

Instruction Manual

DS11 || Differential Pressure Switch

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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, 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. 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.

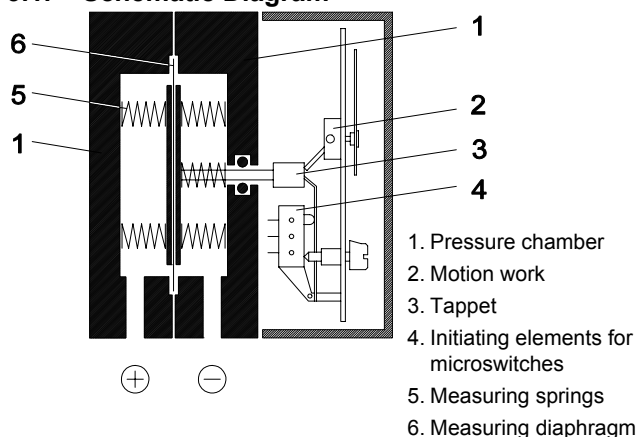
It is the responsibility of the users to ensure that only suitably qualified and experienced technical personnel are used for installation, operation and servicing of this equipment.

2. Intended Applications

The DS11 is a combination of indicating and switching instrument for pressure, differential pressure and partial vacuum. This series is suitable for various measuring applications in the field of industrial and sanitary techniques. Typical applications are measurement of differential pressure between forward- and return flow in heating systems and monitoring of filters and pumps. The pressure chamber and the measuring diaphragm are available in different materials to meet various requirements.

3. Product Description and Functions

3.1. Schematic Diagram



3.2. Principles of Operation

The monitoring and switching instrument is based on a rugged and uncomplicated diaphragm movement suitable for overpressure- partial vacuum- and differential pressure measurements. 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 at the diaphragm. This force moves the diaphragm system against the force of the springs for the measuring range until a new equilibrium is reached. When the subjected to excessive pressure, the diaphragm rests on metal supporting plates.

A centre-mounted tapped transfers the motion of the diaphragm system to the indicator movement and to the initiating elements of the microswitches.

4. Installation

The instrument is intended for wallmounting. It can be attached directly to flat walls by three mounting feet cast to the casing. The instrument can be mounted into switchboard by panel mounting kit DZ11. It is factory-calibrated in vertical position and may not be mounted otherwise.

To ensure proper operation during installation and maintenance, appropriate shut-off fittings have to be installed at the plant. By using recommended accessories (see 9. Accessories, 13. Dimensions and data sheet measuring device accessories MZ) the instrument can be

- depressurized or taken out of operation
- cut off from the relevant pipe net for repair or maintenance purposes
- checked and controlled directly on the spot.

4.1. Process Connections

- Only qualified technicians authorized for this type of work should undertake installation.
- Only for intended mechanical process connection (see ordering code on instrument's type plate)
- Ensure that process equipment and pressure lines are at atmospheric pressure before making pressure connections.
- The instrument should be provided with suitable protection against pressure surges (e.g., snubber or pulsation damper).
- Ensure that the mechanical configuration and materials of construction of the instrument 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 instrument through a suitable fuse.

5. Commissioning

- Power supply and signal cabling to the instrument 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 line.
- The pressure lines must be kept as short as possible and must not have short bends to avoid measurement errors induced by pressure line delays.
- When used with liquid media the lines must be vented to avoid measurement errors induced by different heights in liquid columns.
- The instrument and lines must be protected against frost when used with water.
- Check all pressure connections for leaks before commissioning.

5.1. Pressure Connections

The instruments pressure ports are marked by “+” and “-” symbols. The pressure applications need to be installed according to the label.

Differential pressure measurement: + higher pressure
- lower pressure

Pressure measurement: + pressure port

Negative pressure measurement: - negative pressure port

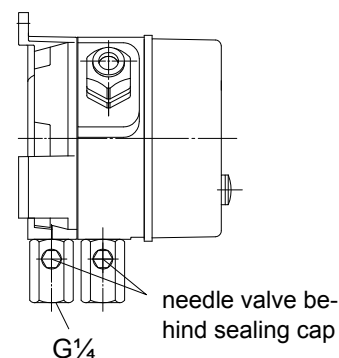
5.2. Pulsation Damping

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 Liquid Media

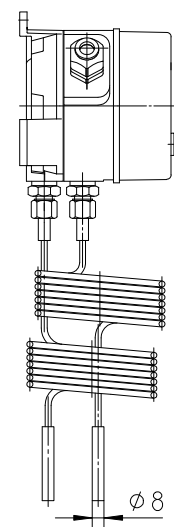
Adjustable attenuator valve **MZ41**

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



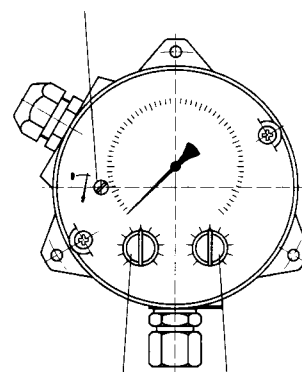
For Gaseous Media

Capillary reactive coil **MZ401**



5.3. Zero Point Adjustment and Setting of Switching Points

Zero point adjustment screw



Switching point adjustment

5.3.1. Zero Point Adjustment

- Vent pressure lines to atmosphere.
- Remove cover.
- Set measuring indicator to zero by zero point adjustment screw (see 5.3.).
- Mount cover.

5.3.2. Setting of Switching Points

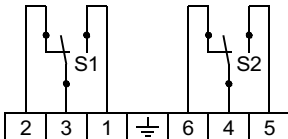
- Unscrew plugs from cover.
- Set desired switching points according to marks on

reference value scale by screwdriver. Achievable accuracy: 5% FS. More exact settings can be achieved by using accessories like testing manometer, ohmmeter on site or ex factory.

- Screw plugs in.

5.4. Connection Scheme

Instrument pressureless and dead



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 output connections and external devices that are connected to these.
- 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 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.

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 Ordering Code are available.


10. Disposal



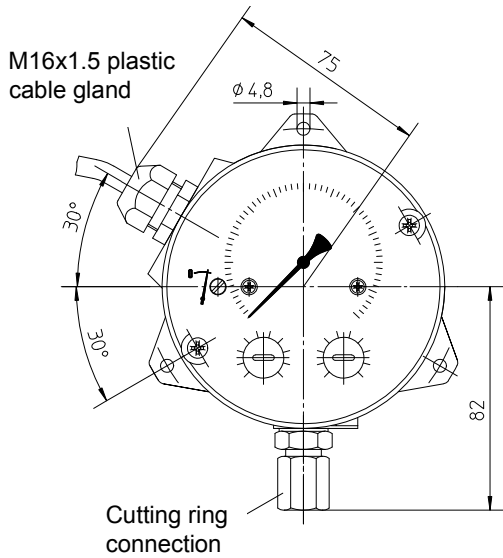
Protect your environment!

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.

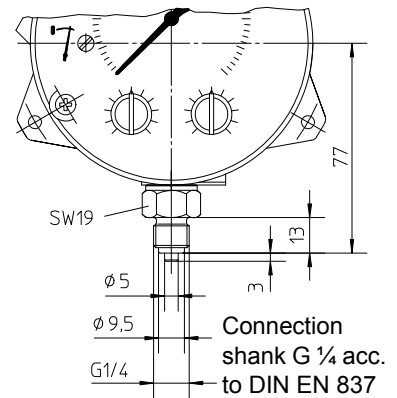
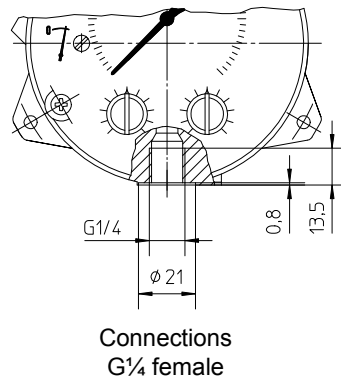
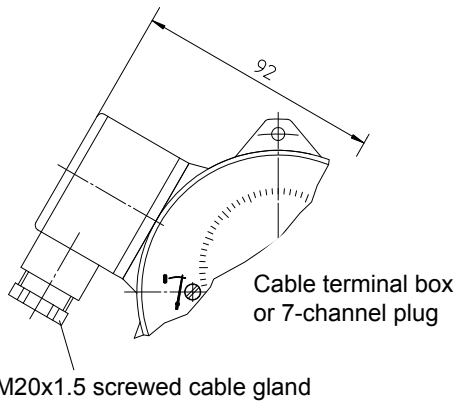
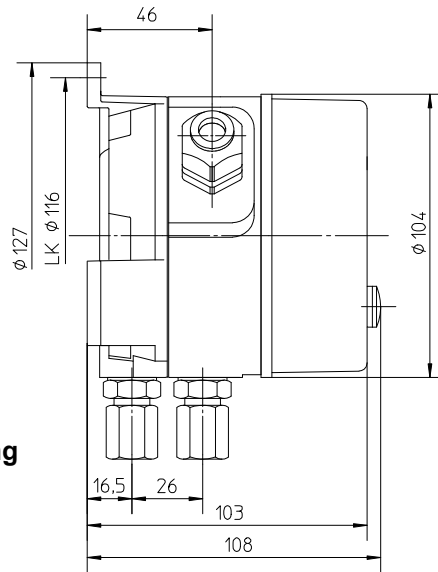
11. Specifications

General	
Measuring range	0... 400 mbar up to 0... 25 bar (see ordering code)
Nominal pressure	25 bar
Max. static operating pressure	Acc. to measuring range (see ordering code)
Max. pressure load	One-sided overpressure protected up to nominal pressure on (+) - and (-) side of diaphragm, partial vacuum protected
Perm. ambient temperature	-10... +70°C (but max. 55°C in case of SEV)
Perm. medium temperature	70°C
Protection class	IP 54 acc. to DIN EN 60529
Mounting position	Vertical
Measuring accuracy	± 2.5% FS
Zero adjustment	Located in the dial
Switching Elements	
Contact output	1 or 2 microswitches, 1-channel change-over contacts
Adjustment of switching points	External adjustment by standard value scales smallest adjustable value: approx. 5% FS
Switching hysteresis	Approx. 2.5% FS
Load data / contacts	$U_{\sim \max.} = 250 \text{ V AC}, I_{\max.} = 5 \text{ A}, P_{\max.} = 250 \text{ VA}$ $U_{\text{max.}} = 30 \text{ V DC}, I_{\max.} = 0.4 \text{ A}, P_{\max.} = 10 \text{ W}$
Electrical Connection	
	Numbered cable, prewired terminal box, 7-channel plug
Pressure Connection	
	Thread G1/4 female, cutting ring connection for 6, 8, 10, 12 mm \varnothing tube of brass, zinc steel or chrome nickel steel connection shank G1/4 male DIN EN 837
Measuring System	
Measuring ranges ≤ 16 bar	Diaphragm measuring system, diaphragm of fabric back stayed elastomer
Measuring range 0-25 bar	Diaphragm measuring system, diaphragm of DURATHERM [®]
Materials	
Pressure chamber	Aluminium GkAlSi10(Mg), varnished black Aluminium GkAlSi10(Mg) HART-COAT [®] Chrome nickel steel 1.4305
Measuring diaphragm	Diaphragm measuring system and gaskets of NBR or Viton [®] Diaphragm of DURATHERM [®] NiCrCo-alloy
Materials: medium	Stainless steel 1.4310, 1.4305
Materials: housing	Macrolon
Weight	Pressure chamber of Aluminium = 1.2 kg, pressure chamber of 1.4305 = 3.5 kg
Approval	Approval acc. to SEV guidelines for low voltage products Type approval acc. to German Lloyd, test mark 
Mounting	
	Wallmounting - 3 fastening elements Panel mounting - panel mounting kit DZ11 $\varnothing 132$ mm Pipe mounting, pressure connections $\cong (+), (-)$ symbols - by screwed-in cutting ring or clamping ring connection - by screwed-in connection shank acc. to DIN EN 837 for nipple fitting acc. to DIN 16288

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

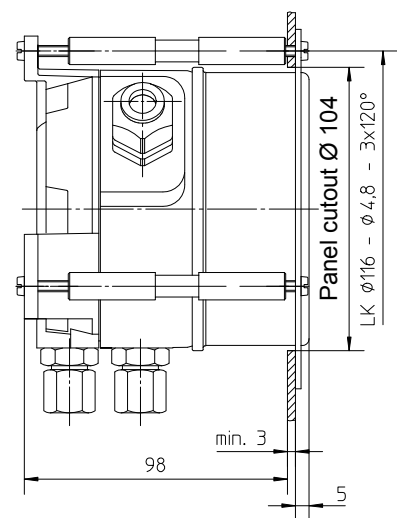
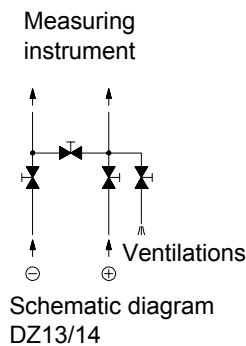
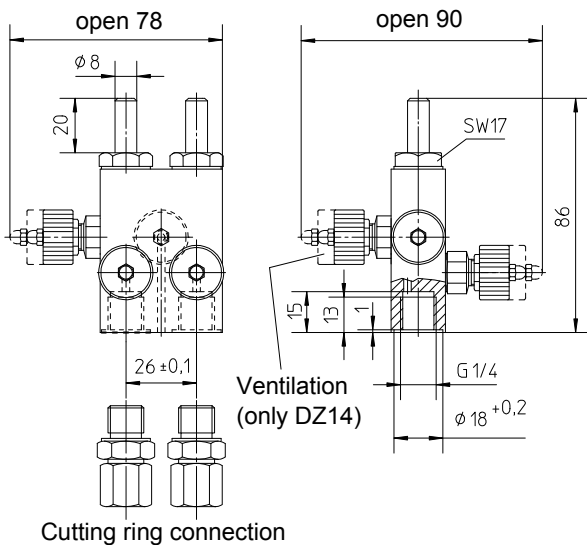


DS11 Wall mounting (standard version)



Variants of electrical connection

Variants of process connection



DZ13/14 Four-spindle shut off and equalizing valves

Panel mounting

13. Ordering Code

Differential Pressure Switch

DS11

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Measuring Range	Max. Static Operating Pressure									
0 ... 400 mbar	6 bar.....	>	8	3						
0 ... 0.6 bar	10 bar.....	>	0	1						
0 ... 1 bar	16 bar.....	>	0	2						
0 ... 1.6 bar	25 bar.....	>	0	3						
0 ... 2.5 bar	25 bar.....	>	0	4						
0 ... 4 bar	25 bar.....	>	0	5						
0 ... 6 bar	25 bar.....	>	0	6						
0 ... 10 bar	25 bar.....	>	0	7						
0 ... 16 bar	25 bar.....	>	0	8						
0 ... 25 bar	25 bar.....	>	0	9						
-0.6 ... 0 bar	10 bar.....	>	3	0						
-1 ... 0 bar	16 bar.....	>	3	1						
-1 ... 0.6 bar	25 bar.....	>	3	2						
-1 ... 1.5 bar	25 bar.....	>	3	3						
-1 ... 3 bar	25 bar.....	>	3	4						
-1 ... 5 bar	25 bar.....	>	3	5						
Measuring Diaphragm /Gaskets										
NBR	NBR (all ranges up to 16 bar).....	>	N							
Viton®	Viton® (all ranges up to 16 bar).....	>	V							
DURATHERM®	NBR (measuring range 0-25 bar only).....	>	D							
DURATHERM®	Viton® (measuring range 0-25 bar only).....	>	E							
Pressure Chamber										
Aluminium	.....	>	A							
Aluminium HART-COAT®	.....	>	D							
Chrome nickel steel 1.4305	.....	>	W							
Pressure Connections										
Female thread G1/4	.....	>	0	1						
Connection shank G1/4 B male of brass	.....	>	0	6						
Connection shank G1/4 B male of stainless steel	.....	>	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 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 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						
Switches										
1 adjustable microswitch	.....	>	A							
2 adjustable microswitches	.....	>	B							
Electrical Connection										
Numbered cable, 1 m long, prewired	.....	>	1							
Numbered cable, 2.5 m long, prewired	.....	>	2							
Numbered cable, 5 m long, prewired	.....	>	5							
Cable terminal box	.....	>	K							
7-channel plug	.....	>	W							
German Lloyd approval , 3 m numbered cable H07 RNF	.....	>	Z							
SEV-approval, 2 m numbered cable VDE NYSLYO	.....	>	U							