

Operating Instructions

DE03 | Differential pressure transmitter

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1 Safety instructions

1.1 General

This manual contains detailed information about the product and instructions for its installation, operation and maintenance. Operators and other technical personnel responsible for the equipment must read this thoroughly before attempting to install or operate this equipment. A copy of this manual must always be kept accessible at the place of work for reference by concerned personnel.

Chapter 1 (sections 1.2 through 1.7) contains general as well as specific safety instructions. Chapters 1 through 10, covering topics ranging from intended purpose of the equipment to its final disposal, also include important points relating to safety. Overlooking or ignoring any of these safety points can endanger humans and animals, and possibly cause damage to other equipment.

1.2 Personnel qualification

Personnel responsible for installation, operation, maintenance and inspection of this product must have the qualifications, training and experience necessary to carry out such work on this type of equipment.



1.3 Risks of disregarding safety instructions

Disregarding safety instructions, use of this product for purposes for which it is not intended, and/or operation of this product outside the limits specified for any of its technical parameters, can result in harm to persons, the environment, or the plant on which it is installed. Fischer Mess- und Regeltechnik GmbH will not be responsible for consequences in such circumstances.

1.4 Safety instructions for operators

Safety instructions for the proper use of this product must be followed. This information must be available at all times by personnel responsible for installation, operation, maintenance and inspection of this product. Adequate steps must be taken to prevent the occurrence of hazardous conditions that can be caused by electric energy and the convertible energy of the process media. Such conditions can, for example, be the result of improper electrical or process connections. Detailed information is available in relevant published norms (DIN EN, UVW in Germany; and equivalents in other countries), industrial standards such as DVWG, Ex-, GL-, VDE guidelines, as well as regulations of the local authorities (e.g., EVUs in Germany).



1.5 Modification forbidden

Modification or other technical alteration of the product is not permissible. This also applies to the use of unauthorized spare parts for repair / maintenance of the product. Any modifications to this product, if and as necessary, should be done only by Fischer Mess- und Regeltechnik GmbH.

1.6 Operational restrictions

The operational reliability of the product is guaranteed only when used for intended purposes. The product must be selected and configured for use specifically with defined process media. The limiting values of operating parameters, as given in the product specification sheet, must never be crossed.

1.7 Safety considerations during installation and maintenance

The safety instructions given in this manual, existing national regulations relating to accident prevention, and the internal safety rules and procedures of the user organization regarding safety during installation, operation and servicing must all be followed meticulously.

It is the responsibility of the users to ensure that only suitably qualified and experienced technical personnel are used for installation, operation and servicing of this equipment.

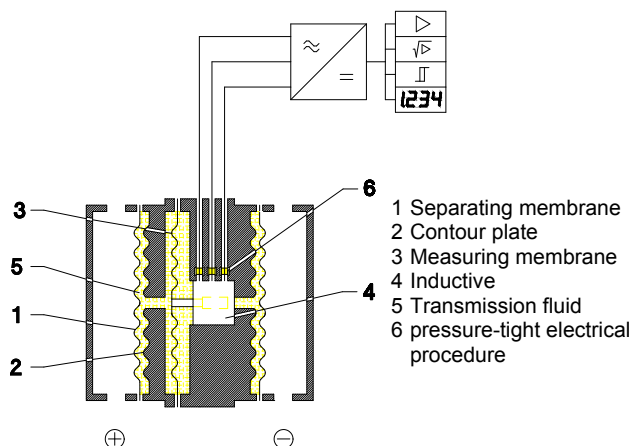
2 Intended Use

As a measuring transducer for differential pressure for gas-like or fluid media.

The instrument may only be used for the intended use given in the manufacturer's data sheet.

3 Description of the Product and its Mode of Operation

3.1 Function diagram



3.2 Design and Mode of Operation

The differential pressure transmitter DE03 has a membrane system filled with liquid whose pressure-proportional deflection is realised into an electrical uniform signal by means of an inductive sensor. The pressure levels that are to be compared are exerted respectively against a separation membrane and are forwarded to the measuring membrane through the transmission fluid. When the pressure is equalised, the measuring system is at rest.

If there is a pressure difference between the (+) and the (-) connection, the generated force deflects the measuring membrane toward the lower pressure. The deflection path is proportional to the pressure. The conversion of the path deflection into an electrical uniform signal is effected via an inductive sensor with downstream electronics.

If the differential pressure exceeds the measuring range defined for the measuring system, the respective separation membrane of the overloaded side presses against the casing wall that is shaped like a wave plate. The maximum displacement volume of the separation membrane up to the system on the wave plates is designed so that the measuring range of the measuring membrane is never exceeded. This achieves overload protection up to the rated pressures of the measuring system.

4 Installation and Setting Up

The unit is designed for mounting to even assembly plates.

The instrument is calibrated in-factory for vertical installation, though it can be installed in any position required. For any installation positions that are not vertical, the zero-point signal needs to be corrected via the installed zero-point adjuster (5.2).

The casing protection class IP54 is only guaranteed if the connection line that matches the cable screw connection is used. Its outer diameter must lie between 7 and 13 mm.

4.1 Process connection

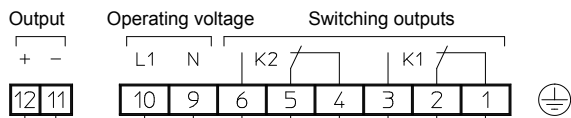
- The process connection may be realised by authorized and qualified specialized personnel.
- The pipes need to be depressurized when the instrument is being connected.
- Appropriate steps must be taken to protect the instrument from pressure surges.
- Check the suitability of the instrument for the media that is to be measured.
- Ensure that the maximum pressure is not exceeded.

4.2 Electrical connection

- The electrical connection may be realised by authorized and qualified specialized personnel.
- The instrument must be connected electrically in accordance with the relevant VDE guidelines and the guidelines of the local EVU.
- Disconnect the system from the mains before you start the work.
- Provide a protective circuit for the contacts according to the switching capacity for radio interference suppression (cracks).
- Install the consumer-adapted fuses.

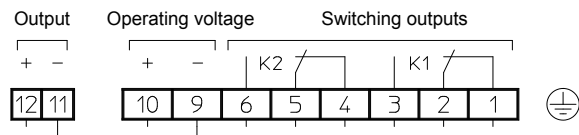
4.2.1 Operating Voltage AC

The four-wire connection for rated voltage AC. Supply and output are separated galvanically.

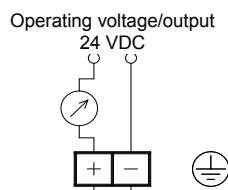


4.2.2 Operating Voltage DC

Three-wire connection for operating voltage DC. Terminal 9 and 11 are connected internally.



4.2.3 Operating Voltage DC two-wire



5 Commissioning

All electrical supply, operating and measuring lines and the pressure connections must have been correctly installed before commissioning. All connecting pipes must be laid in a way that ensures that no mechanical forces act on the instrument.

The pressure measuring lines must be installed on a gradient so that no air pockets e.g. for liquid measurements or water pockets e.g. for gas measurements can be created. If the required incline is not reached, water and/or air filters need to be installed at suitable points.

The pressure measuring lines need to be kept as short as possible and installed without sharp bends to avoid interfering delay times.

Check the leak-tightness of the pressure connections after commissioning.

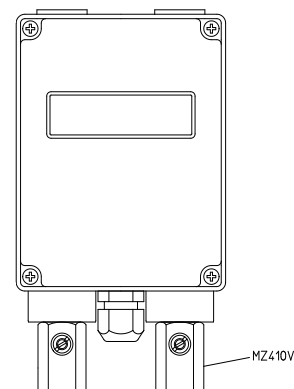
5.1 Pressure measuring line that is to be connected

The pressure connections are marked with the (+) and (-) symbols on the instrument. In the case of differential pressure measurements, the higher pressure is connected to the (+) side and the lower pressure to the (-) side of the instrument.

5.2 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.

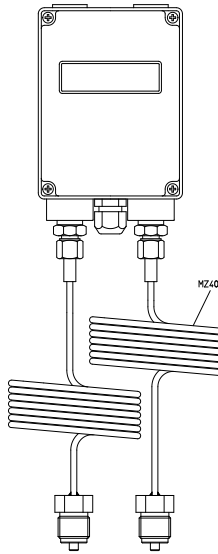
5.2.1 In the case of fluid media



Controllable damping reactor MZ41

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

5.2.2 For gas-like media



Capillary throttle coils MZ40

5.3 Setting the switching points

The instrument has two setting potentiometers and a coding switch on the main PCB for setting the switching points. Both are freely accessible after the lid of the casing has been removed.

The coding switch can be used to select what is shown on the display.

Setting	Display	potentiometer
1	Actual value	
2	Switch point 1	K1
3	Switch point 2	K

To set a switching point, you need to put the coding switch into the appropriate position. The switching point is now shown on the display and can be set with the associated potentiometer.

After making the setting, the coding switch needs to be returned to position 1 so that the actual value is shown on the display.

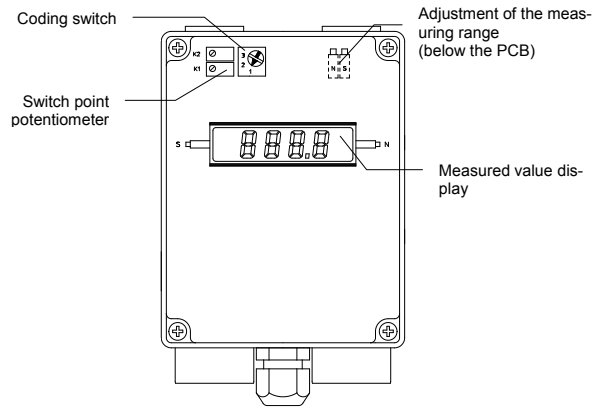
The setting 4 of the coding switch is locked and has no function.

5.4 Adjustment of the measuring range

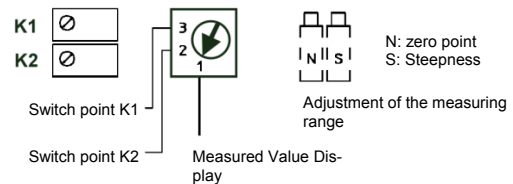
The differential pressure transmitter is delivered with factory settings. Usually these settings do not need to be adjusted at the assembly site.

If the output signal does need to be adjusted, this can be undertaken using the installed zero-point potentiometer. The position and the function of the operating elements are shown in the following illustrations.

In the case of instruments with a root-extracted power output, the measuring range may only be adjusted on site after consulting the manufacturer.



Coding switch and setting potentiometer



- Open the lid of the casing.
- Connect a current or voltage measuring instrument between the terminals 11 and 12 to measure the output signal.
- Switch on the auxiliary energy.
- Depressurise the measuring system. The output signal must now be 0/4 mA or 0V. If this is not the case, set the zero point using the zero-point potentiometer (N).
- Increase the pressure in the measuring system to the final value of the measuring range. The output signal must now be 20 mA or 10V. If this is not the case, set the range using the steepness potentiometer (S).
- It is sensible to check the zero point and measuring range end value again as the range correction has an effect on the zero point.
- Close the lid of the casing.

5.5 Adjustment of the display

The differential pressure transmitter is delivered with a display that is adjusted in the factory and usually does not need to be readjusted.

However if you do need to readjust it, you will find two potentiometers on the left and right of the display with which you can set the zero point (N) and steepness (S).

6 Maintenance

The instrument is inherently maintenance-free.

However, to ensure reliable operation and maximize the operating life of the instrument, it is recommended that the instrument, its external electrical and process connections, and external connected devices be regularly inspected, e.g.:

- Check the display.
- Check the switching function in connection with secondary components.
- Check all pressure connections for leak-tightness.
- Check the integrity of all electrical connections of the instruments.

Inspection and test schedules depend on operating and site conditions. The operating manuals of other equipment to which the differential pressure transmitter is connected must be read thoroughly to ensure that all of them work correctly when connected together.

7 Transport

The product must be protected against shock and vibration during transport. It must therefore be properly packed, preferably in the original factory packaging, whenever it is to be transported.

8 Service

Any defective devices or devices with missing parts should be returned to Fischer Mess- und Regeltechnik GmbH. For quick service contact our service department.



Remaining medium in and on dismantled measuring instruments may cause danger to persons, environment and equipment. Take reasonable precautions! Clean the instrument thoroughly if necessary.

9 Accessories

see technical data and/or dimensional drawings

10 Disposal

Protect your environment!



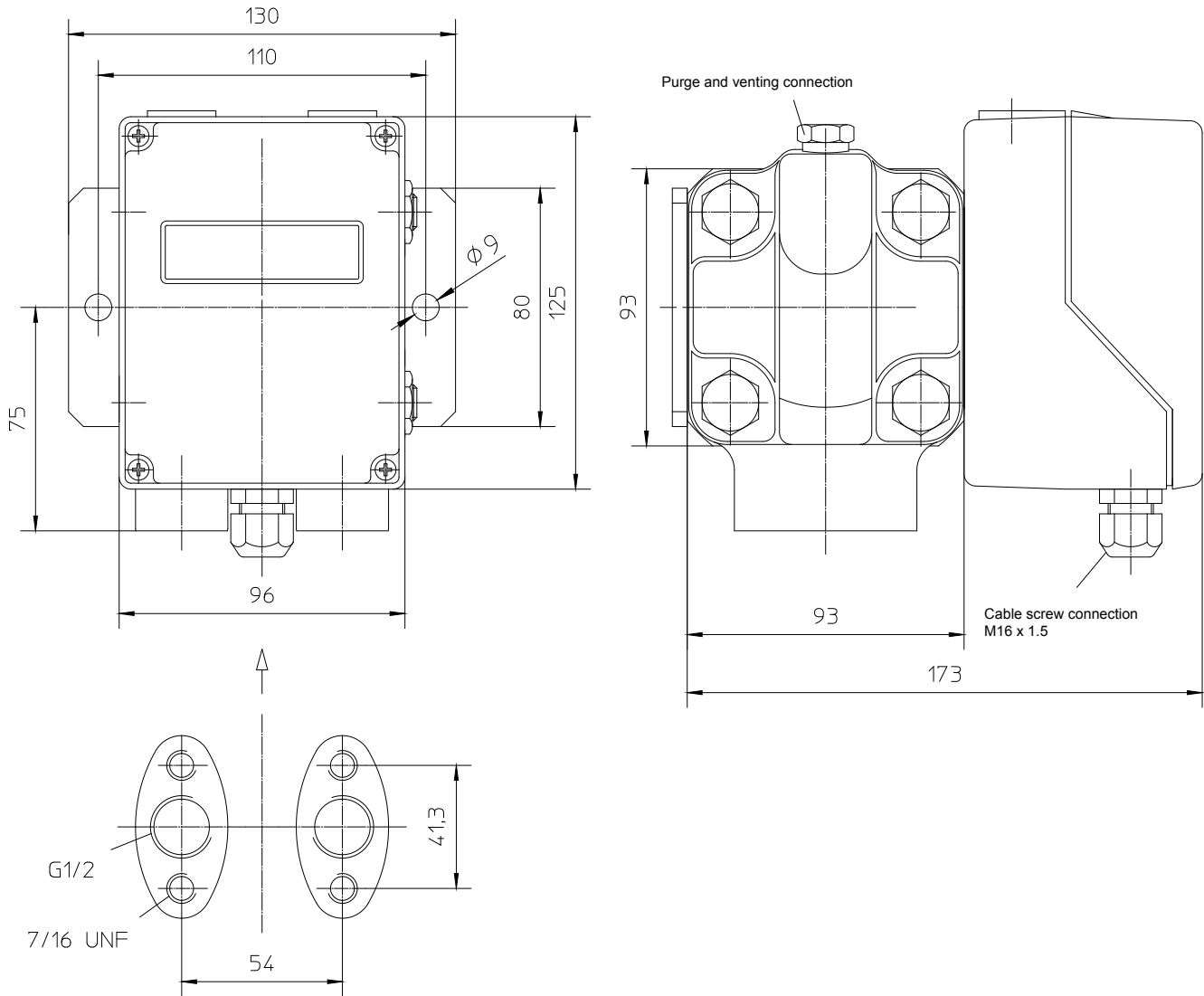
Use the product in accordance with relevant regulations. Please be aware of environmental consequences of disposal at the end of the product's life. bzw. sie weiter zu verwenden.

11 Technical Data

General					
Measuring ranges	0-40 mbar to 0-25 bar (see order code)				
Rated pressure of the measuring system	100 bar				
Max. stat. operating pressure	100 bar				
Max. pressure load	Over-pressure-proof up to permissible operating pressure				
Linearity	< 1% FS				
Hysteresis	< 0.3% FS				
Temperature drift	< 0.5% / 10 K				
Permissible ambient temperature	< -10°C to +70°C				
Permissible media temperature	70 °C				
Protection class	IP 54 acc. to DIN EN 60529				
Electrical Data					
Output signal	0 ... 20 mA		0 ... 10 V		4 ... 20 mA
Operating voltage	24 VDC 24 VDC	230 VAC 115 VAC 24 VAC	24 VDC	230 VAC 115 VAC 24 VAC	24 VDC
Electrical connection	Three-wire	Four-wire	Three-wire	Four-wire	Two-wire
Load at rated voltage	max. 1kΩ		> 2kΩ		max. 450Ω
Current limiting	approx. 30 mA		-		approx. 30 mA
Voltage limit	-		approx. 12V		-
Root extraction of the output	+/- 0.5 % (additional errors)				
Slow-feed suppression	2% is set				
Measured value display	3 1/2-digit LC-Display				
Steepness adjustment	approx. 10% of the measuring range				
zero point adjustment	approx. 10% of the measuring range				
Switch Points					
Switch point setting	The digital display can be switched using the coding switch between the differential pressure actual value and the two switching points. The switching points are set respectively with a potentiometer.				
Switch point hysteresis	approx. 2%				
Switching output	1 or 2 potential-free changeover contact				
Load data of the contacts	$U_{max} = 250 \text{ VDC}$ $I_{max} = 2 \text{ A}$ $P_{max} = 250 \text{ VA}$				
Connection					
Electrical connections	Internal terminal strip, cable opening with cable screw connection M16 x 1.5 (plug connections on request)				
Pressure connections	Pipe connection via screwed-on cutting ring or clamp ring connection or direct screw connection of the pipes using suitable sealing agent into the connections of the casing G $\frac{1}{2}$ i. (other connections on request)				
Rinsing and venting connection	G 1/8 inner thread with closing plug				

Materials	
Pressure caps/separating membrane	Chromium nickel steel 1.4571 (has contact to the medium)
Gaskets	Viton/has contact to the medium
Intermediate plates	Aluminium, hard-coated
Electronics casing	Aluminium painted, plastic
Material variants on request	Pressure caps and separation membrane in Hastelloy C (PTFE-coated gaskets)
Assembly/pressure connections	Wall mounted using assembly plate Pipe assembly using accessory DZ10 - Assembly set for 2"-pipes

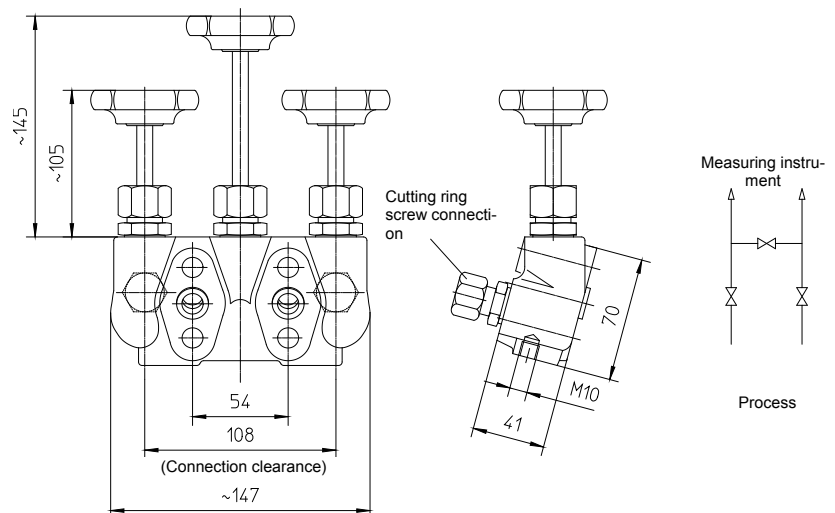
12 Dimensional drawings



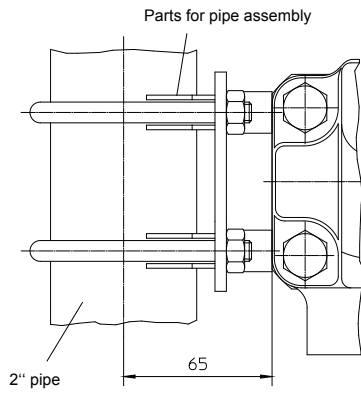
12.1 Accessories DZ36

The three-spindle shut-off and balance block DZ36 that is available as an accessory can be flanged directly. The connection flanges on the instrument comply with DIN 19213 (standard for the connection of differential pressure transducers)

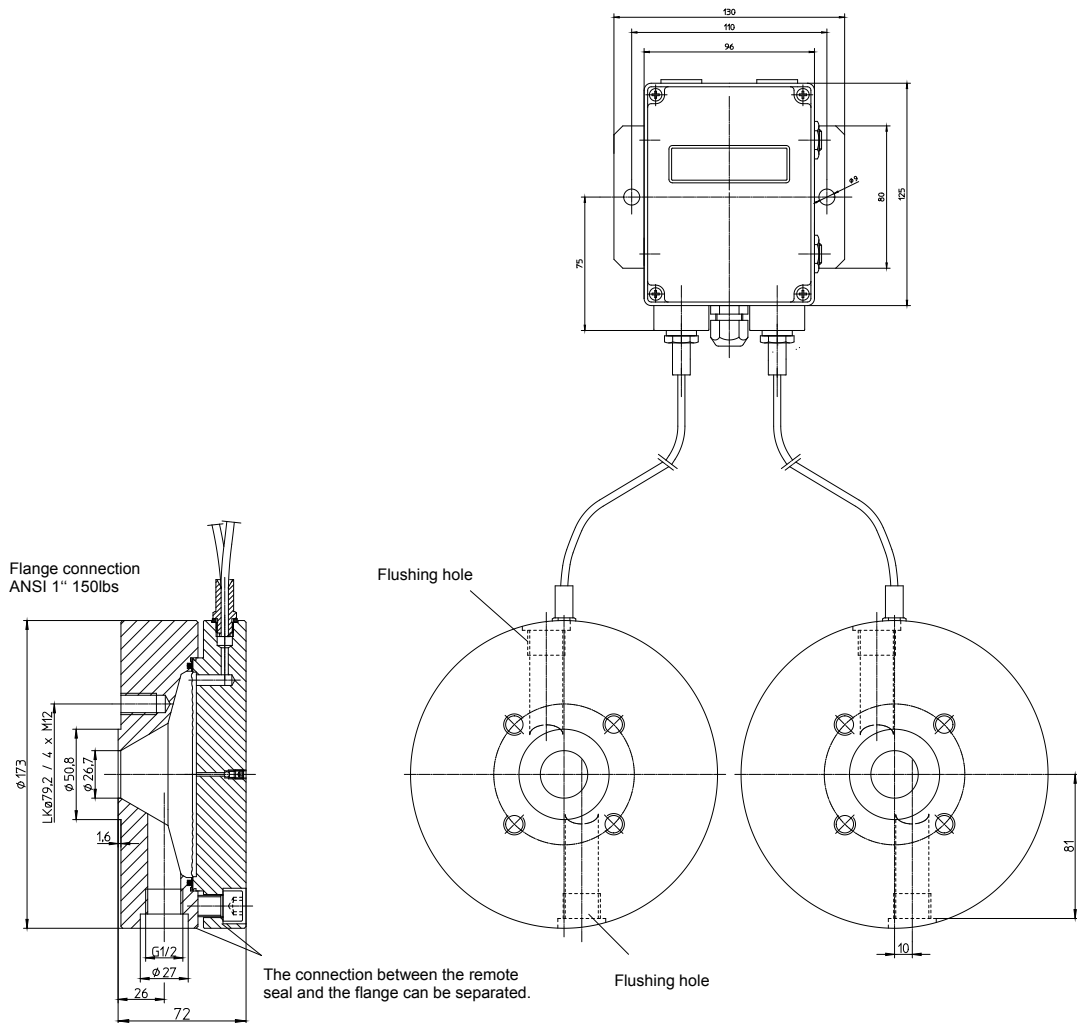
It is also beneficial connecting the differential pressure transmitter via valves as they can then be separated easily from the cable system due to the blocking option (repairs/inspection etc.)



12.2 Accessory assembly set DZ10



12.3 Accessories remote seal



13 Order Codes

Differential pressure transmitter

DE03

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Measuring ranges

0 ... 40 mbar	>	5	7
0 ... 60 mbar	>	5	8
0 ... 100 mbar	>	5	9
0 ... 160 mbar	>	6	0
0 ... 250 mbar	>	8	2
0 ... 400 mbar	>	8	3
-40 ... 60 mbar	>	7	0
-60 ... 100 mbar	>	7	2
-100 ... 150 mbar	>	7	4
-150 ... 250 mbar	>	7	6
0 ... 0.6 bar	>	0	1
0 ... 1 bar	>	0	2
0 ... 1.6 bar	>	0	3
0 ... 2.5 bar	>	0	4
0 ... 4 bar	>	0	5
0 ... 6 bar	>	0	6
0 ... 10 bar	>	0	7
0 ... 16 bar	>	0	8
0 ... 25 bar	>	0	9
-1 ... 0.6 bar	>	3	2
-1 ... 1.5 bar	>	3	3
-1 ... 3 bar	>	3	4
-1 ... 5 bar	>	3	5

Pressure connection

Flange connection according to DIN 19213 with internal thread G1/2	>	0	3
Connecting piece with inside thread 1/4 -18 NPT	>	0	4
Connecting piece with inside thread 1/2 -14 NPT	>	0	5
Connecting pin with outer thread G1/4 B Niro	>	1	1
Connecting pin with outer thread G1/2 B Niro	>	1	3
Connecting pin with outer thread 1/4 -18 NPT EXT Niro	>	1	4
Connecting pin with outer thread 1/2 -14 NPT EXT Niro	>	1	5
Cutting ring screw connection made of 1.4571 for 12 mm pipe ..	>	2	7

Electrical output signal

0 - 20 mA	>	A
4 - 20 mA	>	P
0 - 10 V DC	>	C
0 - 20 mA root extracted,	>	E
4 - 20 mA root extracted,	>	F
0 - 10 V DC root extracted,	>	G
4 - 20 mA 2-CONDUCTOR (* only with measuring value display without switching output and 24 VDC)	>	B

Operating voltage

230 VAC ..	>	1
115 VAC ..	>	2
24 VAC .. ±10%	>	4
24 VDC .. ±10%	>	9

Measured value display/switching output

without measured value display and without a switching output	>	0
3½ digit measured value display without a switching output	>	1
3½ digit measured value display with a potential-free switching output	>	2
3½ digit measured value display with two potential-free switching outputs	>	5

Electrical connection

Inner terminal strip	>	E
M12 plug connection (only for 24 VAC/DC)	>	M

Assembly option

Wall mounting	>	W
Pipe mounting	>	R

14 Declaration of conformity

EG-Konformitätserklärung

Wir erklären in alleiniger Verantwortung, dass nachstehend genannte Produkte

EC Declaration of Conformity

We declare under our sole responsibility that the products mentioned below

Differenzdrucktransmitter / Differential Pressure Transmitter

DE03 #####

gemäß gültigem Datenblatt übereinstimmen mit den

as specified by the current data sheet complies with

EMV-Richtlinien

2004/108/EG (EMV)

EMC-directives

2004/108/EC (EMC)

Die Produkte wurden entsprechend der folgenden Normen geprüft (Störfestigkeit für Industriebereich, Störaussendung für Wohnbereich):

DIN EN 61326-1:2006-10
DIN EN 61326-2-3:2007-05
DIN EN 61010-1:2002-08

The products were tested in compliance with the following standard (Interference immunity for industrial environments, interface emission for residential environments)

DIN EN 61326-1:2006-10
DIN EN 61326-2-3:2007-05
DIN EN 61010-1:2002-08

Die Geräte werden gekennzeichnet mit:

The devices bear the following marking:

CE

Bad Salzuflen, 10.08.10
(Ort, Datum / place, date)


(rechtsverb. Unterschrift / legally authorized signature)

