

Instruction Manual

DE16 || 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 2 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 to 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, UVV 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., EVU's in Germany).



1.5. Modifications 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.

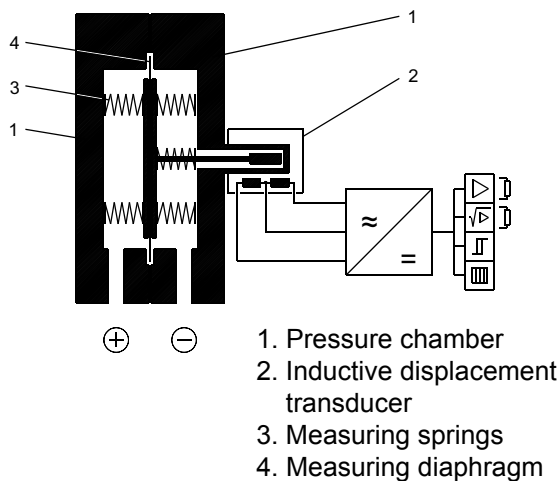
It is the responsibility of the users to ensure that only suitably qualified and experienced technical personnel are used for installation, operation and servicing of this equipment.

2. Intended Applications

Measuring transmitter for overpressure, partial vacuum and differential pressure. It is suitable for accurate monitoring of positive / negative gauge pressure or differential pressure of air and gases. The product must be used only for applications and under conditions specified by the manufacturer.

3. Product Description and Functions

3.1. Block Schematic Diagram



3.2. Principles of Operation

This transmitter is based on a rugged and uncomplicated diaphragm movement, suitable for overpressure, partial vacuum and differential pressure measurement. The operating principle of the system is identical in all three applications.

In a state of equilibrium, the forces of the springs on both sides of the diaphragm are balanced. The pressure or differential pressure to be measured creates an unbalanced force of the springs for the measuring range until a new equilibrium is reached. A centre-mounted tappet transfers the motion of the diaphragm system to the core of an inductive displacement transducer. The subsequent converter circuit transfers this motion into an electrical output signal. The transmitter is short-circuit and reverse battery protected.

4. Installation

The device is intended for mounting on a flat plate or panel. The pressure transmitter is calibrated at the factory while mounted vertically, pressure ports downward. It can be mounted in any orientation. If it is installed with any orientation other than vertical (pressure ports downward), the zero point must be re-set (s. 5.3.). IP54 protection for the housing is guaranteed only if suitable connecting cable is used. Its outer diameter needs to meet a value between 7 and 13 mm.

4.1. Process Connections

- Only qualified technicians authorized for this type of work should undertake installation.
- Ensure that process equipment and pressure lines are at atmospheric pressure before making pressure connections.
- The pressure transmitter should be provided with suitable protection against pressure surges (e.g., snubber or pulsation damper).
- Ensure that the mechanical configuration and materials of construction are compatible with the process media.
- Ensure that process pressure is always less than the specified safe pressure rating.

4.2. Electrical Connections

- Only qualified technicians authorized for this type of work should undertake installation.
- Electrical connections must comply with relevant international, national and local regulations and norms relating to electrical and instrumentation installations.
- Switch off electrical power to the plant before attempting electrical installation work of any kind.
- Make electrical connections to the transmitter through a suitable energy-limiting safety device (isolation or zener barrier).

5. Commissioning

Power supply and signal cabling to the transmitter must be correctly selected to meet operational requirements, and installed in a way that does not cause physical stress to the instrument.

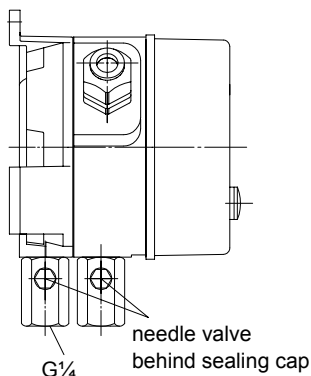
- Pressure lines must have a downward gradient throughout, from the pressure instrument to the process vessel / pipe. This is to prevent formation of air / gas pockets (for liquid applications) and liquid plugs (for air / gas applications). If this continuous downward gradient cannot be provided for any reason, then suitable water and / or air separation devices must be inserted in the pressure lines.
- Pressure lines must be kept as short as possible and must not have short bends to avoid measurement errors induced by pressure line delays.
- Carefully check the pressure-tightness of all pressure connections before start-up.

5.1. Pressure Connections

The instruments pressure ports are marked by "+" and "-" symbols. For differential pressure applications the "+" port must be connected to the higher pressure and the "-" port should be connected to the lower pressure.

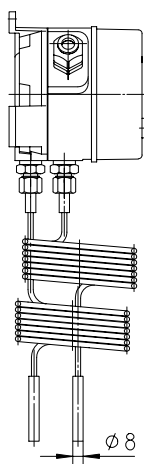
5.2. Shock Pressure Moderation

During pulsating pressure on the plant mechanical wear and disturbances in functional capability may occur. To avoid this we recommend installing absorbers into the pressure lines.



For Gaseous Media

Adjustable attenuator valve **MZ41**
During operating condition adjust needle valve that way, that the indicator follows changes of pressure delayed.

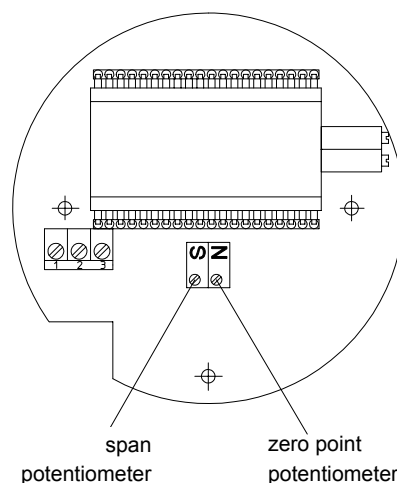


For Gaseous and Liquid Media

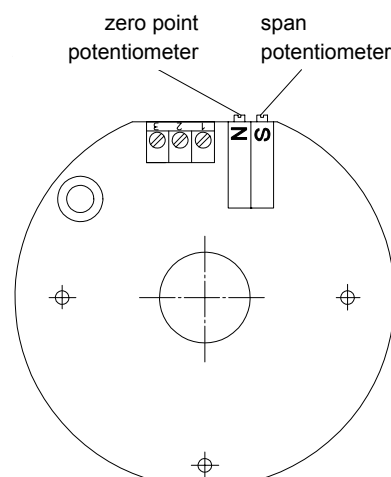
Capillary reactive coil **MZ400**

5.3. Zero Point and Span Adjustment

Usually adjustment of the instrument is not necessary for it is factory calibrated. The output signal can be adjusted with inbuilt zero point potentiometer.



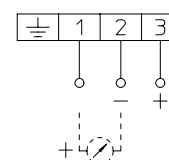
Printed circuit board for all output signal alternatives with indication and 2-wire without indication



Printed circuit board for 3-wire output signal alternatives without indication

5.3.1. Zero Point and Span Adjustment with Output Current

3-wire connection



Adjustment Sequence:

- Dismount cover.
- Connect current indicator (0-20 mA) to output signal between terminals 1 and 2.
- Connect and enter switch on power supply.
- Measuring system depressurized: Output signal = 0 resp. (4) mA. Correct offset using zero point potentiometer **N**.
- Set pressure to end of range value: Output signal 20 mA. Correct offset using span potentiometer **S**.

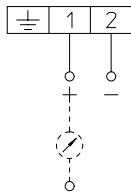
- Check zero point and full scale value again.
- Mount cover.

5.3.2. Zero Point and Range Adjustment for Output Voltage 0-10 V DC

Follow instructions as per 5.3.1.

5.3.3. Zero Point and Range Adjustment for Output Current 4..20 mA 2-wire

2-wire connection



Follow instructions as per 5.3.1. with exception in connecting the current indicator.

6. Maintenance

The instrument is inherently maintenance-free.

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 output signal.
- 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 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.

9. Accessories

9.1. DZ11

Panel mounting kit \varnothing 132 mm consisting of front ring, spacer and fastening screws.

9.2. DZ13/14

Three- and four-spindle shut-off and equalizing valves DZ13/14 are especially suited for mounting differential pressure instruments.

For example they are used for:

- Depressurizing or shutting down of plant.
- Cutting differential pressure instruments off a plant to enable controlling or repairing.
- Shut-off valves may be used for operational checks on site.

DZ14 - additional to DZ13 - is provided with a venting valve to ventilate the connected pipe system. Nominal pressure of these shut-off and equalizing valves is PN40. Case is available in aluminium, brass or stainless steel 1.4301. Several process connections acc. to 13. Ordering Code are available.

10. Disposal



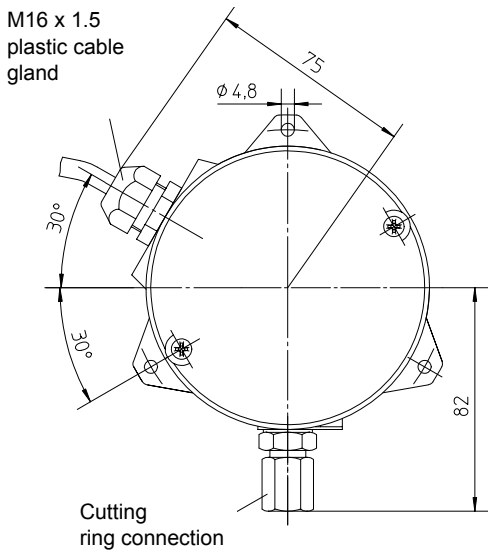
Protect your environment!

Use the product in accordance with relevant regulations. Please be aware of environmental consequences of disposal at the end of the product's life, and take care accordingly.

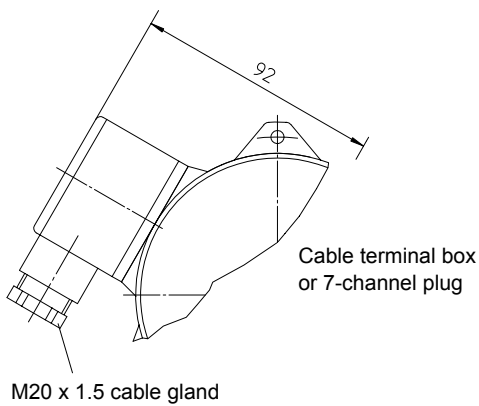
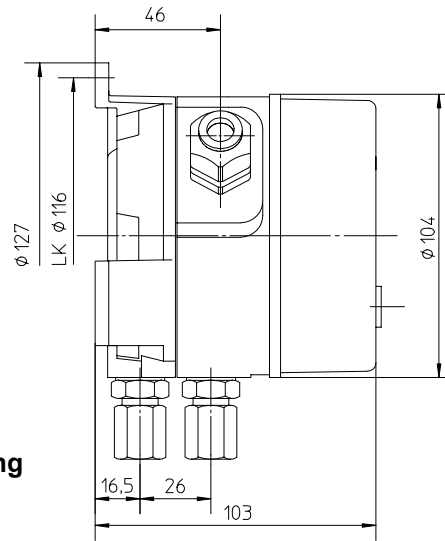
11. Specifications

General					
Measuring range	0...60 mbar to 0....25 bar (acc. to Ordering Code)				
Nominal pressure	25 bar				
Max. pressure load	one-sided overpressure protected up to nominal pressure, on (+) and (-) side of diaphragm, partial vacuum protected				
Perm. ambient temperature	-10°C..... +70°C				
Perm. medium temperature	70°C				
Protection class	IP 54 per DIN EN 60529				
Mounting position	any direction				
Linearity	< 2% FS				
Hysteresis	< 1% FS				
Electrical					
	2-wire connection with or without LC-Display 3-wire connection with LC-Display			3-wire connection without LC-Display	
Electrical connection	2-wire	3-wire	3-wire	3-wire	3-wire
Supply voltage	24 V DC	24 V AC/DC	24 V AC/DC	24 V AC/DC	24 V AC/DC
Perm. supply voltage	15...30V DC	15...30V DC 20...28V AC	15...30V DC 20...28V AC	18...30V DC 21...27V AC	15...30V DC 21...27V AC
Power consumption	≤ 1 W	≤ 0.5 W	≤ 1 W	≤ 2 W	≤ 2 W
Output signal	4-20 mA	0-10 V DC	0-20 mA 4-20 mA	0-10 V DC	0-20 mA 4-20 mA
Load in case of nominal voltage	max. 600 Ω	> 1 K Ω	max. 900 Ω	> 1 K Ω	max.380 Ω
Current limit	max. 23 mA	max. 10 mA	max. 25 mA	max. 15 mA	max. 30 mA
Voltage limit	---	approx. 12 V DC	---	approx.11.5V DC	---
Zero point adjustment	approx. 10% FS				
Slope adjustment	approx. 10% FS				
Measuring Indication	3 ½-digit LC-Display				
Electrical connection	numbered cable, prewired cable terminal box, plug acc. to DIN EN 175 301-803-A				
Pressure connection	female thread G¼, cutting ring connection for 6, 8, 10, 12 mm Ø tube of brass, zincd steel or stainless steel, connection shank G¼ DIN EN 837				
Measuring System					
Measuring range ≤ 10 bar	diaphragm measuring system, diaphragms of reinforced elastomere				
Measuring range ≥ 16 bar	capsule element measuring system, capsule element of DURATHERM®				
Materials					
Pressure chamber	aluminium Gk Al Si 12 (Cu), varnished black aluminium Gk Al Si 12 (Cu) HART-COAT® stainless steel 1.4305				
Measuring diaphragm	diaphragm and gaskets of NBR or Viton® capsule element of DURATHERM® Ni Cr Co-alloy				
Materials, media	stainless steel 1.4310, 1.4305				
Materials, housing	makrolon				
Weight	pressure chamber Al = 1.2 kg, pressure chamber 1.4305 = 3.5 kg				
Mounting	pipe mounting, pressure connections acc. to symbols - by screwed in cutting ring or clamping ring connection - by screwed on connection shank acc. to DIN EN 837 wall mounting - 3 fastening elements				

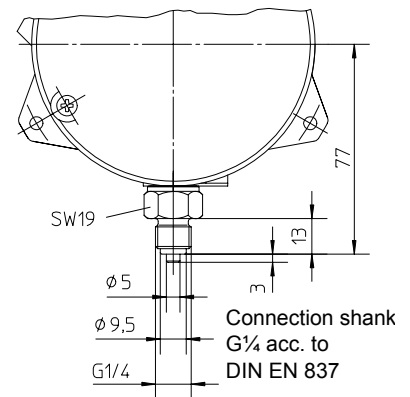
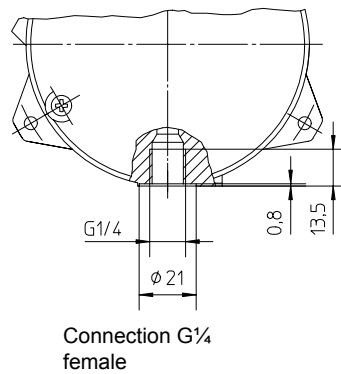
12. Dimensions (all units in mm unless stated otherwise)



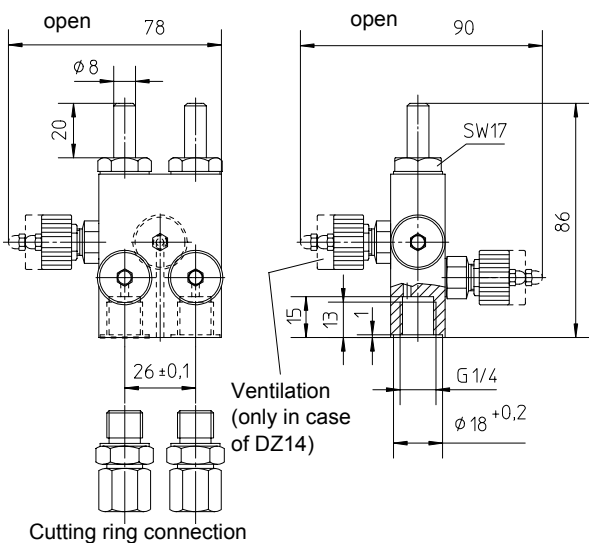
DE 16 Wall mounting (standard version)



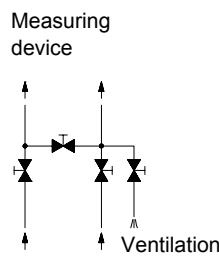
Variants of electrical connection



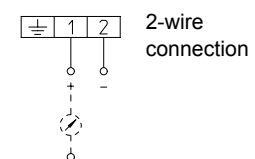
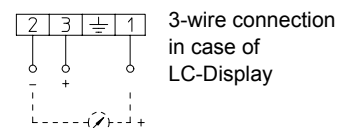
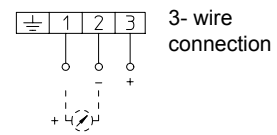
Variants of process connection



DZ13/14 Four spindle shut-off and equalizing valve



Functional description DZ13/14



Electrical connection

13. Ordering Code

Differential Pressure Transmitter DE16

							9			0	0
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Measuring Range

0 . . . 60 mbar.....>	5	8
0 . . . 100 mbar.....>	5	9
0 . . . 160 mbar.....>	6	0
0 . . . 200 mbar.....>	4	4
0 . . . 250 mbar.....>	8	2
0 . . . 400 mbar.....>	8	3
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

Measuring Diaphragm/Gaskets

NBR.....>	N
Viton®.....>	V
DURATHERM® NBR (Range ≥ 16 bar).....>	D
DURATHERM® Viton® (Range ≥ 16 bar).....>	E

Pressure Chamber

Aluminium.....>	A
Aluminium HART COAT®.....>	D
Stainless steel 1.4305.....>	W

Pressure Connections

Female thread G¼.....>	0	1
Connection shank G¼ brass, male.....>	0	6
Connection shank G¼ stainless steel, male.....>	1	1
Cutting ring connection for 6 mm tube of steel.....>	2	0
Cutting ring connection for 8 mm tube of steel.....>	2	1
Cutting ring connection for 10 mm tube of steel.....>	2	2
Cutting ring connection for 12 mm tube of steel.....>	2	3
Cutting ring connection for 6 mm tube of stainless steel 1.4571.....>	2	4
Cutting ring connection for 8 mm tube of stainless steel 1.4571.....>	2	5
Cutting ring connection for 10 mm tube of stainless steel 1.4571.....>	2	6
Cutting ring connection for 12 mm tube of stainless steel 1.4571.....>	2	7
Cutting ring connection for 6 mm tube of brass.....>	2	8
Cutting ring connection for 8 mm tube of brass.....>	2	9
Cutting ring connection for 10 mm tube of brass.....>	3	0

Electrical Output Signal

0 - 20 mA 3-wire.....>	A
4 - 20 mA 2-wire.....>	B
0 - 10 V DC 3-wire.....>	C
4 - 20 mA 3-wire.....>	P

Supply Voltage

24 V DC ±10% (only for 2-wire).....>	9
24 V DC/AC.....>	L

Measuring Indication

Without measuring indication.....>	0
3½-digit LC-Display.....>	1

Electrical Connection

Numbered cable, 1 m, prewired.....>	1
Numbered cable, 2.5 m, prewired.....>	2
Numbered cable, 5 m, prewired.....>	5
Cable terminal box.....>	K
4-pin plug acc. to DIN EN 175 301-803-A.....>	H

Shaded features are not indicated in data sheet and only available on request!

14. CE-Certificate

Declaration of conformityZertifiziert nach DIN EN ISO 9001
Zertifizierungs-Nr.: **08 100 1999**

We declare under our sole responsibility that the following products

Type of instrument: Differential Pressure Transmitter

Type: DE 16

meet the requirements of protection according to the EC directive 89/336EWG and its modification 92/31/EWG and 93/68/EWG referring to the electro magnetical ableness and the requirements of protection according to the low voltage directive 72/23/EWG and ist modification 93/68/EWG.

Generic standards

- **Immunity standard:**
EN 50082-2 2/96 Electromagnetic compatibility, industrial environment
with standards:
EN 61000-4-2
EN 61000-4-3
EN 61000-4-4
EN 61000-4-6
- **Safety requirements:**
EN 61010-1 3/94 Safety requirements for electrical equipment for measurement, control and laboratory use

Bad Salzuffen, 23.11.1999

Günther Hauschild, Managing Director

0308/799

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Technische Änderungen vorbehalten • Subject to change without notice • Changements techniques sous réserve

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