FISCHER MESS- UND REGELTECHNIK

Operating Manual

DE50 | Differential pressure transmitter

Table of Contents

1 Safety guidelines

1.1 General Information

This operating manual contains instructions fundamental to the installation, operation and maintenance of the instrument that must be observed unconditionally. It must be read by the assembler, operator and the specialized personnel in charge of the instrument before it is installed and put into operation.

This operating manual is part of the product and must be kept close by where it is easily accessible to the responsible specialized personnel.

The subsequent sections, in particular the instructions on assembly, commissioning and maintenance, contain important safety instructions, non-observance of which can endanger persons, animals, the environment and physical objects.

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 instrument or the limit values given in the technical specifications can be hazardous or cause harm to persons, the environment or the plant itself.

The manufacturer 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 on correct operation of the instrument shall 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 instrument must be eliminated. For more information, please see the applicable national and international regulations.

In Germany these are the DIN EN, UVV regulations, specific industrial guidelines such as DVGW, Ex, GL, etc., the VDE- regulations and the regulations of the local energy supply companies.

09005137 BA_EN_DE50 Rev.A 11/12

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. Any modifications / alterations required shall be carried out by Fischer Mess- und Regeltechnik GmbH only.

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.

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 Symbol explanation

WARNING!
… indicates a potentially dangerous situation, non-observance of which could endanger persons, animals, the environment or objects.

INFORMATION!
… highlights important information for efficient and smooth operation.

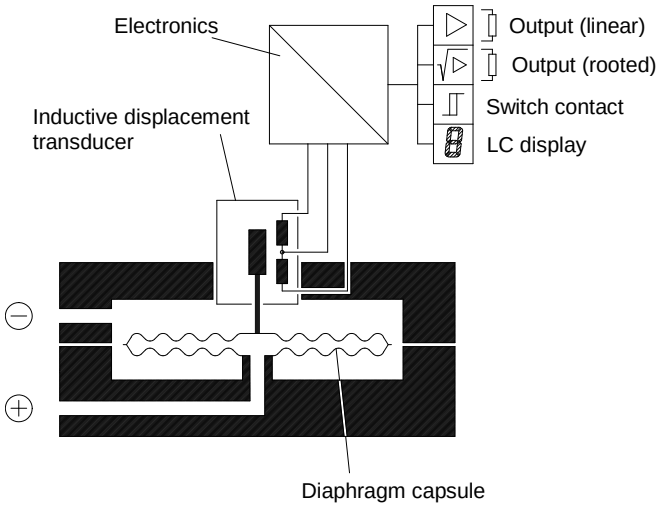
TIP!
… indicates recommendations that are not specifically necessary in certain situations but which could be useful.

2 Application purpose

Measuring transducer and switching device for over-pressure, under-pressure and differential pressure of gaseous media. It may only be used for the intended use given in the manufacturer's data sheet. If any soiled or aggressive media is expected on the system side, the instrument needs to be modified in terms of those parts that have contact with the medium. Talk to the manufacturer before ordering.

3 Description of the product and functional description

3.1 Functional Schematic



3.2 Design and mode of action

The base of the measuring and switching instrument DE 50 is a diaphragm capsule measuring system that is suitable for measuring overpressure, under-pressure and differential pressure. The pressure or differential pressure that is to be measured triggers the diaphragm capsule, thereby moving the core of the inductive displacement transducer. This is converted to an electrical output signal in the downstream electronics. The transformer electronics are available in several models.

In addition to the various operating voltages, the output signal can be designed as a current or voltage signal.

Flows in gaseous media are often measured according to the effective pressure principle. To achieve a flow-proportional measured value, the effective pressure signal needs to be rooted. There are transformer electronics available to supply the rooted output signals for these applications.

In addition to the analogue output signal, the instrument can be equipped with potential-free contact outputs that can be set to each value within the measuring range.

The pressure / differential pressure values can be displayed as linear measured values on site via an installed LC display (optional).

4 Installation and assembly

The instrument can be installed on even walls, assembly plates or switch cabinet assembly rails. The four attachment boreholes are accessible after the lid has been removed from the instrument.

At the factory, the device is calibrated for vertical installation, but the installation position is arbitrary. For any installation positions that are not vertical,

the zero-point signal can be corrected via the installed zero-point adjuster.

If the pressure sensing lines are already pressurised at the time of commissioning, zero-point control and adjustment cannot be performed. In such cases, the instrument should only be connected to the mains without the pressure sensing lines.

To prevent condensation gathering in the instrument, the pressure connections need to point downwards. The casing protection class IP 54 is only guaranteed if the correct connection wires for the cable screw connections are used. Their outer diameter must lie between 6.5 mm and 8 mm.

4.1 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 instrument from pressure surges.
- Check the suitability of the instrument for the media to be measured.
- Only for designated mechanical process connections. For the model, see the order code on the instrument's type plate.
- Check that the pressure connections do not leak before commissioning.
- Maximum pressures shall be observed.
- Do not blow into the pressure connections.

The pressure connections are marked with ⊕ and ⊖ symbols on the instrument. The pressure connections need to be mounted according to this information.

Differential pressure measurements

⊕ Higher pressure

⊖ Low pressure

Pressure measurements

⊕ Pressure connection

Under-pressure measurement

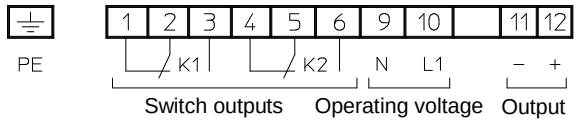
⊖ Under-pressure connection

4.2 Electronic connection

- By authorized and qualified specialized personnel only.
- The electrical connection of the instrument shall be performed according to relevant VDE and local electricity board regulations.
- Disconnect the system from the mains before connecting the instrument.
- Add a fuse adapted to the energy requirements.

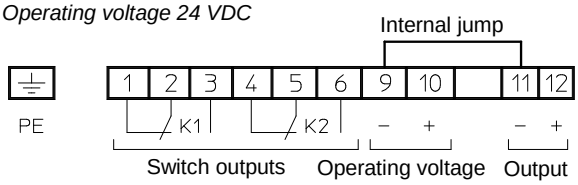
4-wire connection

Operating voltage 230 VAC / 115 VAC / 24 VAC



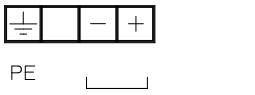
3-wire connection

Operating voltage 24 VDC



2-wire connection

Operating voltage 24 VDC



5 Commissioning

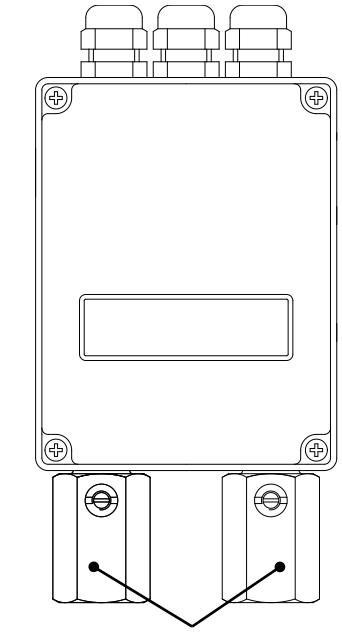
All electrical supply, operating and measuring lines, and the pressure connections must have been correctly installed before commissioning. All supply lines are arranged so that there are no mechanical forces acting on the instrument.

Check that the pressure connections do not leak before commissioning.

5.1 Pressure surge absorption

In the case of pulsating pressure on the system side, wear and functional impairments to the instrument may occur. As a protective measure, we recommend the installation of damping elements in the pressure connection lines.

The installed cutting ring or hose connections are removed and the damping reactor is installed instead (see fig.). Then the dismantled cutting ring or hose connections can be remounted.

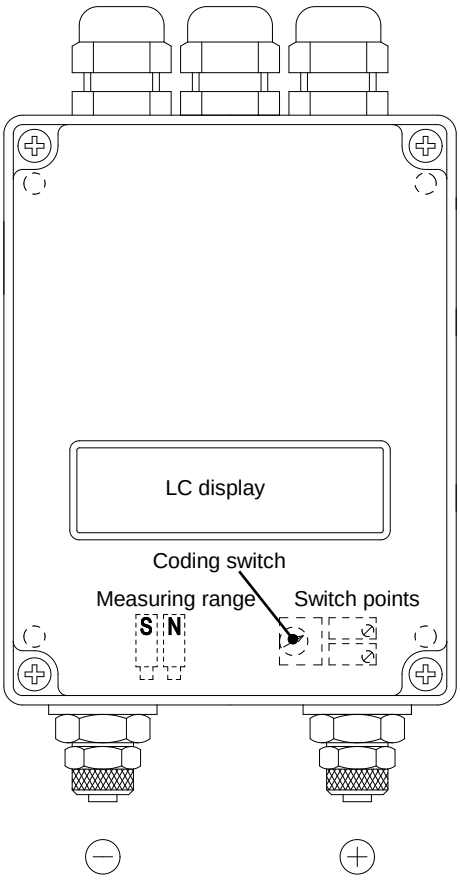


Settable damping reactors MZ41

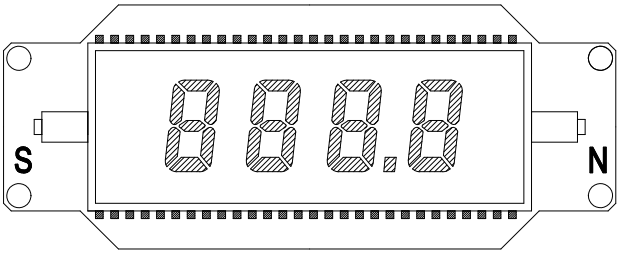
In the operational status, the reactor pins need to be set so that the measurement display follows the pressure changes with a delay.

5.2 Operating elements

After opening the lid of the casing, the operating elements are arranged as follows:

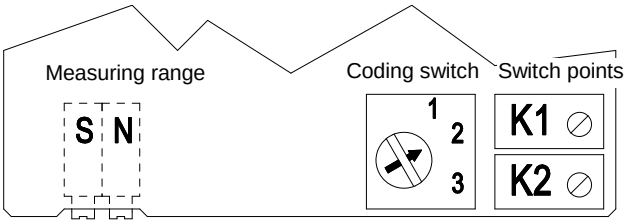


5.2.1 Display range



N Zero point
S Steepness

5.2.2 Measuring range and switch points



N Zero point
S Steepness

1 Actual value
2 Switch point K1
3 Switch point K2

5.3 Adjustment of the zero-point and measuring range

The differential pressure transmitter is delivered with factory settings. They do not usually need to be adjusted at the assembly site.

If the output signal does need to be adjusted, please proceed as described below.

5.3.1 Linear output signal

- Remove the lid of the casing.
- Measure the output signal by connecting a current or voltage measuring instrument between the terminals 11 and 12.
- Connect the operating voltage between the terminals 9 and 10 and switch it on.

In the case of two-wire instruments, the current measuring instrument needs to be switched in series to the operating voltage source.

- Reduce the pressure in the measuring system until the start of the measuring range has been reached. The corresponding value (0/4 mA or 0 V) appears on the display of the measuring instrument. In the case of any deviations, the output signal can be set with the zero-point potentiometer.
- Increase the pressure in the measuring system until the end of the measuring range has been reached. The corresponding value (20 mA / 10 VDC) appears on the display of the measuring instrument. In the case of any deviations, the output signal can be set to the end value via the steepness potentiometer.

- It is sensible to check the zero point and measuring range end value again (adjust if necessary).
- Remount the lid of the casing.

5.3.2 Rooted output

The zero point and the measuring range are adjusted in the same way as the linear output (see above).

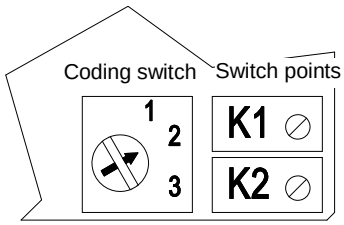
The only difference is that a check is carried out in the measuring range midpoint.

When the pressure is set accordingly in the measuring system, the measuring device needs to display one of the following values in the output.

Output signal	Measured value	Tolerance
0 … 20 mA	14.14 mA	± 0.20 mA
4 … 20 mA	15.31 mA	± 0.16 mA
0 … 10 V	7.07 V	± 0.10 V

5.4 Setting the switching points

The instrument has a coding switch on the main PCB (bottom right) and one or two setting potentiometers (depending on the model) for setting the switching points.



The coding switch can be used to set the value that is to be displayed.

The actual value is displayed in switch position 1. The respective switch points are shown in the two other switch positions (2 and 3).

The setting is made as described below:

5.4.1 Switch point K1

- Remove the lid of the casing.
- Switch on the operating voltage.
- Set the coding switch to position 2. The display now shows switch point K2.
- Set the switch point to the required value.
- Set the coding switch back to position 1. The display now shows the current measured value again.
- Remount the lid of the casing.

5.4.2 Switch point K2

The switch point K2 is set in the same way as switch point K1 (see above). However different in code switch setting 3.

6 Maintenance

The instrument is maintenance-free.

We recommend checking the instrument at regular intervals to ensure reliable operation and a long service life.

- Check the reading.
- Check the switching function in combination with downstream components.
- Check the pressure connections lines for leaks
- Check the electrical connection (cable clamp connection).

The precise test cycles need to be adapted to the operating and ambient conditions. If various instrument components interact, the operating instructions of all the other instruments also need to be observed.

7 Transport

The instrument must not be exposed to mechanical shocks. It shall be transported only in packaging specifically intended for transport.

8 Service

All damaged or faulty instruments shall be directly sent to our repair department. Please coordinate all shipments with our sales department.

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

9 Accessories

No accessories

10 Disposal

For the sake of the environment ....

Please help to protect our environment and dispose of or recycle used instruments as required by the applicable regulations.

11 Technical Specification

General points

Measuring ranges	0 … 4 mbar to 0 … 600 mbar (see order code)
Max. stat. operating pressure	3 bar (see order code)
Max. pressure load	Over-pressure-proof up to permissible operating pressure
Measuring accuracy	± 1 % of the measuring range
Temperature drift	0.5 % /10 K
Admissible ambient temperature	-10 °C to +60 °C
Admissible media temperature	-20 °C to +70 °C
Admissible storage temperature	-25 °C to +80 °C
Enclosure protection class	IP 54 as per DIN EN 60 529

Electrical data

Electrical connection type	**Four-wire**		**Three-wire**		**Two-wire**	
Operating voltage	*Rated voltage*	*- tolerance*	*Rated voltage*	*- tolerance*	*Rated voltage*	*- tolerance*
	230 VAC	+10/-15%				
	115 VAC	+10/-15%				
	24 VAC	±10%	24 VDC	±10%	24 VDC	±10%
Output signal	**0 … 20 mA**	**0 ... 10V**	**0 … 20 mA**	**0 ... 10V**	**4 … 20 mA**	
Load at rated voltage	max. 800 Ω	> 2 kΩ	max. 800 Ω	> 2 kΩ	max. 500 Ω	
Current limiting	approx. 30 mA	approx. 30 mA	approx. 30 mA	approx. 30 mA	approx. 30 mA	
Voltage limit	-	approx. 12 V	-	approx. 12 V	-	
Power consumption	approx. 3 VA	approx. 3 VA	approx. 3 VA	approx. 3 VA	≤ 0.75 W	

Characteristic curve

Root extraction of the output with slow-feed suppression	±0.5 % 2% is set
Steepness adjustment	approx. 10 % of the measuring range
Zero-point adjustment	approx. 10 % of the measuring range

Measured value display / contact elements

Display	3 ½ -digit LC-Display
Switch point setting	The digital display can be switched between the actual differential pressure value and the switch point settings by means of a selector switch. The Output I or Output II can be selected. The digital display now shows the applicable set target value. The target values can be set over the entire measuring range.
Switch point hysteresis	approx. 2%
Switching output	1 or 2 potential-free changeover contact

Load data of the contacts	**AC**	**DC**
U_{max}	250V	30V
I_{max}	2 A	2 A
P_{max} (resistive load)	250 VA	60 W

Connections

Process connection	Inner thread G 1/4, Hose screw connections made of Al, 6/8 mm Cutting ring screw connections made of MS for 6 or 8 mm pipes
Electr. connection	Internal terminal strip, cable opening with M16 x 1.5 Plug connections on request

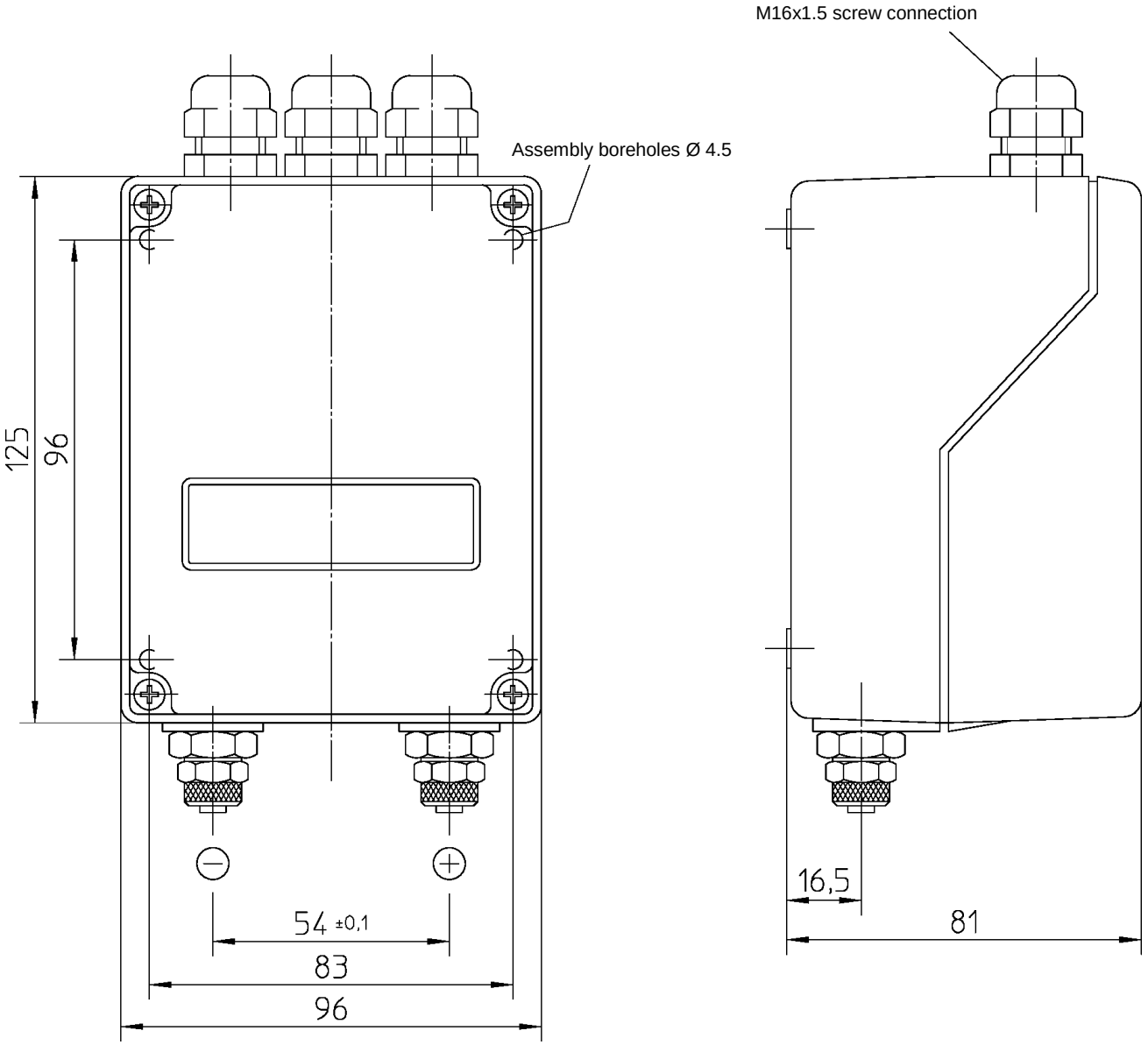
Materials

Casing	Cast aluminium, painted
Hood	ABS – self-extinguishing
Measuring element	Diaphragm capsule made of CuBe 2

Assembly

Install vertically if mounted to walls
Zero-point correction recommended if installed in a different position

12 Dimensional drawings (All dimensions in mm unless otherwise stated)



13 Order Codes

Differential pressure transmitter

DE50 [ ][ ][ ][ ][ ][ ][ ][ ]

Measuring range	Stat. operating pressure		
0 ... 1.6 mbar	8 mbar	(Cl.:2.5) ..... >	**9 7**
0 ... 2.5 mbar	8 mbar	(Cl.:2.5) ..... >	**9 8**
0 ... 4 mbar	20 mbar	..... >	**5 2**
0 ... 6 mbar	30 mbar	..... >	**5 3**
0 ... 10 mbar	50 mbar	..... >	**5 4**
0 ... 16 mbar	80 mbar	..... >	**5 5**
0 ... 25 mbar	125 mbar	..... >	**5 6**
0 ... 40 mbar	200 mbar	..... >	**5 7**
0 ... 60 mbar	300 mbar	..... >	**5 8**
0 ... 100 mbar	500 mbar	..... >	**5 9**
0 ... 160 mbar	800 mbar	..... >	**6 0**
0 ... 250 mbar	1200 mbar	..... >	**8 2**
0 ... 400 mbar	2000 mbar	..... >	**8 3**
0 ... 600 mbar	3000 mbar	..... >	**C 1**
-1 ... 0.6 mbar	5 mbar	..... >	**C 2**
-1 ... 5 mbar	30 mbar	..... >	**C 3**
-4 ... 6 mbar	50 mbar	..... >	**5 0**
-10 ... 6 mbar	80 mbar	..... >	**6 3**
-20 ... 40 mbar	300 mbar	..... >	**6 8**
-40 ... 60 mbar	500 mbar	..... >	**7 0**
-100 ... 60 mbar	800 mbar	..... >	**7 3**
-250 ... 150 mbar	2000 mbar	..... >	**7 7**
0 ... 160 Pa	800 Pa	..... >	**D 5**
0 ... 250 Pa	1250 Pa	..... >	**D 6**
0 ... 400 Pa	2000 Pa	..... >	**D 7**
0 ... 600 Pa	3000 Pa	..... >	**D 8**
0 ... 1000 Pa	5000 Pa	..... >	**D 9**
0 ... 1600 Pa	8000 Pa	..... >	**E 1**
0 ... 2.5 kPa	10 kPa	..... >	**N 3**
0 ... 4.0 kPa	20 kPa	..... >	**N 4**
0 ... 6.0 kPa	30 kPa	..... >	**N 5**
0 ... 10 kPa	50 kPa	..... >	**E 5**
0 ... 16 kPa	80 kPa	..... >	**E 6**
0 ... 25 kPa	120 kPa	..... >	**E 7**
0 ... 40 kPa	200 kPa	..... >	**E 8**
0 ... 60 kPa	300 kPa	..... >	**F 1**

Pressure connection

Inner thread G 1/4 ..... >	**0 1**
Cutting ring screw connection in brass for 6 mm pipe ..... >	**2 8**
Cutting ring screw connection in brass for 8 mm pipe ..... >	**2 9**
Cutting ring screw connection in brass for 10 mm pipe ..... >	**3 0**
Aluminium screw connection for 6 / 4 mm hose ..... >	**4 0**
Aluminium screw connection for 8 / 6 mm hose ..... >	**4 1**

Electrical output signal

0 – 20 mA 3-wire (STANDARD) ..... >	**A**
4 - 20 mA 2-WIRE, only 24 V DC, without contacts, without root extraction ..... >	**B**
0 – 10 V DC 3-wire (STANDARD) ..... >	**C**
0 - 20 mA rooted, 3-wire connection ..... >	**E**
4 - 20 mA rooted, 3-wire connection ..... >	**F**
0 - 10 V DC rooted, 3-wire connection ..... >	**G**
4 – 20 mA 3-wire (STANDARD) ..... >	**P**

Operating voltage

230 VAC +10%/-15% ..... >	**1**
115 VAC +10%/-15% ..... >	**2**
24 VAC ±10% ..... >	**4**
24 VDC ±10% ..... >	**9**

Measuring value display/switching elements

Without measuring value display/switching elements ..... >	**0**
3½-digit measured value display ..... >	**1**
3½-digit measured value display with a potential-free contact ..... >	**2**
3½-digit measured value display with two potential-free contacts ..... >	**5**

Electrical connection

Inner terminal strip ..... >	**E**
M12 plug connection (only for 24 V AC/DC) ..... >	**M**

14 Declaration of conformity

EG-Konformitätserklärung

Für das nachfolgend bezeichnete Erzeugnis

EC Declaration of Conformity

For the product described as follows

Differenzdrucktransmitter
Differential Pressure Transmitter

DE50 # # # # # # # # # #

gemäß gültigem Datenblatt **DB_DE_DE50**

wird hiermit erklärt, dass es den grundlegenden Anforderungen entspricht, die in den nachfolgend bezeichneten Richtlinien festgelegt sind:

in accordance with the valid data sheet **DB_EN_DE50**

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

EG Richtlinien			EC Directives	
2004/108/EG	EMV Richtlinie	EMV	EMC Directive	EMC
2006/95/EG	Niederspannungsrichtlinie	NSR	Low Voltage Directive	LVD

Die Produkte wurden entsprechend der folgenden Normen geprüft:

The products were tested in compliance with the following standards:

EMV (EMC)	
DIN EN 61326-1	2006-10
DIN EN 61326-2-3	2007-05
NSR (LVD)	
DIN EN 61010-1	2011-07

Die Geräte werden gekennzeichnet mit:

The devices bear the following marking:

CE

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung in Bezug auf die Erfüllung der grundlegenden Anforderungen und die Anfertigung der technischen Unterlagen trägt der Hersteller :

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:

Fischer Mess- und Regeltechnik GmbH
Bielefelderstr. 37a
32107 Bad Salzuflen, Germany
Tel. +49 5222 974 0

Bad Salzuflen, 06.11.12
(Ort, Datum / Place, date)

(rechtsverb. Unterschrift / legally binding signature)

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Harmonisierungsrechtsvorschriften, beinhaltet jedoch keine Zusicherung von Eigenschaften.

This declaration certifies compliance with the specified harmonisation law regulations, but does not include assurance of specific properties.

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