developing solutions

FISCHER
MESS- UND REGELTECHNIK

Operating manual

MS10

Pressure vacuum switch

09015438 • BA_EN_MS10 • Rev. ST4-A • 03/24

Masthead

Manufacturer: **FISCHER Mess- und Regeltechnik GmbH**

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Version history

Rev. ST4-A 03/24	Version 1 (first edition)

Table of contents

1 Safety instructions

1.1 General

This operating manual contains basic instructions for the installation, operation and maintenance of the device that must be followed without fail. It must be read by the installer, the operator and the responsible specialist personnel before installing and commissioning the device.

This operating manual is an integral part of the product and therefore needs to be kept close to the instrument in a place that is accessible at all times to the responsible personnel.

The following sections, in particular instructions about the assembly, commissioning and maintenance, contain important information, non-observance of which could pose a threat to humans, animals, the environment and property.

The instrument described in these operating instructions is designed and manufactured in line with the state of the art and good engineering practice.

1.2 Personnel Qualification

The instrument may only be installed and commissioned by specialized personnel familiar with the installation, commissioning and operation of this product.

Specialized personnel are persons who can assess the work they have been assigned and recognize potential dangers by virtue of their specialized training, their skills and experience and their knowledge of the pertinent standards.

1.3 Risks due to Non-Observance of Safety Instructions

Non-observance of these safety instructions, the intended use of the device or the limit values given in the technical specifications can be hazardous or cause harm to persons, the environment or the plant itself.

The supplier of the equipment will not be liable for damage claims if this should happen.

1.4 Safety Instructions for the Operating Company and the Operator

The safety instructions governing correct operation of the instrument must be observed. The operating company must make them available to the installation, maintenance, inspection and operating personnel.

Dangers arising from electrical components, energy discharged by the medium, escaping medium and incorrect installation of the device must be eliminated. See the information in the applicable national and international regulations.

Please observe the information about certification and approvals in the Technical Data section.

1.5 Unauthorised Modification

Modifications of or other technical alterations to the instrument by the customer are not permitted. This also applies to replacement parts. Only the manufacturer is authorised to make any modifications or changes.

1.6 Inadmissible Modes of Operation

The operational safety of this instrument can only be guaranteed if it is used as intended. The instrument model must be suitable for the medium used in the system. The limit values given in the technical data may not be exceeded.

The manufacturer is not liable for damage resulting from improper or incorrect use.

1.7 Safe working practices for maintenance and installation work

The safety instructions given in this operating manual, any nationally applicable regulations on accident prevention and any of the operating company's internal work, operating and safety guidelines must be observed.

The operating company is responsible for ensuring that all required maintenance, inspection and installation work is carried out by qualified specialized personnel.

1.8 Pictogram explanation

⚠ DANGER

Type and source of danger

This indicates a **direct** dangerous situation that could lead to death or **serious injury** (highest danger level).

1. Avoid danger by observing the valid safety regulations.

⚠ WARNING

Type and source of danger

This indicates a **potentially** dangerous situation that could lead to death or **serious injury** (medium danger level).

1. Avoid danger by observing the valid safety regulations.

⚠ CAUTION

Type and source of danger

This indicates a **potentially** dangerous situation that could lead to slight or serious injury, damage or **environmental pollution** (low danger level).

1. Avoid danger by observing the valid safety regulations.

NOTICE

Note / advice

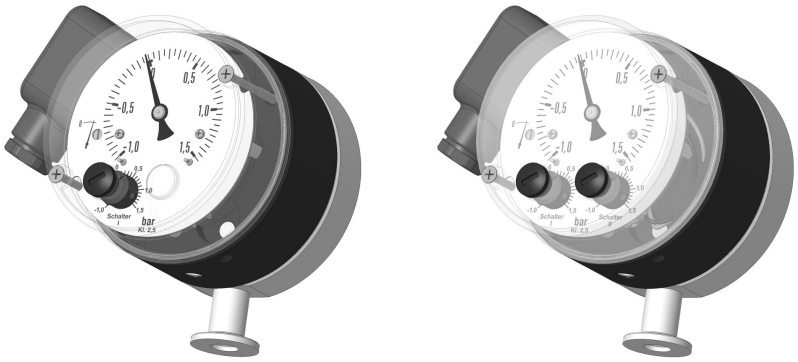
This indicates useful information of advice for efficient and smooth operation.

2 Product and functional description

2.1 Delivery scope

- Pressure vacuum switch MS10
- Operating Manual

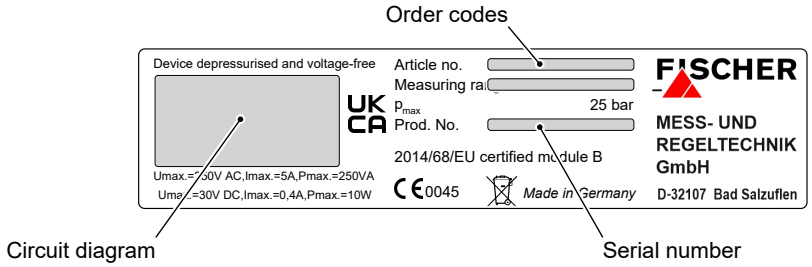
2.2 Device versions



Text

Fig. 1: Device versions

Type plate



2.3 Intended use

The MS10 is an overpressure and vacuum-pressure proof contact pressure gauge for control and monitoring tasks in vacuum technology.

The device may only be used for the purpose stipulated by the manufacturer. The manufacturer will not be liable for damage arising from incorrect or improper use.

Please contact the manufacturer before using this unit with dirty or aggressive media because the media compatibility of the unit needs to be checked.

2.4 Function diagram

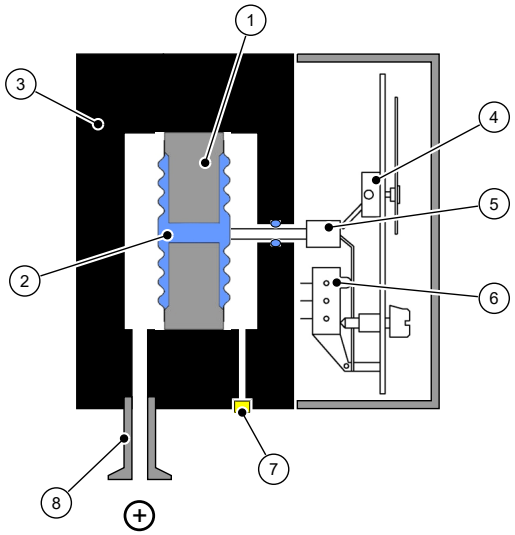


Fig. 2: Function diagram

1	Measuring capsule	2	Hydraulic fluid
3	Pressure chamber	4	Motion train
5	Tappet	6	Micro-switch
7	Sealing plug	8	Process connection

2.5 Design and mode of operation

The measuring element is a measuring capsule with two metal diaphragms that are hydraulically coupled. The diaphragm bulges from its normal position as a result of the applied pressure.

A rod assembly on the side of the measuring capsule that faces away from the measuring material captures the expansion movement proportional to the pressure and transfers it to the motion train and the actuating elements of the microswitches.

In case of an overload the measuring diaphragms in the measuring capsule support one another and protect the device from damage.

3 Installation

The MS10 is equipped for pipeline installation with a small flange ISO KF10 in accordance with DIN 28403 or ISO 2861. The device was calibrated for vertical installation.

To ensure safety during installation and maintenance, we recommend installing a suitable shut-off valve on the system. A shut-off valve offers the following advantages:

- The device can be depressurised or decommissioned.
- The device can be disconnected from the power supply within the applicable system for repairs or inspections.
- A function test of the device can be performed on-site.

3.1 Process connection

- By authorized and qualified specialized personnel only.
- The pipes need to be depressurized when the instrument is being connected.
- Appropriate steps must be taken to protect the device from pressure surges.
- Check that the device is suitable for the medium being measured.
- Maximum pressures must be observed (cf. Tech. data)

The pressure line must be kept as short as possible and installed without any tight bends to avoid delays.

The pressurized line must be installed on a gradient so that no air pockets can be created when measuring fluids and that no water pockets are created when measuring gas. If the required inclination is not reached, water or air filters must be installed at suitable places.

In the case of fluid media, the pressurized line needs to be vented because different fluid pillars in the lines can distort measurements.

If water is used as a measuring medium, the unit must be protected against frost.

Pulsating pressure on the system side can lead to wear and functional problems. To safeguard this, we recommend installing absorption elements in the pressure line.

3.2 Electrical connections

- By authorized and qualified specialized personnel only.
- When connecting the unit, the national and international electro-technical regulations must be observed.
- Disconnect the system from the mains, before electrically connecting the device.
- Install the consumer-adapted fuses.
- Do not connect the connector if strained.

The MS10 can be equipped with one or two micro-switches. Each micro-switch has a changeover contact that is wired as follows.

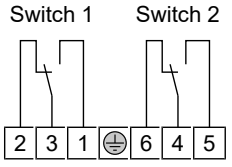


Fig. 3: Electrical connection

Cable socket

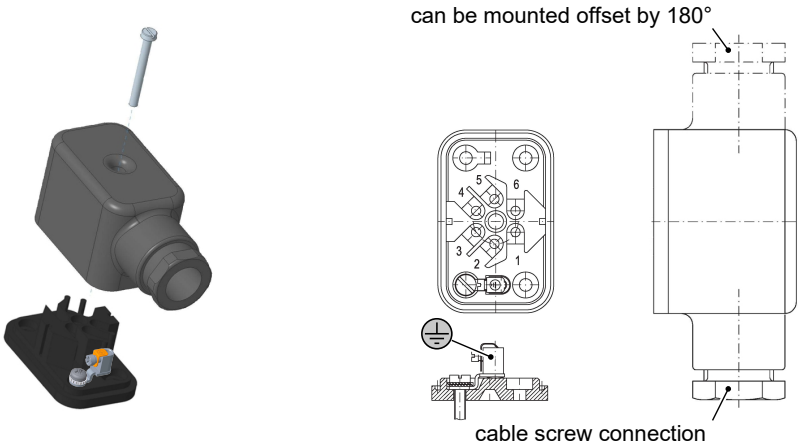


Fig. 4: Cable socket

Terminals 1 to 6	Brass	Screw terminal up to 1.5 mm²
Ground terminal	Nickel-plated brass	Screw terminal up to 2.5 mm²

Cable screw connection	Polyamide 6	M20 x 1.5
Seal	EPDM	
Terminal range		7 to 13 mm

Plug connection

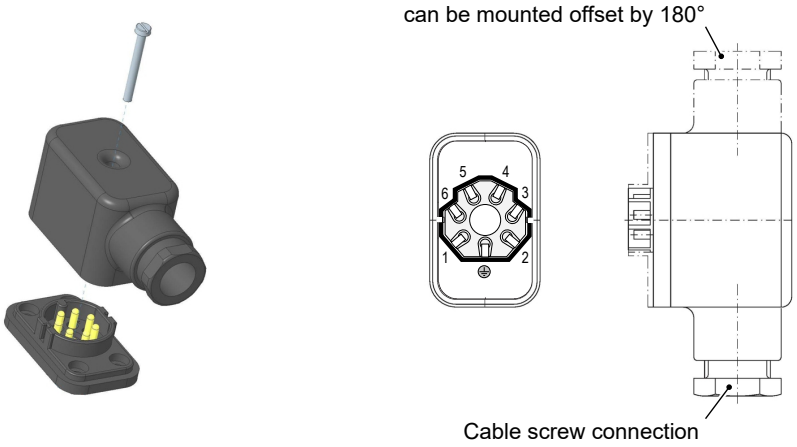


Fig. 5: Cable plug

Terminals 1 to 6	Brass	Screw terminal up to 1.5 mm²
Ground terminal		

Cable screw connection	Polyamide 6	M20 x 1.5
Seal	EPDM	
Terminal range		7 to 13 mm

4 Start-up

A prerequisite for commissioning is correct installation of all electrical supply lines and the pressure lines. All connections are arranged so that there are no mechanical forces acting on the device.

⚠ CAUTION

Leakage test

The pressurized lines need to be checked for leaks before commissioning.

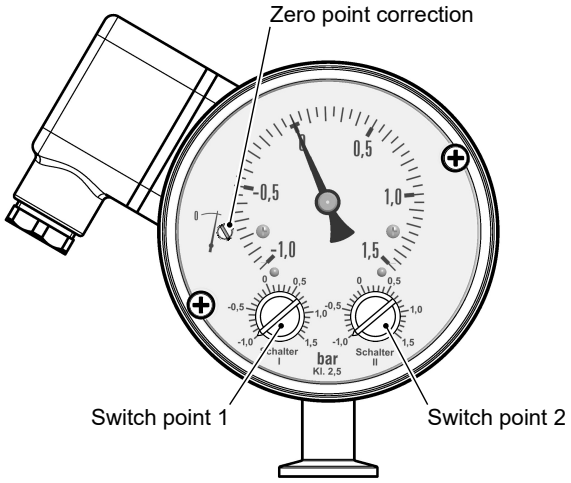
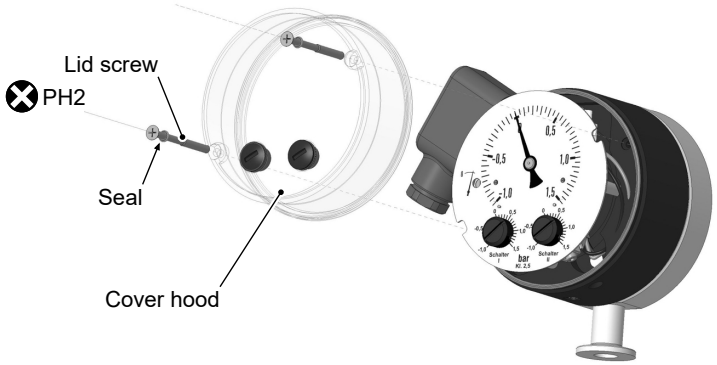


Fig. 6: Control elements

4.1 Zero point correction

The device is calibrated for vertical installation; however, it is possible that zero point correction may be required. To do so, proceed as follows:

1. Depressurise the pressure line.
2. Remove the hood.

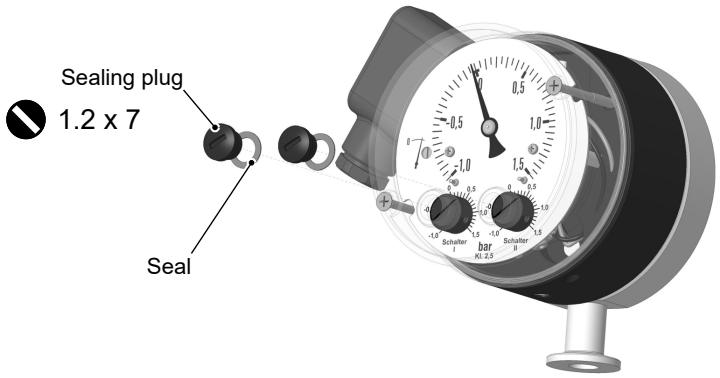


3. Use a suitable screwdriver to turn the zero point correction screw until the measured value indicator is at the scale zero point.
4. Mount the hood.
5. Switch the pressure back on.

4.2 Switch point adjustment

Proceed as follows to set the switching points:

1. Remove the plug in the hood.



2. You can now set the desired switching point with a suitable screwdriver using the switching point reference value scales. The achievable setting precision is 5%.[1]
3. Replace the sealing plugs in the cover hood after completing the settings.

[1] More accurate settings can be made either in the factory or on site using suitable aids, such as test manometer, ohm meter etc.

5 Servicing

5.1 Maintenance

The instrument is maintenance-free. We recommend the following regular inspection to guarantee reliable operation and a long service life:

- Check the function in combination with downstream components.
- Check the leak-tightness of the pressure connection lines.
- Check the electrical connections.

The exact test cycles need to be adapted to the operating and environmental conditions. In combination with other devices, the operating instructions for the other devices also need to be observed.

5.2 Transport

The measuring device must be protected against impacts. It should be transported in the original packaging or a suitable transport container.

5.3 Service

All defective or faulty devices should be sent directly to our repair department. Please coordinate all shipments with our sales department.

⚠ WARNING

Process media residues

Process media residues in and on dismantled devices can be a hazard to people, animals and the environment. Take adequate preventive measures. If required, the devices must be cleaned thoroughly.

Return the device in the original packaging or a suitable transport container.

5.4 Disposal

WEEE-Reg.-No. DE 31751293

Please help to protect our environment and dispose of the workpieces and packaging materials used in an environmentally friendly manner. Observe the country-specific waste treatment and disposal regulations.

The year of production can be found in the production number (serial number):

P# **23** 03618.03.123

Production year 2023

Further information on disposal can be found on our website [www.fischermesstechnik.de]

6 Technical data

6.1 General Information

Reference conditions (acc. to IEC 61298-1)		
Temperature	+15 … +25 °C	
Relative humidity	45 … 75%	
Air pressure	86 to 106 kPa	860 to 1060 mbar
Installation position	Vertical	Lower pressure connection

General information	
Type designation	MS10
Pressure type	Relative pressure
Measurement principle	Metal diaphragm measurement system, welded
Media	Non-aggressive liquid and gaseous media

6.2 Input variables

Measuring ranges	Measuring accuracy
	(± 2.5% of the measuring range)
-200 to 200 mbar	±10 mbar
0 to 400 mbar	±10 mbar
-1 … 0.6 bar	± 0.04 bar
-1 … 1.5 bar	± 0.0625 bar
-1 … 3 bar	± 0.1 bar
-1 … 5 bar	± 0.15 bar
-1 … 9 bar	± 0.25 bar
-1 … 15 bar	± 0.4 bar
-1 … 24 bar	± 0.625 bar

Rated pressure of the measuring system	25 bar
Max. pressure load *(for all measuring ranges)*	Overpressure safe up to rated pressure of the measuring system
	Vacuum pressure safe up to fine vacuum (10^{-2} mbar)
Zero-point setting	Arranged in the front panel of the scale
Leakage rate	≤ 10^{-7} Pa • m^3/s ≤ 10^{-6} mbar • l/s

6.3 Output parameters

Switch contacts	1 to 2 micro-switches
Switching function (per contact)	Changeover contact
Switch point setting	Can be set to reference scales from outside
Smallest settable value	approx 5% of the measuring span
Switch hysteresis	approx 2.5% of the measuring span

Per contact	**AC**	**DC**
Switching voltage	250 V	30 V
Switching current	5 A	0.4 A
Switching output	250 VA	10 W

6.4 Operating conditions

Ambient temperature	-10 to +70°C
Media temperature	-10 to +70°C
Storage temperature	-15 … +75 °C
Enclosure protection class	IP55 according to EN 60529
LVR	EN 61010-1:2010 +A1:2019+A1:2019/AC:2019
RoHS	EN IEC 63000:2018

6.5 Construction design

Process connection	Small flange KF10 according to DIN 28403 / ISO 2861
Electrical connection	Cable socket
	7-pin plug connection
Dimensions	See dimensional drawings
Weight	2.6 kg

6.5.1 Materials

Parts in contact with the medium	
Pressure chamber	1.4571 CrNi steel
Measuring diaphragm	1.4571 CrNi steel
Process connection	1.4571 CrNi steel (small flange KF10)

Parts with no contact with the medium		
Cable socket / plug		Polyamide 6
Casing		Aluminium anodised
Sealing plug		Sinter bronze
Seals		FKM
Cover hood	IP55	Makrolon
Dial face and needle		Aluminium
Setting buttons		AlCuMgPb 3.1645
Screws		Stainless steel, galvanised steel, passivated

6.5.2 Dimensional drawings

All dimensions in mm unless otherwise stated

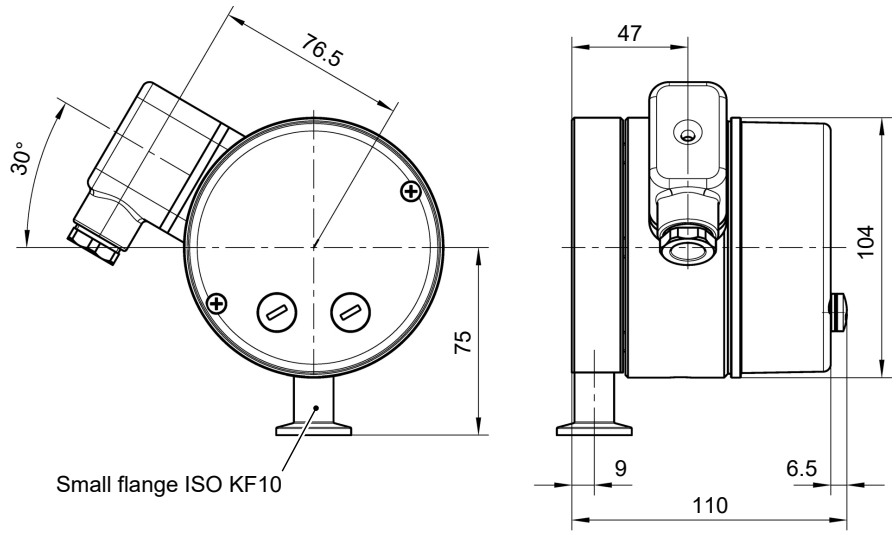
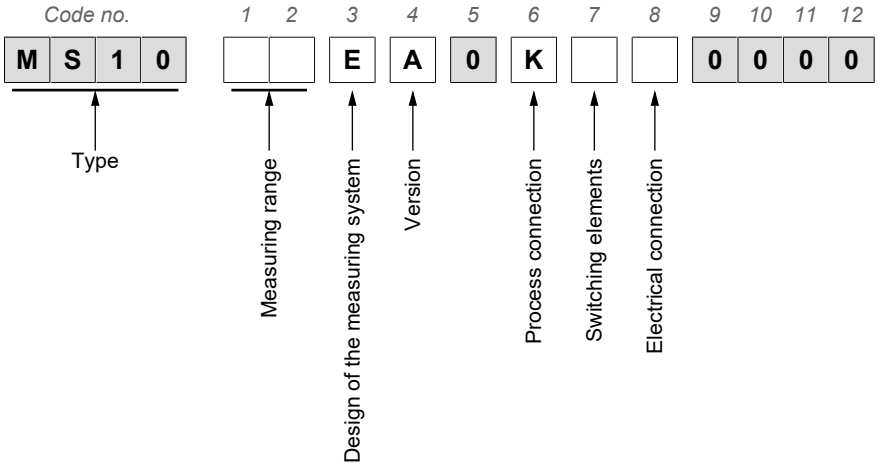


Fig. 7: Dimension drawing

7 Order codes



[1.2]	Measuring range
B5	-200 … 200 mbar
83	0 … 400 mbar
32	-1 … 0.6 bar
33	-1 … 1.5 bar
34	-1 … 3 bar
35	-1 … 5 bar
36	-1 … 9 bar
37	-1 … 15 bar
38	-1 … 24 bar
99	Custom measurement range on request

[3]	Design of the measuring system
E	Stainless steel 1.4571 (in contact with media)

[4]	Version
A	Top part of housing aluminium black anodised

[6]	Process connection
K	Small flange ISO KF10

[7]	Switching elements
A	1 adjustable micro-switch
B	2 adjustable microswitches

[8]	Electrical connection
K	Cable socket
W	7-pin plug connection

8 Annex

FISCHER MESS- UND REGELTECHNIK

(Translation) CE

EU Declaration of Conformity

For the product described as follows

Product designation **Pressure - Vacuum Switch**

Type designation **MS10**

it is hereby declared that it corresponds with the basic requirements specified in the following designated directives:

2014/35/EU	*Low Voltage Directive*
2014/68/EU	*Pressure Equipment Directive*
2011/65/EU	*RoHS Directive*
(EU) 2015/863	*Delegated Directive amending Annex II to Directive 2011/65/EU*

The products were tested in compliance with the following standards.

Low Voltage Directive (LVD)

DIN EN 61010-1:2020-03 *EN 61010-1:2010 + A1:2019 + A1:2019/ AC:2019*	*Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements*
DIN EN 61010-1 Berichtigung 1:2022-02 *(IEC 61010-1:2010 + COR:2011 + A1:2016, modified + A1:2016/COR1:2019)*	*Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements German version EN 61010-1:2010 + A1:2019 + A1:2019/ AC:2019; Corrigendum 1*

Pressure Equipment Directive (PED)

DIN EN 837-3:2019-08 *EN 837-3:1996*	*Pressure gauges - Part 3: Diaphragm and capsule pressure gauges; dimensions, metrology, requirements and testing*

RoHS Directive (RoHS 3)

DIN EN IEC 63000:2019-05 *EN IEC 63000:2018*	*Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*

The notified body **TÜV NORD Systems GmbH & Co. KG NB0045** performed the CE-type examination and issued the following certificates. The same notified body is responsible for monitoring the QS Management.

Safety device category IV

07/202/1082/Z/0064/17/D/0009	*EC-type examination 2014/68/EU (Module B)*

Also they were subjected to the conformity assessment procedure „**Internal production control**".

Sole responsibility for the issue of this declaration of conformity in relation to fulfilment of the fundamental requirements and the production of the technical documents is with the manufacturer.

Manufacturer **FISCHER Mess- und Regeltechnik GmbH**
Bielefelder Str. 37a
32107 Bad Salzuflen, Germany
Tel. +49 (0)5222 974 0

Documentation representative Torsten Malischewski
General Manager R&D

The devices bear the following marking: CE

ppa. T. M

Bad Salzuflen
19 Feb 2024

T. Malischewski
General Manager R&D

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Fig. 8: CE_DE_MS10

ZERTIFIKAT
CERTIFICATE

EU-Baumusterprüfbescheinigung(Baumuster)
nach Richtlinie 2014/68/EU
EU type-examination (production type)
according to directive 2014/68/EU

Zertifikat-Nr.: **07/202/1082/Z/0064/17/D/0009**
Certificate No.:

Name und Anschrift des Herstellers: **Fischer Mess- und Regeltechnik GmbH**
Name and address of manufacturer: **Bielefelder Str. 37a**
D-32107 Bad Salzuflen

Hiermit wird bescheinigt, dass das unten genannte Baumuster die Anforderungen der Richtlinie 2014/68/EU erfüllt.
We hereby certify that the type examination mentioned below fulfills the requirements of directive 2014/68/EU.

Geprüft nach Richtlinie 2014/68/EU Tested according to 2014/68/EU	**Modul B** **module B**
Prüfbericht-Nr.: Test report No.:	**1082/P/0064/17/D/0009**
Beschreibung des Baumusters (Druckgerät): Description of production type (pressure equipment):	**Druck-Vakuumschalter MS10**
Fertigungsstätte Place of manufacture:	**Fischer Mess- und Regeltechnik GmbH** **Bielefelder Str. 37a** **D-32107 Bad Salzuflen**
Gültig bis: valid until:	**02/2027**

Paderborn, 20.02.2017

notified body TÜV NORD 0045 TÜV NORD Systems

Notifizierte Stelle/ Notified Body, 0045
für Druckgeräte
for pressure equipment

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Mitglied der member of CEOC
CONFÉDÉRATION EUROPÉENNE D'ORGANISMES DE CONTRÔLE

deu/eng Rev. 5/06.15

Fig. 9: Module B

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