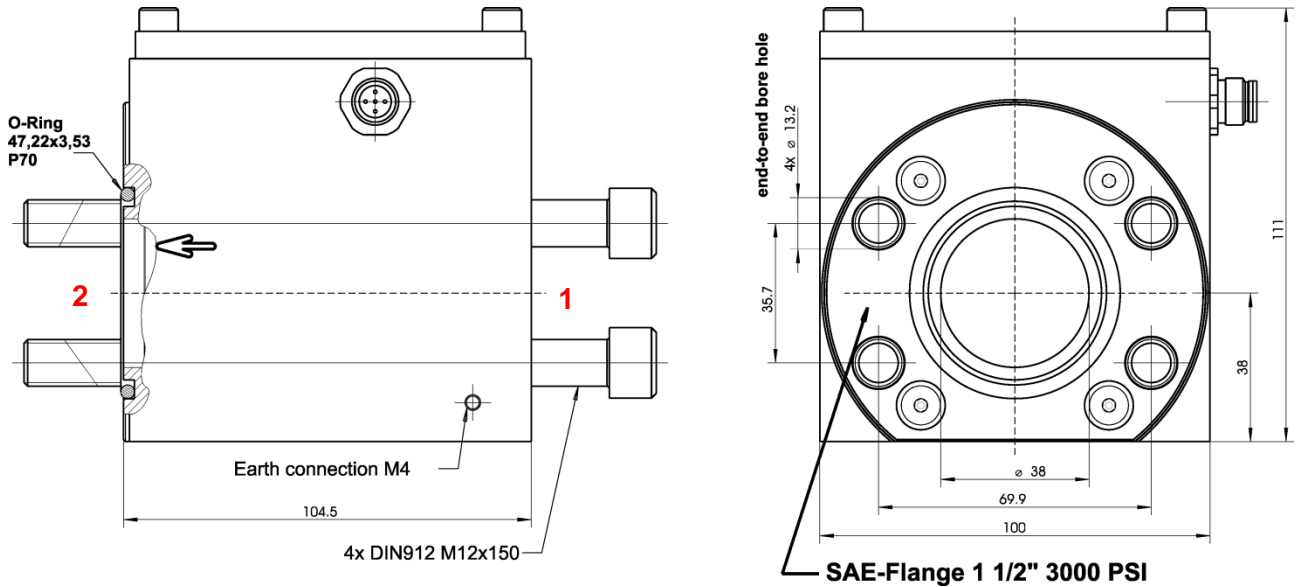
A second, dual output signal serves the purpose of self-diagnostics of the sensor's electronic circuit.

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.

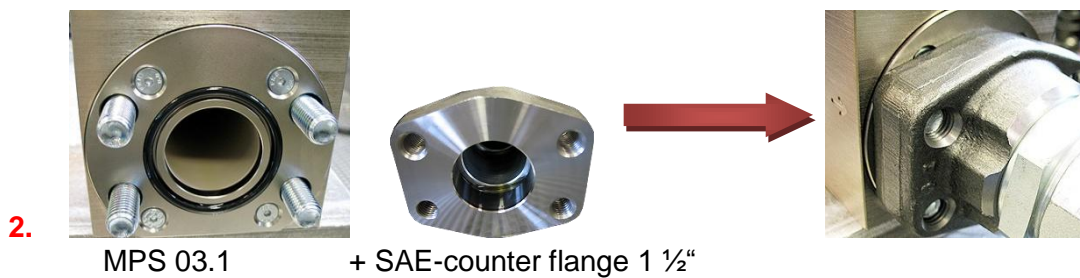
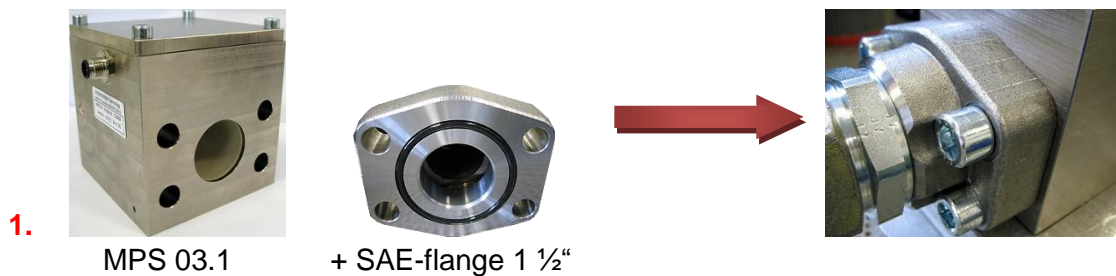
## 2.4. Sensor installation

The **MPS 03.1** is installed at an appropriate point of the system. All specified pressure and volume flow requirements have to be met. (see technical data, chapter 3.1).

- Insert the sensor in the system by using the 4 provided cylinder screws (DIN912 M12x150-8.8-Zn3) and two SAE-flange 1 1/2" 3000 PSI (not included in the shipment).



**Attention:** Look to it, that the SAE-flange 1 1/2" is using with the compatible counter flange!

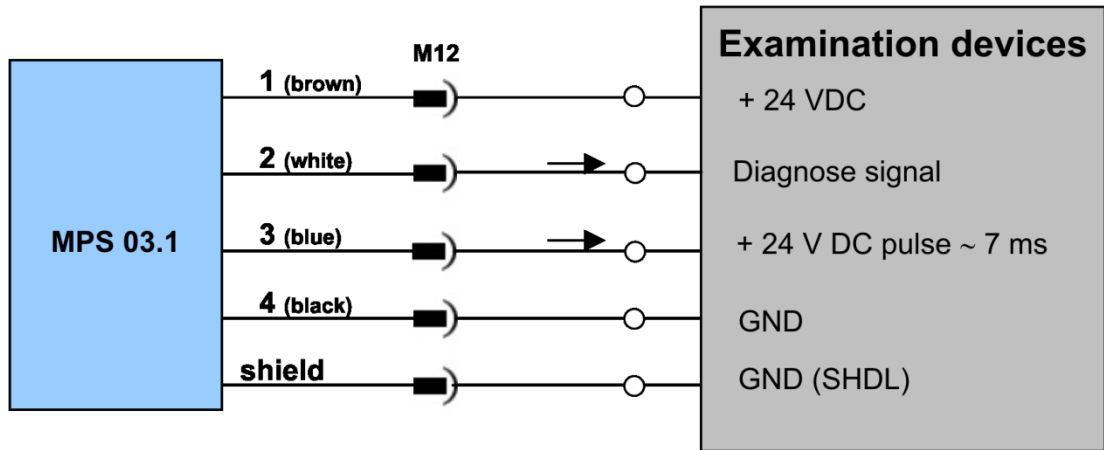


- Connect the MPS 03.1 with the included sensor cable.

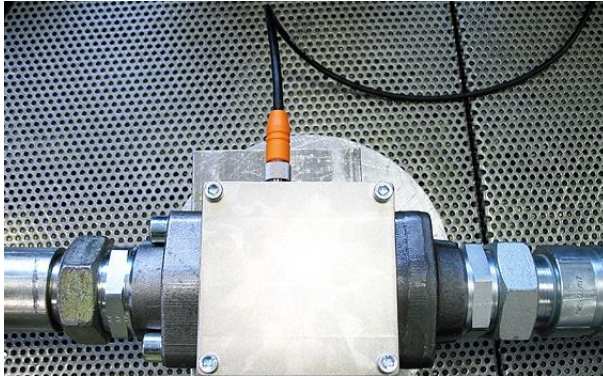


## 2.5. Electrical connection of the MPS 03.1

- The MPS 03.1 can be coupled with every PLC that is equipped with 24 V capable digital input channels.
- The MPS 03.1 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)



After connecting the MPS 03.1 and the power cable to your system, the sensor is ready for operation.



### 3. Appendix

#### 3.1. Technical Data

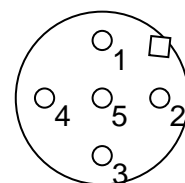
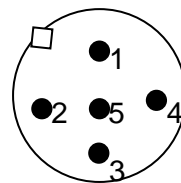
<b>Detection limit:</b>	> 350 µm Fe
<b>Limit of measurement:</b>	max. 100 particles/ s
<b>Operating pressure:</b>	≤ 20 bar / ≤ 290 psi
<b>Ambient temperature:</b>	- 40...+ 70 °C / - 40...158 °F
<b>Fluid temperature range:</b>	- 30*...+ 85 °C / - 22...185 °F
<b>Survival temperature range:</b>	- 40...+ 85 °C / - 40...185 °C
<b>Max. volume flow:</b>	320 l/min / 84,544 gal/ min
<b>Min. volume flow:</b>	60 l/min / 15,852 gal/ min
<b>Power supply:</b>	+ 24 V DC
<b>Ripple:</b>	< 300 mV <sub>pp</sub>
<b>Electrical power consumption:</b>	max. 5 W
<b>Analogue outputs:</b>	1 x Signal output (24 V impulses ” 7 ms) 1 x Diagnostic output (24 V DC, if no malfunctions)
<b>Max. electric current on analogue outputs:</b>	10 mA
<b>Fluids:</b>	Mineral oil based hydraulic- and lubricating fluids (see separate list of fluid compatibility 3.3).
<b>Connection size:</b>	SAE – Flansch 1 ½“ 3000 PSI
<b>Mass:</b>	2 kg

\* The minimum flow rate has to be ensured!

Note: The working temperature range of the MPS 03.1 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 (60 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. 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)

### 3.4. Trouble shooting

No settings of the MPS 03.1 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.

### 3.5. Shipment/ spare parts



- (1) Sensor MPS 03.1
- (2) Sensor cable, L = 5 m
- (3) O-Ring 47,22 x 3,53, P70
- (4) Cylinder screw ISO 4762 – M12 x 150-8.8-Zn3 (4 St.)
- (5) Instruction manual

#### Article No.:

333988

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334614



**North America — HQ**

70 Wood Ave., South, 2nd Floor  
Iselin, NJ 08830  
Toll Free: (800) 656-3344  
(North America Only)  
Voice: (732) 767-4200

**China**

No. 3, Lane 280, Linhong Road  
Changning District, 200335  
Shanghai, P.R. China  
Voice: +86-21-5200-0099

**Singapore**

4 Loyang Lane #04-01/02  
Singapore 508914  
Voice: +65-6825-1668

**Europe/Africa/Middle East**

Friedensstraße 41  
D-68804 Altlussheim, Germany  
Voice: +49-6205-2094-0

Auf der Heide 2  
53947 Nettersheim, Germany  
Voice: +49-2486-809-0

An den Nahewiesen 24  
55450 Langenlonsheim, Germany  
Voice: +49 6704 204-0

**Brazil**

Av. Julia Gaioli, 474 –  
Bonsucesso  
07251-500 – Guarulhos, Brazil  
Voice: +55 (11) 2465-8822

*For more information, please e-mail us at [filtrationinfo@eaton.com](mailto:filtrationinfo@eaton.com)*

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