Supplementary electronics for four-wire connection

Description

By direct connection of the supplementary electronics to a SITRANS P transmitter, a transmitter for four-wire connection is produced. The supplementary electronics can be connected to HK and DS series transmitters, with the exception of the explosion-proof designs. The supplementary electronics is fitted in a light metal housing which is mounted on the left side of the transmitter.

Technical data

Output	
Output signal	0 to 20 mA or 4 to 20 mA
Load	Max. 750 Ω
Characteristic	Linear (square-rooting in transmitter if necessary)
Electrical isolation	Between power supply and input/output
Accuracy	
Conformity error (in addition to transmitter)	≤ 0.15 % of set span
Ambient temperature effect	≤ 0.1 % per 10 K
Power supply effect	≤ 0.1 % per 10 % change in voltage or frequency
Load effect	≤ 0.1 % per 100 % change
Rated operating conditions	
Ambient temperature	-20 to +80 °C
Storage temperature	-50 to +85 °C
Degree of protection	IP 54 to EN 60 529
Electromagnetic compatibility (EMC)	EN 50 081, EN 50 082
Design	
Dimensions (W x H x D) in mm	80 x 120 x 60
Electrical connection	Screw terminals (Pg 13.5 cable inlet) or Han 7D/Han 8U plug
Power supply	
Supply voltage	AC 230 V -10 to +6 %, 47 to 63 Hz, approx. 6 VA or AC/DC 24 V (AC 24 V ±10 %, 47 to 63 Hz, approx. 3 VA)
Permissible ripple (within the specified limits)	Approx. 2.5 V_{pp}

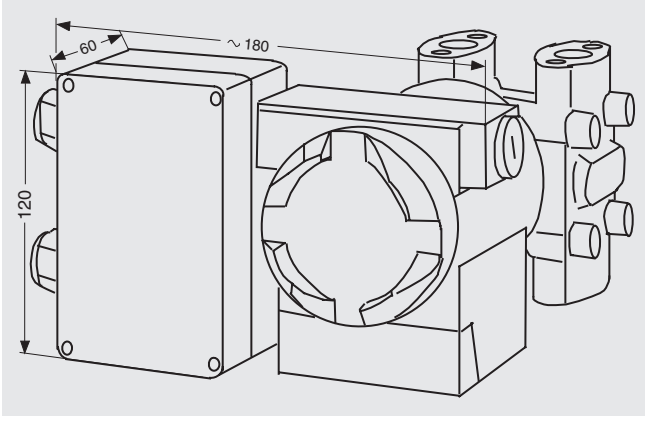


Fig. 1/30 SITRANS P transmitter with supplementary electronics for four-wire connection, dimensions

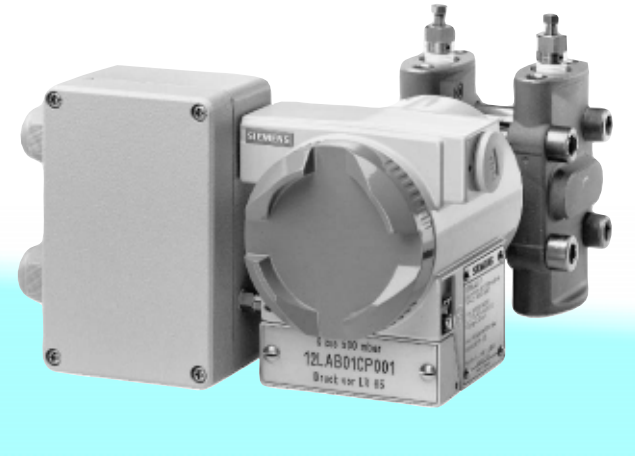
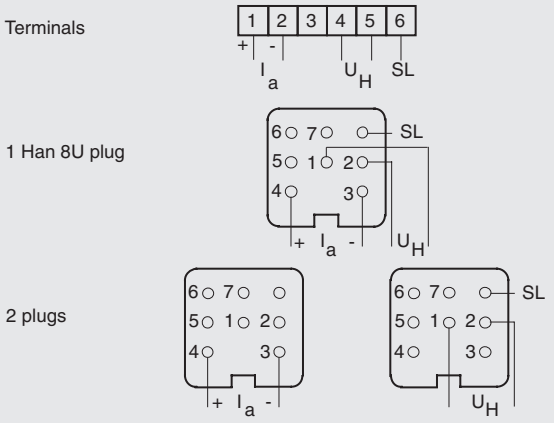


Fig. 1/31 SITRANS P transmitter with supplementary electronics for four-wire connection



I_a Output current
SL Protective earth conductor
U_H Power supply

Fig. 1/32 Connection diagram

Ordering data

Order No. of transmitter — Order code [1])

7MF4■20 - ■■■■■ - 1AA■ **V■■**

7MF4■32 - ■■■■■ - 1AA■ **V■■**

Supplementary electronics for four-wire connection

Power supply	Electrical connection	
AC/DC 24 V	Terminals; 2 Pg screwed glands to the left	**1**
	2 Han 7D/Han 8U plugs to the left	**3**
	Terminals; 1 Pg screwed gland downwards	**6**
	1 Han 8U plug downwards [2])	**9**
AC 230 V	Terminals; 2 Pg screwed glands to the left	**7**
	2 Han 7D plugs to the left	**8**
Output current	0 to 20 mA	**0**
	4 to 20 mA	**1**

Accessories

	Order No.
Instruction Manual	**E86060-A6017-A131-A1**

[1]) Please add "**-Z**" to Order No. of transmitter and specify Order code.
[2]) With 7MF4■32-...: Observe arrangement of plugs and differential pressure lines.

Ordering data	Order No.
Spare parts	
Mounting bracket and mounting parts for HK series pressure transmitters (7M4020-...)	
• Made of steel	**7MF4997-1AA**
• Made of stainless steel	**7MF4997-1AG**
Mounting bracket and mounting parts For pressure transmitters: MK II series (7MF4010-□□□□□-1□C□) MS series (7MF4013-□□□□□-1□C□) and DS series (7MF4032-□□□□□-1□C□) For absolute pressure transmitters: DS series (7MF4232-□□□□□-1□C□)	
• Made of steel	**7MF4997-1AB**
• Made of stainless steel	**7MF4997-1AH**
Mounting bracket and mounting parts For pressure transmitters: MK II series (7MF4010-□□□□□-1□A□, -1□B□ and -1□D□), MS series (7MF4013-□□□□□-1□A□, -1□B□ and -1□D□), DS series (7MF4032-□□□□□-1□A□,) -1□B□ and -1□D□), For absolute pressure transmitters: DS series (7MF4232-□□□□□-1□A□) -1□B□ and -1□D□),	
• Made of steel	**7MF4997-1AC**
• Made of stainless steel	**7MF4997-1AJ**
Mounting bracket and mounting parts for differential pressure transmitters with M10 flange thread (7MF43-□□-... and 7MF44-□□-...)	
• Made of steel	**7MF4997-1AD**
• Made of stainless steel	**7MF4997-1AK**
Mounting bracket and mounting parts for differential pressure transmitters with M12 flange thread (7MF45-□□-...)	
• Made of steel	**7MF4997-1AE**
• Made of stainless steel	**7MF4997-1AL**
Mounting bracket and mounting parts for differential pressure and absolute pressure transmitters with flange thread $^{7}/_{16}$- 20 UNF (7MF43-□□-..., 7MF44-□□-... and 7MF45-□□-...)	
• Made of steel	**7MF4997-1AF**
• Made of stainless steel	**7MF4997-1AM**
Cover (die-cast aluminium) without window, including gasket	
• For HK series	**7MF4997-1BA**
• For MK II, MS and DS series	**7MF4997-1BB**
Cover (stainless steel) without window, including gasket, for DS series	**7MF4997-1BC**
Cover (die-cast aluminium) with window, including gasket	
• For HK series	**7MF4997-1BD**
• For MK II, MS and DS series	**7MF4997-1BE**
Cover (stainless steel) with window, including gasket, for DS series	**7MF4997-1BF**
Cover for DS series with PROFIBUS-PA, (including gasket), made of	
• Die-cast aluminum, without window	**7MF4997-1BG**
• Die-cast aluminum, with window	**7MF4997-1BH**
• Stainless steel precision casting, without window	**7MF4997-1BJ**
• Stainless steel precision casting, with window	**7MF4997-1BK**

Ordering data	Order No.
Spare parts (continued)	
Analog indicator, scale 0 to 100 %	**7MF4997-1BN**
Analog indicator, customer-specific scale divisions as specified in plain text	**7MF4997-1BP-Z Y20: .....**
Digital display including mounting material for DS series	**7MF4997-1BQ**
Digital display including mounting material for MS series	**7MF4997-1BR**
Measuring-point label	
• Without inscription (5 off)	**7MF4997-1CA**
• Printed (1 off), data according to Y01 or Y02, Y15 and Y16 (see Ordering data for SITRANS P transmitters)	**7MF4997-1CB-Z Y□□: .....**
Mounting screws	
• For measuring-point label for HK series, (25 off)	**7MF4997-1CC**
• For measuring-point label for MK II, MS and DS series, earthing and connection terminals or for digital display (50 off)	**7MF4997-1CD**
Sealing screws (1 set = 2 off) for process flange	
• Stainless steel	**7MF4997-1CG**
• Hastelloy	**7MF4997-1CH**
Vent valves complete (1 set = 2 off)	
• Stainless steel	**7MF4997-1CP**
• Hastelloy	**7MF4997-1CQ**
Read-only plug	
For 7M4□32-...	**7MF4997-1DG**
Gaskets, for process flanges made of:	
• FPM (Viton)	**7MF4997-2DA**
• PTFE (Teflon)	**7MF4997-2DB**
• FEP (with silicone core, approved for food)	**7MF4997-2DC**
• FFPM (Kalrez)	**7MF4997-2DD**
• NBR (Buna N)	**7MF4997-2DE**

Available ex stock

Instruction Manuals, HART communication

Ordering data	Order No.
Instruction Manuals	
Instruction Manual for SITRANS P, HK series, for pressure	
• German	**C73000-B5600-C71**
• English	**C73000-B5676-C71**
• French	**C73000-B5677-C71**
• Spanish	**C73000-B5678-C71**
• Italian	**C73000-B5672-C71**
Instruction Manual for SITRANS P, HK series, for absolute pressure	
• German	**C73000-B5600-C73**
• English	**C73000-B5676-C73**
• French	**C73000-B5677-C73**
• Spanish	**C73000-B5678-C73**
• Italian	**C73000-B5672-C73**
Instruction Manual for SITRANS P, HK series, for differential pressure	
• German	**C73000-B5600-C90**
• English	**C73000-B5676-C90**
• French	**C73000-B5677-C90**
• Spanish	**C73000-B5678-C90**
• Italian	**C73000-B5672-C90**
Instruction Manual for SITRANS P, HK series, for level	
• German	**C73000-B5600-C77**
• English	**C73000-B5676-C77**
• French	**C73000-B5677-C77**
• Spanish	**C73000-B5678-C77**
• Italian	**C73000-B5672-C77**
Instruction Manual for SITRANS P, MK II ser.	
• German/English	**C73000-B5674-C100**
• French/Italian/Spanish	**C73000-B5650-C100**
Instruction Manual for SITRANS P, MS series	
• German/English	**C79000-B5674-C40**
• French/Italian/Spanish	**C79000-B5650-C40**
Brief instructions (Leporello) for SITRANS P, MS series	
• German/English	**C79000-X5674-C41**
Instruction Manual for SITRANS P, DS series for pressure	
• German	**C73000-B5600-C82**
• English	**C73000-B5676-C82**
• French	**C73000-B5677-C82**
• Spanish	**C73000-B5678-C82**
• Italian	**C73000-B5672-C82**
Instruction Manual for SITRANS P, DS series for absolute pressure (**7MF4332- ...** from differential pressure transmitter series)	
• German	**C73000-B5600-C84**
• English	**C73000-B5676-C84**
• French	**C73000-B5677-C84**
• Spanish	**C73000-B5678-C84**
• Italian	**C73000-B5672-C84**
Instruction Manual for SITRANS P, DS series for absolute pressure (**7MF4232- ...** from pressure transmitter series)	
• German	**C73000-B5600-C92**
• English	**C73000-B5676-C92**
• French	**C73000-B5677-C92**
• Spanish	**C73000-B5678-C92**
• Italian	**C73000-B5672-C92**

Ordering data	Order No.
Instruction Manuals (continued)	
Instruction Manual for SITRANS P, DS series for differential pressure	
• German	**C73000-B5600-C86**
• English	**C73000-B5676-C86**
• French	**C73000-B5677-C86**
• Spanish	**C73000-B5678-C86**
• Italian	**C73000-B5672-C86**
Instruction Manual for SITRANS P, DS series for level	
• German	**C73000-B5600-C88**
• English	**C73000-B5676-C88**
• French	**C73000-B5677-C88**
• Spanish	**C73000-B5678-C88**
• Italian	**C73000-B5672-C88**
Instruction Manual Supplement for PROFIBUS-PA	
• German/English	**C79000-B5674-C207**
HART communication	
HART communicator, with accu, charger unit for AC 230 V and carrying case, type of protection "Intrinsic safety" EEx ia IIC T4	
• German	**7MF4998-8KF**
• English	**7MF4998-8KT**
HART modem	**7MF4997-1DA**

Available ex stock

Power supply units: see page 2/50.

7MF49.. Introduction

Application

The remote seals 7MF49.. can be fitted to SITRANS P transmitters for

- ***pressure*** (7MF4010, 7MF4013, 7MF4020 and 7MF4032),
- ***absolute pressure*** (7MF4320, 7MF4232, 7MF4332) and
- ***differential pressure and flow*** (7MF4420 and 7MF4432).

Design and mode of operation

A remote seal system consists of a transmitter, one or two remote seals, an appropriate transmission liquid, and a connection between the transmitter and remote seal (direct mounting or capillary).

The volume in contact with the measured medium is terminated by an elastic diaphragm. The volume between this diaphragm and the pressure gauge (transmitter or manometer) is completely filled with a transmission liquid. If a pressure is now applied to the remote seal, this is transmitted via the elastic diaphragm and the filling liquid to the pressure gauge.

In many cases, a capillary is located between the remote seal and the pressure gauge in order e.g. to minimize temperature effects from the hot medium on the latter. However, the capillary line influences the response time and the temperature response of the complete remote seal system. When fitting remote seals to differential pressure transmitters, two capillaries of the same length must always be used.

Fields of use

Remote seal systems should be used if a separation between the measured medium and the measuring instrument is appropriate or essential for the following reasons:

- The ***temperature of the medium*** is outside the limits specified for the transmitter.
- The medium is ***corrosive*** and requires diaphragm materials in the transmitter which are not available.
- The medium is ***highly viscous*** or ***contains solids*** which would block the measuring chambers of the transmitter.
- The medium may freeze in the measuring chambers or pulse line.
- The medium is ***heterogeneous*** and ***fibrous.***
- The medium tends towards polymerization or crystallization.
- The process requires ***quick-release*** remote seals, as necessary e.g. in the food industry for fast cleaning.
- The process requires cleaning of the measuring point, e.g. in a batch process.

Constructional designs

A differentiation is made between diaphragm seals and clamp-on seals.

With the diaphragm seals, the pressure is measured via a flat diaphragm which rests in a bed.

With the clamp-on seals, the pressure is measured via a cylindrical diaphragm positioned in a pipe, and transmitted to the transmitter via the filling liquid.

The clamp-on seal is a special design for flowing media. It consists of a cylindrical pipe in which a cylindrical diaphragm is embedded. Since it is completely integrated in the process pipe, no turbulences, dead volumes or other obstructions to the flow occur. The clamp-on seal can furthermore be cleaned by a pig.

Fig. 1/33 Diaphragm seal of sandwich design, and also with projecting diaphragm (tube)

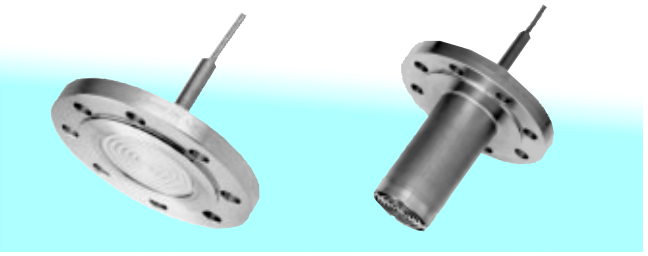


Fig. 1/34 Diaphragm seal of flange design, and also with projecting diaphragm (tube)

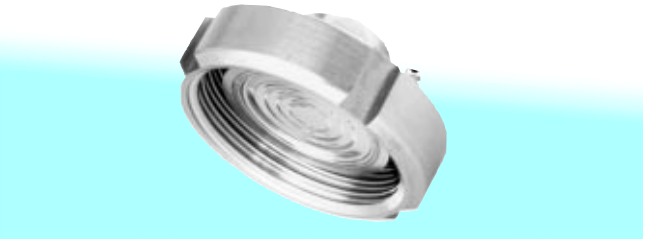


Fig. 1/35 Quick-release remote seal

Diaphragm seals

The following types of diaphragm seals exist:

- Sandwich design, and sandwich design with projecting diaphragm (tube) to DIN or ANSI which are secured using a dummy flange (Fig. 1/33).
- Flange design, and flange design with projecting diaphragm (tube) to DIN or ANSI which are secured using holes in the flange (Fig. 1/34).
- Quick-release remote seals, e.g. to DIN 11851, SMS standard, IDF standard, APV RJT standard, clamp connection, etc. (Fig. 1/35).

The quick-release remote seals are common designs in the food industry. Their design means that the measured medium cannot accumulate in dead volumes. The quick-release clamp present on the remote seal means that quick dismounting is possible for cleaning.

The following types of quick-release remote seals exist:

- Miniature diaphragm seal with male thread for screwing into tapped holes (Fig. 1/36).
- Remote seals with customer-specific process connections.

7MF49.. Introduction

Clamp-on seals

The following types of clamp-on seals exist:

- Quick-release clamp-on seals, e.g. to DIN 11851, SMS standard, IDF standard, APV RJT standard, clamp connection etc. The quick-release facility enables the seal to be removed quickly for cleaning purposes (Fig. 1/37).
- Clamp-on seals for positioning between DIN or ANSI flanges (Fig. 1/37).
- Clamp-on seals with customer-specific process connections.

Transmission response

Temperature errors occur if the filling liquid in the remote seal and in the capillaries expands or contracts as a result of temperature effects. The temperature error depends on the diaphragm rigidity, the influence of the filling liquid, and the influence of the filling liquid under the process flanges or in the connection spigots on the transmitter.

Diaphragm rigidity

The rigidity of the remote seal is of decisive importance. The larger the diaphragm diameter, the softer it is. In comparison to a smaller diaphragm, this means that it can respond far easier to temperature-based expansions of the filling liquid.
The result is that small measuring ranges are only possible with large diaphragm diameters. In addition, the diaphragm thickness, its material, and any coatings which may be present must be considered.

Filling liquid

All filling liquids expand or contract when the temperature varies. Temperature-independent errors can be minimized by selecting a suitable filling liquid, but it must also be ensured that the filling liquid is appropriate for the temperature limits and operating pressure, and is also physiologically harmless.

Since the filling liquid is present under the remote seal diaphragm, in the capillaries and under the process flanges of the transmitter, the temperature error must be calculated separately for each combination.

Response time

The response time depends on the internal diameter of the capillaries, the viscosity of the filling liquid, the capillary tube length, and the pressure in the measuring system:

Internal diameter:
The response time decreases as the internal diameter increases, but the temperature error increases.

Viscosity:
The response time increases as the viscosity increases.

Capillary length:
The capillary length has a proportional effect on the response time and the temperature error.

Measuring system pressure:
The response time decreases as the pressure in the measuring system increases.

Recommendations

The following should be observed to obtain an optimum combination of transmitter and remote seal:

- The remote seal diameter, and thus the effective diameter of the diaphragm, should be selected as large as possible in order to keep the temperature-dependence errors as low as possible.
- The capillaries should be selected as short as possible in order to keep the response time and the temperature-dependent errors as low as possible.

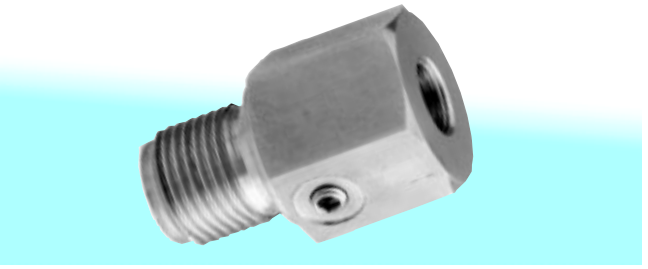


Fig. 1/36 Miniature diaphragm seal with diaphragm flush with front

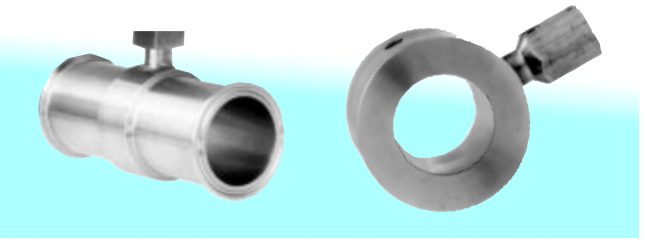


Fig. 1/37 Quick-release clamp-on seal and for flange mounting

- A filling liquid should be selected which has the lowest viscosity and the lowest coefficient of expansion, and which simultaneously fulfills the process requirements with respect to pressure/vacuum and temperature. The filling liquid must also be compatible with the process medium.
- When installing the equipment for low-pressure applications, the transmitter must always be located below the lowest spigot.
- It should also be noted that some of the filling liquids are very limited with respect to the permissible temperature of the medium for low-pressure applications.
- When operating permanently at a low pressure, the remote seal must be designed in the version resistant to low-pressure.
- Recommendations on the minimum span can be found in the tables on pages 1/59 and 1/60.

Note

The remote seals listed in this catalog are a selection of the most common designs. As a result of the large variety of process connections, it may nevertheless be the case that certain remote seals which are not listed in the catalog are still available.

Other versions could be:

- Other process connections, standards
- Aseptic or sterile connections
- Other dimensions
- Other nominal pressures
- Special diaphragm materials, including coatings
- Other sealing faces
- Other filling liquids
- Other capillary lengths
- Sheathing of capillaries with protective hose
- Calibration at higher/lower temperatures etc.

Please contact your Siemens Regional Office for more information.

Technical data

Nominal diameter, nominal pressure, pressure connection	See Ordering data
Sealing face (only for sandwich and flange remote seals)	To DIN 2526, form D or ANSI B16.5 RF 500 RMS (for stainless steel, mat. No. 1.4571), DIN 2526, form E or ANSI B16.5 RFSF for other materials
Materials	
• Main body for sandwich and flange remote seals	Stainless steel, mat. No. 1.4571
• Wetted parts materials	See Ordering data
• Main body and diaphragm for clamp-on seals	Stainless steel, mat. No. 1.4435 or stainless steel, mat. No. 1.4571 for remote seals 7MF4980-... and 7MF4983-...
• Capillary	Stainless steel, mat. No. 1.4571
• Sheath	Spiral hose made of stainless steel, mat. No. 1.4571
Sealing material in the pressure flanges	
• For absolute pressure transmitters and low-pressure applications	Copper
• For other applications	Viton
Max. pressure	See nominal pressure of remote seal and transmitter
Capillary	
• Length	Max. 10 m, longer lengths on inquiry
• Internal bore	2 mm
• Smallest bending radius	150 mm
Filling liquid	
• For sandwich and flange remote seals	See Ordering data
• For quick-release remote seals	Vegetable oil or glycerine/water
Ambient temperature	See transmitter and filling liquid

Temperature errors of diaphragm seals when connected to pressure, absolute pressure or level transmitters, and with ***single-sided*** connection to differential pressure transmitters

	Nominal diameter/ design	Diaphragm diameter in mm	Temperature error of remote seal in mbar/10K	Temperature error of capillary in mbar/10K · m_{Cap}	Temperature error of process flange/ connection spigot in mbar/10K	Recommended values, recommended minimum spans (observe temperature error)
Flange to DIN 2501	DN 50 without tube	59	3	4	4	500 mbar
	DN 50 with tube	48	5	10	10	500 mbar
	DN 80 without tube	89	0.4	0.4	0.4	100 mbar
	DN 80 with tube	72	1	1	1	250 mbar
	DN 100 without tube	89	0.4	0.4	0.4	100 mbar
	DN 100 with tube	89	0.4	0.4	0.4	100 mbar
	DN 125 without tube	124	0.2	0.1	0.1	20 mbar
	DN 125 with tube	124	0.2	0.1	0.1	20 mbar
Flange to ANSI B16.5	2 inch without tube	59	3	4	4	500 mbar
	2 inch with tube	48	5	10	10	500 mbar
	3 inch without tube	89	0.4	0.4	0.4	100 mbar
	3 inch with tube	72	1	1	1	250 mbar
	4 inch without tube	89	0.4	0.4	0.4	100 mbar
	4 inch with tube	89	0.4	0.4	0.4	100 mbar
	5 inch without tube	124	0.2	0.1	0.1	20 mbar
	5 inch with tube	124	0.2	0.1	0.1	20 mbar
Remote seal with groove union nut to DIN 11 851	DN 25	25	25	160	160	6 bar
	DN 32	32	17	70	70	4 bar
	DN 40	40	7	15	15	2 bar
	DN 50	52	4	5	5	500 mbar
	DN 65	59	3	4	4	500 mbar
	DN 80	72	1	1	1	250 mbar
Remote seal with threaded socket to DIN 11 851	DN 25	25	25	160	160	6 bar
	DN 32	32	17	70	70	4 bar
	DN 40	40	7	15	15	2 bar
	DN 50	52	4	5	5	500 mbar
	DN 65	59	3	4	4	500 mbar
	DN 80	72	1	1	1	250 mbar
Clamp connection	1½ inch	32	17	70	70	4 bar
	2 inch	40	7	15	15	2 bar
	2½ inch	59	3	5	5	500 mbar
	3 inch	72	1	1	1	250 mbar
Miniature diaphragm seal	G 1B	25	25	160	160	6 bar
	G 1½B	40	7	15	15	2 bar
	G 2B	52	4	5	5	500 mbar

Table 1/1 Temperature errors of diaphragm seals (part 1)

Remarks:

- Values apply to liquids: silicone oil M5 and M50, high-temperature oil, halocarbon oil and vegetable oil.
- Half the values apply to glycerine/water mixture as the filling liquid.
- Values apply to stainless steel as the diaphragm material.

7MF49.. Introduction

Temperature errors of diaphragm seals with *double-sided* connection to differential pressure transmitters

	Nominal diameter/ design	Diaphragm diameter in mm	Temperature error of remote seal in mbar/10K	Temperature error of capillary in mbar/10K · m_{Cap}	Temperature error of process flange/ connection spigot in mbar/10K	Recommended values, recommended minimum spans (observe temperature error)
Flange to DIN 2501	DN 50 without tube	59	0.7	0.67	0.67	250 mbar
	DN 50 with tube	48	1.26	1.7	1.7	250 mbar
	DN 80 without tube	89	0.1	0.07	0.07	50 mbar
	DN 80 with tube	72	0.24	0.17	0.17	100 mbar
	DN 100 without tube	89	0.01	0.07	0.07	50 mbar
	DN 100 with tube	89	0.1	0.07	0.07	50 mbar
	DN 125 without tube	124	0.05	0.03	0.03	20 mbar
	DN 125 with tube	124	0.05	0.03	0.03	20 mbar
Flange to ANSI B16.5	2 inch without tube	59	0.7	0.67	0.67	250 mbar
	2 inch with tube	48	1.26	1.7	1.7	250 mbar
	3 inch without tube	89	0.1	0.07	0.07	50 mbar
	3 inch with tube	72	0.24	0.17	0.17	100 mbar
	4 inch without tube	89	0.1	0.07	0.07	50 mbar
	4 inch with tube	89	0.1	0.07	0.07	50 mbar
	5 inch without tube	124	0.05	0.03	0.03	20 mbar
	5 inch with tube	124	0.05	0.03	0.03	20 mbar
Remote seal with groove union nut to DIN 11 851	DN 50	52	1	0.83	0.83	250 mbar
	DN 65	59	0.7	0.67	0.67	250 mbar
	DN 80	72	0.24	0.17	0.17	100 mbar
Remote seal with threaded socket to DIN 11 851	DN 50	52	1	0.83	0.83	250 mbar
	DN 65	59	0.7	0.67	0.67	250 mbar
	DN 80	72	0.24	0.17	0.17	100 mbar
Clamp connection	2 inch	40	1.7	3	3	2 bar
	2½ inch	59	0.7	0.67	0.67	250 mbar
	3 inch	72	0.24	0.17	0.17	100 mbar

Table 1/2 Temperature errors of diaphragm seals (part 2)

Remarks:

- Values apply to liquids: silicone oil M5 and M50, high-temperature oil, halocarbon oil and vegetable oil.
- Half the values apply to glycerine/water mixture as the filling liquid.
- Values apply to stainless steel as the diaphragm material.

Temperature errors of clamp-on seals when connected to pressure or absolute pressure transmitters, and with *single-sided* connection to differential pressure transmitters

Nominal diameter/design	Temperature error of remote seal in mbar/10K	Temperature error of capillary in mbar/10K · m_{Cap}	Temperature error of process flange/connection spigot in mbar/10K	Recommended values, recommended minimum spans (observe temperature error)
DN 25/1 inch	6.0	8.5	8.5	1 bar
DN 40/1½ inch	4.5	4.5	4.5	250 mbar
DN 50/2 inch	4.0	3.0	3.0	100 mbar
DN 80/3 inch	9.5	5.0	5.0	100 mbar
DN 100/4 inch	8.0	3.0	3.0	100 mbar

Temperature errors of clamp-on seals with *double-sided* connection to differential pressure transmitters

Nominal diameter/design	Temperature error of remote seal in mbar/10K	Temperature error of capillary in mbar/10K · m_{Cap}	Temperature error of process flange/connection spigot in mbar/10K	Recommended values, recommended minimum spans (observe temperature error)
DN 25/1 inch	2.3	1.8	1.8	1 bar
DN 40/1½ inch	0.8	0.3	0.3	250 mbar
DN 50/2 inch	0.3	0.1	0.1	100 mbar
DN 80/3 inch	3	0.5	0.5	100 mbar
DN 100/4 inch	1	0.1	0.1	100 mbar

Table 1/3 Temperature errors of clamp-on seals

Remarks:

- Values apply to liquids: silicone oil M5 and M50, high-temperature oil, halocarbon oil and vegetable oil.
- Half the values apply to glycerine/water mixture as the filling liquid.
- Values apply to stainless steel as the diaphragm material.
- Diaphragm depth: DN 25/DN 40/DN 50: 0.05 mm
  DN 80/DN 100: 0.1 mm

Calculation of temperature error for remote seals

The following equation is used to calculate the temperature error for remote seals:

$$dp = (t_{RS} - t_{Cal}) \cdot f_{RS} + (t_{Cap} - t_{Cal}) \cdot l_{Cap} \cdot f_{Cap} + (t_{TR} - t_{Cal}) \cdot f_{PF}$$

dp	Additional temperature error (mbar)
t_{RS}	Temperature on remote seal diaphragm (generally corresponds to temperature of medium)
t_{Cal}	Reference (calibration) temperature (20 °C)
f_{RS}	Temperature error of remote seal (see tables on pages 1/59 and 1/60)
t_{Cap}	Ambient temperature on the capillaries
l_{Cap}	Capillary tube length
f_{Cap}	Temperature error of capillaries (see tables on pages 1/59 and 1/60)
t_{TR}	Ambient temperature on transmitter
f_{PF}	Temperature error of oil filling in process flanges of transmitter (see tables on pages 1/59 and 1/60)

Example of calculation of temperature error for remote seals

Existing conditions:

• SITRANS P transmitter for differential pressure, 250 mbar, set to 0 to 100 mbar, with DN 80 remote seal diaphragm without tube, diaphragm made of stainless steel, mat. No. 1.4571	f_{RS} = 0.1 mbar/10 K
• Capillary 2 x 6 m	l_{Cap} = 2 x 6 m
• Capillaries fitted on both sides	f_{Cap} = 0.07 mbar/ 10 K · m
• Filled with silicone oil M5	f_{PF} = 0.07 mbar/10 K
• Temperature of medium 100 °C	t_{RS} = 100 °C
• Temperature on capillaries 50 °C	t_{Cap} = 50 °C
• Temperature on transmitter 50 °C	t_{TR} = 50 °C

Required:

Additional temperature error dp of remote seal

Calculation:

dp = (100 °C – 20 °C) · 0.1 mbar/10 K + (50 °C – 20 °C) · 6 m · 2 · 0.07 mbar/10 K · m + (50 °C – 20 °C) · 0.07 mbar/10 K

dp = 0.8 mbar + 2.52 mbar + 0.21 mbar

Result:

dp = 3.53 mbar (corresponds to 3.53 % of set span)

Note:

The temperature error determined above only applies to the error resulting from connection of the remote seal.

The transmission response of the respective transmitter is not included in this consideration. It must be calculated separately, and the resulting error added to the error determined above from connection of the remote seal.

Dependence of temperature error on diaphragm material

The errors listed in the tables on pages 1/59 and 1/60 refer to the use of stainless steel as the diaphragm material. If a different material is used, the listed values change by the amount shown in the following table.

Diaphragm material	Change in temperature error of remote seal
Stainless steel	Values as specified in tables on pages 1/59 and 1/60
Hastelloy C4, mat. No. 2.4610	Increase in values by 50 %
Hastelloy C276, mat. No. 2.4819	Increase in values by 50 %
Monel 400, mat. No. 2.4360	Increase in values by 60 %
Tantalum	Increase in values by 50 %
Titanium	Increase in values by 50 %
PTFE coating on stainless steel diaphragm	Increase in values by 120 %
ECTFE coating or PFA coating on stainless steel diaphragm	Increase in values by 100 %
Gold coating on stainless steel diaphragm	Increase in values by 40 %

Response times (guidance values)

The listed values are the response times (in seconds, per meter of capillary tube) for a change in pressure which corresponds to the set span.

The listed values must be multiplied by the respective length of the capillary tube, or with transmitters for differential pressure and flow by the total length of both capillary tubes.

The response times are independent of the set span within the range of the respective transmitter. The response times are of insignificant importance for spans above 10 bar. The response times of the transmitters have not been considered.

Filling liquid	Density kg/dm³	Temperature on capillary tube	Response time in s/m with max. span of transmitter		
			250 mbar	600 mbar	1600 mbar
Silicone oil M5	0.914	+60 °C +20 °C - 20 °C	0.06 0.11 0.3	0.02 0.02 0.12	0.01 0.02 0.05
Silicone oil M50	0.966	+60 °C +20 °C - 20 °C	0.6 0.61 1.69	0.25 0.26 0.71	0.09 0.1 0.27
High-temperature oil	1.07	+60 °C +20 °C -10 °C	0.14 0.65 3.96	0.06 0.27 1.65	0.02 0.1 0.62
Halocarbon oil	1.968	+60 °C +20 °C - 20 °C	0.07 0.29 2.88	0.03 0.12 1.2	0.01 0.05 0.45
Vegetable oil	0.94	+60 °C +20 °C - 20 °C	0.18 0.43 1.19	0.08 0.18 0.5	0.03 0.07 0.18
Glycerine/ water	1.22	+60 °C +20 °C 0 °C	0.13 0.76 9.72	0.05 0.32 4.05	0.02 0.12 1.51

7MF49.. Introduction

Technical data of filling liquid

When selecting the filling liquid, check that it is suitable with respect to the permissible temperature of the medium and the process pressure. Also check the compatibility with the measured medium. For example, only physiologically harmless filling liquids may be used in the food industry. A special case are oxygen and chlorine as the measured media; the filling liquid must not react with them, otherwise an explosion or fire made occur if there is a leak in the remote seal.

Filling liquid	Digit in Order No.	Permissible temperature of medium (°C)		Density at 20 °C kg/dm^3	Viscosity at 20 °C ($m^2/s \cdot 10^6$)	Expansion coefficient (1/°C)
		p_{abs} < 1 bar	p_{abs} > 1 bar			
Silicone oil M5	1	-60 to +80	-90 to +180	0.914	4	0.00108
Silicone oil M50	2	-20 to +150	-20 to +300	0.96	50	0.00104
High-temperature oil	3	-10 to +200	-10 to +400	1.07	39	0.0008
Halocarbon oil	4	-40 to +80	-40 to +175	1.968	14	0.00086
Vegetable oil	5	-10 to +200	-10 to +250	0.94	66	0.00082
Glycerine/water	6	Not possible	-10 to +120	1.22	88	0.0005

Maximum temperature of medium

The following maximum temperatures of the medium apply depending on the wetted parts materials:

Material	p_{abs} < 1 bar	p_{abs} > 1 bar
Stainless steel, mat. No. 1.4571	+200 °C	+400 °C
PTFE coating	+100 °C	+150 °C
ECTFE/PFA coating	+100 °C	+150 °C
Hastelloy C4, mat. No. 2.4610	+200 °C	+400 °C
Hastelloy C276, mat. No. 2.4819	+200 °C	+400 °C
Monel 400, mat. No. 2.4360	+200 °C	+400 °C
Tantalum	+200 °C	+300 °C

Maximum capillary length (guidance values for diaphragm seals and clamp-on seals)

Nominal diameter		Max. length of capillary tube	
		Diaphragm seal	Clamp-on seal
DN 25	1 inch	2.5 m	2.5 m
DN 32	1¼ inch	2.5 m	2.5 m
DN 40	1½ inch	4 m	6 m
DN 50	2 inch	6 m	10 m
DN 65	2½ inch	8 m	10 m
DN 80	3 inch	10 m	10 m
DN 100	4 inch	10 m	10 m
DN 125	5 inch	10 m	–

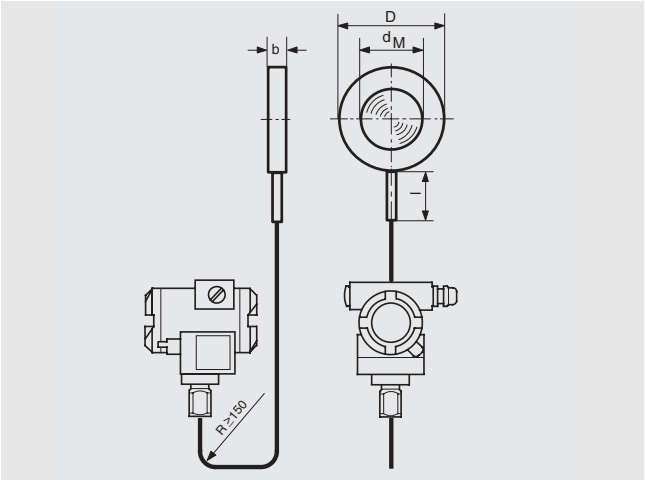


Fig. 1/38 Dimensions of sandwich-type diaphragm seal (without flange) 7MF4900 with flexible capillary tube for connection to SITRANS P pressure transmitters

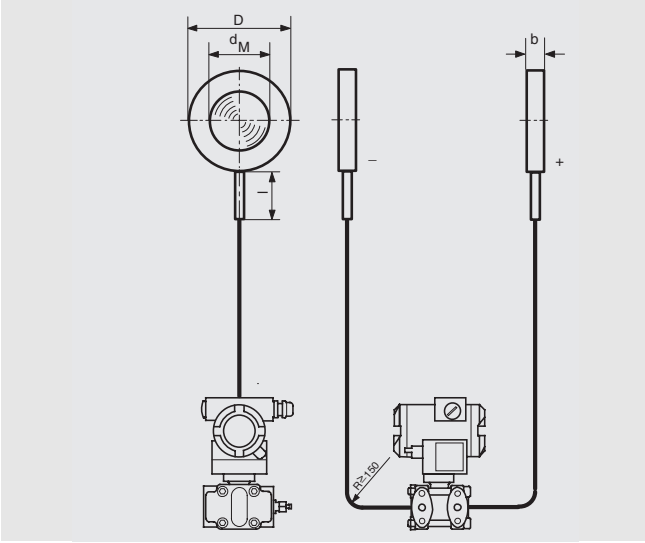


Fig. 1/39 Dimensions of sandwich-type diaphragm seal (without flange) with flexible capillary tube
7MF4901 for connection to SITRANS P absolute pressure transmitters, 7MF4903 for connection to SITRANS P differential pressure and flow transmitters

Connection to DIN 2501

Nominal diameter	Nominal pressure	b	D	d_M	l
DN 50	PN 16 to PN 400	20	102	59	100
DN 80		20	138	89	100
DN 100		20	158	89	100
DN 125		22	188	124	100

Connection to ANSI B16.5

Nominal diameter	Nominal pressure lb/sq.in.	b inch (mm)	D inch (mm)	d_M inch (mm)	l inch (mm)
2 inch	150 to 2500	0.79 (20)	3.94 (100)	2.32 (59)	3.94 (100)
3 inch		0.79 (20)	5.28 (134)	3.50 (89)	3.94 (100)
4 inch		0.79 (20)	6.22 (158)	3.50 (89)	3.94 (100)
5 inch		0.87 (22)	7.32 (186)	4.88 (124)	3.94 (100)

d Inside diameter of gasket to DIN 2690/ANSI B16.5
d_M Effective diaphragm diameter

Ordering data

Order No.

Diaphragm seal

Sandwich-type design, with flexible capillary tube connected to a SITRANS P transmitter (order separately):

For pressure 7MF4010, 7MF4013, 7MF4020 and 7MF4032; scope of delivery 1 off — **7MF4900-1 ■■■■-■ B ■■■**

For absolute pressure 7MF4320, 7MF4232 and 7MF4332; scope of delivery 1 off — **7MF4901-1 ■■■■-■ B ■■■**

For differential pressure and flow 7MF4420 and 7MF4432; scope of deliv. 2 off — **7MF4903-1 ■■■■-■ B ■■■**

Nominal diameter and nominal pressure

DN 50	PN 16 to PN 400	A
(only recommended for press. transmitters)		
DN 80	PN 16 to PN 400	B
DN 100	PN 16 to PN 400	C
DN 125	PN 16 to PN 400	D
2 inch	Class 150 to 2500	E
(only recommended for press. transmitters)		
3 inch	Class 150 to 2500	H
4 inch	Class 150 to 2500	L
5 inch	Class 150 to 2500	N
Smooth sealing face conforming to DIN 2526, form D, or to ANSI B16.5 RF 500 RMS		
Other version		Z
Add Order code and plain text: Nominal diameter: ...; Nominal pressure: ... Sealing face: see "Technical data"		J1Y

Wetted parts materials

• Stainless steel, mat. No. 1.4571	A
• PTFE (for low-pressure on request)	E
• ECTFE (for low-pressure on request)	F
• PFA (for low-pressure on request)	D
• Monel 400, mat. No. 2.4360	G
• Hastelloy C276, mat. No. 2.4819	J
• Hastelloy C4, mat. No. 2.4610	U
• Tantalum	K
Other version	Z
Add Order code and plain text: Wetted parts materials: ...	K1Y

Tube length

• Without tube	0
Other version:	9
Add Order code and plain text: Tube length: ...	L1Y

Filling liquid

• Silicone oil M5	1
• Silicone oil M50	2
• High-temperature oil	3
• Halocarbon oil (for measuring O_2)	4
• Vegetable oil	5
• Glycerine/water[1])	6
Other version	9
Add Order code and plain text: Filling liquid: ...	M1Y

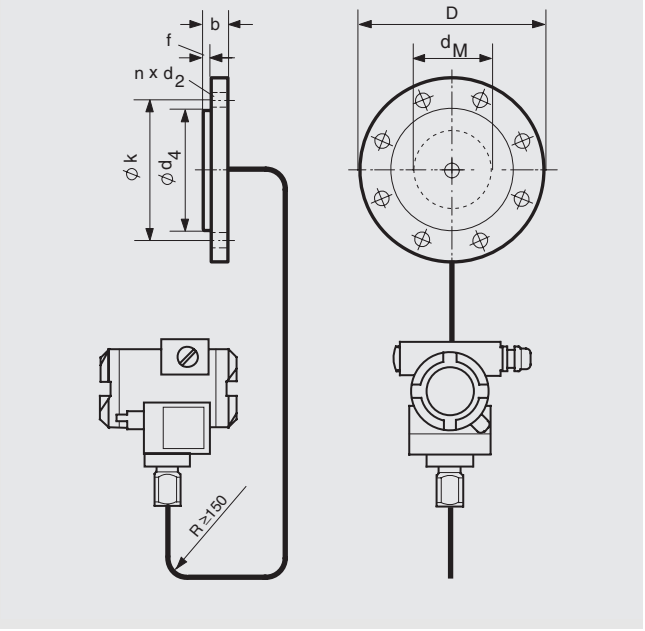
Length of capillary tube [2])

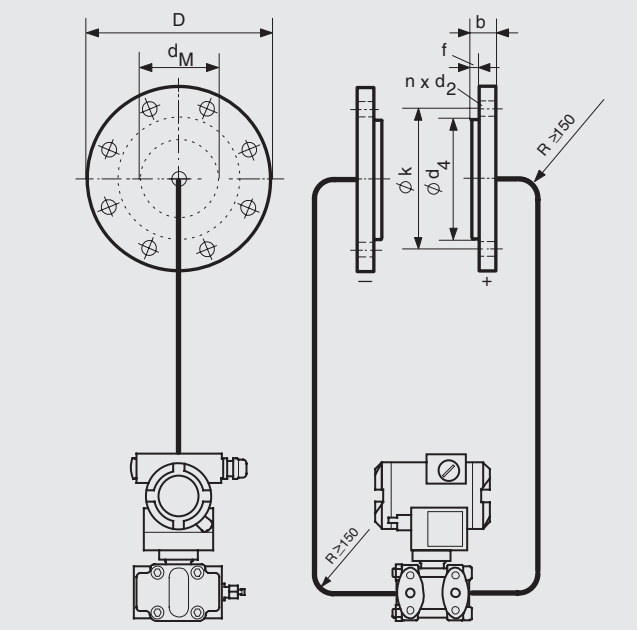
• 1.0 m	2
• 1.6 m	3
• 2.5 m	4
• 4.0 m	5
• 6.0 m	6
• 8.0 m	7
• 10.0 m	8
Other version	9
Add Order code and plain text: Length of capillary tube: ...	N1Y

See page 1/65 for further designs.

1) Not suitable for use in low-pressure range.
2) See page 1/62 for max. capillary length.

7MF492. Diaphragm seals





Connection to DIN 2501

Nominal diameter	Nom. press.	b	D	d_2	d_4	d_M	f	k	n
DN 50	PN 40	20	165	18	102	59	3	125	4
	PN 100	28	195	26	102	59	3	145	4
	PN 160	30	195	26	102	59	3	145	4
DN 80	PN 40	24	200	18	138	89	3	160	8
	PN 100	32	230	26	138	89	3	180	8
	PN 160	36	230	26	138	89	3	180	8
DN 100	PN 16	20	220	18	158	89	3	180	8
	PN 40	24	235	22	162	89	3	190	8
DN 125	PN 16	22	250	18	188	124	3	210	8
	PN 40	26	270	26	188	124	3	220	8

Connection to ANSI B16.5

Nom. diam.	Nom. press. lb/ sq.in.	b inch (mm)	D inch (mm)	d_2 inch (mm)	d_4 inch (mm)	d_M inch (mm)	f inch (mm)	k inch (mm)	n
2 inch	150	0.79 (20)	5.80 (150)	0.79 (20)	3.62 (92)	2.32 (59)	0.06 (1.6)	4.74 (120.5)	4
	300	0.89 (22.5)	6.50 (165)	0.79 (20)	3.62 (92)	2.32 (59)	0.06 (1.6)	5 (127)	8
	600	1.26 (32)	6.50 (165)	0.79 (20)	3.62 (92)	2.32 (59)	0.06 (1.6)	5 (127)	8
3 inch	150	0.96 (2.4)	7.48 (190)	0.79 (20)	5 (127)	3.50 (89)	0.06 (1.6)	6 (152.5)	4
	300	1.14 (29)	8.27 (210)	0.87 (22)	5 (127)	3.50 (89)	0.06 (1.6)	6.63 (168.5)	8
	400	1.52 (38.5)	8.27 (210)	0.87 (22)	5 (127)	3.50 (89)	0.25 (6.4)	6.63 (168.5)	8
4 inch	150	0.95 (24)	9.06 (230)	0.79 (20)	6.22 (158)	3.50 (89)	0.06 (1.6)	7.5 (190.5)	4
	300	1.26 (32)	10.04 (255)	0.87 (22)	6.22 (158)	3.50 (89)	0.06 (1.6)	7.87 (200)	8
	400	1.62 (41.5)	10.04 (255)	1.02 (26)	6.22 (158)	3.50 (89)	0.25 (6.4)	7.87 (200)	8
5 inch	150	0.94 (24)	10.04 (255)	0.87 (22)	7.32 (186)	4.88 (124)	0.08 (2)	8.50 (216)	4
	300	1.38 (35)	11.02 (280)	0.87 (22)	7.32 (186)	4.88 (124)	0.08 (2)	9.25 (235)	8
	400	1.79 (45.5)	11.02 (280)	1.02 (26)	7.32 (186)	4.88 (124)	0.28 (7)	9.25 (235)	8

d Inside diameter of gasket according to DIN 2690/ANSI B16.5
d_M Effective diaphragm diameter

Fig. 1/40 Dimensions of flanged diaphragm seal 7MF4920 with flexible capillary tube for connection to SITRANS P pressure transmitters

Connection to DIN 2501

Nominal diameter	Nom. press.	b	D	d_2	d_4	d_M	f	k	n
DN 80	PN 40	24	200	18	138	89	3	160	8
	PN 100	32	230	26	138	89	3	180	8
	PN 160	36	230	26	138	89	3	180	8
DN 100	PN 16	20	220	18	158	89	3	180	8
	PN 40	24	235	22	162	89	3	190	8
DN 125	PN 16	22	250	18	188	124	3	210	8
	PN 40	26	270	26	188	124	3	220	8

Connection to ANSI B16.5

Nom. diam.	Nom. press. lb/ sq.in.	b inch (mm)	D inch (mm)	d_2 inch (mm)	d_4 inch (mm)	d_M inch (mm)	f inch (mm)	k inch (mm)	n
3 inch	150	0.96 (2.4)	7.48 (190)	0.79 (20)	5 (127)	3.50 (89)	0.06 (1.6)	6 (152.5)	4
	300	1.14 (29)	8.27 (210)	0.87 (22)	5 (127)	3.50 (89)	0.06 (1.6)	6.63 (168.5)	8
	600	1.52 (38.5)	8.27 (210)	0.87 (22)	5 (127)	3.50 (89)	0.25 (6.4)	6.63 (168.5)	8
4 inch	150	0.95 (24)	9.06 (230)	0.79 (20)	6.22 (158)	3.50 (89)	0.06 (1.6)	7.5 (190.5)	4
	300	1.26 (32)	10.04 (255)	0.87 (22)	6.22 (158)	3.50 (89)	0.06 (1.6)	7.87 (200)	8
	400	1.62 (41.5)	10.04 (255)	1.02 (26)	6.22 (158)	3.50 (89)	0.25 (6.4)	7.87 (200)	8
5 inch	150	0.94 (24)	10.04 (255)	0.87 (22)	7.32 (186)	4.88 (124)	0.08 (2)	8.50 (218)	4
	300	1.38 (35)	11.02 (280)	0.87 (22)	7.32 (186)	4.88 (124)	0.08 (2)	9.25 (235)	8
	400	1.79 (45.5)	11.02 (280)	1.02 (26)	7.32 (186)	4.88 (124)	0.28 (7)	9.25 (235)	8

d Inside diameter of gasket according to DIN 2690/ANSI B16.5
d_M Effective diaphragm diameter

Fig. 1/41 Dimensions of flanged diaphragm seal with flexible capillary tube
7MF4921 for connection to SITRANS P absolute pressure transmitters
7MF4923 for connection to SITRANS P differential pressure and flow transmitters

Ordering data

Order No.

Diaphragm seal
Flange design, with flexible capillary tube, connected to a SITRANS P transmitter (order separately):

For pressure (7MF4010, 7MF4013, 7MF4020 and 7MF4032); scope of delivery 1 off — **7MF4920-1 ■■■■-■ B ■■■**

For absolute pressure (7MF4320, 7MF4232 and 7MF4332); scope of delivery 1 off — **7MF4921-1 ■■■■-■ B ■■■**

For differential pressure and flow (7MF4420 and 7MF4432); scope of deliv. 2 off — **7MF4923-1 ■■■■-■ B ■■■**

Nominal diameter and nominal pressure

DN 50	PN 10 to PN 40	A
	PN 100	B
	PN 160	C
(DN 50 only recommended for press. transm.)		
DN 80	PN 10 to PN 40	D
	PN 100	E
	PN 160	F
DN 100	PN 16	G
	PN 40	H
DN 125	PN 16	J
	PN 40	K
2 inch	Class 150	L
	Class 300	M
	Class 600	N
	Class 1500	P
(2 inch only recommended for press. transm.)		
3 inch	Class 150	Q
	Class 300	R
	Class 600	S
4 inch	Class 150	T
	Class 300	U
	Class 400	V
5 inch	Class 150	W
	Class 300	X
	Class 400	Y
Smooth sealing face conforming to DIN 2526, form D, or to ANSI B16.5 RF 500 RMS		Z
Other version Add Order code and plain text: Nominal diameter: ...; Nominal pressure: ... Sealing face: see "Technical data"		J1Y

Wetted parts materials

• Stainless steel, mat. No. 1.4571	A
• PTFE (for low-pressure on request)	E
• ECTFE (for low-pressure on request)	0
• PFA (for low-pressure on request)	F
• Monel 400, mat. No. 2.4360	D
• Hastelloy C276, mat. No. 2.4819	G
• Hastelloy C4, mat. No. 2.4610	J
• Tantalum	U
Other version Add Order code and plain text: Wetted parts materials: ...	K Z K1Y

Tube length

• Without tube	0
Other version Add Order code and plain text: Tube length: ...	9 L1Y

See right

Ordering data (continued)

Order No.

7MF492.-1 ■■■■-■ B ■■■ (See left)

Filling liquid

• Silicone oil M5	1
• Silicone oil M50	2
• High-temperature oil	3
• Halocarbon oil (for measuring O_2)	4
• Vegetable oil	5
• Glycerine/water[1])	6
Other version Add Order code and plain text: Filling liquid: ...	9 M1Y

Length of capillary tube [2])

• 1.0 m	2
• 1.6 m	3
• 2.5 m	4
• 4.0 m	5
• 6.0 m	6
• 8.0 m	7
• 10.0 m	8
Other version Add Order code and plain text: Length of capillary tube: ...	9 N1Y

Further designs

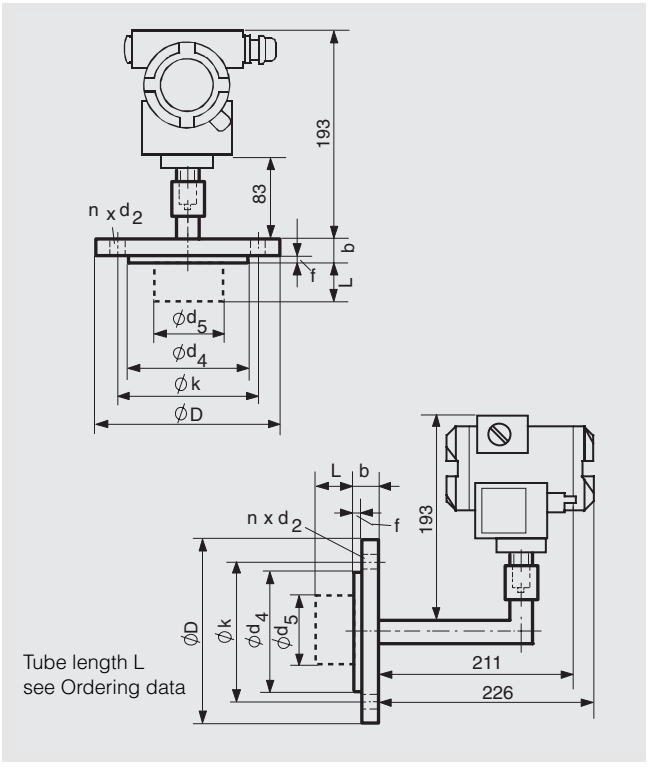
Please add "**-Z**" to Order No. and specify Order code(s).

	Order code
With flame flashover lock-out for mounting on zone 0 (including documentation)	
• For pressure and absolute pressure transmitters	A01
• For differential pressure transmitters	A02
Manufacturer's test certificate M to DIN 55 350, Part 18, and to ISO 9001	C11
Acceptance test certificate B to DIN 50 049, Section 3.1/EN 10 204	C12
Vacuum-proof design for use in low-pressure range	
• For pressure transmitters	V01
• For differential pressure transmitters	V03
Calculation of span of associated transmitter Enclose filled-in questionnaire (see page 1/81) with order	Y05

[1]) Not suitable for use in low-pressure range.
[2]) See page 1/62 for max. capillary length.

Remote seals for transmitters and pressure gauges

7MF4910 Diaphragm seals



Connection to DIN 2501

Nominal diameter	Nom. press.	b	D	d_2	d_4	d_5	d_M	f	k	n
DN 50	PN 40	20	165	18	102	48,3	59	3	125	4
	PN 63	26	180	22	102	48,3	59	3	135	4
	PN 160	30	195	26	102	48,3	59	3	145	4
DN 80	PN 40	24	200	18	138	76	89	3	160	8
	PN 63	28	215	22	138	76	89	3	170	8
	PN 160	36	230	26	138	76	89	3	180	8
DN 100	PN 16	20	220	18	158	94	89	3	180	8
	PN 40	24	235	22	162	94	89	3	190	8

Connection to ANSI B16.5

Nom. diam.	Nom. press. lb/ sq.in.	b inch (mm)	D inch (mm)	d_2 inch (mm)	d_4 inch (mm)	d_5 inch (mm)	d_M inch (mm)	f inch (mm)	k inch (mm)	n
2 inch	150	0.79 (20)	5.91 (150)	0.79 (20)	3.62 (92)	1.9 (48.3)	2.32 (59)	0.06 (1.6)	4.74 (120.5)	4
	300	0.89 (22.5)	6.50 (165)	0.79 (20)	3.62 (92)	1.9 (48.3)	2.32 (59)	0.06 (1.6)	5 (127)	8
	600	1.26 (32)	6.50 (165)	0.79 (20)	3.62 (92)	1.9 (48.3)	2.32 (59)	0.25 (6.4)	5 (127)	8
	1500	1.77 (45)	8.46 (215)	1.02 (26)	3.62 (92)	1.9 (48.3)	2.32 (59)	0.25 (6.4)	6.50 (165)	8
3 inch	150	0.95 (2.4)	7.48 (190)	0.79 (20)	5 (127)	3 (75.5)	3.50 (89)	0.06 (1.6)	6 (152.5)	4
	300	1.14 (29)	8.27 (210)	0.87 (22)	5 (127)	3 (75.5)	3.50 (89)	0.06 (1.6)	6.63 (168.5)	8
	600	1.52 (38.5)	8.27 (210)	0.87 (22)	5 (127)	3 (75.5)	3.50 (89)	0.25 (6.4)	6.63 (168.5)	8
4 inch	150	0.95 (24)	9.06 (230)	0.79 (20)	6.22 (158)	3.69 (94)	3.50 (89)	0.06 (1.6)	7.5 (190.5)	8
	300	1.26 (32)	10.04 (255)	0.87 (22)	6.22 (158)	3.69 (94)	3.50 (89)	0.06 (1.6)	7.87 (200)	8
	400	1.62 (41.5)	10.04 (255)	1.02 (26)	6.22 (158)	3.69 (94)	3.50 (89)	0.25 (6.4)	7.87 (200)	8

d Inside diameter of gasket according to DIN 2690/ANSI B16.5
d_M Effective diaphragm diameter

Fig. 1/42 Dimensions of diaphragm seal 7MF4910 connected directly to SITRANS P transmitter (process connection: vertical at top, horizontal at bottom)

Ordering data

Order No. Order code

7MF4910-

Diaphragm seal
connected directly to a SITRANS P transmitter for pressure
(7MF4010, 7MF4013, 7MF4020 and 7MF4032; order separately)

Process connection
- Vertical (transmitter upright) — **0 2**
- Horizontal

Nominal diameter and nominal pressure

DN 50	PN 40	A
	PN 63	B
	PN 160	C
DN 80	PN 40	D
	PN 63	E
	PN 160	F
DN 100	PN 16	G
	PN 40	H
2 inch	Class 150	L
	Class 300	M
	Class 600	N
	Class 1500	P
3 inch	Class 150	Q
	Class 300	R
	Class 600	S
4 inch	Class 150	T
	Class 300	U
	Class 400	V

Smooth sealing face to DIN 2526, form D, or ANSI B16.5 RF 500 RMS

Other version — **Z**
Add Order code and plain text:
Nominal diameter: ...; Nominal pressure: ... — **J1Y**

Wetted parts materials
- Stainless steel, mat. No. 1.4571 — **A**
- PTFE (for low-pressure on request) — **E**
- ECTFE (for low-pressure on request) — **F**
- PFA (for low-pressure on request) — **D**
- Monel 400, mat. No. 2.4360 — **G**
- Hastelloy C276, mat. No. 2.4819 — **J**
- Hastelloy C4, mat. No. 2.4610 — **U**
- Tantalum — **K**

Other version — **Z**
Add Order code and plain text:
Wetted parts materials: ... — **K1Y**

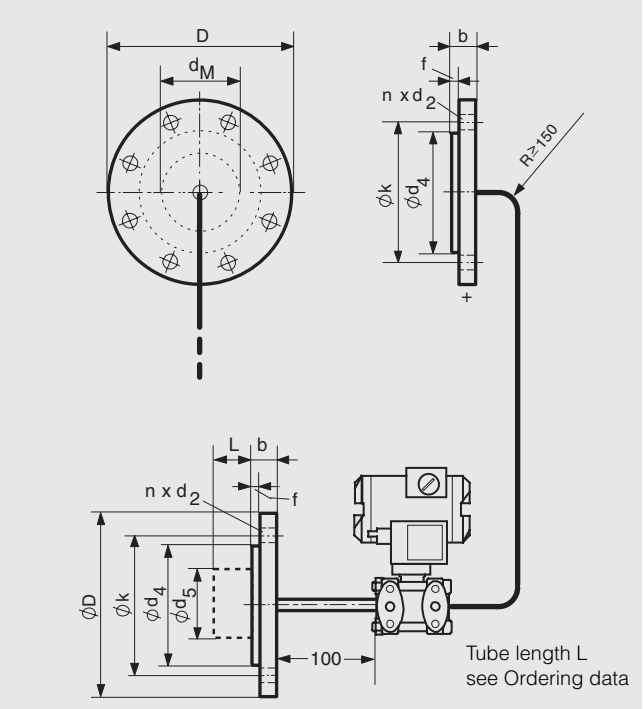
Tube length
- Without tube — **0**
- 50 mm — **1**
- 100 mm — **2**
- 150 mm — **3**
- 200 mm — **4**

Filling liquid
- Silicone oil M5 — **1**
- Silicone oil M50 — **2**
- High-temperature oil — **3**
- Halocarbon oil (for measuring O_2) — **4**
- Vegetable oil — **5**
- Glycerine/water [1] — **6**

Other version — **9**
Add Order code and plain text:
Filling liquid: ... — **M1Y**

See page 1/65 for further designs

[1] Not suitable for use in low-pressure range.



Connection to DIN 2501

Nom. diam.	Nom. press.	b	D	d_2	d_4	d_5	d_M	f	k	n
DN 80	PN 40	24	200	18	138	76	89	3	160	8
	PN 100	32	230	26	138	76	89	3	180	8
	PN 160	36	230	26	138	76	89	3	180	8
DN 100	PN 16	20	200	18	158	94	89	3	180	8
	PN 40	24	235	22	162	94	89	3	190	8

Connection to ANSI B16.5

Nom. diam.	Nom. press. lb/ sq.in.	b inch (mm)	D inch (mm)	d_2 inch (mm)	d_4 inch (mm)	d_5 inch (mm)	d_M inch (mm)	f inch (mm)	k inch (mm)	n
3 inch	150	0.96 (2.4)	7.48 (190)	0.79 (20)	5 (127)	3 (75,5)	3.50 (89)	0.06 (1.6)	6 (152.5)	4
	300	1.14 (29)	8.27 (210)	0.87 (22)	5 (127)	3 (75,5)	3.50 (89)	0.06 (1.6)	6,63 (168.5)	8
	600	1.52 (38.5)	8.27 (210)	0.87 (22)	5 (127)	3 (75,5)	3.50 (89)	0.25 (6.4)	6,63 (168.5)	8
4 inch	150	0.95 (24)	9.06 (230)	0.79 (20)	6.22 (158)	3.69 (94)	3.50 (89)	0.06 (1.6)	7 (190.5)	4
	300	1.26 (32)	10.04 (255)	0.87 (22)	6.22 (158)	3.69 (94)	3.50 (89)	0.06 (1.6)	7.87 (200)	8
	400	1.62 (41.5)	10.04 (255)	1.02 (26)	6.22 (158)	3.69 (94)	3.50 (89)	0.25 (6.4)	7.87 (200)	8

d Inside diameter of gasket to DIN 2690/ANSI B16.5
d_M Effective diaphragm diameter

Fig. 1/43 Dimensions of diaphragm seals 7MF4913, flange design, with flexible capillary tube or fixed connection, for connection to SITRANS P differential pressure transmitters

1) Not suitable for use in low-pressure range.
2) See page 1/62 for max. capillary length.

Ordering data

Order No. Order code

Mounting flange (optionally with tube) for direct mounting to high-pressure side **and flanged remote seal without tube** conn. via capillary to low-pressure side of SITRANS P diff. press.transm., DS series

Flange	Nom. diam.	Nom. press.	
Conn. to DIN 2501	DN 80	PN 40	D
	DN 100	PN 16	G
		PN 40	H
Conn. to ANSI B 16.5	3 inch	Class 150	Q
		Class 300	R
	4 inch	Class 150	T
		Class 300	U

Other version
Add Order code and plain text:
Flange:..., Nom. diam.:..., Nom. press.:... Z JY1

Wetted parts materials
Smooth sealing face to DIN 2526, form D or form E, or to ANSI B 16.5 500 RMS or RFSF
- Stainless steel, mat. No. 1.4571
  - Without foil A
  - With PTFE coating E
  - With ECTFE coating F
  - With PFA coating D
- Monel 400, mat. No. 2.4360 G
- Hastelloy C276, mat. No. 2.4819 J
- Tantalum K
- Hastelloy C4, mat. No. 2.4610 U
- Other version Z K1Y

Add Order code and plain text:
Wetted parts materials: ...

Tube length (for flange on high-pr. side)
- Without tube 0
- 50 mm 1
- 100 mm 2
- 150 mm 3
- 200 mm 4
- Other version 9 L1Y

Add Order code and plain text:
Wetted parts materials: ...

Filling liquid
- Silicone oil M5 1
- Silicone oil M50 2
- High-temperature oil 3
- Halocarbon oil (for measuring 0_2) 4
- Vegetable oil 5
- Glycerine/water [1] 6
- Other version 9 M1Y

Add Order code and plain text:
Filling liquid: ....

Length of capillary tube [2]
- 1.0 m 2
- 1.6 m 3
- 2.5 m 4
- 4.0 m 5
- 6.0 m 6
- 8.0 m 7
- 10.0 m 8
- Other version 9 N1Y

Add Order code and plain text:
Length of capillary tube: ...

7MF4913- 1 - B

Remote seals with other nominal diameter, made of other material, with other sealing face or other filling liquid on request.

Other versions for mounting flange Please add **"-Z"** to Order No. and specify Order code(s).	Order code
With flame flashover lock-out for mounting on zone 0 (including documentation)	**A02**
Manufacturer's test cert. M to DIN 55 350, Part 18, and ISO 9001	**C11**
Acceptance test cert. B to DIN 50 049, Sect. 3.1/EN 10 204	**C12**
Vacuum-proof design for use in low-pressure range	**V03**
Calculation of span of associated transmitter Enclose filled-in questionnaire (see page 1/81) with order	**Y05**

7MF4925 Flushing ring

Application

Flushing rings are required for flange-mounted and sandwich-type remote seals 7MF4900 to 7MF4923 if the danger exists that the process conditions and the geometric design of the connection for the medium could lead to deposits or blockages.

The flushing ring is clamped between the process flange and the remote seal.

Deposits can be flushed away from the diaphragm through the holes in the side, or the pressure volume can be vented. Different nominal diameters and forms permit adaptation to the respective process flange.

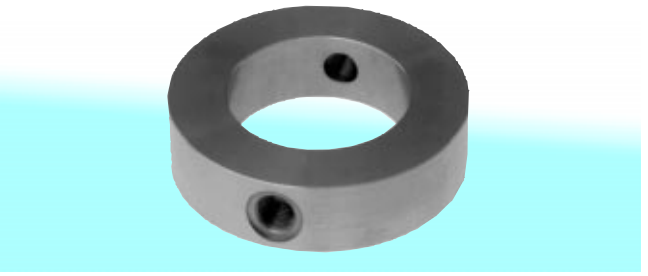


Fig. 1/46 Flushing ring

Process connection

For flanges to DIN and ANSI
DN 50, 80, 100, 125; PN 16 to 400 or
DN 2 inch, 3 inch, 4 inch, 5 inch; class 150 to 2500.

Standard design

Material: CrNi steel 1.4571
See Ordering data for sealing faces and flushing holes.

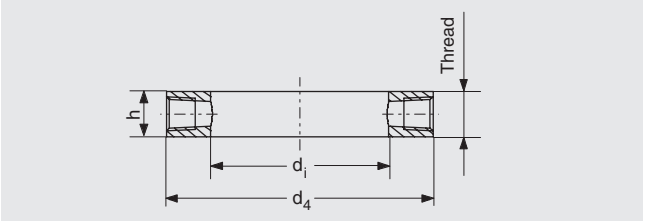


Fig. 1/44 Flushing ring, dimensions

Connection to DIN

DN [mm]	PN [bar]	Dimensions [mm]			Mass
		d_4	d_i	h	[kg]
50	16 to 400	102	62	30	1.10
80	16 to 400	138	92	30	1.90
100	16 to 400	162	92	30	3.15
125	16 to 400	188	126	30	3.50

Connection to ANSI

DN	Class	Dimensions [mm]			Mass
		d_4	d_i	h	[kg]
2 inch	150 to 2500	92	62	30	0.60
3 inch	150 to 2500	127	92	30	1.05
4 inch	150 to 2500	157	92	30	2.85
5 inch	150 to 2500	185.5	126	30	3.30

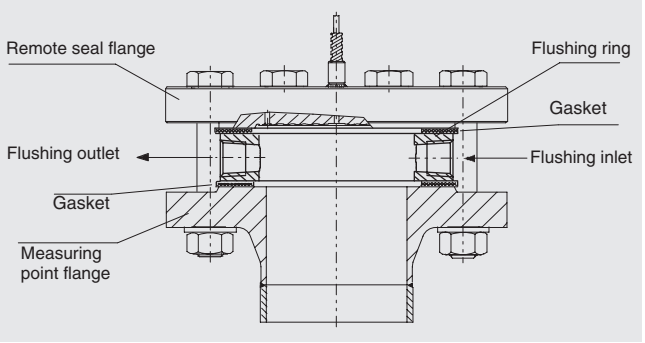


Fig. 1/45 Installation example

Ordering data

Order No. Ord. code

Flushing ring — **7MF4925-** — **1**

for remote seals 7MF4900 to 7MF4923

Nom. diam.	Nom. press.	
DN 50	PN 16 to PN 400	A
DN 80	PN 16 to PN 400	B
DN 100	PN 16 to PN 400	C
DN 125	PN 16 to PN 400	D
2 inch	Class 150 to 2500	G
3 inch	Class 150 to 2500	H
4 inch	Class 150 to 2500	J
5 inch	Class 150 to 2500	K
Other version Add Order code and plain text: Nominal diam.: ...; Nominal press.: ...		Z J1Y

Sealing face

• DIN 2526	Form C	A
	Form D	B
	Form E	C
• DIN 2512	Groove/groove	D
	Tongue/tongue	E
	Groove/tongue	F
• DIN 2513	Overhang	G
	Recess	H
• ANSI B 16.5	RF 500 RMS	M
	RFSF	Q
	RJT ring groove	R
Other version Add Order code and plain text: Sealing face: ...		Z K1Y

Flushing holes (2 off)

• Female thread G¼	1
• Female thread G½	2
• Female thread ¼" - 18 NPT	3
• Female thread ½" - 14 NPT	4

Material

• Stainless steel, mat. No. 1.4571	0
Other version: Add Order code and plain text: Material: ...	9 M1Y

Further designs
Please add **"-Z"** to Order No. and specify Order code(s).

	Order code
Acceptance test certificate B to DIN 50 049, Section 3.1/EN 10 204	**C12**

7MF498. Clamp-on seals for flange-mounting

Application

The clamp-on seal is completely integrated in the process line. It is particularly suitable for flowing and highly viscous media.

The remote seal consists of a cylindrical jacket into which a thin-walled pipe is welded. It is clamped directly between two flanges in the pipeline.

Technical data

Process connection	Flange to DIN 2501 or ANSI B16.5
Sealing face	Form D to DIN 2526 or ANSI RF 500 RMS B16.5
Materials	
• Diaphragm	Stainless steel, mat. No. 1.4571
• Remote seal body	Stainless steel, mat. No. 1.4571
Other process connections, sealing faces, wetted parts materials etc. available on request.	

Connection to DIN 2501

DN [mm]	PN [bar]	Dimensions [mm]			
		D	Mb	L	H
25	6 to 400	63	28.5	60	78.5
40	6 to 400	85	43	60	89.5
50	6 to 400	95	54.5	60	92.5
80	6 to 400	130	82.5	60	112
100	6 to 400	150	107	60	122

Connection to ANSI B16.5

DN	Class	Dimensions [mm]			
		D	Mb	L	H
1"	150 to 2500	63	28.5	60	78.5
1½"	150 to 2500	85	43	60	86
2"	150 to 2500	95	54.5	60	94.5
3"	150 to 2500	130	82.5	60	112
4"	150 to 2500	150	107	60	122

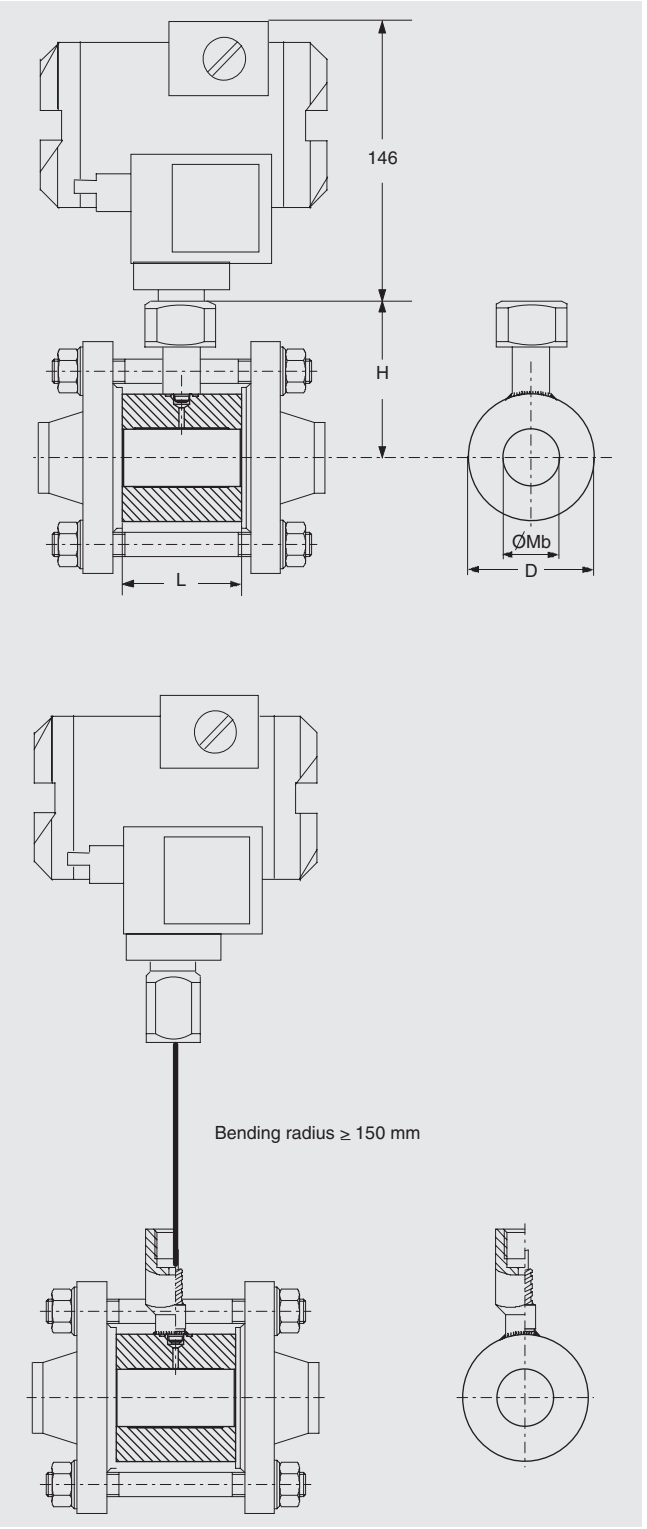


Fig. 1/47 Clamp-on seal connected to SITRANS P transmitter

7MF498. Clamp-on seals for flange-mounting

Ordering data

Order No. Order code

Clamp-on seal for flange-mounting
For SITRANS P transmitters for pressure

(7MF4010, 7MF4013, 7MF4020 and 7MF4032; order separately), scope of delivery: 1 off

For SITRANS P transmitters for differential pressure and flow

(7MF4420 and 7MF4432; order separately), scope of delivery: 1 pair (set)
Material: completely made of stainless steel, mat. No. 1.4571; process connection to DIN 2501 or ANSI B16.5; sealing face to DIN 2526, form D or to ANSI B16.5 RF 500 RMS

Nom. diam.	Nom. press.	
DN 25	PN 6 to 400	B
DN 40	PN 6 to 400	D
DN 50	PN 6 to 400	E
DN 80	PN 6 to 400	G
DN 100	PN 6 to 400	H
1"	Class 150 to 2500	L
1½"	Class 150 to 2500	M
2"	Class 150 to 2500	N
3"	Class 150 to 2500	P
4"	Class 150 to 2500	Q
Other version Add Order code and plain text: Nominal diam.: ...; Nominal press.: ...		Z

Wetted parts materials

• Stainless steel, mat. No. 1.4571	A
• PFA coating	D
• ECTFE coating	F
• Monel 400, mat. No. 2.4360	G
• Hastelloy C276, mat. No. 2.4819	J
• Hastelloy C4, mat. No. 2.4610	U
• Tantalum	K
Other version Add Order code and plain text: Material: ...	Z

Filling liquid

• Silicone oil M5	1
• Silicone oil M50	2
• High-temperature oil	3
• Halocarbon oil	4
• Vegetable	5
• Glycerine/water [1]	6
Other version Add Order code and plain text: Filling liquid ...	9

Connection to transmitter

Direct	0
Via capillary tube, length [2]	
• 1.0 m	2
• 1.6 m	3
• 2.5 m	4
• 4.0 m	5
• 6.0 m	6
• 8.0 m	7
• 10.0 m	8
Other version: Add Order code and plain text: Length: ...	9

7MF4980-... 1 ■■ 0 ■ - ■ B ■■■

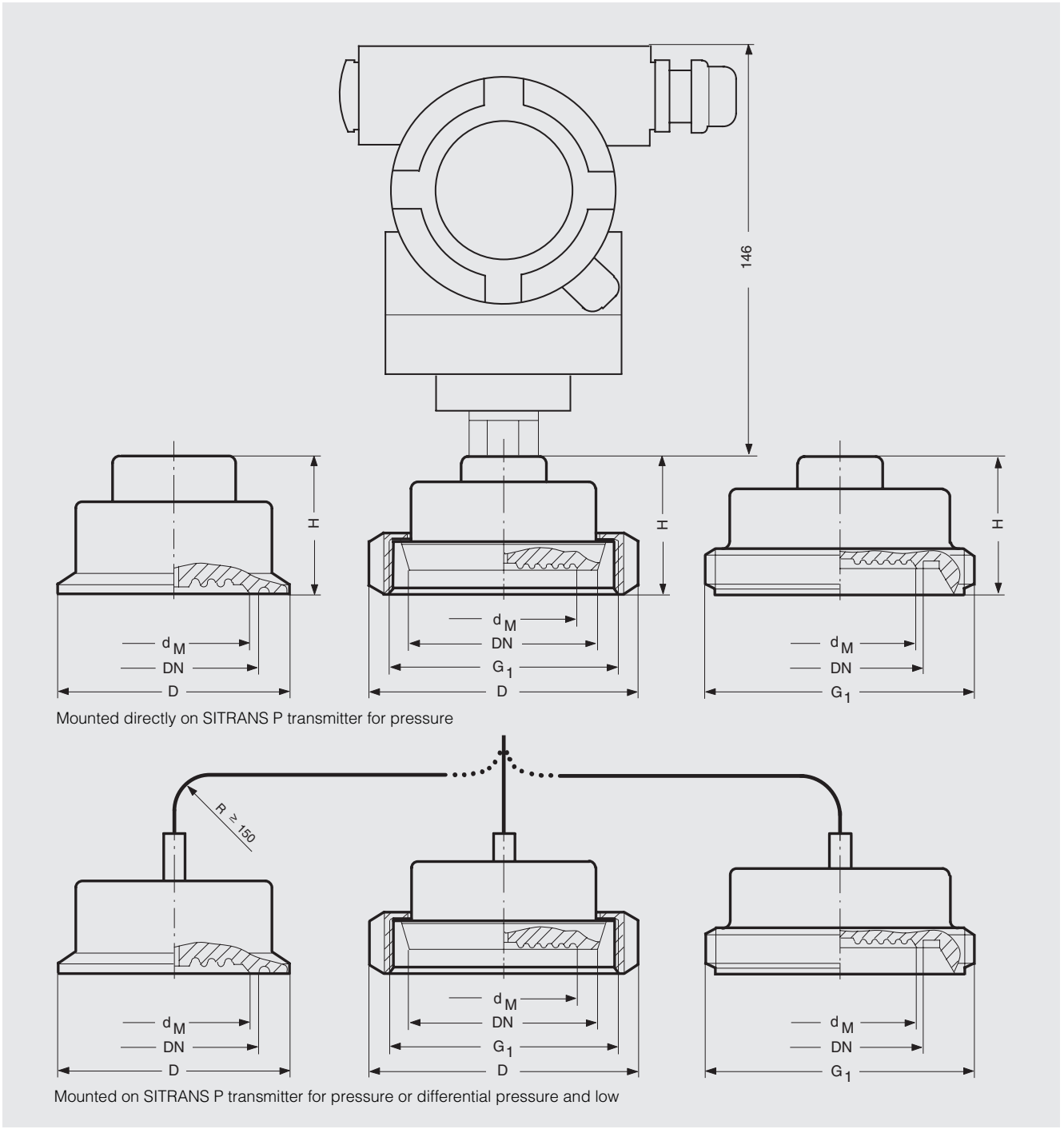
7MF4983-... 1 ■■ 0 ■ - ■ B ■■■

Order code
J1Y
K1Y
M1Y
N1Y

Further designs
Please add **"-Z"** to Order No. and specify Order code(s).

	Order code
With flame flashover lock-out for mounting on zone 0 (including documentation)	
• For pressure or absolute pressure transmitters	**A01**
• For differential pressure transmitters	**A02**
Manufacturer's test certificate M to DIN 55 350, Part 18, and to ISO 9001	**C11**
Acceptance test certificate B to DIN 50 049, Section 3.1/EN 10 204	**C12**
Vacuum-proof design for use in low-pressure range	
• For pressure transmitters	**V01**
• For differential pressure transmitters	**V03**
Calculation of span of associated transmitter Enclose filled-in questionnaire (see page 1/81) with order **Note:** Suffix **"Y01"** required with transmitter!	**Y05**

[1]) Not suitable for applications in low-pressure range.
[2]) See page 1/62 for max. capillary length.



Clamp connection

DN	Ø d_M	Ø D	H
1½ inch	32	50.5	35
2 inch	40	64	35
2½ inch	52	77.5	35
3 inch	72	91	35

d_M = effective diaphragm diameter

Connection to DIN 11851 with slotted union nut

DN	Ø d_M	Ø D	H	G_1
25	25	63	36	Rd 52 x 1/6
32	32	70	36	Rd 52 x 1/6
40	40	78	36	Rd 65 x 1/6
50	52	112	36	Rd 78 x 1/6
65	65	112	36	Rd 95 x 1/6
80	72	127	36	Rd 110 x 1/6

Connection to DIN 11851 with screw necks

DN	Ø d_M	H	G_1
25	25	36	Rd 52 x 1/6
32	32	36	Rd 52 x 1/6
40	40	36	Rd 65 x 1/6
50	52	36	Rd 78 x 1/6
65	65	36	Rd 95 x 1/6
80	72	36	Rd 110 x 1/6

Fig. 1/48 Quick-release diaphragm seal, dimensions (DN partly in inches, rest in mm)

Remote seals for transmitters and pressure gauges

7MF494.
Quick-release diaphragm seals

Ordering data

Order No. 7MF4940- A 0 - B

Order code

Quick-release diaphragm seal
for SITRANS P transmitters for pressure (type 7MF4010, 7MF4013, 7MF4020 or 7MF4032; order separately)
Filling liquid: vegetable oil
Material: stainless steel, mat. No. 1.4571

Conn.	Nom. diam.	Nom. press.	Order code
DIN 11 851 with slotted union nut	DN 25	PN 40	1B
	DN 32	PN 40	1C
	DN 40	PN 40	1D
	DN 50	PN 25	1E
	DN 65	PN 25	1F
	DN 80	PN 25	1G
DIN 11 851 with screw necks	DN 25	PN 40	2B
	DN 32	PN 40	2C
	DN 40	PN 40	2D
	DN 50	PN 25	2E
	DN 65	PN 25	2F
	DN 80	PN 25	2G
Clamp connection	1½ inch	PN 40	4L
	2 inch	PN 40	4M
	2½ inch	PN 40	4N
	3 inch	PN 40	4P
Other version Add Order code and plain text: Nominal diam.: ...; Nominal press.: ...			9Z

Filling liquid
- Vegetable oil — 5
- Glycerine/water [1] — 6
- Other version — 9
Add Order code and plain text:
Filling liquid: ...

Connection to transmitter
- Direct — 0
- Via capillary tube [2]
  - 1.0 m — 2
  - 1.6 m — 3
  - 2.5 m — 4
  - 4.0 m — 5
  - 6.0 m — 6
  - 8.0 m — 7
  - 10.0 m — 8
- Other version — 9
Add Order code and plain text:
Length of capillary tube: ...

H1Y — M1Y — N1Y

Further designs
Please add **"-Z"** to Order No. and specify Order code(s).

	Order code
Manufacturer's test certificate M to DIN 55 350, Part 18, and to ISO 9001 Acceptance test certificate B to DIN 50 049, Section 3.1/EN 10 204	C11 C12
Vacuum-proof design for use in low-pressure range	V01

Ordering data

Order No. 7MF4943- A 0 - B

Order code

Quick-release diaphragm seal
for SITRANS P transmitters for differential pressure and flow (type 7MF4420 or 7MF4423; order separately)
Filling liquid: vegetable oil
Material: stainless steel, mat. No. 1.4571
Delivery unit: 2 off

Conn.	Nom. diam.	Nom. press.	Order code
DIN 11 851 with slotted union nut	DN 50	PN 25	1E
	DN 65	PN 25	1F
	DN 80	PN 25	1G
DIN 11 851 with screw necks	DN 50	PN 25	2E
	DN 65	PN 25	2F
	DN 80	PN 25	2G
Clamp connection	2"	PN 40	4M
	2½"	PN 40	4N
	3"	PN 40	4P
Other version Add Order code and plain text: Nominal diam.: ...; Nominal press.: ...			9Z

Filling liquid
- Vegetable oil — 5
- Glycerine/water [1] — 6
- Other version — 9
Add Order code and plain text:
Filling liquid: ...

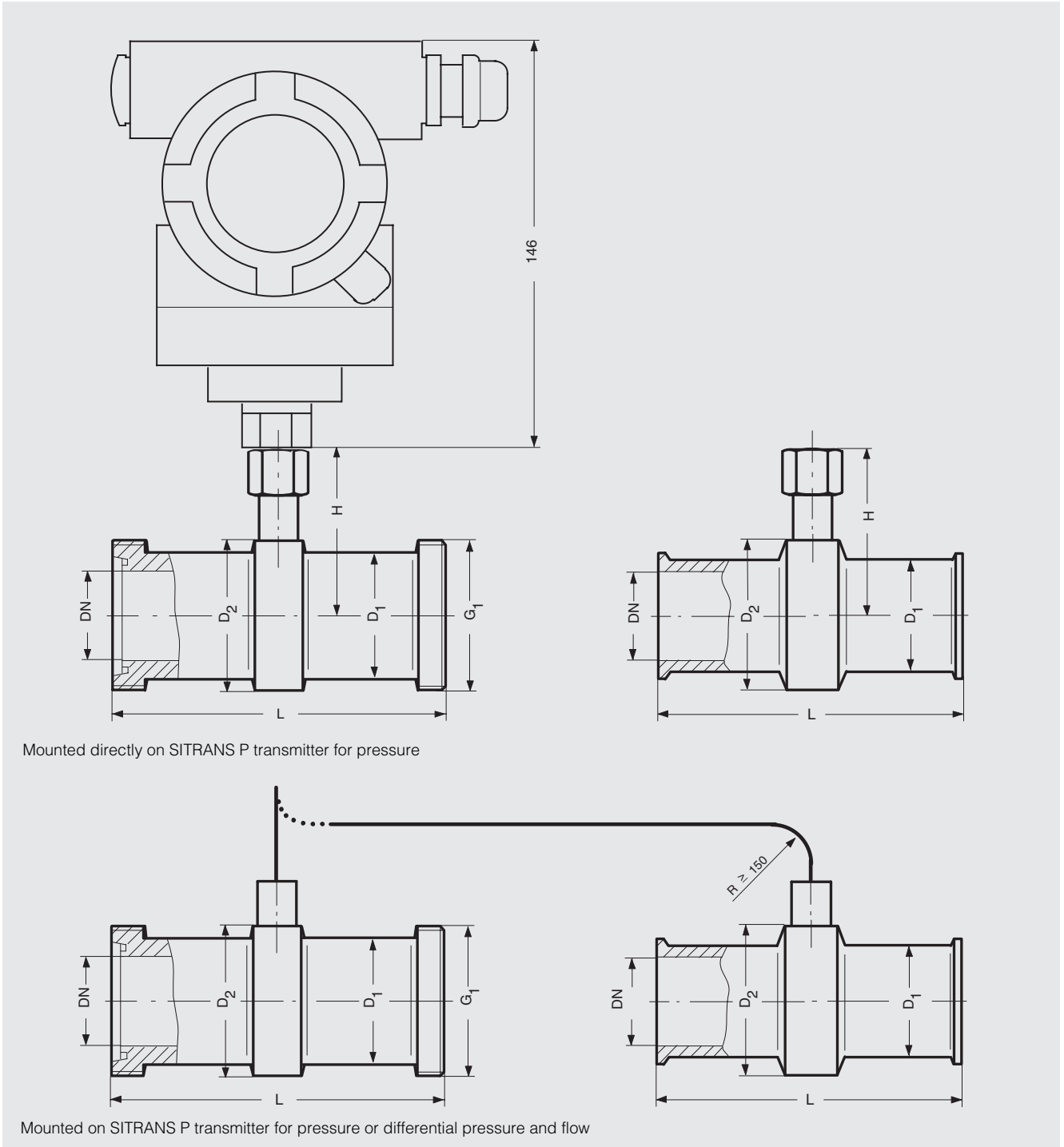
Connection to transmitter
- Via capillary tube [2]
  - 1.0 m — 2
  - 1.6 m — 3
  - 2.5 m — 4
  - 4.0 m — 5
  - 6.0 m — 6
  - 8.0 m — 7
  - 10.0 m — 8
- Other version — 9
Add Order code and plain text:
Length of capillary tube: ....

H1Y — M1Y — N1Y

Further designs
Please add **"-Z"** to Order No. and specify Order code(s).

	Order code
Manufacturer's test certificate M to DIN 55 350, Part 18, and to ISO 9001 Acceptance test certificate B to DIN 50 049, Section 3.1/EN 10 204	C11 C12
Vacuum-proof design for use in low-pressure range	V03

[1] Not suitable for use in low-pressure range.
[2] See page 1/62 for max. capillary length.



Mounted directly on SITRANS P transmitter for pressure

Mounted on SITRANS P transmitter for pressure or differential pressure and flow

Connection to DIN 11851 with screw necks

DN	Ø D_1	Ø D_2	H	L	G_1
25	38	52	68	128	Rd 52 x 1/6
40	55	65	74.5	160	Rd 65 x 1/6
50	68	78	81	170	Rd 78 x 1/6
65	85	95	89.5	182	Rd 95 x 1/6
80	110	110	97	182	Rd 110 x 1/4
100	130	130	107	182	Rd 130 x 1/4

Clamp connection

DN	Ø D_1	Ø D_2	H	L
1 inch	38	50	67	114
1½ inch	43	65	74.5	146
2 inch	56	75	79.5	156
2½ inch	68	77	80.5	156
3 inch	82	91	87.5	156

Fig. 1/49 Quick-release clamp-on seal, dimensions (DN partly in inches, rest in mm)

7MF4950
Quick-release clamp-on seals

Ordering data

Order No. 7MF4950- A 0 - B

Order code

Quick-release clamp-on seal
for SITRANS P transmitters for pressure (type 7MF4010, 7MF4013, 7MF4020 or 7MF4032; order separately)
Filling liquid: vegetable oil
Material: Stainless steel, mat. No. 1.4435

Conn.	Nom. diam.	Nom. press.	Order code
DIN 11 851 with screw necks	DN 25	PN 40	**2B**
	DN 40	PN 40	**2D**
	DN 50	PN 25	**2E**
	DN 65	PN 25	**2F**
	DN 80	PN 25	**2G**
	DN 100	PN 25	**2H**
Clamp connection	1½"	PN 40	**4L**
	2"	PN 40	**4M**
	2½"	PN 40	**4N**
	3"	PN 40	**4P**
Other version Add Order code and plain text: Nominal diam.: ...; Nominal press.: ...			**9Z**

Filling liquid

	Order code
• Vegetable	**5**
• Glycerine/water [1]	**6**
Other version Add Order code and plain text: Filling liquid: ...	**9**

Connection to transmitter

	Order code
• Direct	**0**
• Via capillary tube [2]	
- 1.0 m	**2**
- 1.6 m	**3**
- 2.5 m	**4**
- 4.0 m	**5**
- 6.0 m	**6**
- 8.0 m	**7**
- 10.0 m	**8**
Other version Add Order code and plain text: Length of capillary tube:	**9**

Further designs
Please add **"-Z"** to Order No. and specify Order code(s).

	Order code
Manufacturer's test certificate M to DIN 55 350, Part 18, and to ISO 9001	**C11**
Acceptance test certificate B to DIN 50 049, Section 3.1/EN 10 204	**C12**
Vacuum-proof design for use in low-pressure range	**V01**

[1]) Not suitable for use in low-pressure range.
[2]) See page 1/62 for max. capillary length.

7MF4960
Miniature diaphragm seals

Description

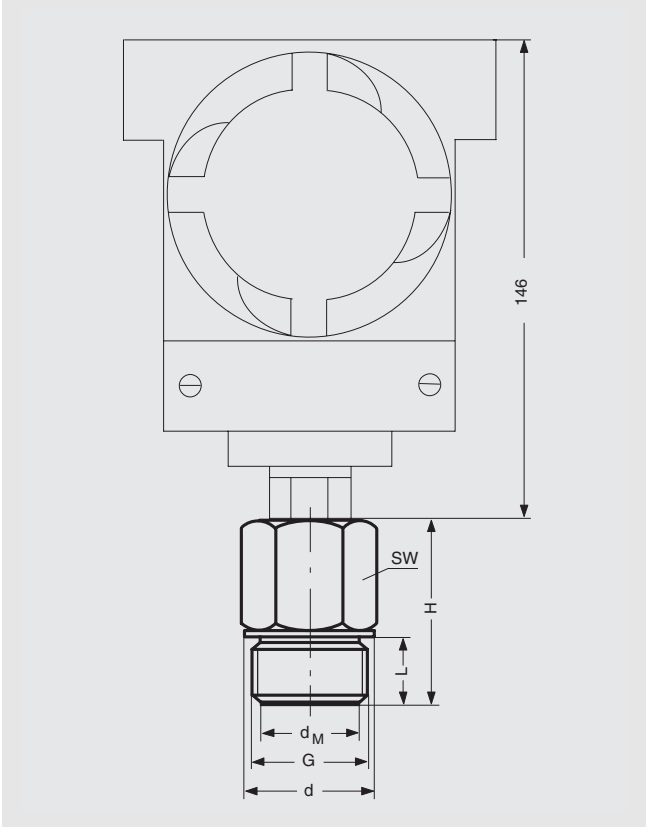
For connection to SITRANS P transmitters for pressure. Suitable for high pressures, contaminated, fibrous and viscous media in the chemical, paper, food and drink industries.

Design

- Flush-mounted diaphragm
- No dead spaces
- Fixed threaded stems

Technical data

Span with • G1B • G1½B • G2B	 > 6 bar > 2 bar > 600 mbar
Filling liquid	Silicone oil M5 or vegetable oil
Material	Stainless steel, mat. No. 1.4571
Maximum pressure	100 % of nominal pressure of transmitter, up to maximum of PN 600
Linearity	Same as transmitter
Temperature of use	Same as transmitter
Temperature range of medium	Same as transmitter
Weight • G1B • G1½B • G2B	 Approx. 0.3 kg Approx. 0.5 kg Approx. 0.8 kg



G	Ø d_M	SW	Ø d	L	H
G1B	25	41	39	21	56
G1½B	40	55	60	30	50
G2B	50	60	70	30	63

d_M = effective diaphragm diameter

Fig. 1/50 Miniature diaphragm seal, dimensions (in mm)

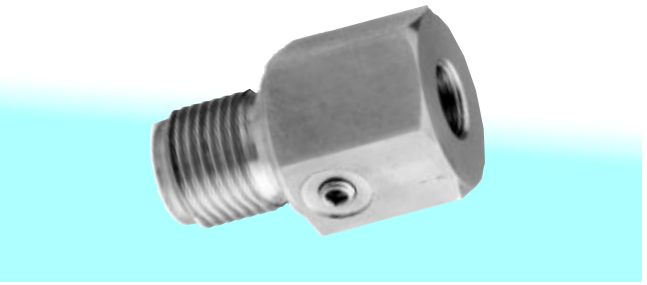


Fig. 1/51 Miniature diaphragm seal

Ordering data

	Order No. Order code
Miniature diaphragm seal directly fitted on SITRANS P transmitters for pressure (type 7MF4010, 7MF4013, 7MF4020 and 7MF4032; order separately) Material: stainless steel, mat. No. 1.4571 Pressure rating: see transmitter	**7MF4960-** **1 ■ ■ 0 ■** ■ ■ ■
Process connection • G1B • G½B • G2B	**C** **D** **E**
Wetted parts materials • Stainless steel, mat. No. 1.4571	**A**
Other version Add Order code and plain text: Wetted parts materials: ...	**Z**
	K1Y
Filling liquid • Silicone oil M5 • Vegetable oil	**1** **5**
Other version Add Order code and plain text: Filling liquid: ...	**9** **M1Y**

Further designs
Please add **"-Z"** to Order No. and specify Order code(s).

	Order code
Manufacturer's test certificate M to DIN 55 350, Part 18, and to ISO 9001	**C11**
Acceptance test certificate B to DIN 50 049, Section 3.1/EN 10 204	**C12**

Measuring setups

Measuring setups

The following pages show examples of typical measuring setups for use of SITRANS P transmitters with and without remote seals, such as:

- Setups for transmitters with connection of remote seals, with associated equations for calculation.
- Questionnaires
  Checking of combination between transmitter and remote seal
- Setups for transmitters without remote seals, with associated equations for calculation
- Questionnaires
  For hydrostatic level measurements

Installation

Remote seals of sandwich design are fitted between the connection flange of the measuring point and a dummy flange. Remote seals of flanged design are fitted directly on the connection flange of the measuring point. The respective pressure rating of the dummy flange or the flanged remote seal must be observed. The transmitter should always be installed below the connection flange, and below the lower connection flange in the case of differential pressure transmitters. When measuring at pressures above atmospheric, the transmitter can also be installed above the connection flange. When measuring at pressures below atmospheric, the transmitter must always be installed below the connection flange, and below the lower connection flange in the case of differential pressure transmitters.

Offset of measuring range

If there is a difference in height between the two connection flanges when measuring with two remote seals, an additional differential pressure results from the oil filling of the remote seal capillaries. This results in an offset of the actual measuring range and must be taken into account when adjusting the transmitter. An offset in the measuring range also occurs when combining a remote seal with a transmitter if the latter is not installed at the same height as the former.

Transmitter output

If the level, separation layer or density increase in closed vessels, the differential pressure and the output signal of the transmitter also increase. If an inverted relationship is desired between the differential pressure and the output signal, the start-of-scale and full-scale values of the SITRANS P must be interchanged.

With open vessels, an increasing pressure is usually assigned to an increasing level, separation layer or density.

Influence of ambient temperature

The capillaries between the remote seal and the transmitter should be kept as short as possible to obtain the good transmission response. Temperature differences between the individual capillaries or between the individual remote seals should be avoided.

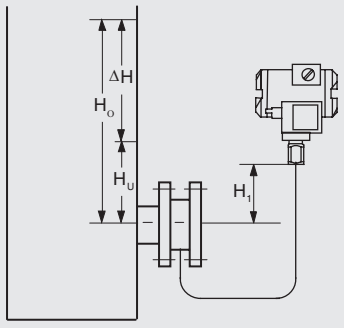
If the complete setup is exposed to temperature variations, errors result from the thermal expansion of the filling liquid in the capillaries, in the remote seals and in the connection units of the transmitters.

Notes

- When measuring separation layers, ensure that the layer is positioned between the two spigots. Also ensure that the level in the vessel is always above the top spigot.
- When measuring density, make sure that the level of the medium remains constant. The level is usually above the top spigot.

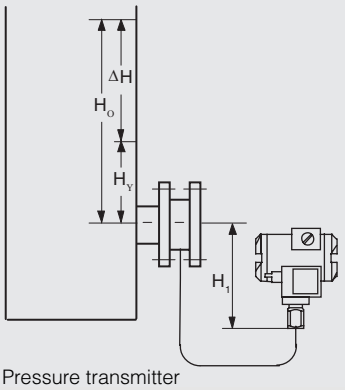
Types of installation for pressure and level measurements

Installation type A



Pressure transmitter
above the measuring point

Installation type B



Pressure transmitter
below the measuring point

$H_1 \leq 7$m; with halocarbon oil as filling liquid only $H_1 \leq 4$m.

Installation type A

Start-of-scale: $p_{MA} = \rho_{FL} \cdot g \cdot H_U - \rho_{Öl} \cdot g \cdot H_1$

Full-scale: $p_{ME} = \rho_{FL} \cdot g \cdot H_O - \rho_{Öl} \cdot g \cdot H_1$

Installation type B

Start-of-scale: $p_{MA} = \rho_{FL} \cdot g \cdot H_U + \rho_{Öl} \cdot g \cdot H_1$

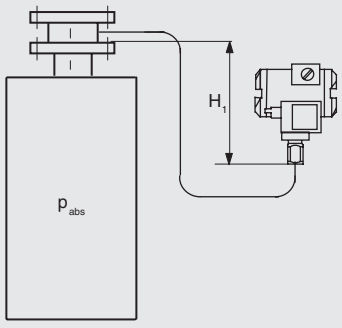
Full-scale: $p_{ME} = \rho_{FL} \cdot g \cdot H_O + \rho_{Öl} \cdot g \cdot H_1$

Legend

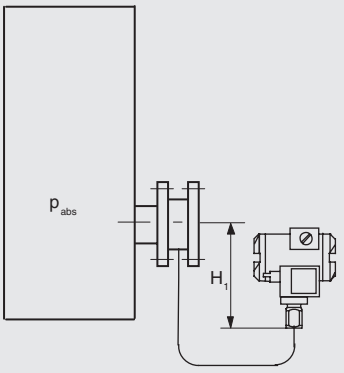
p_{MA}	Start-of-scale value
p_{ME}	Full-scale value
ρ_{FL}	Density of medium in vessel
$\rho_{Öl}$	Density of filling oil in the capillary tube to the remote seal
g	Local acceleration due to gravity
H_U	Start-of-scale value
H_O	Full-scale value
H_1	Distance between vessel flange and transm.

Types of installation for absolute pressure measurements

Installation type C_1



Installation type C_2



Absolute pressure transmitter always below the measuring point: $H_1 \leq 200$ mm

Installation types C_1 and C_2

Start-of-scale: $p_{MA} = p_{START} + \rho_{Öl} \cdot g \cdot H_1$

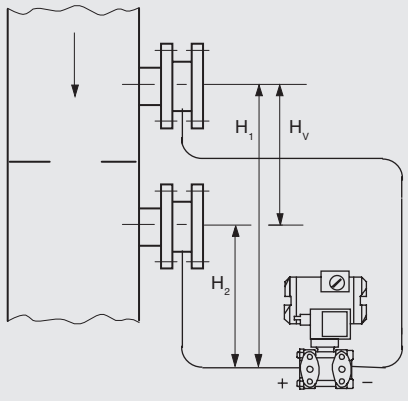
Full-scale: $p_{ME} = p_{END} + \rho_{Öl} \cdot g \cdot H_1$

Legend

p_{MA}	Start-of-scale value to be set
p_{ME}	Full-scale value to be set
p_{START}	Start-of-scale value
p_{END}	Full-scale value
$\rho_{Öl}$	Density of filling oil in the capillary tube to the remote seal
g	Local acceleration due to gravity
H_1	Distance between vessel flange and transm.

Type of installation for differential pressure and flow measurements

Installation type D Filter monitoring



Installation type D

Start-of-scale: $p_{MA} = p_{START} - \rho_{Öl} \cdot g \cdot H_V$

Full-scale: $p_{ME} = p_{END} - \rho_{Öl} \cdot g \cdot H_V$

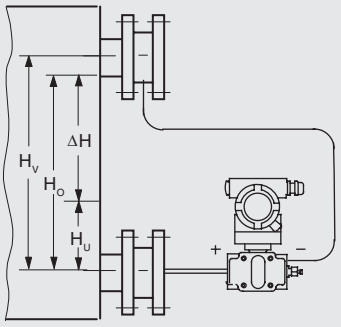
Legend

p_{MA}	Start-of-scale value to be set
p_{ME}	Full-scale value to be set
p_{START}	Start-of-scale value
p_{END}	Full-scale value
$\rho_{Öl}$	Density of filling oil in the capillary tube to the remote seal
g	Local acceleration due to gravity
H_V	Distance between the measuring points (spigots)

Types of installation

Types of installation for level measurements

Installation type E



Installation type E

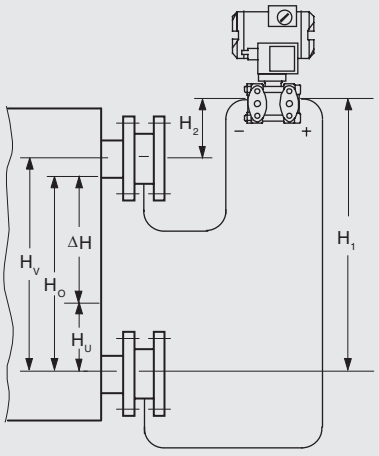
Start-of-scale: $p_{MA} = \rho_{FI} \cdot g \cdot H_U - \rho_{\ddot{O}I} \cdot g \cdot H_V$

Full-scale: $p_{ME} = \rho_{FI} \cdot g \cdot H_O - \rho_{\ddot{O}I} \cdot g \cdot H_V$

Legend

p_{MA}	Start-of-scale value
p_{ME}	Full-scale value
ρ_{FL}	Density of medium in vessel
$\rho_{\ddot{O}I}$	Density of filling oil in the capillary tube to the remote seal
g	Local acceleration due to gravity
H_U	Start-of-scale value
H_O	Full-scale value
H_V	Distance between the measuring points (spigots)

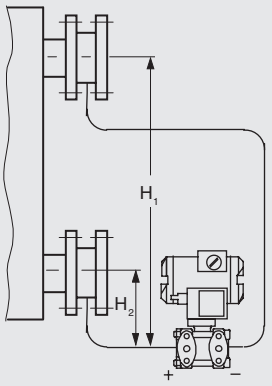
Installation type G



Differential transmitter above the upper measuring point, no vacuum

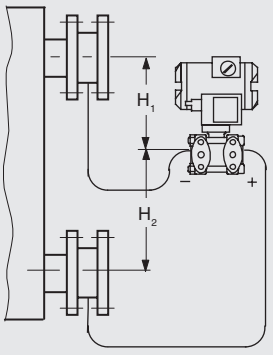
$H_1 \leq 7$m; with halocarbon oil as filling liquid only $H_1 \leq 4$m.

Installation type H



below the lower measuring point

Installation type J



between the measuring points, no vacuum

$H_2 \leq 7$m; with halocarbon oil as filling liquid only $H_2 \leq 4$m.

Installation types G, H and J

Start-of-scale: $p_{MA} = \rho_{FL} \cdot g \cdot H_U - \rho_{\ddot{O}I} \cdot g \cdot H_V$

Full-scale: $p_{ME} = \rho_{FL} \cdot g \cdot H_O - \rho_{\ddot{O}I} \cdot g \cdot H_V$

Legend

p_{MA}	Start-of-scale value
p_{ME}	Full-scale value
ρ_{FL}	Density of medium in vessel
$\rho_{\ddot{O}I}$	Density of filling oil in the capillary tube to the remote seal
g	Local acceleration due to gravity
H_U	Start-of-scale value
H_O	Full-scale value
H_V	Distance between the measuring points (spigots)

Measuring setups without remote seals

The following types of installation are used to measure level, separation level and density in open and closed vessels without the application of remote seals.

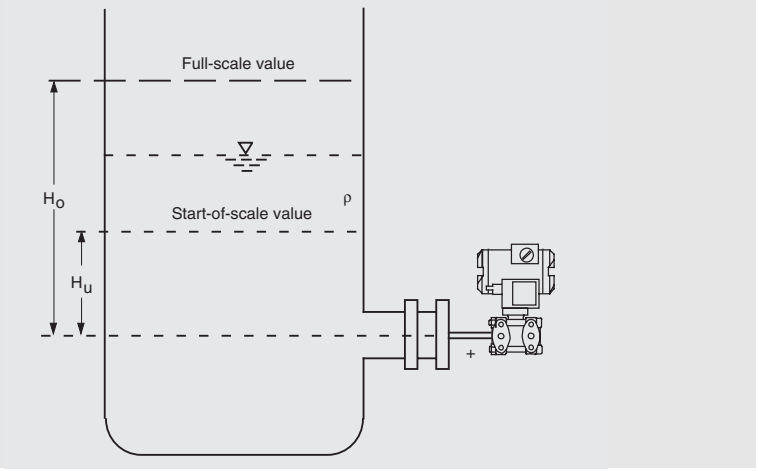
Notes

When measuring separation layers, ensure that the layer is positioned between the two spigots. Also ensure that the level in the vessel is always above the top spigot.

When measuring density, make sure that the level of the medium remains constant. The level is usually above the top spigot.

A questionnaire is printed on page 1/82 which is used for hydrostatic level measurements, e.g. for the measurement of the level in steam boilers, steam drums, condensation vessels etc.

Transmitters for differential pressure for flange mounting - types of installation for open vessels



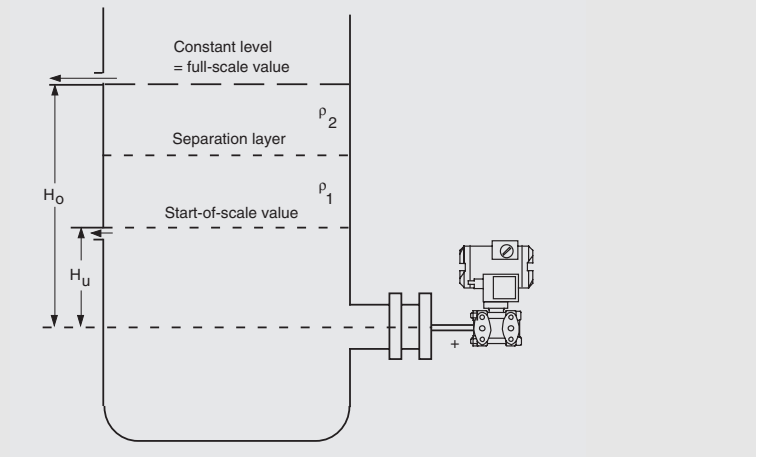
Level measurement

Start-of-scale: $p_{MA} = \rho \cdot g \cdot H_U$

Full-scale: $p_{ME} = \rho \cdot g \cdot H_O$

Legend

p_{MA}	Start-of-scale value
p_{ME}	Full-scale value
H_U	Start-of-scale value
H_O	Full-scale value
g	Local acceleration due to gravity
ρ	Density of medium in vessel



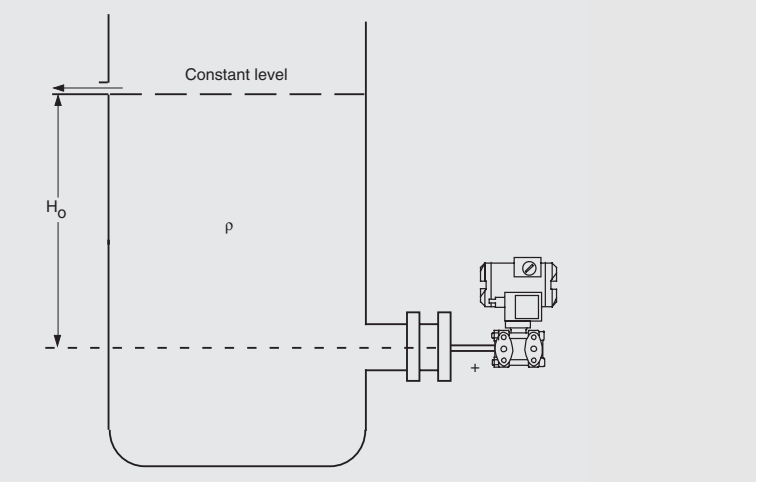
Separation layer measurement

Start-of-scale: $p_{MA} = g \cdot (H_U \cdot \rho_1 + (H_O - H_U) \cdot \rho_2)$

Full-scale: $p_{ME} = \rho_1 \cdot g \cdot H_O$

Legend

p_{MA}	Start-of-scale value
p_{ME}	Full-scale value
H_U	Start-of-scale value
H_O	Full-scale value
g	Local acceleration due to gravity
ρ_1	Density of heavier liquid with separation layer measurement
ρ_2	Density of lighter liquid with separation layer measurement



Density measurement

Start-of-scale: $p_{MA} = \rho_{MIN} \cdot g \cdot H_O$

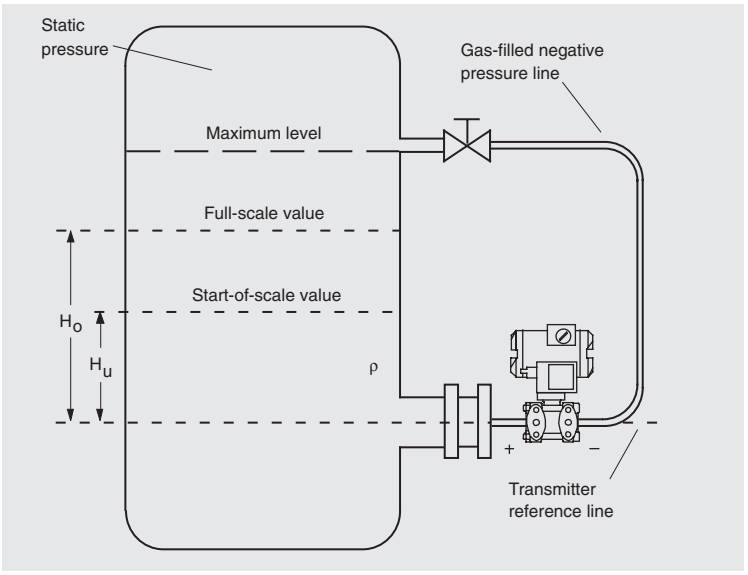
Full-scale: $p_{ME} = \rho_{MAX} \cdot g \cdot H_O$

Legend

p_{MA}	Start-of-scale value
p_{ME}	Full-scale value
H_O	Full-scale value in m
g	Local acceleration due to gravity
ρ_{MIN}	Minimum density of medium in vessel
ρ_{MAX}	Maximum density of medium in vessel

Measuring setups without remote seals

Transmitters for differential pressure for flange mounting - types of installation for closed vessels



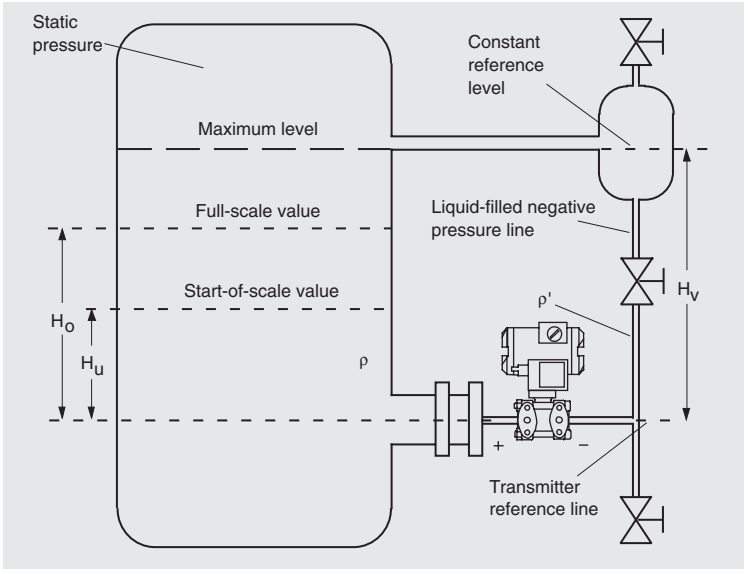
Level measurement, version 1

Start-of-scale: $\Delta p_{MA} = \rho \cdot g \cdot H_U$

Full-scale: $\Delta p_{ME} = \rho \cdot g \cdot H_O$

Legend

Δp_{MA}	Start-of-scale value
Δp_{ME}	Full-scale value
H_U	Start-of-scale value
H_O	Full-scale value
g	Local acceleration due to gravity
ρ	Density of medium in vessel



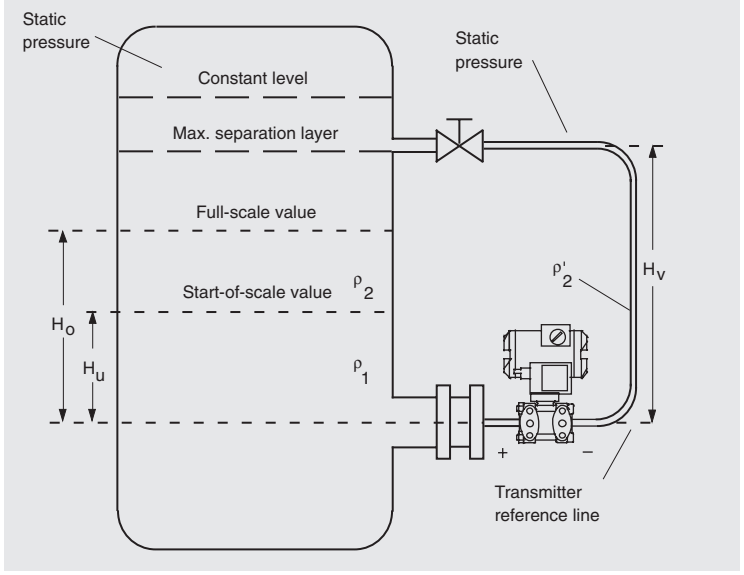
Level measurement, version 2

Start-of-scale: $\Delta p_{MA} = g \cdot (H_U \cdot \rho - H_V \cdot \rho')$

Full-scale: $\Delta p_{ME} = g \cdot (H_O \cdot \rho - H_V \cdot \rho')$

Legend

Δp_{MA}	Start-of-scale value
Δp_{ME}	Full-scale value
H_U	Start-of-scale value
H_O	Full-scale value
H_V	Distance between the measuring points (spigots)
g	Local acceleration due to gravity
ρ	Density of medium in vessel
ρ'	Density of liquid in the negative pressure line, corresponding to the temperature existing there



Separation layer measurement

Start-of-scale: $\Delta p_{MA} = g \cdot (H_U \cdot \rho_1 + (H_O - H_U) \cdot \rho_2 - H_V \cdot \rho'_2)$

Full-scale: $\Delta p_{ME} = g \cdot (H_O \cdot \rho_1 - H_V \cdot \rho'_2)$

Legend

Δp_{MA}	Start-of-scale value
Δp_{ME}	Full-scale value
H_U	Start-of-scale value
H_O	Full-scale value
g	Local acceleration due to gravity
ρ_1	Density of heavier liquid with separation layer in vessel
ρ_2	Density of lighter liquid with separation layer
ρ'_2	Density of liquid in the negative pressure line for separation layer measurement, corresponding to the temperature existing there

Questionnaire

Checking of transmitter/remote seal combinations

SIEMENS

* Customer:_____ Tag. No.: _____
* Plant: _____ Item No.: _____
* Ordering code:_____ Person responsible: _____
* Ordering department: _____ Phone: _____
*** Transmitter Order No.: 7MF 4 ☐☐☐ –1 ☐☐☐☐ –1 ☐☐☐**

Order No. of transmitter known?

Yes

*** Order No. of remote seal:**
7MF 4 9 ☐☐ – ☐☐☐☐☐ – ☐☐ –Z
Suffixes _____
Suffixes _____

No

*** Or without Order No.: Process connection**

* Standard: _____
* Nominal diameter: _____
* Nominal pressure: _____
* Constructional design:
  - ☐ Sandwich-type rem. seal
  - ☐ Flanged remote seal
  - ☐ Quick-release remote seal
  - ☐ Clamp-on seal
  - ☐ Other.:_____
* Connection:
  - ☐ Direct connection
  - ☐ Capillary on one side; connection to: ☐ + side ☐ – side
  - ☐ Capillaries on both sides;
  - ☐ Capillary length: ___ m
* Vacuum-proof design ☐ Yes ☐ No
* Wetted parts materials: _____
* Tube: ☐ No ☐ Yes, ___mm long
* Filling liquid _____
* Miscellaneous _____

Calculation of measuring range necessary?

No

*** Range to be set:**
(without calculation)
Start-of-scale:_____ mbar (4 mA)
Full-scale: _____ mbar (20 mA)
*** Required measuring accuracy:**
Error: < . % of set span per 10 V change in temperature

Please fill in this questionnaire and enclose with every order!

Checked: Name:
Department:
Date:

Yes

Medium _____
Density of medium: _____ kg/m³
*** Temperature of medium:** Normal _____ °C
Minimum _____ °C
Maximum _____ °C
*** Ambient temperature on capillaries:** Normal _____ °C
Minimum _____ °C
Maximum _____ °C
*** Ambient temperature on transmitter:** Normal _____ °C
Minimum _____ °C
Maximum _____ °C
*** Operating pressure referred to absolute zero:** ____ bar_{abs}
* Does a **vacuum** occur **during startup**? ☐ No ☐ Yes
If yes, associated temperature of medium: _____ °C
*** Installation type**, see pages 1/77 and 1/78 ☐ A ☐ B ☐ C_1 ☐ C_2 ☐ D ☐ E ☐ G ☐ H ☐ J
*** Measuring range:** With install. types A, B, C_1, C_2 and D: from ___ to ___ mbar
With install. types A, B, G, H and J: H_U = ___ mm; H_O = ___ mm
*** Dimensions:** With install. types A, B, C_1 and C_2: H_1 = ___ mm
With install. types D, G, H and J: H_V = ___ mm
*** Start-of-scale value following calculation:**_____ mbar (4 mA)
Full-scale value following calculation:_____ mbar (20 mA)
Associated span: _____ mbar
Error to be expected: < , % of set span per 10 K change in temperature

***) Values must be entered here!**

SIEMENS

Questionnaire
for hydrostatic level measurements

Order date: _____

Processing date: _____

Ordering code (customer): _____

Ordering code (supplier): _____

Customer reference: _____

Measuring point: _____

Position: _____

Dimensions: _____

Pressure: ☐ bar

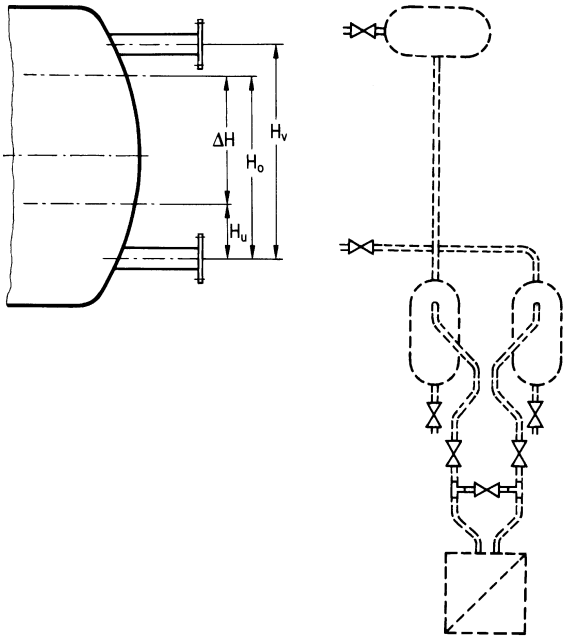
Temperature: ☐ K ☐ °C

Measuring range: ☐ cm ☐ m
(please mark with cross)

Order No. of transmitter [1]:

7 M F 4 _ _ _ _ – _ _ _ _ _ _ – _ _ _ _ –Z

Y01



The different pressures and temperatures (densities) in the vessel and in the reference column result in an offset in the start-of-scale and full-scale values.
The calibration data are determined in addition.
It is also checked whether – as a result of the range offset – the ordered transmitter is suitable for this measurement.

Please supply the following characteristic data so that we can calculate the measuring range, start-of-scale value, full-scale value and calibration data:

Please mark type of boiler with a cross: Closed [1] ☐
Open or not under pressure [2] ☐

Medium _____

Licensed boiler pressure (absolute) _____ bar

Operating pressure (absolute) Lowest _____ bar
Normal [3] _____ bar
Highest _____ bar

Temperature of reference column (cold) _____ K

Distance between measuring points (dimension according to sketch) H_V = _____ m

Measuring range [4] = start-of-scale value to full-scale value
Start-of-scale value _____ H_U = m
Full-scale value _____ H_O = m

Position of equalizing vessel above bottom measuring point if different from H_V _____ m

Please mark pressure correction of level with a cross: No ☐
Yes [4] ☐

[1]) Reference line filled with condensation! Falling differential pressure with increasing level.
[2]) Reference line without gas or filled with gas (air). Rising differential pressure with increasing level.
[3]) If not specified otherwise, this value is assumed as the calculation pressure of the level meter. The input signal (differential pressure) depends on the density (pressure and temperature). The influence is practically negligible for a lowest liquid level of 20 to 30% of the distance between the measuring points.
[4]) If a pressure correction of the level is required, the **measuring range must be the same as the distance between the measuring points**, and the transmitter is designed for the calculation pressure of 1 bar (absolute).
Pressure correction means: the static pressure and the temperature are measured separately and calculated by a correction computer or measured-value computer.

Application

All shut-off fittings can be secured onto walls, racks (72 mm grid) and vertical and horizontal pipes.

This offers the advantage when assembling a plant that the shut-off fittings can be secured first and the lines for the medium and differential pressure connected to them. It is then possible to check all connections for leaks and to blow out or flush the pipes in order to remove dirt (welding residues, shavings etc.).

The measuring instruments can be screwed onto the shut-off fittings right at the end when all piping has been completed.

If an instrument has to be removed for maintenance, the fittings and pipes remain as they are. It is only necessary to close the valves – the instrument can then be removed, and refitted following maintenance.

Transmitters with shut-off fittings – mounting examples

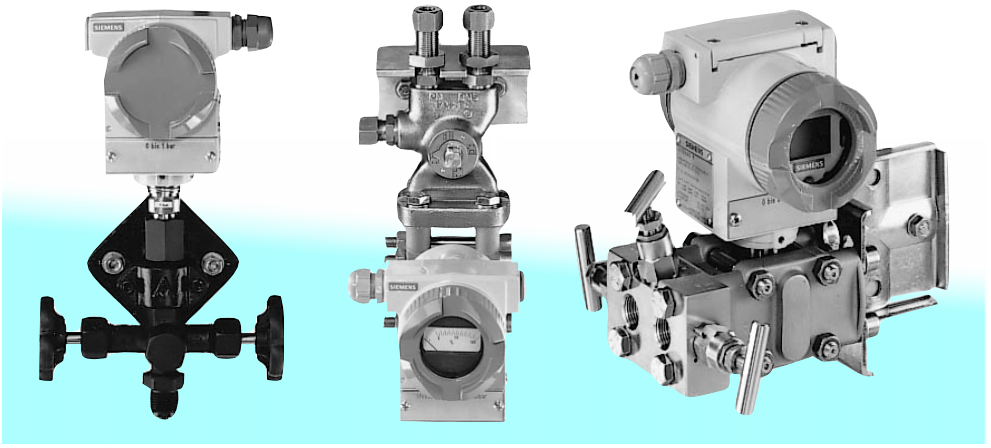


Fig. 1/52 SITRANS P differential pressure transmitter with double shut-off valve (1), multiway cock (2) or three-spindle valve manifold (3)

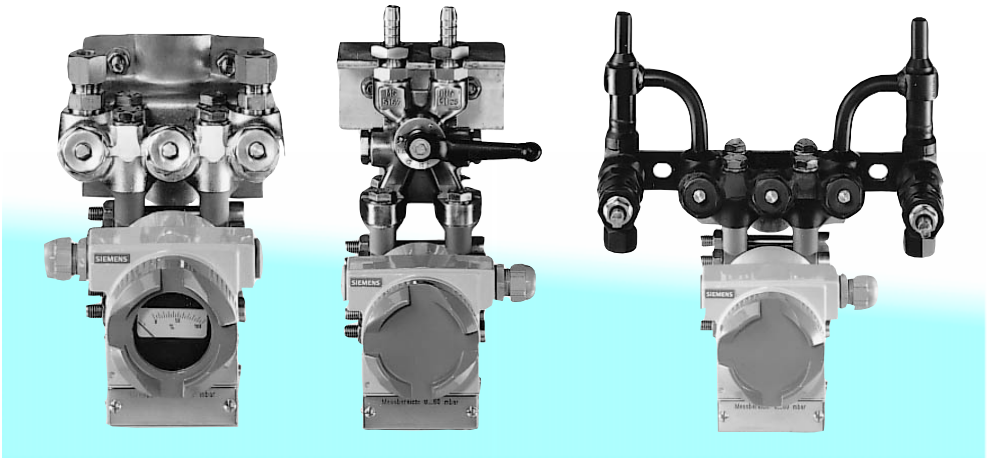


Fig. 1/53 SITRANS P differential pressure transmitter with three-way valve manifold (1), low-pressure multiway cock (2) or valve manifold combination DN 5/DN 8 (3)

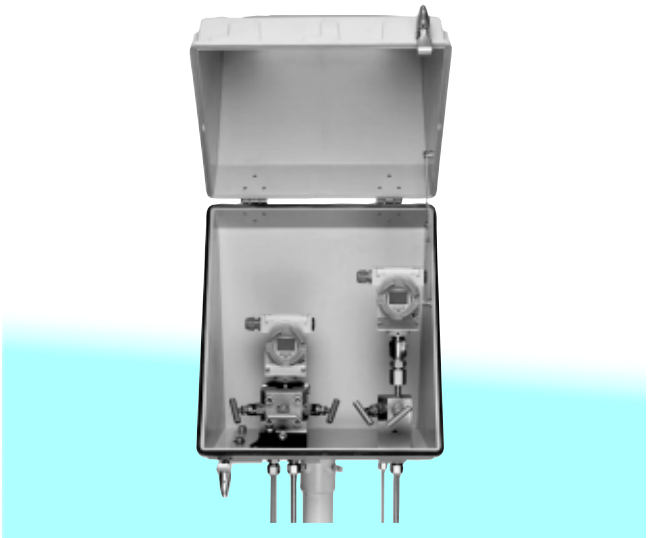


Fig. 1/54 SITRANS P differential pressure transmitter mounted in protective box (available on request)

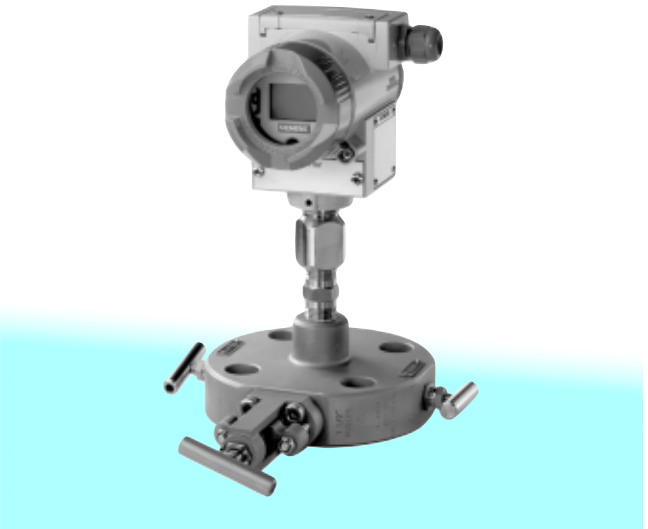


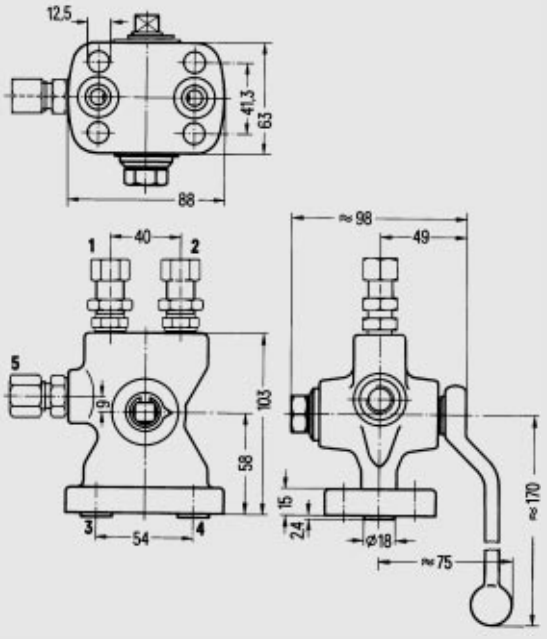
Fig. 1/55 SITRANS P pressure transmitter mounted on valve combination "Monoflange" for direct connection to flanges (available on request)

Multiway cocks

7MF9004 for differential pressure transmitters

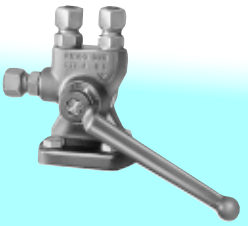
Application

The multiway cocks are used to shut off differential pressure lines, to test the transmitter zero, and to blow out the differential pressure lines.



1 and 2 Process connections
3 and 4 Connections for transmitter (DIN 19 213)
5 Connection for blowing out

Fig. 1/56 Multiway cock for flanging to transmitter, dimensions



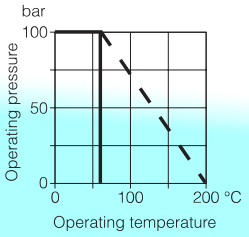


Fig. 1/57 Multiway cock PN 100 and permissible operating pressure as a function of the permissible operating temperature

Design

Multiway cocks for flanging to transmitters.

Housing forged in one piece.
Sealing can be improved during operation.
Removable switching lever.
The multiway cocks comply with DIN 19 209, No. 11.
Delivery with factory certificate or acceptance test certificate to EN 10 204 is possible for the pressure housing.

Note: an accessory set is always required for flanging of the multiway cock to a differential pressure transmitter.

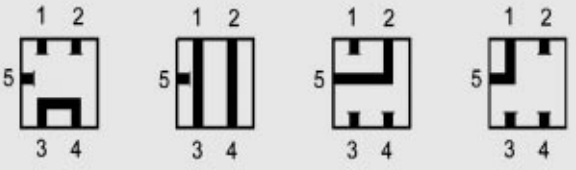


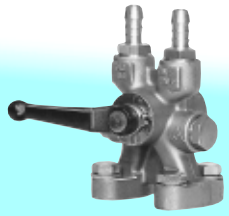
Fig. 1/58 Cock positions; the symbols are printed on the cock

Ordering data

					Order No.	Appr. kg
Multiway cock PN 100 (without accessory set) for flanging onto transmitter. Max. operating pressure 100 bar Max. operating temperature 60 °C (up to 200 °C for a short time)	Material	Permissible medium	Process connection	Connection for blowing out	**7MF9004–■■■**	
	C 22.8, mat. No. 1.0460	Water and non-corrosive gases and vapors	2 bulkhead glands Made of steel, for pipe diameter 12 mm, L series	Pipe union with ferrule	**1P**	2.5
	X 6 CrNiMoTi 17 12 2, mat. No. 1.4571	Corrosive liquids, gases and vapors	2 bulkhead glands Made of stainless steel, for pipe diameter 12 mm, L series	Pipe union with ferrule	**1Q**	2.5
	Constructional test and acceptance test for pressure housing		Without certificate With factory certificate EN 10 204-2.2 With material acceptance test certificate EN 10 204-3.1.B		**A** **B** **D**	
Accessory set (description on page 1/97)					Order codes[1]) **L11** **L31** **L15**	 0.2 0.2 0.2
• Multiway cock, oil-free and grease-free design, max. PN 63 (instead of PN 100) BAM-tested lubricant, gasket suitable for oxygen measurement; only with Order No. 7MF9004–1Q ■–Z					**S11**	
Mounting bracket (see page 1/95 for data), required for wall mounting or for securing on mounting rack (72 mm grid)					**M13**	0.85
Further acceptance test conditions by arrangement.						

[1]) Please add **"-Z"** to Order No. and specify Order code(s).

7MF9004 for differential pressure transmitters



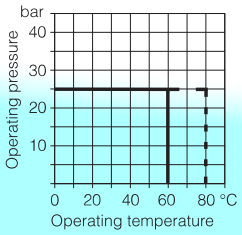


Fig. 1/59 Low-pressure multiway cock and permissible operating pressure as a function of the permissible operating temperature

Application

The low-pressure multiway cocks are used to shut off differential pressure lines, to test the transmitter zero, and to test the transmitter characteristic.

Design

Multiway cocks for flanging to transmitters.

Housing made of hot-pressed brass CuZn39Pb3, mat. No. 2.0401.
Test connections with screw plugs or with self-sealing quick-release couplings.

Note: an accessory set is always required for flanging of the multiway cock to a differential pressure transmitter.

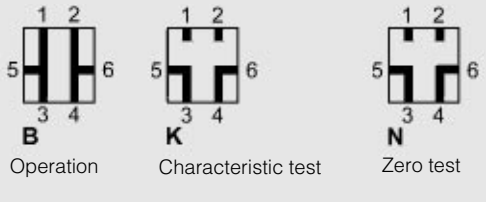
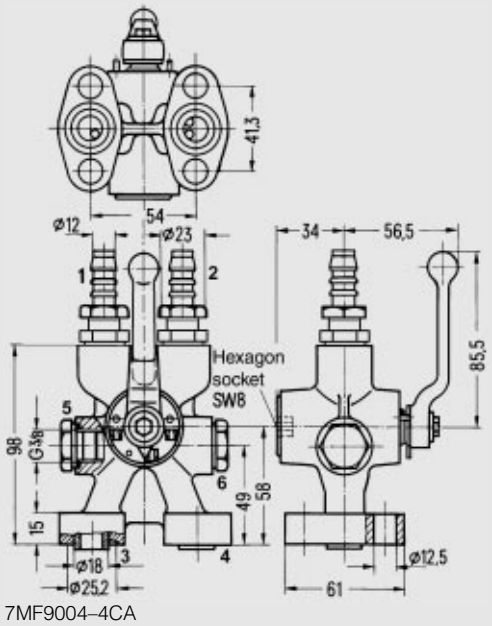


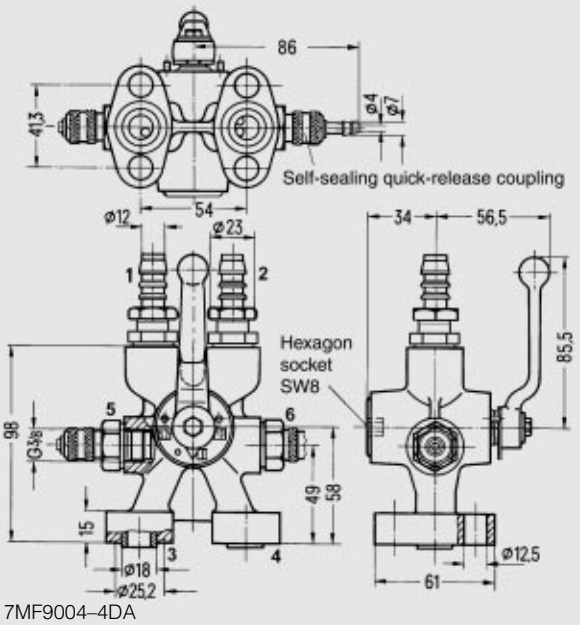
Fig. 1/60 Cock positions; the symbols are printed on the cock

Ordering data	Order No.	Appr. kg
Low-pressure multiway cock for liquids and gases (without accessory set), for flanging to transmitters, max. operating pressure 25 bar, max. operating temperature 60 °C (up to 80 °C for a short time)		
Test connections 2 sealing screws $G^3/_8$ 2 quick-release couplings	**7MF9004–4CA** **7MF9004–4DA**	1.75 1.75
Accessory set Description on page 1/97, required for flanging	Order codes[1])	
Screws M10, flat-profile gaskets Screws $^7/_{16}$-20 UNF, flat-profile gaskets	**L11** **L31**	0.2 0.2
For oxygen (in conjunction with Order code S11), screws M10, flat-profile gaskets	**L15**	0.2
Multiway cock, oil-free and grease-free design BAM- tested lubricant, gasket suitable for oxygen measurement	**S11**	
Mounting bracket (see page 1/95 for data), required for wall mounting or for securing on mounting rack (72 × 72 mm grid)	**M13**	0.85

[1]) Please add **"-Z"** to Order No. and specify Order code(s).



7MF9004–4CA



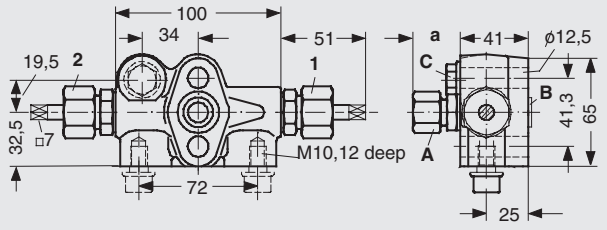
7MF9004–4DA

1 and 2 Process connections (hose sleeve diameter 12 mm)
3 and 4 Connections for transmitter (DIN 19 213)
5 and 6 Connections for testing, with sealing screws $G^3/_8$ or with quick-release couplings

Fig. 1/61 Low-pressure multiway cocks for direct flanging to transmitters, dimensions

Two-way valve manifolds DN 5

7MF9001 and 7MF9401 for pressure gauges and pressure transmitters

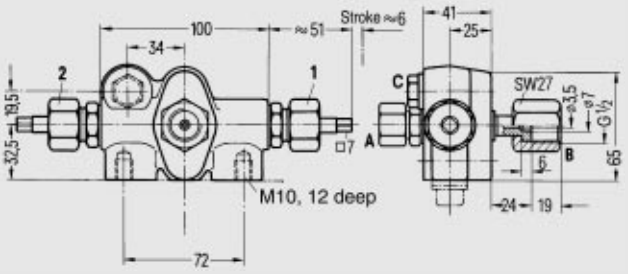


A Process connection
Pipe union with ferrule, diameter 12 mm,
L series to DIN 2353 at max. operating pressure 100 bar,
S series to DIN 2353 at max. operating pressure 400 bar
(a = ~27 mm (L series), ~59 mm (S series))
B Connection for pressure gauge: flange conn. to DIN 19 213
C Test connection: thread $G^3/_8$

1 Operating valve
2 Test valve

Valve design: internal spindle thread

Fig. 1/62 Two-way valve manifold DN 5 for flanging, dimensions



A Process connection
Pipe union with ferrule, diameter 12 mm,
S series to DIN 2353
B Connection for pressure gauge: nipple conn. to DIN 16 284
C Test connection: thread $G^3/_8$

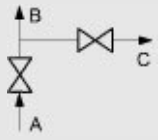
1 Operating valve
2 Test valve

Valve design: internal spindle thread

Fig. 1/63 Two-way valve manifold DN 5 for connection to pressure gauges or pressure transmitters, dimensions

Valve manifold	7MF9001–2E■ 7MF9401–2E■ 7MF9401–2J■	7MF9001–2F■ 7MF9401–2F■ 7MF9401–2K■

Component	Material	Mat. No.	Material	Mat. No.
Housing	C 22.8	1.0460		
Head parts	C 35	1.0501		
Spindles	X 12 CrMoS 17	1.4104		
Cones	X 35 CrMo 17 hardened and tempered	1.4122	X 6 CrNiMoTi 17 12 2	1.4571
Valve seats	X 6 CrNiMoTi 17 12 2	1.4571		
Packings	PTFE	–	PTFE	



A Process connection
B Transmitter connection
C Test and blow-out connection

Fig. 1/64 Connections of the two-way valve manifolds

Application

The two-way valve manifolds are used to shut off and vent the line with the measured medium, and to test the connected pressure gauge or transmitter.

The characteristic of the pressure gauge or transmitter can be checked via the test connection which is closed by a screw when delivered. A pressure gauge for local display can also be connected to this point.

Ordering data	Order No.	Appr. kg
Two-way valve manifold DN 5 for flanging onto transmitters (accessory set and mounting plate to be ordered via Order code)		
• Max. operating pressure **100 bar** at 60 °C		
For non-corrosive liquids and gases	**7MF9001–2E**■	1.75
For corrosive liquids and gases	**7MF9001–2F**■	1.75
• Max. operating pressure **400 bar** at 120 °C		
For non-corrosive liquids and gases	**7MF9401–2E**■	1.85
For corrosive liquids and gases	**7MF9401–2F**■	1.85
Two-way valve manifold DN 5 for connection to pressure gauges or pressure transmitters, with nipple connection to DIN 16 284 (mounting plate to be ordered via Order code)		
• Max. operating pressure **400 bar** at 120 °C		
For non-corrosive liquids and gases	**7MF9401–2J**■	1.8
For corrosive liquids and gases	**7MF9401–2K**■	1.8
Constructional test and acceptance test Without certificate With factory test certificate EN 10204–2.2 With material acceptance test certificate EN 10204–3.1.B	**A** **B** **D**	
Accessory set for valve manifold for flanging (see page 1/97 for description)	Order codes[1])	
• For valve manifold 7MF9001, 100 bar: Screws M10, flat-profile gasket Screws $^7/_{16}$-20 UNF, flat-profile gasket Screws M10, flat-profile gasket For oxygen (in conjunction with Order code S12)	 **A11** **A31** **A15**	 0.1 0.1 0.1
• For valve manifold 7MF9401, 400 bar: Screws M10, O-ring (FPM90)[2]) Screws M12, O-ring (FPM90) Screws $^7/_{16}$-20 UNF, O-ring (FPM90)	 **A16** **A24** **A34**	 0.1 0.1 0.1
Mounting plate (see page 1/95 for description) For wall mounting or for securing to mounting rack For pipe mounting	 **M11** **M12**	 0.5 0.7
Valve manifold 100 bar, suitable for oxygen, only for 7MF9001–2F■, 7MF9401-2F■ and 7MF9401-2K■	**S12**	

Further acceptance conditions by arrangement.

1) Please add **"-Z"** to Order No. and specify Order code(s).
2) Flange connection to DIN 19 213 with M10 screws only permissible up to PN 160!

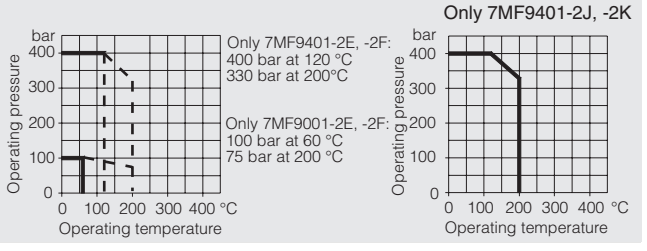
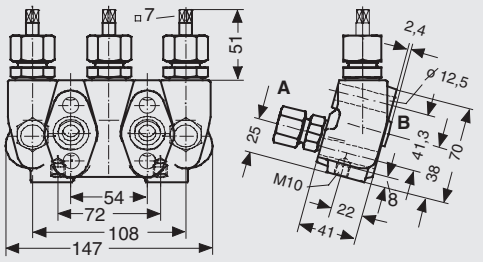


Fig. 1/65 Permissible operating pressure

Three-way and five-way valve manifolds DN 5

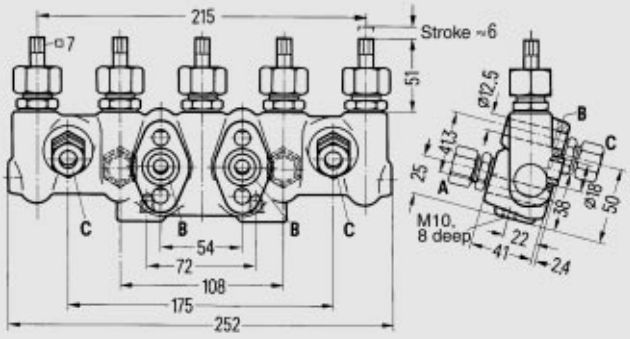
7MF9010 and 7MF9410 for differential pressure transmitters



A Process connection
e.g. on primary device — Pipe union with ferrule, diameter 12 mm, S series DIN 2353
B Transmitter connection — Flange connection DIN 19 213

Valve design: internal spindle thread

Fig. 1/66 Three-way valve manifold DN 5, dimensions

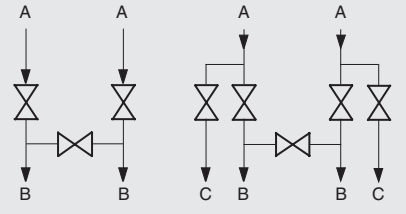


A Process connection
e.g. on primary device — Pipe union with ferrule, diameter 12 mm, S series DIN 2353
B Transmitter connection — Flange connection DIN 19 213
C Blow-out connection — Pipe union with ferrule, diameter 12 mm, S series DIN 2353

Valve design: internal spindle thread

Fig. 1/67 Five-way valve manifold DN 5, dimensions

Valve manifold	7MF9010–1E■ 7MF9010–3E■ 7MF9410–1E■ 7MF9410–3E■		7MF9010–1F■ 7MF9010–3F■ 7MF9410–1F■ 7MF9410–3F■	
Component	Material	Mat. No.	Material	Mat. No.
Housing	C 22.8	1.0460	X 6 CrNiMoTi 17 12 2	1.4571
Head parts	C 35	1.0501		
Spindles	X 12 CrMoS 17	1.4104		
Cone	X 35 CrMo 17 hardened and tempered	1.4122		
Valve seats	X 6 CrNiMoTi 17 12 2	1.4571		
Packings	PTFE	–	PTFE	



A Process conn.
B Transmitter conn.
C Vent/test conn.

Three-way valve manifold for liquids and gases

Five-way valve manifold for liquids and gases or vapors

Fig. 1/68 Connections of the three-way and five-way valve manifolds

Application

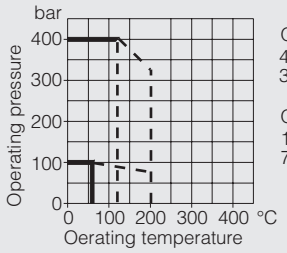
The three-way and five-way valve manifolds are used to shut off the differential pressure lines and to check the transmitter zero.

In addition, the five-way valve manifold permits blowing out of the differential pressure lines.

Ordering data	Order No.	Appr. kg
Three-way valve manifold DN 5 for flanging onto transmitters, process connection: pipe union with ferrule (accessory set and mounting plate to be ordered via Order codes)		
• Max. operating pressure **100 bar** at 60 °C		
For non-corrosive liquids and gases	**7MF9010–1E**■	2.9
For corrosive liquids and gases	**7MF9010–1F**■	2.9
• Max. operating pressure **400 bar** at 120 °C		
For non-corrosive liquids and gases	**7MF9410–1E**■	2.9
For corrosive liquids and gases	**7MF9410–1F**■	2.9
Five-way valve manifold DN 5 for flanging onto transmitters, process connection and blow-out connection: pipe union with ferrule (accessory set and mounting plate to be ordered via Order codes)		
• Max. operating pressure **100 bar** at 60 °C		
For non-corrosive liquids and gases	**7MF9010–3E**■	4.4
For corrosive liquids and gases	**7MF9010–3F**■	4.4
• Max. operating pressure **400 bar** at 120 °C		
For non-corrosive liquids and gases	**7MF9410–3E**■	4.4
For corrosive liquids and gases	**7MF9410–3F**■	4.4
Constructional test and acceptance test		
Without certificate	**A**	
With factory test certificate EN 10204-2.2	**B**	
With material acceptance test certificate EN 10204-3.1.B	**D**	
Accessory set (see page 1/97 for description)	Order codes[1])	
• For valve manifold 7MF9010, 100 bar:		
Screws M10, flat-profile gaskets	**B11**	0.2
Screws $^{7}/_{16}$-20 UNF, flat-profile gaskets	**B31**	0.2
Screws M10, flat-profile gaskets Oxygen (in conjunction with Order code S13 or S14)	**B15**	0.2
• For valve manifold 7MF9410, 400 bar:		
Screws M10, O-ring (FPM90)[2])	**B16**	0.2
Screws M12, O-ring (FPM90)	**B24**	0.2
Screws $^{7}/_{16}$-20 UNF, O-ring (FPM90)	**B34**	0.2
Mounting plate (see page 1/95 for description)		
For wall mounting or for securing to mounting rack	**M11**	0.7
For pipe mounting	**M12**	0.7
Valve manifold 100 bar, suitable for oxygen,		
Only for 7MF9010–1F■	**S13**	
Only for 7MF9010–3F■	**S14**	

Further acceptance conditions by arrangement.

1) Please add **"-Z"** to Order No. and specify Order code(s).
2) Flange connection to DIN 19 213 with M10 screws only permissible up to PN 160.



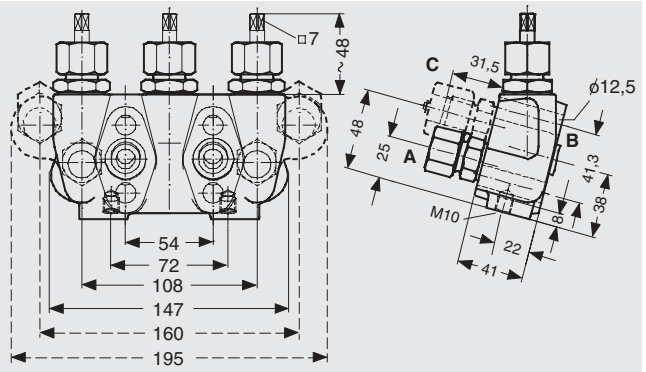
Only 7MF9010-1E, -1F, -3E, -3F:
400 bar at 120 °C
330 bar at 200°C

Only 7MF9410-1E, -1F, -3E, -3F:
100 bar at 60 °C
75 bar at 200 °C

Fig. 1/69 Permissible operating pressure

Three-way valve manifold DN 8

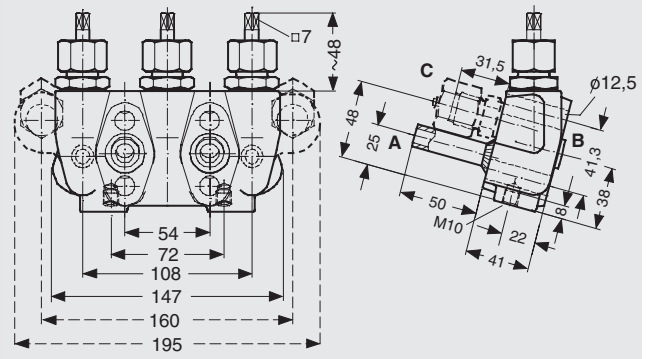
7MF9016 and 7MF9416 for differential pressure transmitters



A	Process connection e.g. on primary device	Pipe union with ferrule, diameter 12 mm, S series DIN 2353
B	Transmitter connection	Flange connection DIN 19 213
C	Test connection	M 20 × 1.5

Valve design: internal spindle thread

Fig. 1/70 Three-way valve manifold DN 8 with pipe union, dimensions

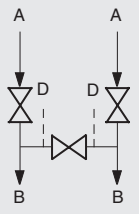


A	Process connection e.g. on primary device	Welding pin Ø 14 × 2.5
B	Transmitter connection	Flange connection DIN 19 213
C	Test connection	M 20 × 1.5

Valve design: internal spindle thread

Fig. 1/71 Three-way valve manifold DN 8 with welding pin, dimensions

Valve manifold	7MF9016–1B■ –1C■ 7MF9416–1B■ –1C■ 7MF9416–2B■ –2D■		7MF9016–1D■ –1E■ 7MF9416–1D■ –1E■	
Component	Material	Mat. No.	Material	Mat. No.
Housing	C 22.8	1.0460	X 6 CrNiMoTi 17 12 2	1.4571
Head parts	C 35	1.0501		
Spindles	X 12 CrMoS 17	1.4104		
Cone	X 35 CrMo 17	1.4122		
Valve seats	X 20 Cr 13	1.4021		
Packings	PTFE	–	PTFE	



Three-way valve manifold for liquids and gases

A Process conn.
B Transmitter conn.
D Test conn.

Fig. 1/72 Connections of the three-way valve manifold

Application

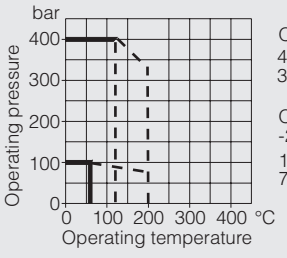
The three-way valve manifold is used to shut off the differential pressure lines and to check the transmitter zero.

In the designs with a test connection, a test device can be connected to check the transmitter characteristic.

Ordering data	Order No	Appr. kg
Three-way valve manifold DN 8 for flanging onto transmitters, (accessory set and mounting plate to be ordered via Order codes)		
• Max. operating pressure **100 bar** at 60 °C		
For non-corrosive liquids and gases Process connection: pipe union with ferrule		
Test connection: Without	**7MF9016–1B■**	3
With	**7MF9016–1C■**	3.5
For corrosive liquids and gases Process connection: pipe union with ferrule		
Test connection: Without	**7MF9016–1D■**	3
With	**7MF9016–1E■**	3.5
• Max. operating pressure **400 bar** at 120 °C		
For non-corrosive liquids and gases Process connection: pipe union with ferrule		
Test connection: Without	**7MF9416–1B■**	3
With	**7MF9416–1C■**	3.5
Process conn.: welding pin 14 diam. × 2.5		
Test connection: Without	**7MF9416–2C■**	3
With	**7MF9416–2D■**	3.5
For corrosive liquids and gases Process connection: pipe union with ferrule		
Test connection: Without	**7MF9416–1D■**	3
With	**7MF9416–1E■**	3.5
Constructional test and acceptance test		
Without certificate	**A**	
With factory test certificate EN 10204-2.2	**B**	
With material acceptance test certificate EN 10204-3.1.B	**D**	
Accessory set (see page 1/97 for description)	Order codes[1])	
• For valve manifold 7MF9016, 100 bar: Screws M10, flat-profile gasket	**B11**	0.2
Screws $^{7}/_{16}$-20UNF, flat-profile gaskets	**B31**	0.2
• For valve manifold 7MF9416, 400 bar: Screws M10, O-ring (FPM90) Flange connection to DIN 19 213 only permissible up to PN 160!	**B16**	0.2
Screws M12, O-rings (FPM90)	**B24**	0.2
Screws $^{7}/_{16}$-20UNF, O-rings (FPM90)	**B34**	0.2
Mounting plate (see page 1/95 for description) For wall mounting or for securing to mounting rack	**M11**	0.5
For pipe mounting	**M12**	0.7

Further acceptance conditions by arrangement.

[1]) Please add **"-Z"** to Order No. and specify Order code(s).



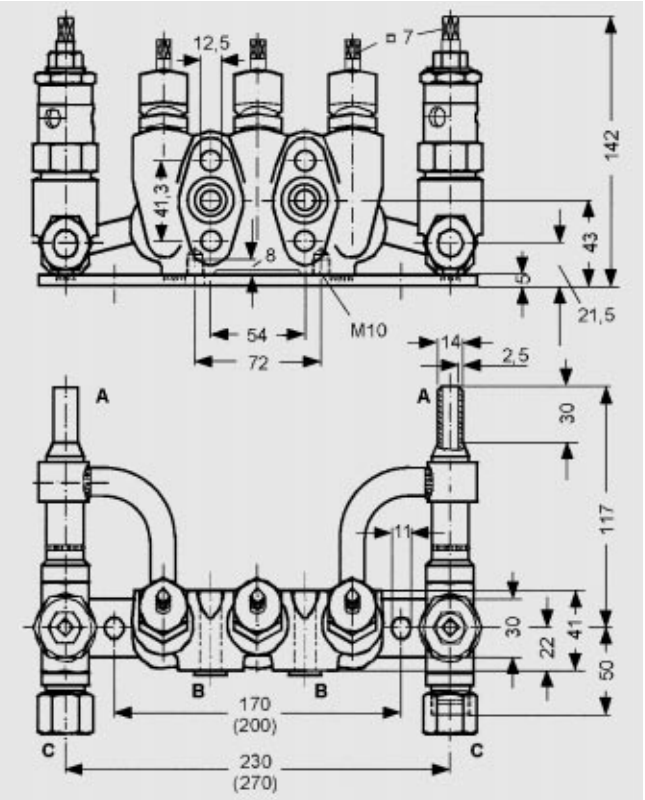
Only 7MF9016-1B, -1C, -1C, -1E:
400 bar at 120 °C
330 bar at 200°C

Only 7MF9416-1B, -1C, -2C, -2D, -1D, -1E:
100 bar at 60 °C
75 bar at 200 °C

Fig. 1/73 Permissible operating pressure

Valve manifold combination DN 5/DN 8

7MF9416 for differential pressure transmitters

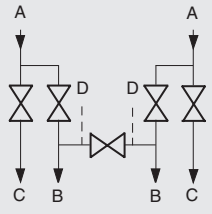


A Process connection
e.g. on primary device — Welding pin
B Transmitter connection — Flange connection DIN 19 213
C Blow-out connection — Pipe union with ferrule, diameter 14 mm, S series DIN 2353

Valve design: Manifold valves: internal spindle thread
Blow-out valves: external spindle thread

Fig. 1/74 Valve manifold combination DN 5/DN 8 (7MF9416–6C■), dimensions (deviating dimensions for 7MF9416–6D■ shown in brackets)

Component	Valve manifold DN 5		Blow-out valves DN 8	
	Material	Mat. No.	Material	Mat. No.
Housing	C 22.8	1.0460	15 Mo 3	1.5415
Head parts	C 35	1.0501	21 CrMo V 57	1.7709
Spindles	X 12 CrMoS 17	1.4104	X 20 Cr 13	1.4021
Cone	X 35 CrMo 17 hardened and tempered	1.4122	X 35 CrMo 17 hardened and tempered	1.4122
Valve seats	X 6 CrNiMoTi 17 12 2	1.4571	X 20 Cr 13	1.4021
Packings	PTFE	–	Pure graphite	–
Welding pin	–	–	15 Mo 3	1.5415



Valve manifold combination for vapors

A Process connection
B Transmitter connection
C Blow-out connection
D Test connection

Fig. 1/75 Connections of the valve manifold combination DN 5/DN 8

Application

The valve manifold combinations are used to shut off the differential pressure lines, to check the transmitter zero, and to blow out the differential pressure lines.

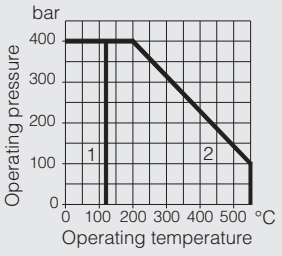
In the designs with a test connection, a test device can be connected to check the transmitter characteristic.

Ordering data	Order No.	Appr. kg
Valve manifold combination DN 5/DN 8 for vapors, for flanging onto transmitters, (accessory set to be ordered via Order code)	**7MF9416–6** ■■	
• Max. operating pressure **400 bar** at 120 °C		
Without test connections	**C**	
With test connections M20 × 1.5	**D**	
Constructional test and acceptance test		
Without certificate	**A**	
With factory test certificate EN 10204-2.2	**B**	
With material acceptance test certificate		
EN 10204-3.1.A	**C**	
EN 10204-3.1.B	**D**	
EN 10204-3.1.C	**E**	
Accessory set (see page 1/97 for description)	Order codes[1])	
Screws M10, O-rings (FPM90) Flange connection to DIN 19 213 only permissible up to PN 160!	**B16**	0.2
Screws M12, O-rings (FPM90)	**B24**	0.2
Screws $^{7}/_{16}$-20 UNF, O-rings (FPM90)	**B34**	0.2

The above-mentioned valve manifold combination is also available in stainless steel on request.

Further acceptance conditions by arrangement.

[1]) Please add **"-Z"** to Order No. and specify Order code(s).

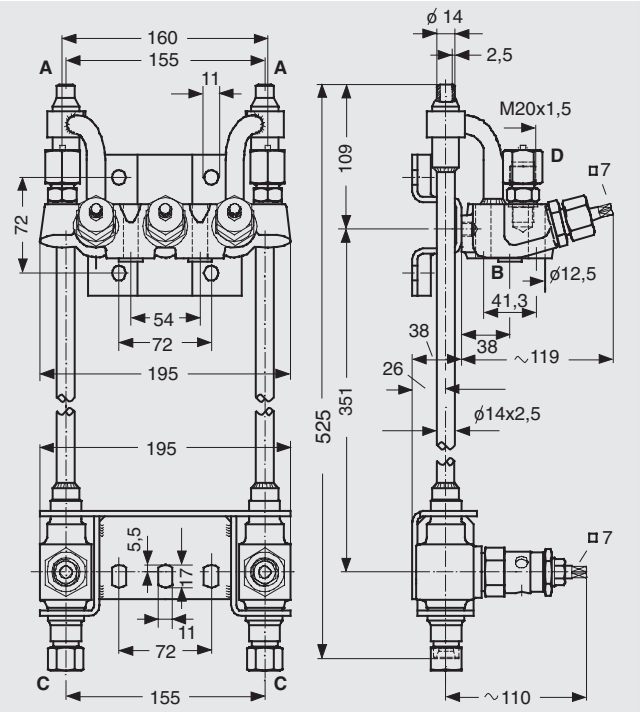


1 Valve manifold
2 Blow-out connection

Fig. 1/76 Permissible operating pressure

Valve manifold combination DN 8

7MF9416 for differential pressure transmitters

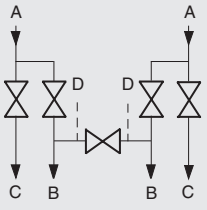


A Process connection
e.g. on primary device — Welding pin
B Transmitter connection — Flange connection DIN 19 213
C Blow-out connection — Pipe union with ferrule, diameter 14 mm, S series DIN 2353
D Test connection (only with Order No. 7MF9416–4D.) — M 20 × 1.5

Valve design: Manifold valves: internal spindle thread
Blow-out valves: external spindle thread

Fig. 1/77 Valve manifold combination DN 8, dimensions

Component	Valve manifold		Blow-out valves	
	Material	Mat. No.	Material	Mat. No.
Housing	C 22.8	1.0460	15 Mo 3	1.5415
Head parts	C 35	1.0501	21 CrMo V 57	1.7709
Spindles	X 12 CrMoS 17	1.4104	X 20 Cr 13	1.4021
Cone	X 35 CrMo 17 hardened and tempered	1.4122	X 35 CrMo 17 hardened and tempered	1.4122
Valve seats	X 20 Cr 13	1.4021	X 20 Cr 13	1.4021
Packings	PTFE	–	Pure graphite	–
Welding pin	–	–	15 Mo 3	1.5415



Valve manifold combination for vapors

A Process connection
B Transmitter connection
C Blow-out connection
D Test connection

Fig. 1/78 Connections of the valve manifold combination DN 8

Application

The valve manifold combinations are used to shut off the differential pressure lines, to check the transmitter zero, and to blow out the differential pressure lines.

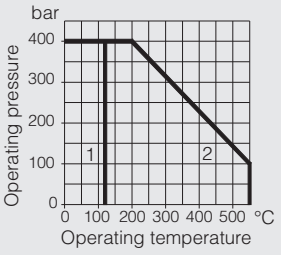
In the designs with a test connection, a test device can be connected to check the transmitter characteristic.

Ordering data

	Order No.	Appr. kg
Valve manifold combination DN 8 for vapors, for flanging onto transmitters, with mounting plate, (accessory set to be ordered via Order code)		
• Max. operating pressure **400 bar** at 120 °C		
Without test connections	**7MF9416–4C** ■	7.6
With test connections M20 × 1.5	**7MF9416–4D** ■	8.1
Constructional test and acceptance test	↑	
Without certificate	**A**	
With factory test certificate EN 10204-2.2	**B**	
With material acceptance test certificate EN 10204-3.1.A	**C**	
EN 10204-3.1.B	**D**	
EN 10204-3.1.C	**E**	
Accessory set (see page 1/97 for description)	Order codes[1])	
Screws M10, O-rings (FPM90) Flange connection to DIN 19 213 only permissible up to PN 160!	**B16**	0.2
Screws M12, O-rings (FPM90)	**B24**	0.2
Screws $^{7}/_{16}$-20 UNF, O-rings (FPM90)	**B34**	0.2

Further acceptance conditions by arrangement.

[1]) Please add **"-Z"** to Order No. and specify Order code(s).

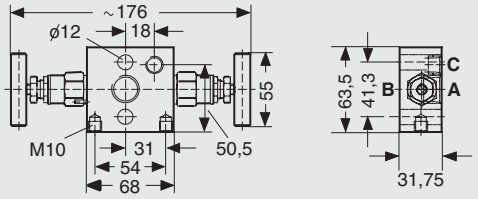


1 Valve manifold
2 Blow-out connection

Fig. 1/79 Permissible operating pressure

Two-spindle, three-spindle and five-spindle valve manifolds DN 5

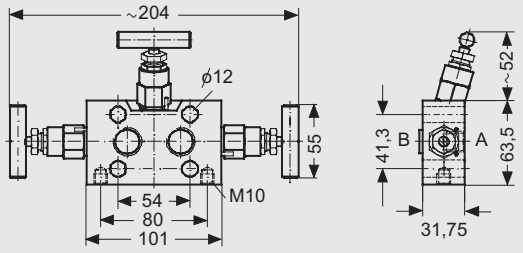
7MF9411 for absolute pressure and differential pressure transmitters



A Process connection ½-14 NPT
B Transmitter connection: flange connection IEC 61 518 form B
C Vent/test connection ¼-18 NPT

Valve design: external spindle thread

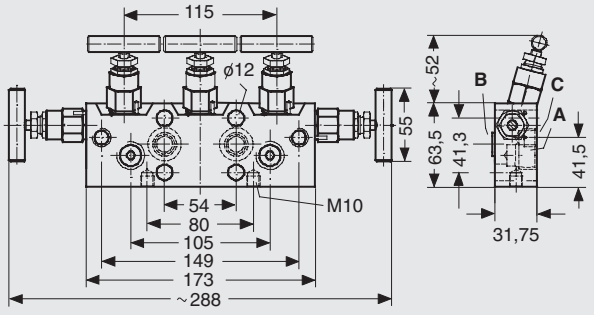
Fig. 1/80 Two-spindle valve manifold DN 5, dimensions



A Process connection ½-14 NPT
B Transmitter connection: flange connection IEC 61 518 form B

Valve design: external spindle thread

Fig. 1/81 Three-spindle valve manifold DN 5, dimensions



A Process connection ½-14 NPT
B Transmitter connection: flange connection IEC 61 518 form B
C Vent/test connection ¼-18 NPT

Valve design: external spindle thread

Fig. 1/82 Five-spindle valve manifold DN 5, dimensions

Further acceptance conditions by arrangement

Component	Valve manifold	
	Material	Mat. No.
Housing	X 2 CrNiMo 17 13 2	1.4404
Cone	X 6 CrNiMoTi 17 12 2	1.4571
Spindles	X 6 CrNiMoTi 17 12 2	1.4571
Head parts	X 6 CrNiMoTi 17 12 2	1.4571
Packings	PTFE	–

Application

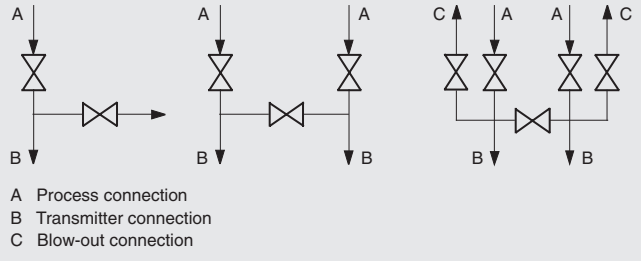
The two-spindle, three-spindle and five-spindle valve manifolds are used to shut off the differential pressure lines and to check the transmitter zero.

The five-spindle valve manifold permits venting on the transmitter side and checking of the transmitter characteristic.

Ordering data

	Order No.	Appr. kg
Two-spindle valve manifold DN 5	**7MF9411–5A** ■	1.2
Three-spindle valve manifold DN 5	**7MF9411–5B** ■	1.8
Five-spindle valve manifold DN 5	**7MF9411–5C** ■	3.5
Max. operating pressure 420 bar at 80 °C for liquids and gases, for flanging onto transmitters (accessory set to be ordered via Order code)		
Constructional test and acceptance test		
Without certificate	**A**	
With factory test certificate EN 10204-2.2	**B**	
With material acceptance test certificate EN 10204-3.1.B	**D**	
For valve manifold 7MF9411–5A ■	Order codes[1])	
Accessory set (see page 1/97 for description) Connection between manifold and transmitter		
Screws M10, flat-profile gaskets	**K15**	0.1
Screws $^{7}/_{16}$-20 UNF, flat-profile gaskets	**K35**	0.1
For valve manifold 7MF9411–5B ■ and –5C ■		
Accessory set (see page 1/97 for description) Connection between manifold and transmitter		
Screws M10, flat-profile gaskets	**K16**	0.2
Flange connection to DIN 19 213 with M10 screws only permissible up to PN 160.		
Screws $^{7}/_{16}$-20 UNF, flat-profile gaskets	**K36**	0.2
Mounting plate (see page 1/95 for descrip.)		
For wall mounting or for securing to mounting rack	**M11**	0.5
For pipe mounting	**M12**	0.7
Valve manifold (suitable for oxygen)		
for 7MF9411–5A ■	**S12**	
–5B ■	**S13**	
–5C ■	**S14**	

[1]) Please add **"-Z"** to Order No. and specify Order code(s).



A Process connection
B Transmitter connection
C Blow-out connection

Fig. 1/83 Connections of the two-spindle, three-spindle and five-spindle valve manifolds

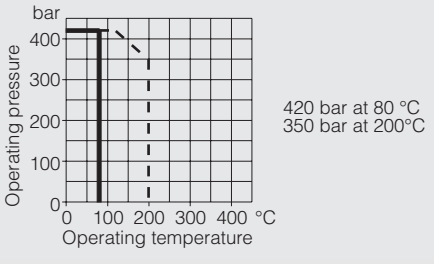


Fig. 1/84 Permissible operating pressure

Two-spindle, three-spindle and five-spindle valve manifolds DN 5

7MF9412 for mounting in protective boxes

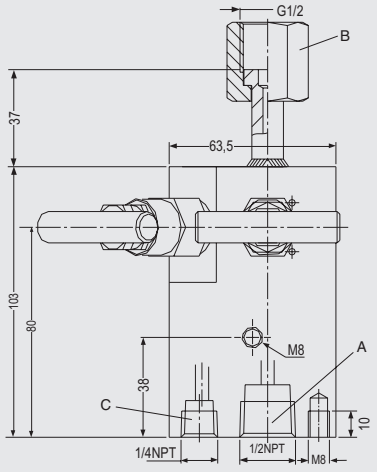
Application

The two-spindle, three-spindle and five-spindle valve manifolds are used to shut off the differential pressure lines and to check the transmitter zero.

The five-spindle valve manifold permits venting on the transmitter side and checking of the transmitter characteristic.

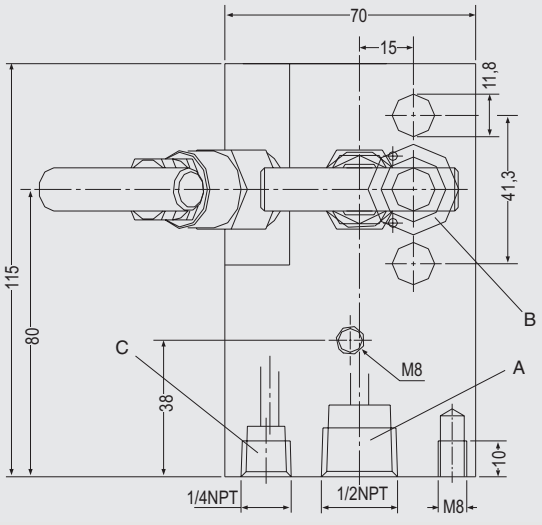
These valve manifolds are preferentially used when mounting in protective boxes. In addition, they can also be used for wall, frame or pipe mounting together with the mounting bracket.

Transmitters of the DS series can be operated and read from the front when using these valve manifolds.



A Process connection ½-14 NPT,
B Transmitter connection: nipple to DIN 16 284, G½, SW 27
C Vent/test connection ¼-18 NPT

Fig. 1/85 Two-spindle valve manifold with rotatable sleeve, dimensions

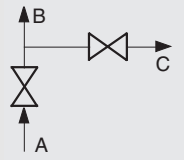


A Process connection ½-14 NPT,
B Transmitter connection: flange connection IEC 61 518 form A
C Vent/test connection ¼-18 NPT

Valve design: external spindle thread

Fig. 1/86 Two-spindle valve manifold DN 5, dimensions

Component	Valve manifold	
	Material	Mat. No.
Housing	X 2 CrNiMo 17 13 2	1.4404
Cone	X 6 CrNiMoTi 17 12 2	1.4571
Spindles	X 6 CrNiMoTi 17 12 2	1.4571
Head parts	X 6 CrNiMoTi 17 12 2	1.4571
Packings	PTFE	–



A Process connection
B Connection for pressure gauge or transmitter for pressure or absolute pressure
C Vent/test connection

Fig. 1/87 Two-spindle valve manifold with rotatable sleeve, connections

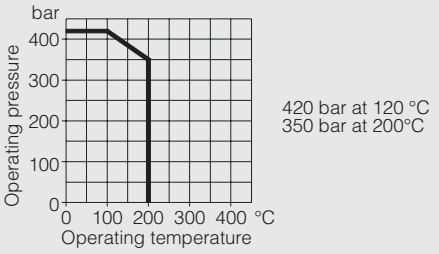
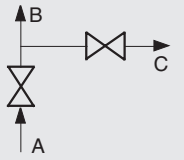


Fig. 1/88 Permissible operating pressure



A Process connection
B Connection for pressure gauge or transmitter for pressure or absolute pressure
C Vent/test connection

Fig. 1/89 Two-spindle valve manifold DN 5, connections

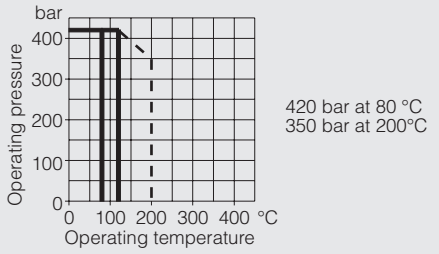
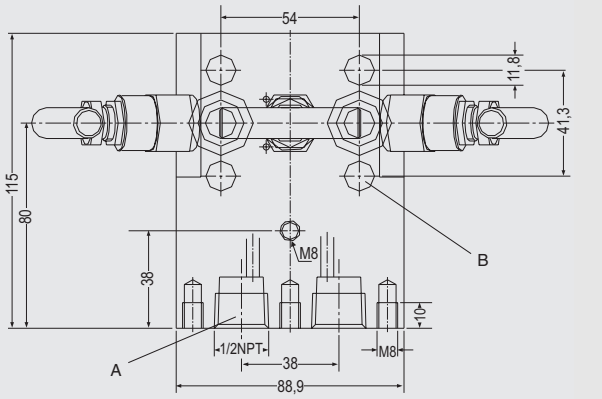


Fig. 1/90 Permissible operating pressure

Two-spindle, three-spindle and five-spindle valve manifolds DN 5

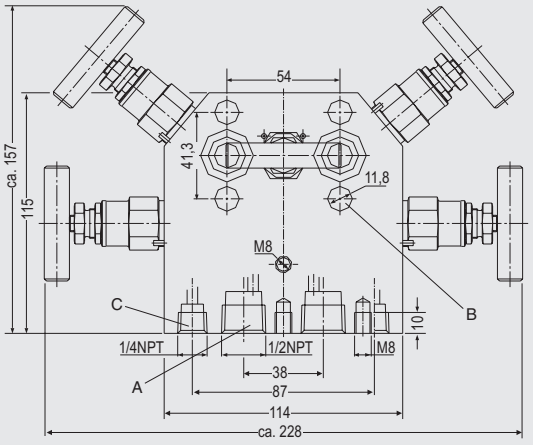
7MF9412 for mounting in protective boxes



A Process connection ½-14 NPT
B Transmitter connection: flange connection IEC 61 518 form A

Valve design: external spindle thread

Fig. 1/91 Three-spindle valve manifold DN 5, dimensions

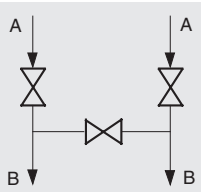


A Process connection ½-14 NPT
B Transmitter connection: flange connection IEC 61 518 form A
C Vent/test connection ¼-18 NPT

Valve design: external spindle thread

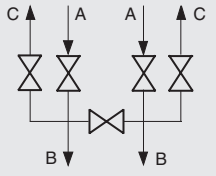
Fig. 1/92 Five-spindle valve manifold DN 5, dimensions

Ordering data	Order No.	Appr. kg
Valve manifold for mounting in protect. box Material: stainless steel, mat. No. 1.4404, max. operating pressure 420 bar at 120 ° C[1]), for liquids and gases, for flanging onto transmitter (order accessories using Order code)	**7MF9412–1** ■■	
Versions:		
Two-spindle valve manif. with rotat. sleeve G½	**B**	
Two-spindle valve manif. with flange connection	**C**	
Three-spindle valve manifold	**D**	
Five-spindle valve manifold	**E**	
Constructional test and acceptance test:		
Without certificate	**A**	
With factory test certificate EN 10204–2.2	**B**	
With material acceptance test certificate EN10204–3.1.B	**D**	
For valve manifold 7MF9412–1C ■	Order codes[1])	
Accessory set (see page 1/97 for description) Connection between manifold and transmitter		
Screws M10, O-rings (FPM90)[2])	**F12**	
Screws $^{7}/_{16}$-20 UNF, O-rings (FPM90)	**F32**	
Screws M10, flat-profile gaskets[2])	**F15**	
Screws $^{7}/_{16}$-20 UNF, flat-profile gaskets	**F35**	



A Process connection
B Transmitter connection

Fig. 1/93 Three-spindle valve manifold DN 5, connections



A Process connection
B Transmitter connection
C Vent/test connection

Fig. 1/94 Five-spindle valve manifold DN 5, connections

Ordering data (continued)	Order No.	Appr. kg
For valve manifolds 7MF9412–1D ■ and –1E ■	Order codes[3])	
Accessory set (see page 1/97 for description) Connection between manifold and transmitter		
Screws M10, O-rings (FPM90)[2])	**F14**	
Screws $^{7}/_{16}$-20 UNF, O-rings (FPM90)	**F34**	
Screws M10, flat-profile gaskets[2])	**F16**	
Screws $^{7}/_{16}$-20 UNF, flat-profile gaskets	**F36**	
For valve manifolds 7MF9412–1B ■ and –1C ■		
Mounting bracket (see page 1/95 for descrip.) for wall or rack mounting	**M14**	
Mounting clip (2 off) to secure mounting bracket to pipe	**M16**	
For valve manifold 7MF9412-1D ■		
Mounting bracket (see page 1/95 for descrip.) for wall or rack mounting	**M17**	1.25
Mounting clip (2 off) to secure mounting bracket to pipe	**M16**	0.15
For valve manifold 7MF9412-1E ■		
Mounting bracket (see page 1/95 for descrip.) for wall or rack mounting	**M18**	1.45
Mounting clip (2 off) to secure mounting bracket to pipe	**M16**	0.15
Valve manifold 100 bar, suitable for oxygen		
For valve manifold 7MF9412–1B ■ and –1C ■	**S12**	
For valve manifold 7MF9412–1D ■	**S13**	
For valve manifold 7MF9412–1E ■	**S14**	

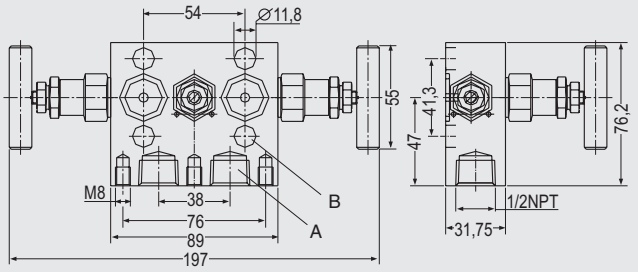
[1]) Max. operating temperature 120 °C with O-rings FPM90, max. operating temperature 80 ° with flat-profile gaskets
[2]) Flange connection with M10 screws only permissible up to PN 100!
[3]) Please add **"–Z"** to Order No. and specify Order code(s).

Three-spindle and five-spindle valve manifolds

7MF9413
for vertical differential pressure lines

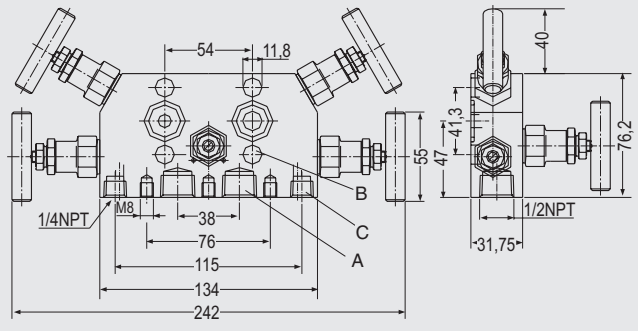
Application

The three-spindle and five-spindle valve manifolds are used to shut off the differential pressure lines and to check the transmitter zero. The five-spindle valve manifold permits venting on the transmitter side and checking of the transmitter characteristic. Transmitters of the DS series can be operated and read from the front when using these valve manifolds.



A Process connection ½-14 NPT
B Transmitter connection: flange connection IEC 61518 form B

Fig. 1/95 Three-spindle valve manifold, dimensions



A Process connection ½-14 NPT
B Transmitter connection: flange connection IEC 61518 form B
C Vent/test connection ¼- 18 NPT

Fig. 1/96 Five-spindle valve manifold, dimensions

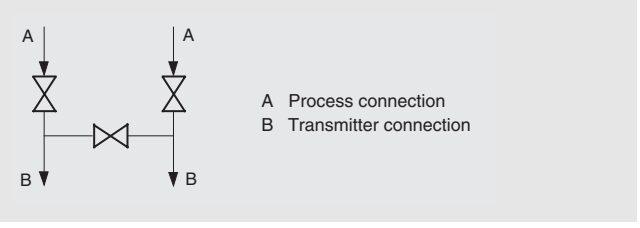


Fig. 1/97 Three-spindle valve manifold, connections

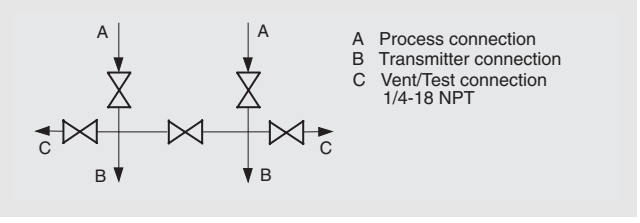


Fig. 1/98 Five-spindle valve manifold, connections

Ordering data	Order No.	Appr. kg
Valve manifold for vertical differential pressure lines (special SITRANS P, DS series) Material: stainless steel mat. No. 1.4404, max. operating pressure 420 bar at 80 °C, for liquids and gases, for flanging onto transmitters, flange connection to IEC 61518 form B (accessories to be ordered via Order code)	**7MF9413-1** ■ ■	
Versions:		
Three-spindle valve manifold	**D**	2.5
Five-spindle valve manifold	**E**	3.5
Constructional test and acceptance test:		
Without certificate	**A**	–
With factory test certificate EN10204-2.2	**B**	–
With material acceptance test certificate EN10204-3.1.B	**D**	–
Accessory set Connection between manifold and transmitter	Order codes[1])	
Screws M10, flat-profile gaskets)	**K16**	0.2
Screws $^{7}/_{16}$-20 UNF, flat-profile gaskets	**K36**	0.2
For valve manifold 7MF 9413-1D ■		
Mounting bracket (see page 1/95 for descrip.) for wall or rack mounting	**M17**	1.25
Mounting bracket (see page 1/95 for descrip.) for mounting on 2" standpipe	**M19**	1.5
Mounting clip (2 off) to secure mounting bracket to pipe	**M16**	0.15
For valve manifold 7MF 9413-1E ■		
Mounting bracket (see page 1/95 for descrip.) for wall or rack mounting	**M18**	1.45
Mounting clip (2 off) to secure mounting bracket to pipe	**M16**	0.15

[1]) Please add **"–Z"** to Order No. and specify Order code(s).
[2]) Flange connection with M10 screws only permissible up to PN 100!

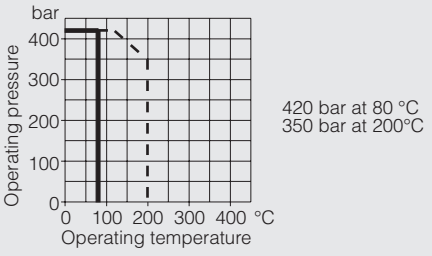


Fig. 1/99 Permissible operating pressure

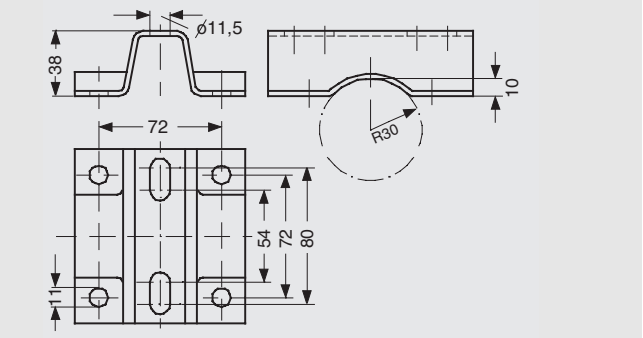


Fig. 1/100 Mounting plate, dimensions

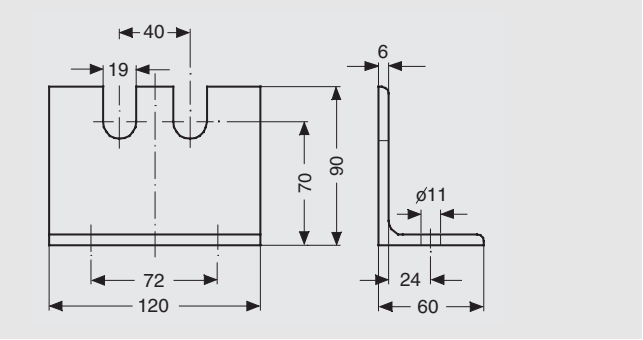


Fig. 1/101 Mounting bracket, dimensions

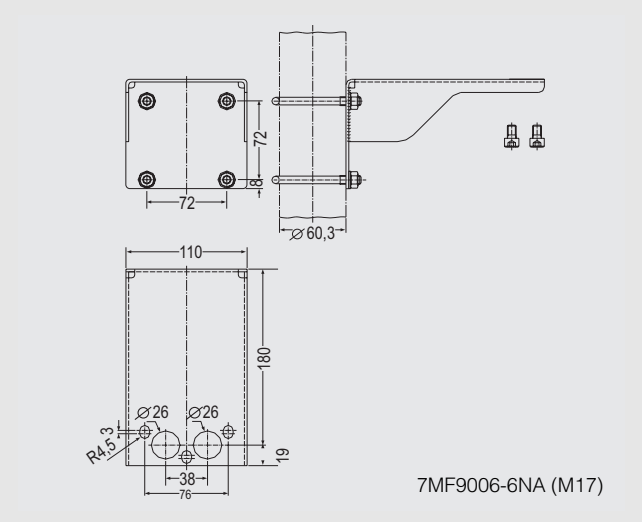


Fig. 1/102 Mount. bracket for three-spindle valve manifolds, dimensions

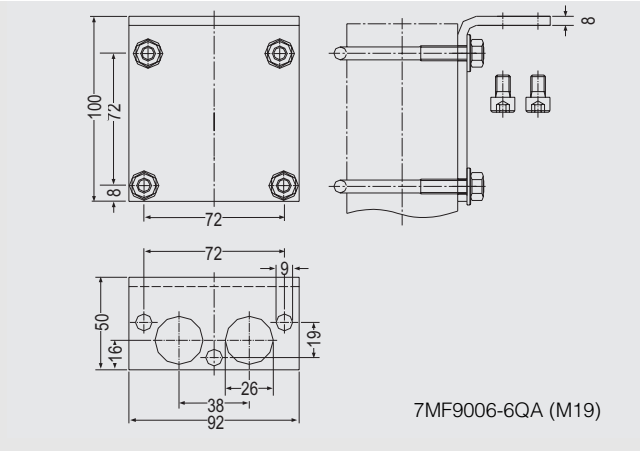


Fig. 1/103 Mount. bracket for three/five-spindle valve manifolds, dimen.

Ordering data	Order code[1])	Order No.[1])	Appr. kg
Mounting plate for valve manifold, made of electrogalvanized sheet-steel, material: RQSt 37-2, mat. No. 1.0122			
For wall mounting or for securing on rack (72 mm grid) Scope of delivery: 1 mounting plate	**M11**	**7MF9006-6EA**	0.5
For pipe mounting Scope of delivery: 1 mounting plate 7MF9006–6EA 2 pipe brackets with nuts and washers 7MF9101–8AB for pipes with max. diam. 60.3 mm	**M12**	**7MF9006-6GA**	0.7
Mounting bracket for multiway cock for wall mounting or for securing on rack (72 mm grid); made of electrogalvanized sheet-steel, material: RQSt 37-2, mat. No. 1.0122	**M13**	**7MF9004-6AA**	0.85
Mounting bracket, for valve manifold			
• 7MF9412-1B■ and -1C■	**M14**	**7MF9006-6LA**	1.25
• 7MF9412-1D■ and 7MF9413-1D■	**M17**	**7MF9006-6NA**	1.45
• 7MF9412-1E-■ and 7MF9413-1E■	**M18**	**7MF9006-6PA**	1.45
• 7MF9413-1D-■ and 7MF9413-1E■	**M19**	**7MF9006-6QA**	1.5
Mounting clip, 2 off to secure mounting brackets 7MF9006-6LA, -6NA, -6PA, -6QA (M14, M17, M18, M19) to pipe	**M16**	**7MF9006–6KA**	0.15

[1]) If valve manifold and mounting plate or multiway cock and mounting bracket are ordered together, the Order code for the mounting plate or the mounting bracket must be specified with the Order No. for the valve manifold or multiway cock. When ordering a mounting plate or a mounting bracket alone, the Order No. for the mounting plate or the mounting bracket must be specified.

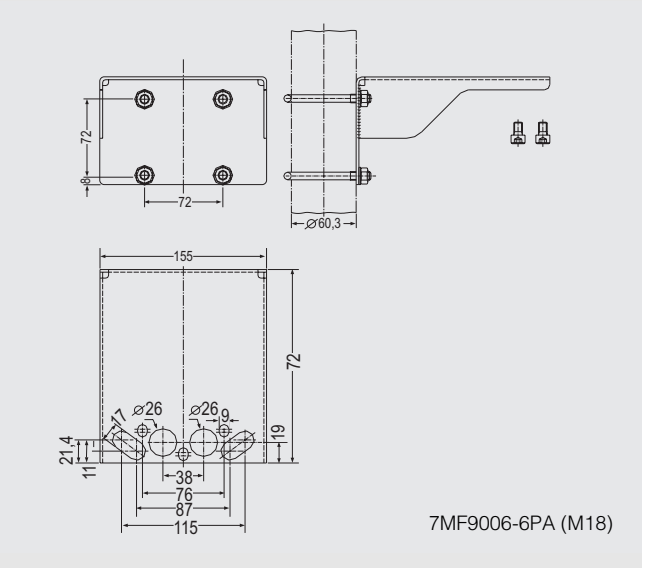


Fig. 1/104 Mounting bracket for five-spindle valve manifolds, dimensions

Oval flange

7MF9408 for absolute pressure and differential pressure transmitters

Ordering data	Order No.	Appr. kg
Oval flange with female thread ½-14 NPT, max. operating pressure 400 bar		
Material		
C 22.8, mat. No. 1.0460	**7MF9408–2CE**	
X 2 CrNiMo 17 132, mat. No. 1.4404	**7MF9408–2CL**	
Accessory set for oval flange (description on page 1/97) Please add **"–Z"** to Order No. and specify Order code.	Order code	
Screws M10, O-rings (FPM90) Flange connection to IEC 61 518 form A, only permissible up to PN 100!	**E13**	0.1
Screws $^{7}/_{16}$-20 UNF, O-rings (FPM90)	**E34**	0.1

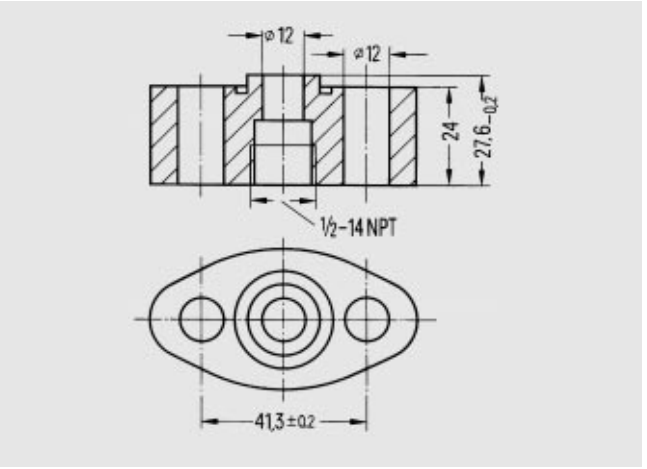


Fig. 1/105 Oval flange, dimensions

Ordering data

Screws			Washers [4]	Gaskets	Order No.	Approx. kg	Suitable for	Order code [1]
Qty	Size	Standard	Quantity/ diameter	Quantity/ design [3]				
Accessory set								
Consisting of:								
2	M10 × 55	DIN EN ISO 4762	2/10.5	1/flat	**7MF9001–6AD**	0.1	Two-way valve manifold DN 5, page 1/86	**A11**
2	$^{7}/_{16}$-20 UNF × 2 $^{1}/_{8}$ inch	ANSI B 18.3	2/11.5	1/flat	**7MF9001–5CC**	0.1		**A31**
2	M10 × 55	DIN EN ISO 4762	2/10.5	1/flat	**7MF9001–6AE** [2]	0.1		**A15**
2	M10 × 55	DIN EN ISO 4762	2/10.5	1/O-ring (FPM90)	**7MF9001–6AF**	0.1		**A16**
2	M12 × 55	DIN EN ISO 4762	–	1/O-ring (FPM90)	**7MF9401–6CA**	0.1		**A24**
2	$^{7}/_{16}$-20 UNF × 2 $^{1}/_{8}$ inch	ANSI B 18.3	2/10.5	1/O-ring (FPM90)	**7MF9401–5AA**	0.1		**A34**
4	M10 × 55	DIN EN 24014	4/10.5	2/flat	**7MF9010–6AD**	0.2	Three-way and five-way valve block DN 5, page 1/87 Three-way valve manifold DN 8, page 1/88	**B11**
4	$^{7}/_{16}$-20 UNF × 2 $^{1}/_{8}$ inch	ANSI B 18.2.1	4/11.5	2/flat	**7MF9010–5CC**	0.2	Three-way and five-way valve block DN 5, page 1/87	**B31**
4	M10 × 55	DIN EN 24014	4/10.5	2/flat	**7MF9010–6AE** [2]	0.2		**B15**
4	M10 × 55	DIN EN 24014	4/10.5	2/O-ring (FPM90)	**7MF9010–6CC**	0.2	Three-way and five-way valve block DN 5, page 1/87	**B16**
4	M12 × 55	DIN EN 24014	–	2/O-ring (FPM90)	**7MF9410–6CA**	0.2	Three-way valve manifold DN 8, page 1/88 Valve combination DN 8, page 1/90 Valve combination DN 5/DN 8, page 1/89	**B24**
4	$^{7}/_{16}$-20 UNF × 2 $^{1}/_{8}$ inch	ANSI B 18.2.1	4/11.5	2/O-ring (FPM90)	**7MF9410–5CA**	0.2		**B34**
2	M10 × 45	DIN EN 24014	–	1/flat	**7MF9411–7BB**	0.1	Two-spindle valve manifold DN 5, page 1/91	**K15**
2	$^{7}/_{16}$-20 UNF × 1 $^{3}/_{4}$ inch	ANSI B 18.2.1	–	1/flat	**7MF9411–7DB**	0.1		**K35**
4	M10 × 45	DIN EN 24014	–	2/flat	**7MF9411–6BB**	0.2	Three-spindle and five-spindle valve manifold DN 5, page 1/91	**K16**
4	$^{7}/_{16}$-20 UNF × 1 $^{3}/_{4}$ inch	ANSI B 18.2.1	–	2/flat	**7MF9411–5DB**	0.2		**K36**
4	M10 × 30	DIN EN 24017	4/10.5	2/flat	**7MF9004–6AD**	0.2	Multiway cock PN 100, page 1/84	**L11**
4	$^{7}/_{16}$-20 UNF × 1 $^{1}/_{8}$ inch	ANSI B 18.2.1	4/11.5	2/flat	**7MF9004–5CC**	0.2	Low-pressure multiway cock, page 1/85	**L31**
4	M10 × 30	DIN EN 24017	4/10.5	2/flat	**7MF9004–6AE** [2]	0.2		**L15**
2	M10 × 40	DIN EN ISO 4762	2/10.5	1/O-ring (FPM90)	**7MF9408–6AA**	0.1	Oval flange, page 1/96	**E13**
2	$^{7}/_{16}$-20 UNF × 1 $^{1}/_{2}$ inch	ANSI B 18.3	2/11.5	1/O-ring (FPM90)	**7MF9408–5CA**	0.1		**E34**
2	M10 × 50	DIN EN 24 014	–	1/O-ring (FPM90)	**7MF9412–6AA**	0.1	Two-spindle valve manifold for mounting in protective box, page 1/92	**F12**
2	M10 × 50	DIN EN 24 014	–	1/flat	**7MF9412–6BA**	0.1		**F15**
2	$^{7}/_{16}$-20 UNF × 2 inch	ANSI B 18.2.1	–	1/O-ring (FPM90)	**7MF9412–6CA**	0.1		**F32**
2	$^{7}/_{16}$-20 UNF × 2 inch	ANSI B 18.2.1	–	1/flat	**7MF9412–6DA**	0.1		**F35**
4	M10 × 50	DIN EN 24 014	–	2/O-ring (FPM90)	**7MF9412–6EA**	0.2	Three-spindle and five spindle valve manifold for mounting in protective box, page 1/93	**F14**
4	M10 × 50	DIN EN 24 014	–	2/flat	**7MF9412–6FA**	0.2		**F16**
4	$^{7}/_{16}$-20 UNF × 2 inch	ANSI B 18.2.1	–	2/O-ring (FPM90)	**7MF9412–6GA**	0.2		**F34**
4	$^{7}/_{16}$-20 UNF × 2 inch	ANSI B 18.2.1	–	2/flat	**7MF9412–6HA**	0.2		**F36**

Note: an accessory set is obligatory in order to flange a transmitter to an add-on part.

Note: accessory sets with stainless steel screws and washers available on request.

[1]) If accessory set and add-on part are ordered together (instead of specifying the Order No. of the accessory set mentioned above), the Order code must be added to the Order No. of the add-on part.

[2]) Suitable for oxygen.

[3]) Flat-profile gaskets 17.7 × 24 × 2.7 made of PTFE; max. 100 bar, 60 °C (for accessory sets 7MF9411–■■■ flat gasket 20 × 25.4 × 2.7 made of PTFE and for accessory sets 7MF9412-■■■ flat gasket 17.7 × 24 × 2.7, max. 420 bar, 80 °C)
O-rings DIN 3771, 20 × 2.65 – S – FPM90; max. 400 bar, 120 °C

[4]) Washers 10.5 diam. to DIN 125, Part 2 or washers 11.5 diam. × 18 diam. × 1.5

Shut-off valves

7MF9401 for pressure gauges and pressure transmitters

Application

Suitable for shutting off the line of the measured medium with corrosive and non-corrosive gases, vapors and liquids.

A water trap (page 1/102) must be connected upstream of the shut-off valve in the case of temperatures of the medium above 120 °C. The shut-off valves form B have a shaft diameter 26 h11 with which they can be secured on an instrument bracket (page 1/100). An adapter is therefore not required to secure these valves. The vent/test connection can be shut off separately with the double shut-off valves DN 5. This permits checking of the zero on the pressure gauge. In addition, the characteristic of the pressure gauge can be checked using an external pressure source.

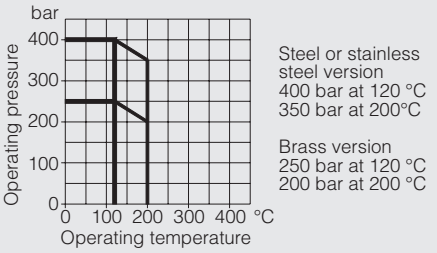
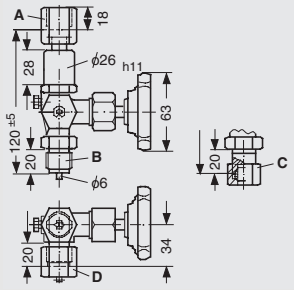
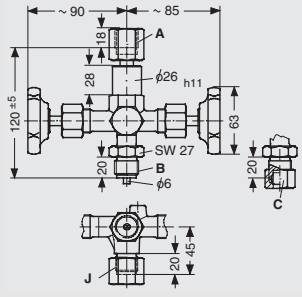


Fig. 1/106 Permissible operating pressure

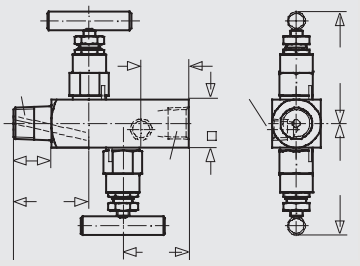
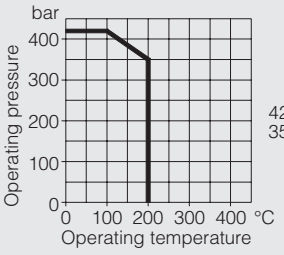
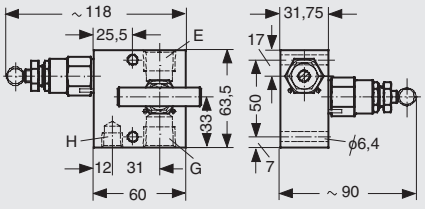
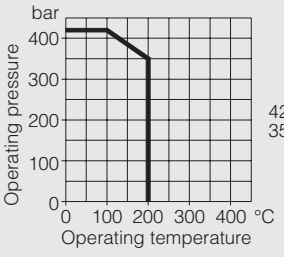
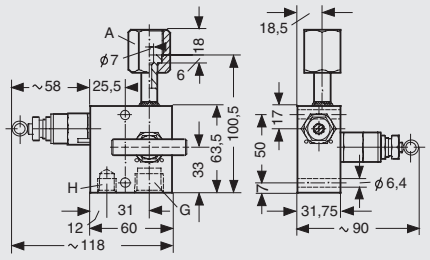
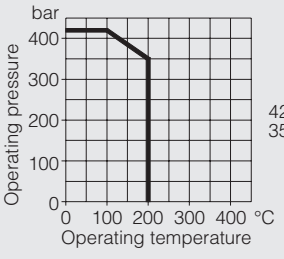
Ordering data

		Material of valve housing Abbreviated name	Mat. No.	Max. operating pressure	Order No.	Approx. kg
	**Shut-off valve** form B, DIN 16 270, without test collar, connection shank	CuZn40Pb2 C 22.8 gunmetal finish X 6 CrNiMoTi 17 122	2.0402 1.0460 1.4571	250 bar 400 bar 400 bar	**7MF9401–7AA** **7MF9401–7AB** **7MF9401–7AC**	0.6 0.6 0.6
	Shut-off valve form B, DIN 16 271, with test collar, connection shank	CuZn40Pb2 C 22.8 X 6 CrNiMoTi 17 122	2.0402 1.0460 1.4571	250 bar 400 bar 400 bar	**7MF9401–7BA** **7MF9401–7BB** **7MF9401–7BC**	0.75 0.75 0.75
	Shut-off valve form B, DIN 16 270, without test collar, pipe union	C 22.8 gunmetal finish X 6 CrNiMoTi 17 122	1.0460 1.4571	400 bar 400 bar	**7MF9401–8AB** **7MF9401–8AC**	0.7 0.7
	Shut-off valve form B, DIN 16 271, with test collar, pipe union	C 22.8 gunmetal finish X 6 CrNiMoTi 17 122	1.0460 1.4571	400 bar 400 bar	**7MF9401–8BB** **7MF9401–8BC**	0.85 0.85
	**Double shut-off valve** form B, DIN 16 272, with test collar, connection shank	CuZn40Pb2 C 22.8 gunmetal finish X 6 CrNiMoTi 17 122	2.0402 1.0460 1.4571	250 bar 400 bar 400 bar	**7MF9401–7DA** **7MF9401–7DB** **7MF9401–7DC**	1.1 1.1 1.1
	Double shut-off valve form B, DIN 16 272, with test collar, pipe union (e.g. ferrule)	C 22.8 gunmetal finish X 6 CrNiMoTi 17 122	1.0460 1.4571	400 bar 400 bar	**7MF9401–8DB** **7MF9401–8DC**	1.1 1.1

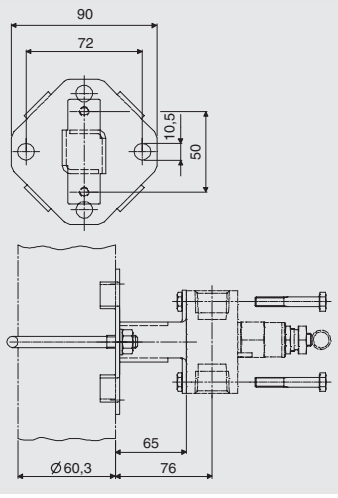
A Connection on device side: nipple to DIN 16 284, G½, SW27
B Connection on measurement side: connection shank to DIN EN 837-1, G½
C Connection on measurement side: pipe union with ferrule 12 mm diam., S series, to DIN 2353, SW24
D Connection on test collar (with sealing cap): thread M20 × 1.5
J Connection on test collar (with protective cap): thread M20 × 1.5

7MF9011
for pressure gauges and pressure transmitters

Ordering data

		Material of valve housing Abbreviated name	Mat. No.	Max. operating pressure	Order No.	Approx. kg
	**Double shut-off valve DN 5** (sleeve-collar)  420 bar at 120 °C 350 bar at 200°C	X 2 CrNiMo 17 132	1.4404	420 bar	**7MF9011–4FA**	1
	**Double shut-off valve DN 5** (sleeve- sleeve)  420 bar at 120 °C 350 bar at 200°C	X 2 CrNiMo 17 132	1.4404	420 bar	**7MF9011–4DA**	1.2
	**Double shut-off valve DN 5** (sleeve-nipple connection)  420 bar at 120 °C 350 bar at 200°C	X 2 CrNiMo 17 132	1.4404	420 bar	**7MF9011–4EA**	1.4

A Connection on device side: nipple to DIN 16 284, G½, SW27
E Connection on device side ½-14 NPT
G Connection on measurement side: ½-14 NPT
H Vent and test connection ¼-18 NPT



Ordering data	Material	Order No.
Mounting set comprising: 1 mounting bracket 2 hexagon screws M 6 × 40 1 mounting clip 2 washers 8.4 DIN 125 2 hexagon nuts M8 DIN EN 24 032	Stainless steel	**7MF9011–8AB**

Instrument brackets

M56340 for pressure gauges, pressure transmitters and shut-off valves

Application

The instrument brackets are used for mounting pressure gauges with a threaded connection at the bottom as well as shut-off valves to DIN 16 270, DIN 16 271 and DIN 16 272 (page 1/98).

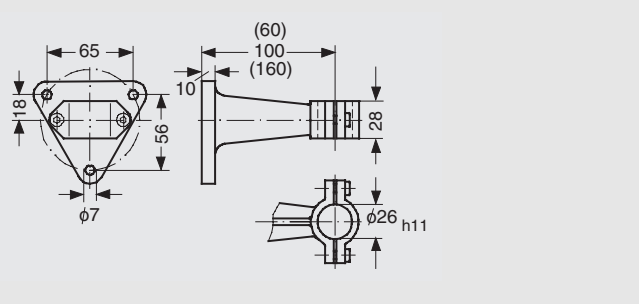


Fig. 1/108 Instrument bracket form H, dimensions

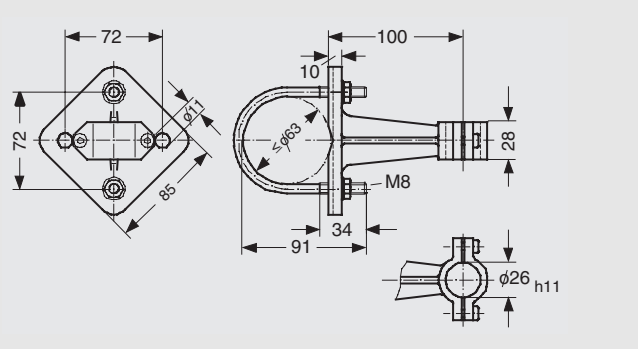


Fig. 1/109 Instrument bracket form A, wall or pipe mounting, dimensions

Ordering data	Order No.	Approx. kg
Instrument bracket form H DIN 16 281 made of aluminium alloy, painted black; for mounting on walls; screw-type bracket cover Projection length 60 mm 100 mm	 **M56340–A46** **M56340–A47**	 0.1 0.2
Instrument bracket form A DIN 16 281 made of annealed cast iron, galvanized and primed, screw-type bracket cover, projection length 100 mm; for mounting on a wall or rack or on a horizontal or vertical sectional rail	**M56340–A53**	0.8
Instrument bracket M56340–A53 with pipe clamp 7MF9101–8AF for mounting on a horizontal or vertical pipe	**M56340–A79**	0.9

Adapters for pressure gauges

7MF9001

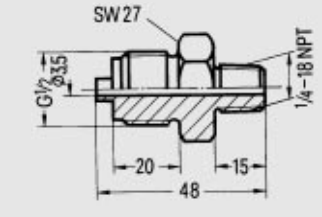
Application

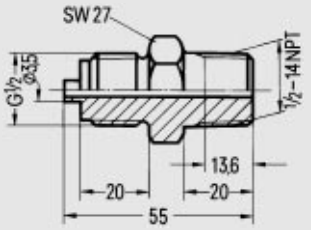
Adapters enable e.g. a transition from medium connections with NPT thread to shut-off valves to DIN 16 270 to 16 272 or pipes in conjunction with a connection gland (e.g. 7MF9008, page 1/101).

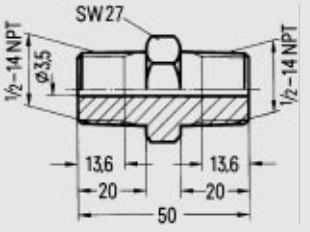
Design

Adapters made of X 6 CrNiMoTi 17 122, mat. No. 1.4571, with NPT thread and connection shank G½ to DIN EN 837-1 or two NPT threads.

Ordering data	Order No.	Approx. kg
Adapter with thread ¼-18 NPT – G½	**7MF9001–1AA**	0.2
Adapter with thread ½-14 NPT – G½	**7MF9001–1CA**	0.2
Adapter with thread ½-14 NPT – ½-14 NPT	**7MF9001–1DA**	0.2







Connection glands for pipes

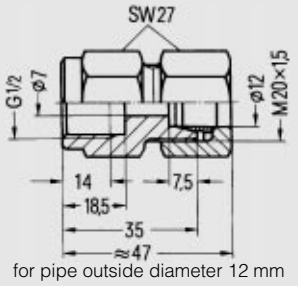
7MF9008

Application

Connection glands are used to connect medium and differential pressure lines to DIN 19 210 to collars G½ to DIN EN 837-1; for rated pressures up to PN 630, for oxygen only up to PN 250.

Ordering data

Abbreviated name of material	Mat. No.	Design	Order No.	Approx. weight kg
Connection gland				
9 SMn 28 k	1.0501	Standard	**7MF9008–1GA**	0.2
X 6 CrNiMoTi 17 122	1.4571	Standard	**7MF9008–1GB**	0.2
		Grease-free	**7MF9008–1GC**	0.2

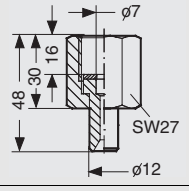
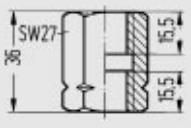
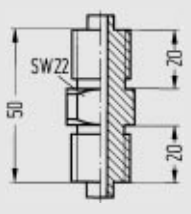


for pipe outside diameter 12 mm

Connection parts G½

M56340
for pressure gauges and shut-off fittings

Ordering data

			Material Abbreviated name	Mat. No.	Max. operating pressure	Order No.	Approx. kg
	Female thread G½	**Nipple connection** G½ DIN 16 284 (union nut with nipple and gasket) Connection: G½ DIN EN 837-1	CuZn39Pb3 F44	2.0401.26	400 bar	**M56340–A1**	0.1
			Union nut 9 SMn 28 k Nipple RSt 37-2	1.0715 1.0037	400 bar	**M56340–A2**	0.1
			Union nut X 8 CrNiS 18 9 Nipple X 6 CrNiMoTi 17 122	1.4305 1.4571	400 bar	**M56340–A3**	0.1
	Female thread G½ right-hand G½ left-hand	**Clamping sleeve** G½ DIN 16 283 Connections: G½ DIN EN 837-1	CuZn40Pb2 F43 9 SMn 28 k	2.0402.26 1.0715	400 bar 400 bar	**M56340–A4** **M56340–A5**	0.1 0.1
	Male thread G½ G½	**Collar connection piece** Connections: G½ DIN EN 837-1	CuZn39Pb2 F44 9 SMn 28 k	2.0401.26 1.0715	400 bar 400 bar	**M56340–A6** **M56340–A7**	0.16 0.16

Water traps

M56340 for pressure gauges and pressure transmitters

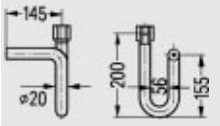
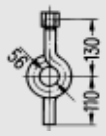
Application

Water traps protect pressure gauges and shut-off fittings from heating up (e.g. by steam) by the water column produced by the water trap.

Design

U- shape or circular shape to DIN 16 282, made of seamless pipe 20 × 2.6 DIN 2448-St35.8 or of stainless steel X 6 CrNiMoTi 17 122. Water traps for higher operating pressures and higher operating temperatures on request.

Ordering data

		Material Abbreviated name	Mat. No.	Max. operating temp.[1]	Max. operating pressure	Order No.	Approx. kg
	**Water trap** B DIN 16 282			120 °C	100 bar	**M56340-A43**	0.7
	Connection on device side: Clamping sleeve G½ DIN 16 283	St 35.8	1.0305	400 °C	63 bar		
	Connection on measurement side: Weld-on end 20 mm diam. × 2.6 mm	X 6 CrNiMoTi 17 122	1.4571	120 °C	100 bar	**M56340-A61**	0.7
				400 °C	63 bar		
	**Water trap** D DIN 16 282			120 °C	100 bar	**M56340-A45**	0.7
	Connection on device side: Clamping sleeve G½ DIN 16 283	St 35.8	1.0305	400 °C	63 bar		
	Connection on measurement side: Weld-on end 20 mm diam. × 2.6 mm	X 6 CrNiMoTi 17 122	1.4571	120 °C	100 bar	**M56340-A63**	0.7
				400 °C	63 bar		

[1]) If the temperature of the measured medium is higher, a sufficiently long line should be connected upstream of the trap to enable heat dissipation.

Primary shut-off valves

7MF9017

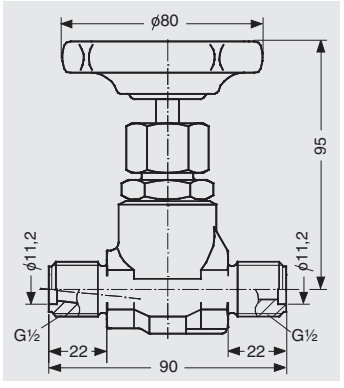


Fig. 1/110 Shut-off valve 7MF9017–1A■, dimensions

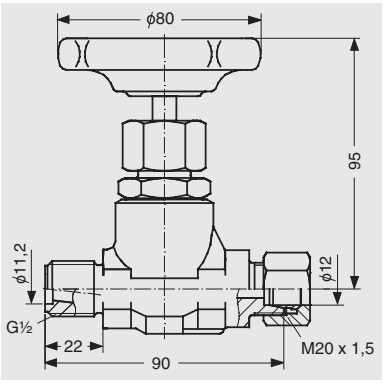


Fig. 1/111 Shut-off valves 7MF9017–1B■, –2B■, –3B■, dimensions

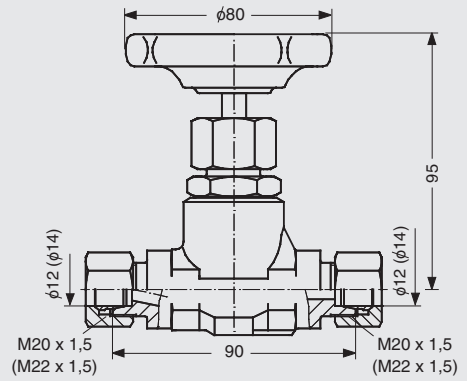
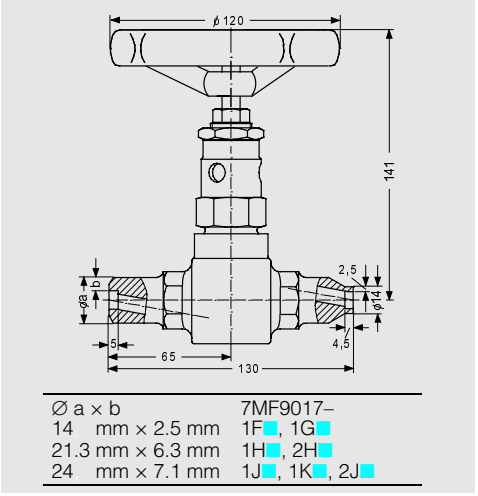


Fig. 1/112 Shut-off valves 7MF9017–1C■, –1D■, –2C■, –3C■, dimensions



Ø a × b	7MF9017–
14 mm × 2.5 mm	1F■, 1G■
21.3 mm × 6.3 mm	1H■, 2H■
24 mm × 7.1 mm	1J■, 1K■, 2J■

Fig. 1/113 Shut-off valves 7MF9017–, dimensions

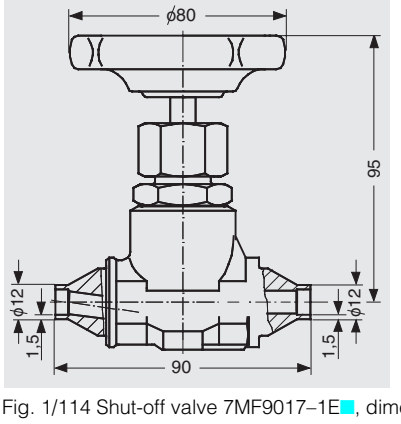


Fig. 1/114 Shut-off valve 7MF9017–1E■, dimensions

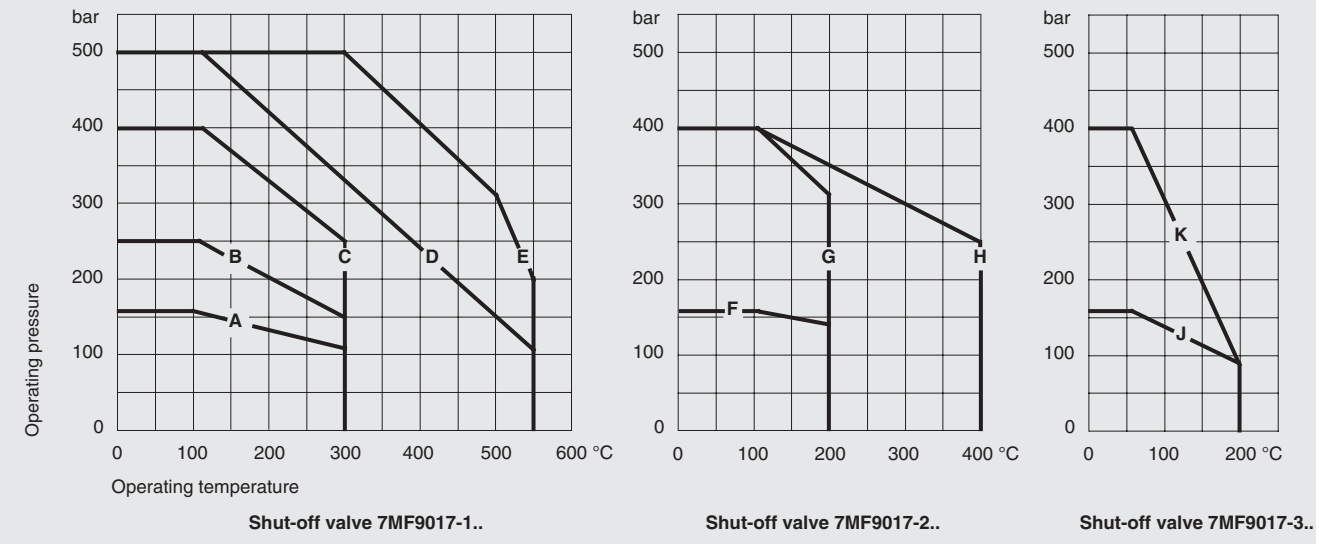


Fig. 1/114 Permissible operating pressure as a function of the operating temperature

Ordering data

	Max. operating pressure	Pressure/ temp. curve in Fig. 1/127	Material (mat. No.)	Spindle thread	Connections	Order No.	Approx. kg
Shut-off valve for non-corrosive liquids, gases and vapors	160 bar	A	C22.8 (1.0460)	Internal	Threaded sleeves G½ form R, DIN 19 207	**7MF9017–1A** ■	0.8
	160 bar	A	C22.8 (1.0460)	Internal	Threaded sleeves G½ form R, DIN 19 207 and pipe union with ferrule for pipe diameter 12 mm, S series	**7MF9017–1B** ■	0.8
	400 bar	C	C22.8 (1.0460)	Internal	Pipe union with ferrule for pipe diameter 12 mm, S series	**7MF9017–1C** ■	1
	400 bar	C	C22.8 (1.0460)	Internal	Pipe union with ferrule for pipe diameter 14 mm, S series	**7MF9017–1D** ■	1
	250 bar	B	C22.8 (1.0460)	Internal	Welding sleeves 12 mm diameter × 1.5 mm	**7MF9017–1E** ■	0.7
	500 bar	D	15 Mo 3 (1.5415)	External	Welding sleeves 14 mm diameter × 2.5 mm	**7MF9017–1F** ■	1.6
	500 bar	E	10 CrMo 9 10 (1.7380)	External	Welding sleeves 14 mm diameter × 2.5 mm	**7MF9017–1G** ■	1.6
	500 bar	D	15 Mo 3 (1.5415)	External	Welding sleeves 21.3 mm diam. × 6.3 mm and 14 mm diameter × 2.5 mm	**7MF9017–1H** ■	1.6
	500 bar	D	15 Mo 3 (1.5415)	External	Welding sleeves 24 mm diam. × 7.1 mm and 14 mm diameter × 2.5 mm	**7MF9017–1J** ■	1.6
	500 bar	E	10 CrMo 9 10 (1.7380)	External	Welding sleeves 24 mm diam. × 7.1 mm and 14 mm diameter × 2.5 mm	**7MF9017–1K** ■	1.6
Shut-off valve for corrosive liquids and gases	160 bar	F	X 6 CrNiMoTi 17 122 (1.4571)	Internal	Threaded sleeves G½ form R, DIN 19 207 and pipe union with ferrule for pipe diameter 12 mm, S series	**7MF9017–2B** ■	0.8
	400 bar	G	X 6 CrNiMoTi 17 122 (1.4571)	Internal	Pipe union with ferrule for pipe diameter 12 mm, S series	**7MF9017–2C** ■	1
	400 bar	H	X 6 CrNiMoTi 17 122 (1.4571)	External	Welding sleeves 21.3 diameter mm × 6.3 mm and 14 mm diam. × 2.5 mm	**7MF9017–2H** ■	1.6
	400 bar	H	X 6 CrNiMoTi 17 122 (1.4571)	External	Welding sleeves 24 mm diameter × 7.1 mm and 14 mm diam. × 2.5 mm	**7MF9017–2J** ■	1.6
Shut-off valve grease-free for oxygen	160 bar	J	X 6 CrNiMoTi 17 122 (1.4571)	Internal	Threaded sleeves G½ form R, DIN 19 207 and pipe union with ferrule for pipe diameter 12 mm, S series	**7MF9017–3B** ■	0.8
	400 bar	K	X 6 CrNiMoTi 17 122 (1.4571)	Internal	Pipe union with ferrule for pipe diameter 12 mm, S series	**7MF9017–3C** ■	1

Constructional test and acceptance test for pressure housing	Without certificate	**A**
	With factory test certificate EN 10 204–2.2	**B**
	With material accept. test certificate EN 10 204–3.1.A	**C**
	With material accept. test certificate EN 10 204–3.1.B	**D**
	With material accept. test certificate EN 10 204–3.1.C	**E**

Further acceptance conditions subject to agreement.

Compensation vessels

7MF9015

The compensation vessels prevent the level difference which occurs with pressure changes in the pressure lines and which falsifies the measurement.

According to DIN 19 211, the temperature in the compensation vessel is 50 K less than the steam temperature in the pipe when calculating the wall thicknesses since the temperature in the compensation vessel during operation can only rise up to the saturated steam temperature.

A material acceptance test certificate A EN 10 204 is available for the materials from which the compensation vessels are made.

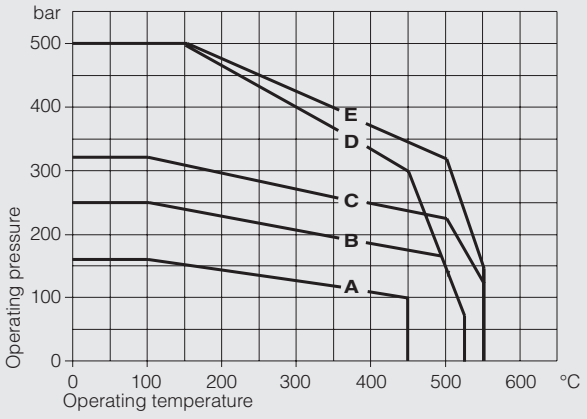
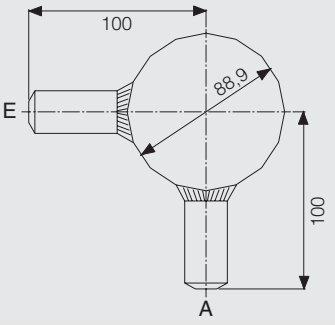
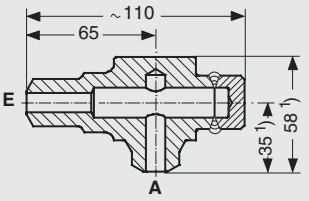


Fig. 1/115 Permissible operating pressure as a function of the permissible operating temperature



A Output (see Ordering data for dimensions)
E Input (see Ordering data for dimensions)

Fig. 1/116 Compensation vessel 7MF9015–1■■, dimensions



A Output (see Ordering data for dimensions)
E Input (see Ordering data for dimensions)

1) 30 mm longer with 7MF9015–5A■

Fig. 1/117 Compensation vessel 7MF9015–5■■, dimensions

Ordering data

						Order No.	Approx. kg
Compensation vessel							
Max. operating pressure	Pressure/ temperature curve Fig. 1/128	Material (mat. No.)	Connections Input	Output	Approx. contents		
160 bar	A	15 Mo 3 (1.5415)	Threaded sleeve G½ form R, DIN 19 207	Threaded sleeve G½ form V, DIN 19 207	250 cm^3	**7MF9015–1A■**	2.4
250 bar	B	15 Mo 3 (1.5415)	Welding sleeve 21 mm diam. × 6.3 mm	Welding sleeve 21 mm diam. × 6.3 mm	250 cm^3	**7MF9015–1B■**	2.4
250 bar	B	15 Mo 3 (1.5415)	Welding sleeve 24 mm diam. × 7.1 mm	Welding sleeve 24 mm diam. × 7.1 mm	250 cm^3	**7MF9015–1C■**	2.4
250 bar	C	10 CrMo 9 10 (1.7380)	Welding sleeve 24 mm diam. × 7.1 mm	Welding sleeve 24 mm diam. × 7.1 mm	250 cm^3	**7MF9015–1D■**	2.4
250 bar	B	15 Mo 3 (1.5415)	Welding sleeve 33.7 mm diam. × 4.5 mm	Welding sleeve 24 mm diam. × 7.1 mm	250 cm^3	**7MF9015–1E■**	2.4
160 bar	A	15 Mo 3 (1.5415)	Threaded sleeve G½ form R, DIN 19 207	Threaded sleeve G½ form V, DIN 19 207	20 cm^3	**7MF9015–5A■**	0.9
500 bar	D	15 Mo 3 (1.5415)	Welding sleeve 21 mm diam. × 6.3 mm	Welding sleeve 21 mm diam. × 6.3 mm	20 cm^3	**7MF9015–5B■**	0.8
500 bar	D	15 Mo 3 (1.5415)	Welding sleeve 24 mm diam. × 7.1 mm	Welding sleeve 24 mm diam. × 7.1 mm	20 cm^3	**7MF9015–5C■**	0.8
500 bar	E	10 CrMo 9 10 (1.7380)	Welding sleeve 24 mm diam. × 7.1 mm	Welding sleeve 24 mm diam. × 7.1 mm	20 cm^3	**7MF9015–5D■**	0.8
Constructional test and acceptance test			Without certificate			**A**	
			With factory test certificate EN 10 204–2.2			**B**	
			With material accept. test certificate	EN 10 204–3.1.A		**C**	
				EN 10 204–3.1.B		**D**	
				EN 10 204–3.1.C		**E**	

Further acceptance conditions subject to agreement.

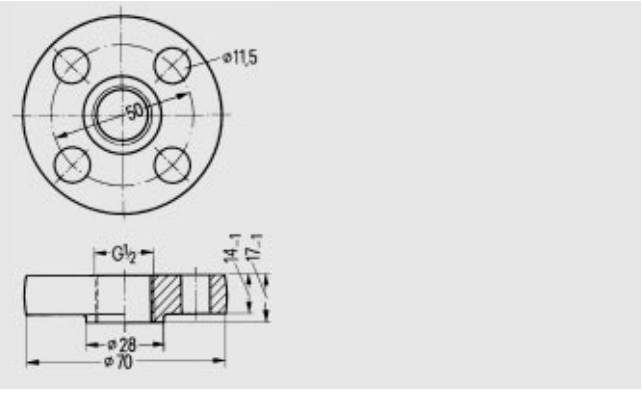


Fig. 1/119 Threaded flange, dimensions

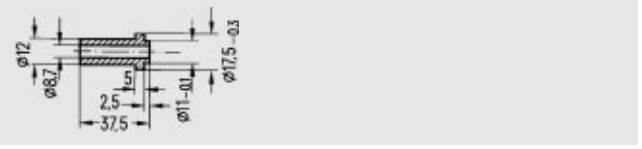


Fig. 1/120 Nipple G½, dimensions

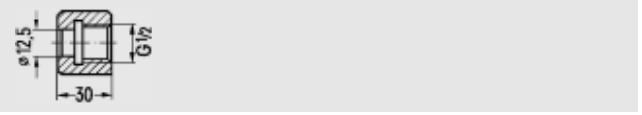


Fig. 1/121 Union nut G½, dimensions

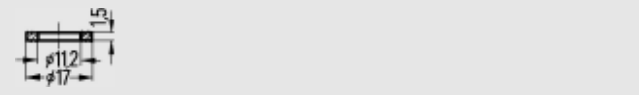


Fig. 1/122 Gasket, dimensions

Ordering data

	Order No.	Approx. kg
Threaded flange pair G½		
With stainless steel gasket	**7MF9007–4CA**	0.75
Grease-free for oxygen, with stainless steel gasket	**7MF9007–4DA**	0.75
Scope of delivery:		
2 Threaded flanges DIN 19 207 – G½ – 1.0460, made of C 22.8		
4 Hexagon screws M 10 × 45 DIN EN 24 014 Ck 35		
4 Hexagon nuts M 10 DIN EN 24 032		
1 Gasket DIN 19 207 B½ (grooved) made of X 6 CrNiMoTi 17 122, mat. No. 1.4571, 7MF9007-6BA (only version 7MF9007-4CA)		
1 Gasket DIN 19 207 B½ (grooved) made of X 6 CrNiMoTi 17 122, mat. No. 1.4571, grease-free for oxygen, 7MF9007-6CA (only version 7MF9007-4DA)		
Nipple G½ form V DIN 19 207 made of 15 Mo 3, mat. No. 1.5415	**7MF9007–4KA**	0.1
Grease-free for oxygen made of X 6 CrNiMoTi 17 122, mat. No. 1.4571	**7MF9007–4LA**	0.1
Union nut G½ DIN 16 284 made of C 35, mat. No. 1.0501	**7MF9007–4MA**	0.1
Grease-free for oxygen made of X 6 CrNiMoTi 17 122, mat. No. 1.4571	**7MF9007–4NA**	0.1
Gasket DIN 19 207 B½ (grooved) made of X 6 CrNiMoTi 17 122, mat. No. 1.4571	**7MF9007–6BA**	0.01
Grease-free for oxygen made of X 6 CrNiMoTi 17 122, mat. No. 1.4571	**7MF9007–6CA**	0.01

Material designations

Due to introduction of the European standards, the following new material designations are used:

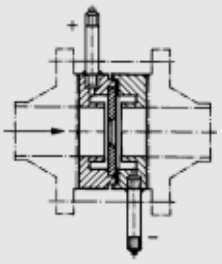
Material No.	Material designation to DIN	Material designation to European standard
1.0037	RSt 37-2	S235JR
1.0038	RSt 37-2	S235JRG2
1.0122	RQSt 37-2	S235JRG2C
1.0255	St 37.4	P235T2
1.0305	St 35.8	P235G1TH
1.0308	St 35	S235G2T
1.0309	St 35.4	DX55D
1.0345	H I	P235GH
1.0405	St 45.8	P255G1TH
1.0425	H II	P 265GH
1.0460	C 22.8	C22G2
1.0501	C 35	C35

Material No.	Material designation to DIN	Material designation to European standard
1.0715	9 SMn 28 k	11SMn30
1.4021	X 20 Cr 13	X20Cr13
1.4104	X 12 CrMoS 17	X14CrMoS17
1.4122	X 35 CrMo17	X39CrMo17-1
1.4305	X 8 CrNiS 18 9	X8CrNiS18-9
1.4404	X 2 CrNiMo 17 13 2	X2CrNiMo17-13-2
1.4571	X 6 CrNiMoTi 17 12 2	X6CrNiMoTi17-12-2
1.5415	15 Mo 3	16Mo3
1.7335	13 CrMo44	13 CrMo 4-5
1.7380	10 CrMo 9 10	10CrMo9-10
1.7709	21 CrMo V 57	21CrMoV5-7

Primary differential pressure devices to DIN 1952, July 1982/DIN EN ISO 5167

Flowmeters based on the differential pressure method, for gases, vapors and liquids

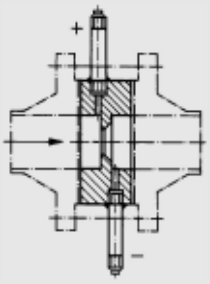
Summary - **Primary differential pressure devices** for mounting between flanges



Orifice plates with annular chambers

Nominal diameters DN 50 to DN 1000
Nominal pressures PN 6 to PN 100

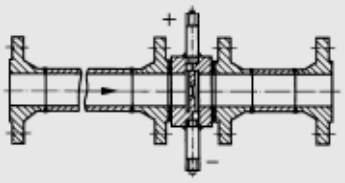
Page 1/110



Orifice plates with single tappings

Nominal diameters DN 50 to DN 500
Nominal pressures PN 6 to PN 315

Page 1/112



Metering pipes

Orifice plate with annular chambers, mounted between flanges

Nominal diameters DN 10 to DN 50
Nominal pressures PN 10 to PN 100

Page 1/114

Orifice plate with single tappings, mounted between flanges

Nominal diameters DN 10 to DN 50
Nominal pressures PN 10 to PN 315

Page 1/116

Calculation of primary differential pressure devices: see page 1/120.

Application

Of all methods for measuring flow, the differential pressure method is the most important. With one clearly-defined phase – liquid, vapor or gas, no solid components – it can be used within wide temperature and pressure ranges.

Electric differential pressure transmitters (from page 1/28 onwards) are connected to the differential pressure devices. Errors due to fluctuations in the state of the medium – pressure and temperature – can be corrected by a measured-value computer (from page 1/139 onwards).

Design

Standard orifice plates or nozzles are used in the normal case. These are robust units. In order to measure the differential pressure, these have either annular chambers connected to the inside of the pipe via an annular gap or have single tappings. The latter design is preferably used for higher pressures.

Since the measurements can be influenced by wall roughness and diameter tolerances in the case of pipes with smaller nominal diameters (DN 10 to DN 50), metering pipes are used for this range. These are primary differential pressure devices with inlet and outlet sections made of precision pipes. The pipe lengths correspond to DIN 19 205. Metering pipes can be flanged or welded into a pipeline. The flow coefficient C must be determined by experiment to permit exact measurements with metering pipes of DN 10 to DN 50.

The primary differential pressure devices are calculated according to DIN EN ISO 5167, 1991 and the VDI 2040 and 2041 guidelines. In special applications which cannot be covered by these standards, manufacturing is carried out following consultation with the customer.

If the calculation is required when a primary device is ordered, the calculation sheet (see page 1/121) must be included with the required data: pipeline, mounting position, medium, measuring range etc. The diameter of the primary device opening is then calculated or, if no solution is possible with the supplied data, the value which deviates from the required nominal diameter and differential pressure as little as possible. If a calculation is not required, the diameter of the primary device opening must be specified when ordering.

Certificates 3.1 B and 3.1 A to EN 10 204 (DIN 50 049) available on request.

Fittings for primary differential pressure devices: see page 1/83.

Primary differential pressure devices in general

Types of primary differential pressure devices

Standard orifice plates

For mounting between flanges and for welding;
sampling of differential pressure via annular chambers or single tappings.

In the case of orifice plates with annular chambers, two rings support the replaceable orifice disk; in the case of orifice plates with single tappings, the orifice disk and the support rings are one unit.

These one-part orifice plates are suitable for higher pressures.

Shapes of the orifice disk aperture (Fig. 1/123)

The primary differential pressure devices are manufactured according to DIN EN ISO 5167. According to this, the application range of the standard orifice disk aperture form A is limited by the Reynolds number. The limits depend on the diameter ratio $\beta = d/D$. (D: internal diameter of pipe).

In the case of Reynolds numbers from approx. 10^3 to 10^5, the orifice disk aperture form B (quarter circle) can be used for slightly less accurate measurements. The profile radius r depends on the diameter ratio β and results from the calculation of the diameter of the orifice disk aperture d.

The cylindrical orifice disk aperture form D is used for measurements in both flow directions.

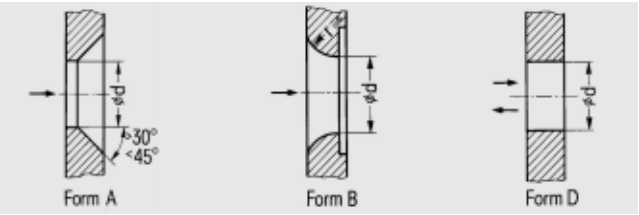


Fig. 1/123 Shapes of the orifice disk aperture

Selection of the primary differential pressure device

The remaining pressure loss is also important when selecting the primary differential pressure device. Venturi nozzles have a smaller remaining pressure loss than ISA 1932 nozzles and orifice plates (Fig. 1/124); the energy costs are lower. Venturi nozzles are more expensive, however, because their manufacture is more difficult, and the most economical solution must be considered in each case.

The accuracies of orifice plates and ISA 1932 nozzles are identical.

Orifice plates with orifice disk apertures of forms B and D as well as Venturi nozzles are less accurate.

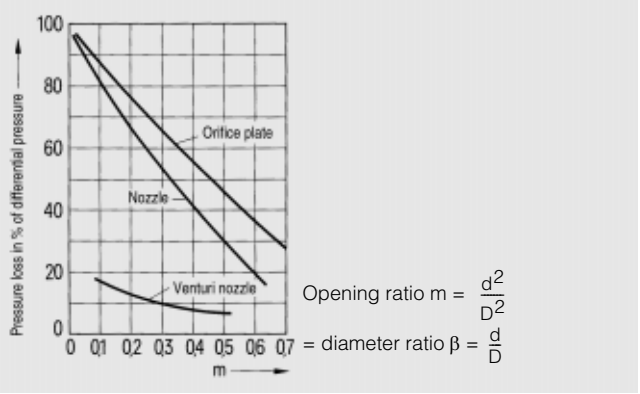


Fig. 1/124 Remaining pressure loss with various primary devices

Position of the tapping sockets

The arrangement of the tapping sockets is optional when measuring liquids and gases; the compensation vessels must be at the same height when measuring steam.

In the case of horizontal steam lines, straight sockets are arranged opposite each other or, if the pipe is close to a wall, bent sockets on one side (Fig. 1/125).

In the case of vertical and inclined steam pipes, the lower socket is bent upwards so that the connection flanges and compensation vessels are also at the same height in this case (Fig. 1/126).

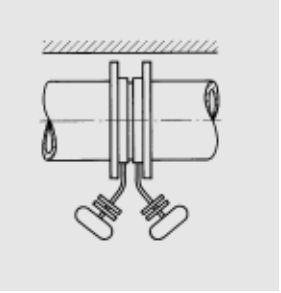


Fig. 1/125 Horizontal pipe in front of a wall with primary differential pressure device and valve combination; with annular chamber orifice plate or single part orifice plate with special length of 65 mm

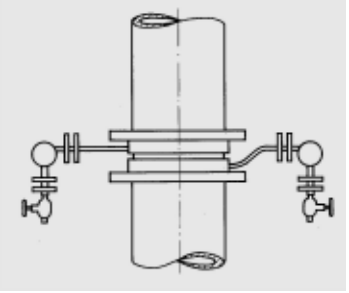


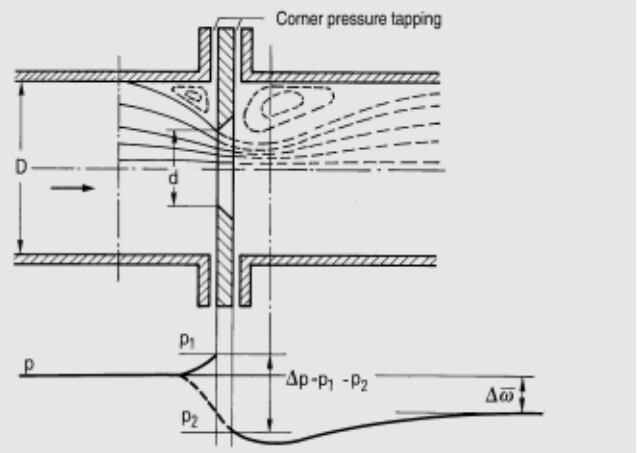
Fig. 1/126 Vertical steam pipe with primary differential pressure device and valve combination

Extract from DIN 19 205, Part 1, August 1988

No.	Pipe position and flow direction			Positions of tapping sockets		Application
1	Horizontal		→	180°	—○—	With compensation vessels
2 [1)2)]				0°	—○	
3 [1)2)]					○—	
4	Vertical	Rising	↑	90°	—○	
5		Falling	↓			
6		Rising	↑	180°	—○—	
7		Falling	↓			
10	Horizontal		→	∠γ [3)]	○	Without compensation vessels
11	Horizontal, vertical		→↓↑	180°	—○—	
13	Vertical		↓↑	90°	—○	

[1)] Not possible with orifice plates with single tappings (overall length 40 mm).
[2)] Only possible with orifice plates with annular chambers (overall length 65 mm) and bent-up tapping sockets.
[3)] Angle γ is dependent on the nominal pressure and nominal diameter according to DIN 19 205.

Primary differential pressure devices in general



D	Internal diameter of pipe
d	Diameter of orifice disk aperture
p	Pressure in the pipe
p_1	Pressure immediately upstream of primary device
p_2	Pressure immediately downstream of primary device
Δp	Differential pressure
$\Delta\bar{\omega}$	Remaining pressure loss

Fig. 1/127 Principle of the differential pressure method: pressure curve at a pipe restriction

Principle of measurement

The differential pressure method is based on the law of continuity and Bernoulli's energy equation.

According to the law of continuity, the flow of a moving medium in a pipe is the same at all points. If the cross-section is reduced at one point, the flow rate must increase at this point. According to Bernoulli's energy equation, the energy content of a flowing medium is constant and is the total of the static (pressure) and kinetic (movement) energies. An increase in the flow rate therefore results in a reduction in the static pressure (Fig. 1/127). This pressure difference, the so-called differential pressure, is a measure of the flow.

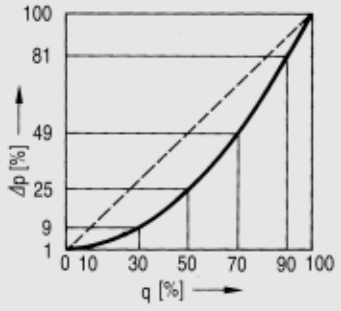
In general the equation applies: $q = c\sqrt{\Delta p}$

Where:

q	Mass or volume flow (q_m, q_v)
Δp	Differential pressure
c	Factor depending on the dimensions of the pipe, the type of restriction, the density of the flowing medium etc.

This equation states that the differential pressure generated by the restriction is proportional to the square of the flow (Fig. 1/128).

In order to measure the flow, a primary differential pressure device is fitted at the point of measurement. This restricts the pipe and has two connections for sampling the differential pressure. If the properties of the primary device and the medium are known such that the above equation can be evaluated, the differential pressure is a measure of the absolute flow. No comparison measurements are required; the flow measurement can be checked independent of the device manufacturer.



q	0	1	3	5	8	10	15	20	30	40	50	60	70	80	90	100	%
Δp	0	0.01	0.09	0.25	0.64	1	2.25	4	9	16	25	36	49	64	81	100	%

Setting range for application point of square-rooted characteristic for SITRANS P differential pressure transmitter

Fig. 1/128 Relationship between flow q and differential pressure Δp

Terms

Nominal pressure to DIN 2401, Part 1, May 1977

The nominal pressure of a pipe is the pressure for which standardized pipe sections have been designed based on an initial material specified in the respective dimensional standards and a temperature of 20 °C. The nominal pressures incremented according to the values in the standard constitute the basis for the design of standards for pipe sections.

Nominal pressure values in bar

	1	**10**	**100**	**1000**
		12.5	125	1250
	1.6	**16**	**160**	**1600**
	2	20	200	2000
	2.5	**25**	**250**	**2500**
	3.2	32	315	
	4	**40**	**400**	**4000**
0.5	5	50	500	
	6	**63**	**630**	**6300**
			700	
	8	80	800	

Pressure values printed in bold type should be preferred.

Permissible operating pressure

The permissible operating pressure in a pipe is the highest pressure to which the pipe sections designed for a certain nominal pressure may be subjected.

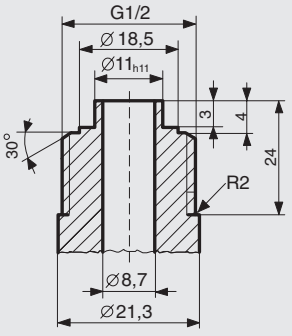
The magnitude of the permissible operating pressure for a pipe section designed for a specific nominal pressure depends on the permissible operating temperature and the material used. If the starting material envisaged in the dimensional standards is used, the permissible operating pressure is the same as the nominal pressure at a temperature of 20 °C. At other temperatures, the dependence of the permissible operating pressure on the nominal pressure for individual materials or groups of materials can be obtained from the special standards.

Pressure variations, possible increases in temperature, and additional mechanical stresses must be taken into account when determining the permissible operating pressure. It may then be advisable to select a higher nominal pressure stage.

Tapping sockets

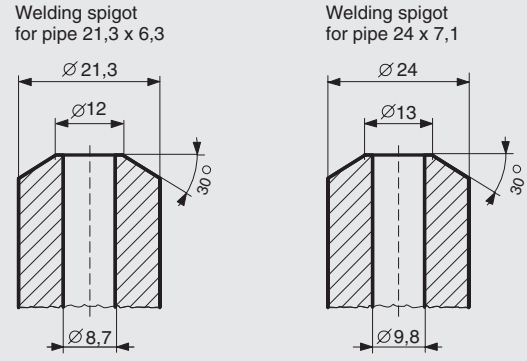
The type of socket connections depends on the measured medium and the nominal pressure of the shut-off fittings (Figs. 1/129 and 1/130); the socket length depends on the nominal diameter (pipe diameter) of the primary differential pressure device and the operating temperature (because of the thermal insulation!); the socket position depends on the measured medium and the flow direction (Fig. 1/131).

Other connections on request.



For liquids and gases
PN 100,
for steam PN 100

Fig. 1/129 Threaded connections of tapping sockets



for liquids and gases
PN 100 to PN 400,
for steam PN 100

for liquids and gases
over PN 400,
for steam over PN 100

Fig. 1/130 Welding connections of tapping sockets

Normal version for all media and steam
Sockets offset by 180°

Liquids
Sockets pointing downwards, offset by 90°

Gases
Sockets pointing upwards, offset by 90°

Fig. 1/131 Recommendations for tapping sockets according to DIN 19 216 (see also page 1/107).

7ME1110
Orifice plates with annular chambers

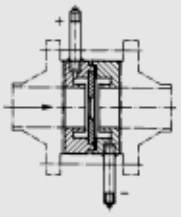


Fig. 1/132 Orifice plate with annular chamber

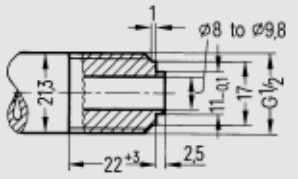


Fig. 1/133 Tapping sockets with threaded connection, dimensions

Application

Suitable for corrosive and non-corrosive gases, vapors and liquids;
permissible operating temperature –60 to +400 °C

Design

Two support rings with replaceable orifice disk form A, B or D (Fig. 1/123); see Ordering data for materials.

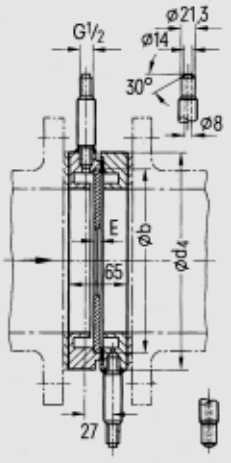
Graphite gasket with metal washer insert between support rings and orifice disks.

Overall length	65 mm to DIN 19 205
Nominal diameters	DN 50 to DN 1000
Nominal pressures	PN 6 to PN 100

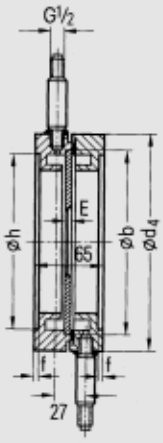
Sealing face to the mating flanges:
- Plane, sealing face turned, N10/N12 to DIN ISO 1302, for soft gasket (PN 6 to PN 40),
- plane, sealing face turned, N8 to DIN ISO 1302, for grooved gasket to DIN 2697 (PN 63 to PN 100),
- with recess to DIN 2513 (PN 10 to PN 100) or
- with groove to DIN 2512 (PN 10 to PN 100).

Tapping sockets straight or bent
- with pipe thread G½ DIN ISO 228/1, connection dimensions to DIN 19 207 form V, Fig. 1/133, or
- with spigot for welding, 21.3 mm diameter.

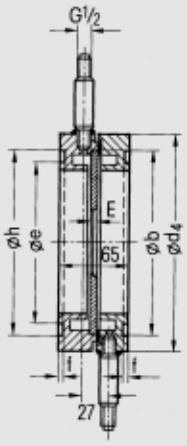
See page 1/137 for positions of the tapping sockets.



Sealing face to the mating flanges: plane for soft gasket or grooved gasket



Recess to DIN 2513, R13



Groove to DIN 2512, N

Tapping sockets: socket length is defined according to pressure and nominal diameter (DIN 19 205, Part 2) See Figs. 1/125 and 1/126 for designs for steam pipes

DN	Int. diameter	External diameter d_4 Sealing face: plane PN 6	10	16	25	40	63	100	Sealing face: recess and groove PN 10 to 63	PN 100	b PN 6	PN 10 to PN 25	PN 40	PN 63 to PN 100	E PN 6 to PN 100	h PN 10 to PN 100	e PN 10 to PN 100	f PN 10 to PN 100	Approx. weight in kg [1]
50	43 to 55	96	107	107	107	107	113	119	98	98	79	79	79	79	2±0.1	88	72	3	2.5 4.5
65	59 to 71	116	127	127	127	127	138	144	120	120	96	96	96	96	2±0.1	110	94	3	3.4 6.4
80	73 to 85	132	142	142	142	142	148	154	131	131	115	115	115	115	4±0.2	121	105	3	4.3 6.9
100	90 to 108	152	162	162	168	168	174	180	160	160	137	137	137	137	4±0.2	150	128	3.5	4.7 8.6
125	114 to 132	182	192	192	194	194	210	217	186	186	164	164	164	164	4±0.2	176	154	3.5	6.3 12.4
150	142 to 160	20	218	218	224	224	247	257	214	214	193	193	193	193	4±0.2	204	182	3.5	7.0 17.0
200	185 to 211	262	273	273	284	290	309	324	270	270	247	247	247	247	4±0.2	260	238	3.5	10.3 26.2
250	237 to 262	317	328	329	340	352	364	391	323	323	302	302	302	302	4±0.2	313	291	3.5	13.1 36.6
300	285 to 314	373	378	384	400	417	424	458	374	374	354	354	354	354	4±0.2	364	242	3.5	17.3 49.0
350	328 to 362	423	438	444	457	474	486	512	432	432	403	403	403	403	4±0.2	422	394	4	25.0 63.0
400	380 to 408	473	489	495	514	546	543	–	484	484	452	452	452	452	4±0.2	474	446	4	28.0 73.8
500	477 to 514	578	594	617	624	628	–	–	586	586	553	563	563	–	6±0.2	576	548	4	36.2 65.9
600	581 to 610	679	695	734	731	–	–	–	686	686	659	659	–	–	6±0.2	676	648	4	42.5 75.6
700	686 to 710	784	810	804	833	–	–	–	786	786	757	762	–	–	8±0.2	778	750	4	51.8 89.5
800	776 to 810	890	917	911	942	–	–	–	893	–	869	875	–	–	8±0.2	883	855	4	61.7 109
900	876 to 910	990	1017	1011	1042	–	–	–	998	–	969	975	–	–	8±0.2	988	960	4	68.3 123
1000	976 to 1010	1090	1124	1128	1154	–	–	–	1104	–	1071	1079	–	–	10±0.2	1094	1060	5	74.0 148

Fig. 1/134 Orifice plates with annular chambers; dimensions and weights

[1]) With smallest and largest nominal pressure.

Ordering data

Order No.

7ME1110– ■■■■■ **–** ■■■■ **–Z**

Orifice plate with annular chambers

for mounting between flanges,
sealing faces to the mating flanges: plane, with recess or with groove.
Note:
graphite flat gasket with metal washer insert (1.4401, 0.1 mm),
application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

DN	PN 6	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100
50	**1GA**	**1GE**	**1GE**	**1GE**	**1GE**	**1GF**	**1GG**
65	**1HA**	**1HE**	**1HE**	**1HE**	**1HE**	**1HF**	**1HG**
80	**1JA**	**1JE**	**1JE**	**1JE**	**1JE**	**1JF**	**1JG**
100	**2AA**	**2AC**	**2AC**	**2AE**	**2AE**	**2AF**	**2AG**
125	**2BA**	**2BC**	**2BC**	**2BE**	**2BE**	**2BF**	**2BG**
150	**2CA**	**2CC**	**2CC**	**2CE**	**2CE**	**2CF**	**2CG**
200	**2EA**	**2EC**	**2EC**	**2ED**	**2EE**	**2EF**	**2EG**
250	**2FA**	**2FB**	**2FC**	**2FD**	**2FE**	**2FF**	**2FG**
300	**2GA**	**2GB**	**2GC**	**2GD**	**2GE**	**2GF**	**2GG**
350	**2HA**	**2HB**	**2HC**	**2HD**	**2HE**	**2HF**	**2HG**
400	**2JA**	**2JB**	**2JC**	**2JD**	**2JE**	**2JF**	–
500	**2KA**	**2KB**	**2KC**	**2KD**	**2KE**	–	–
600	**3AA**	**3AB**	**3AC**	**3AD**	–	–	–
700	**3BA**	**3BB**	**3BC**	**3BD**	–	–	–
800	**3CA**	**3CB**	**3CC**	**3CD**	–	–	–
900	**3DA**	**3DB**	**3DC**	**3DD**	–	–	–
1000	**3EA**	**3EB**	**3EC**	**3ED**	–	–	–

For non-corrosive media • Permissible operating temp. –10 to +400 °C	Support rings Tapping sockets Orifice disk	C22G2, mat. No. 1.0460 P255G1TH, mat. No. 1.0405 X 6 CrNiMoTi 17-12-2, mat. No. 1.4571	**1 2**
For corrosive media • Permissible operating temp. –60 to +400 °C	Support rings, tapping sockets and orifice disk	X 6 CrNiMoTi 17-12-2, mat. No. 1.4571	**1 4**
Tapping sockets			
• With threaded connection G½	Opposite one another, straight Opposite one another, bent-up, for vertical pipes Arranged on one side, for horizontal pipes		**1 A** **1 B** **1 C**
• With welded connection 21.3 mm diameter	Opposite one another, straight Opposite one another, bent-up, for vertical pipes Arranged on one side, for horizontal pipes		**1 D** **1 E** **1 F**
Shape of orifice disk aperture (Fig. 1/123)			
• For flow in one direction	Orifice plate form A Quarter-circle nozzle form B		**A** **B**
• For flow in both directions	Cylindrical orifice plate form D		**D**
Manufacture according to pressure equipment guideline (see page 1/118 for description)			
• Without			**0**
• According to Article 3, Paragraph 3			**1**
• According to category 1			**2**
• According to category 2			**3**
• According to category 3			**4**

		Order code [1]
Calculation of orifice disk aperture	Enclose calculation sheet (page 1/121) with order	**A11**
Orifice plate without calculation	Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D= ... mm** Radius of quarter-circle nozzle **r = ... mm**	**Y01**
Orifice plate degreased	For oxygen measurements Note: Degreasing carried out with cold degreasing agent WBC 16 When using, note that the orifice plate must be completely degreased when fitted in the pipe.	**A12**
Orifice disk including gasket on request		

Scope of delivery: Two support rings with tapping sockets, one orifice disk, one gasket between orifice disk and support ring

Further designs:
- Design to ANSI (30% extra charge) (specify in plain text)
- Acceptance test certificate B to EN 10 204, cold water pressure test at 1.5 × PN (extra charge)
- Flushing rings (25% extra charge)
- Sealing face of orifice plate with recess or groove (5% extra charge)

Accessories: See page 1/83

[1] Order codes additive, any sequence

7ME1120
Orifice plates with single tappings

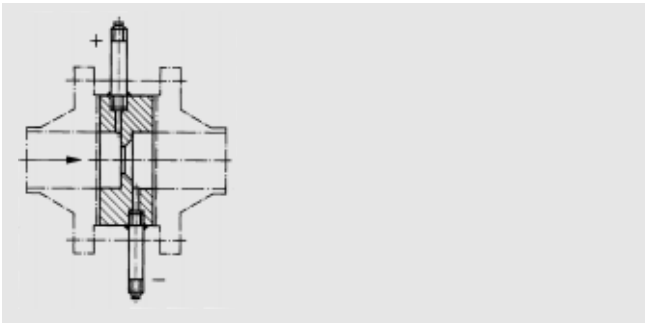


Fig. 1/135 Orifice plate with single tappings

Application

Suitable for corrosive and non-corrosive gases, vapors and liquids;
permissible operating temperature –60 to +500 °C.

Design

One-piece orifice plate, orifice disk form A, B or D (Fig. 1/123); see Ordering data for materials;
Overall length 40 mm to DIN 19 205
Nominal diameters DN 50 to DN 500
Nominal pressures PN 6 to PN 315

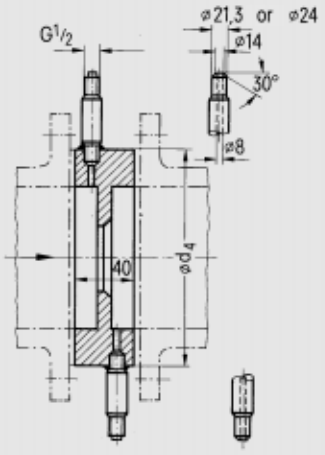
Sealing face to the mating flanges:
- Plane, sealing face turned, N10/N12 to DIN ISO 1302, for soft gasket (PN 6 to PN 40),
- plane, sealing face turned, N8 to DIN ISO 1302, for grooved gasket to DIN 2697 (PN 63 to PN 400),
- with recess to DIN 2513 (PN 10 to PN 100) or
- with groove to DIN 2512 (PN 10 to PN 160).

Straight tapping sockets
- with pipe thread G½ DIN ISO 228/1,
- with connection dimensions to DIN 19 207 form V, Fig. 1/133, or
- with spigot for welding, 21.3 mm or 24 mm diameter.

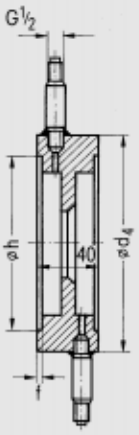
The connection size depends on the operating pressure, the temperature of the medium (DIN 19 207 and 19 211) and the medium, e.g.:
For liquids and gases
PN 6 to PN 160: Thread G½
Welding connection 21.3 mm diameter
PN 250 and PN 315: Welding connection 21.3 mm diameter

For steam
PN 6 to PN 100: Thread G½
Welding connection 21.3 mm diameter
PN 160 to PN 315: Welding connection 24 mm diameter

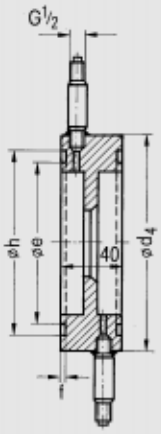
See page 1/107 for positions of the tapping sockets.



Sealing face to the mating flanges
PN 6 to PN 315: plane



PN 10 to max.
PN 100: recess to DIN 2513



PN 10 to max. PN 160: groove to DIN 2512

Tapping sockets: socket length is defined according to pressure and nominal diameter (DIN 19 205, Part 2)
See Figs. 1/125 and 1/126 for designs for steam pipes

DN	Int. diameter	Sealing face: plane										Sealing face				Approx. weight in kg[1])	
		External diameter d_4										Recess to PN 100 or groove to PN 160					
												d_4	h	e	f		
		PN 6	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100	PN 160	PN 250	PN 315	PN 10 to max. PN 160					
50	45 to 55	96	107	107	107	107	113	119	119	124	134	98	88	72	3	1.6	4.0
65	61 to 71	116	127	127	127	127	138	144	144	154	170	120	110	94	3	2.2	6.3
80	77 to 85	132	142	142	142	142	148	154	154	170	190	131	121	105	3	2.9	7.8
100	94 to 108	152	162	162	168	168	174	180	180	202	229	160	150	128	3.5	3.2	11.5
125	117 to 132	182	192	192	194	194	210	217	217	242	274	186	176	154	3.5	4.3	15.9
150	144 to 160	207	218	218	224	224	247	257	257	284	311	214	204	182	3.5	4.7	20.6
200	188 to 211	262	273	273	284	290	309	324	324	358	398	270	260	238	3.5	7.0	33.7
250	240 to 262	317	328	329	340	352	364	391	388	442	488	323	313	291	3.5	9.0	50.6
300	292 to 314	373	378	384	400	417	424	458	458	538	–	374	364	342	3.5	12.3	37.3
350	331 to 362	423	438	444	457	474	486	512	–	–	–	432	422	394	4	17.7	44.6
400	383 to 408	473	489	495	514	546	543	–	–	–	–	484	474	446	4	19.8	43.1
500	480 to 514	578	594	617	624	628	–	–	–	–	–	586	576	548	4	25.6	46.6

Fig. 1/136 Orifice plates with single tappings; dimensions and weights

[1]) With smallest and largest nominal pressure.

Ordering data

Order No. **7ME1120– ■■■■■ – ■■■■ –Z**

Orifice plate with single tappings

for mounting between flanges
Sealing faces to the mating flanges: plane, with recess or with groove

DN	PN 6	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100	PN 160	PN 250	PN 315
50	**1GA**	**1GE**	**1GE**	**1GE**	**1GE**	**1GF**	**1GH**	**1GH**	**1GJ**	**1GK**
65	**1HA**	**1HE**	**1HE**	**1HE**	**1HE**	**1HF**	**1HH**	**1HH**	**1HH**	**1HK**
80	**1JA**	**1JE**	**1JE**	**1JE**	**1JE**	**1JF**	**1JH**	**1JH**	**1JJ**	**1JK**
100	**2AA**	**2AC**	**2AC**	**2AE**	**2AE**	**2AF**	**2AH**	**2AH**	**2AJ**	**2AK**
125	**2BA**	**2BC**	**2BC**	**2BE**	**2BE**	**2BF**	**2BH**	**2BH**	**2BJ**	**2BK**
150	**2CA**	**2CC**	**2CC**	**2CE**	**2CE**	**2CF**	**2CH**	**2CH**	**2CJ**	**2CK**
200	**2EA**	**2EC**	**2EC**	**2ED**	**2EE**	**2EF**	**2EH**	**2EH**	**2EJ**	**2EK**
250	**2FA**	**2FB**	**2FC**	**2FD**	**2FE**	**2FF**	**2FG**	**2FH**	**2FJ**	**2FK**
300	**2GA**	**2GB**	**2GC**	**2GD**	**2GE**	**2GF**	**2GH**	**2GH**	–	–
350	**2HA**	**2HB**	**2HC**	**2HD**	**2HE**	**2HF**	**2HG**	–	–	–
400	**2JA**	**2JB**	**2JC**	**2JD**	**2JE**	**2JF**	–	–	–	–
500	**2KA**	**2KB**	**2KC**	**2KD**	**2KE**	–	–	–	–	–

		Order code
For non-corrosive media		
• Permissible operating temp. –10 to +400 °C	Orifice plate and tapping sockets C22G2, mat. No. 1.0460 Metering edge X 5 CrNiMoNb 19 12, mat. No. 1.4576, welded as ordered	**2 1**
• Permissible operating temp. –10 to +500 °C (forged up to 570 °C)	Orifice plate and tapping sockets 13 CrMo 4-5, mat. No. 1.7335 Metering edge X 5 CrNiMoNb 19 12, mat. No. 1.4576, welded as ordered	**2 4**
For corrosive media		
• Permissible operating temp. –200 to +400 °C	Orifice plate and tapping sockets X 6 CrNiMoTi 17-12-2 mat. No. 1.4571	**2 2**
Tapping sockets		
• With threaded connection G½	Opposite one another, straight	**1 A**
	Opposite one another, bent-up, for vertical pipes	**1 B**
	Any arrangement of tapping sockets (specify angle in plain text)	**1 G**
• With welded connection 21.3 mm diam. or 24 mm diam.	Opposite one another, straight	**1 D**
	Opposite one another, bent-up, for vertical pipes	**1 E**
	Any arrangement of tapping sockets (specify angle in plain text)	**1 H**
Note: arranged on one side for horizontal pipes only possible with special length 65 mm.		
Shape of orifice disk aperture (Fig. 1/123)		
• For flow in one direction	Orifice plate form A	**A**
	Quarter-circle nozzle form B	**B**
• For flow in both directions	Cylindrical orifice plate form D	**D**
Manufacture according to pressure equipment guideline (see page 1/118 for description)		
• Without		**0**
• According to Article 3, Paragraph 3		**1**
• According to category 1		**2**
• According to category 2		**3**
• According to category 3		**4**
Calculation of orifice disk aperture	Enclose calculation sheet (page 1/121) with order	**A11**
Orifice plate without calculation	Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D = ... mm** Radius of quarter-circle nozzle **r = ... mm**	**Y01**
Orifice plate degreased	For oxygen measurements Note: Degreasing carried out with cold degreasing agent WBC 16 When using, note that the orifice plate must be completely degreased when fitted in the pipe.	**A12**

Scope of delivery: One-part orifice plate with tapping sockets

Further designs:
- Design to ANSI (30% extra charge) (specify in plain text)
- Overall length 65 mm (required for tapping sockets arranged on one side) (20% extra charge)
- Acceptance test certificate B to EN 10 204, cold water pressure test at 1.5 × PN (extra charge)
- Flushing rings (25% extra charge)
- Sealing face of orifice plate with recess or groove (5% extra charge)
- Orifice plate made of other materials on request

Accessories: See page 1/83

[1]) Order codes additive, any sequence.

7ME1310 Metering pipes - orifice plates with annular chambers

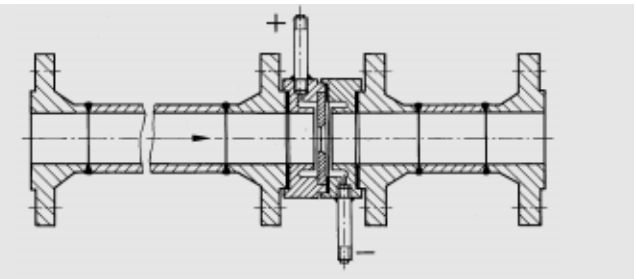


Fig. 1/137 Metering pipe for installation between flanges, with flanged orifice plate

Application

Suitable for corrosive and non-corrosive gases, vapors and liquids;
permissible operating temperature –10 to +400 °C.

Design

Orifice plate with annular chambers, consisting of two support rings with replaceable orifice disk form A or B (Fig. 1/123); flanged between inlet and outlet like sections according to DIN 19 205.

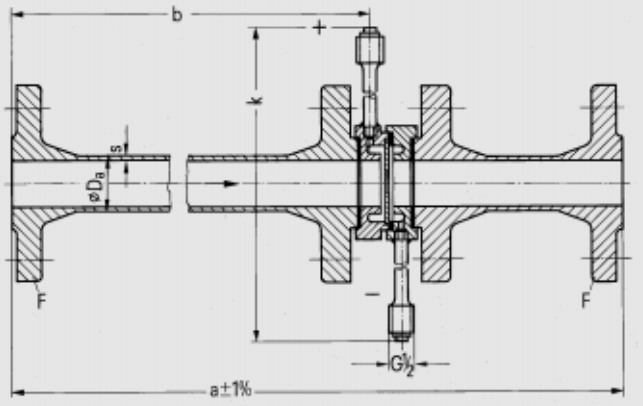
Nominal diameters DN 10 to DN 50
Nominal pressures PN 10 to PN 100

Sealing face of the end flanges:
- Plane, sealing face turned, N10/N12 to DIN ISO 1302, for soft gasket (PN 10 to PN 40),
- plane, sealing face turned, N8 to DIN ISO 1302, for grooved gasket to DIN 2697 (PN 63 to PN 100),
- with recess to DIN 2513 or
- with groove to DIN 2512.

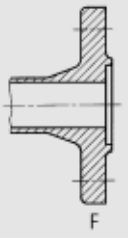
Straight tapping sockets
- with pipe thread G½ DIN ISO 228/1, connection dimensions to DIN 19 207 form V, Fig. 1/133.

See page 1/107 for positions of the tapping sockets.
Tapping socket length for all metering pipes l = 120 mm.

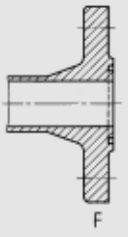
Design for flow in both corrections (orifice disk aperture form D, Fig. 1/123),
flanges to ANSI
Material certificates and TÜV acceptance on request.



Sealing faces of the end flanges: plane



Recess to DIN 2513



Groove to DIN 2512

DN	PN	a	b	k	End flange F	Pipe $D_a \times s$	Approx. weight in kg
10	10 and 16 25 and 40 63 and 100	400	218	320 320 295	DIN 2633 DIN 2635 DIN 2637	18 × 4	4.5 5 6.5
15	10 and 16 25 and 40 63 and 100	550	368	325 325 300	DIN 2633 DIN 2635 DIN 2637	20 × 2.5	5 5.5 7.5
20	10 and 16 25 and 40	700	488	335	DIN 2633 DIN 2635	25 × 2	6.5 7
25	10 and 16 25 and 40 63 and 100	900	638	310	DIN 2633 DIN 2635 DIN 2637	30 × 2.5	8 9 14
32	10 and 16 25 and 40	1100	788	320	DIN 2633 DIN 2635	38 × 3	11.5 12.5
40	10 and 16 25 and 40 63 and 100	1300	988	330 330 335	DIN 2633 DIN 2635 DIN 2637	46 × 3	13 15 25
50	10 and 16 25 and 40 63 100	1500	1188	340 340 345 345	DIN 2633 DIN 2635 DIN 2636 DIN 2637	60 × 4	20 22 34 34

Fig. 1/138 Metering pipes for mounting between flanges, orifice plates with annular chambers flanged; dimensions and weights

7ME1310 Metering pipes - orifice plates with annular chambers

Ordering data

Order No.

Metering pipe for mounting between flanges **7ME1310–** ■■■■■ **–** ■■■■ **–Z**

Orifice plate with annular chambers, flanged
Sealing faces to the mating flanges: plane, with recess or with groove on request

For non-corrosive media	
Permissible operating temperature	–10 to + 400 °C
Pipe	P235G1TH, mat. No. 1.0305
Tapping sockets	P255G1TH, mat. No. 1.0405
Flanges	S235JR, mat. No. 1.0037 (up to PN 16), C22G2, mat. No. 1.0460 (PN 25 and above)
Support rings	C22G2, mat. No. 1.0460
Orifice disk	X 6 CrNiMoTi 17-12-2, mat. No. 1.4571

DN	PN 10 and 16	PN 25 and 40	PN 63	PN 100
10	**1AC32**	**1AE32**	**1AF32**	**1AG32**
15	**1BC32**	**1BE32**	**1BF32**	**1BG32**
20	**1CC32**	**1CE32**	**–**	**–**
25	**1DC32**	**1DE32**	**1DF32**	**1DG32**
32	**1EC32**	**1EE32**	**–**	**–**
40	**1FC32**	**1FE32**	**1FF32**	**1FG32**
50	**1GC32**	**1GE32**	**1GF32**	**1GG32**

Shape of orifice disk aperture (Fig. 1/123)	Orifice plate form A Quarter-circle nozzle form B	**1 A A** **1 A B**
Manufacture according to pressure equipment guideline (see page 1/118 for description)		
• Without		**0**
• According to Article 3, Paragraph 3		**1**
• According to category 1		**2**
• According to category 2		**3**
• According to category 3		**4**
Calculation of orifice disk aperture	Enclose calculation sheet (page 1/121) with order	Order code [1] **A11**
Orifice plate without calculation	Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D= ... mm** Radius of quarter-circle nozzle **r = ... mm**	**Y01**

Scope of delivery: Orifice plate consisting of two support rings with tapping sockets and one orifice disk; flanged between inlet and outlet pipes; with gaskets between orifice plate and support ring and between support rings and flanges of the inlet and outlet pipes, including bolts and nuts.
Graphite flat gasket with metal washer insert (1.4401, 0.1 mm), application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

Further designs:
- Design to ANSI (30% extra charge) (specify in plain text)
- Acceptance test certificate B to EN 10 204, cold water pressure test at 1.5 × PN (extra charge)
- Metering pipes for corrosive media on request.

Accessories: See page 1/135

[1] Order codes additive, any sequence.

for mounting between flanges

7ME1320 Metering pipes - orifice plates with single tappings

Application

Suitable for corrosive and non-corrosive gases, vapors and liquids; permissible operating temperature –10 to +400 °C.

Design

Orifice plate with single tappings, orifice disk aperture form A or B (Fig. 1/123); flanged between standard inlet and outlet pipe sections with lengths according to DIN 19 205.

Nominal diameters DN 10 to DN 50
Nominal pressures PN 10 to PN 315

Sealing face of the end flanges:
- Plane, sealing face turned, N10/N12 to DIN ISO 1302, for soft gasket (PN 10 to PN 40),
- plane, sealing face turned, N8 to DIN ISO 1302, for grooved gasket to DIN 2697 (PN 63 to PN 315),
- with recess to DIN 2513 (PN 10 to PN 100) or
- with groove to DIN 2512 (PN 10 to PN 160).

Straight tapping sockets 120 mm long
- with pipe thread G½ DIN ISO 228/1, connection dimensions to DIN 19 207 form V, Fig. 1/133, or
- with welded connection

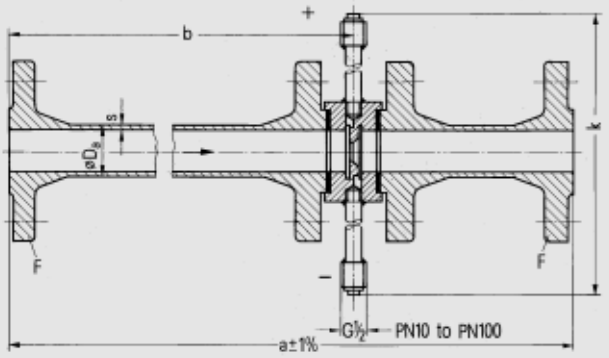
The connection size depends on the operating pressure, the temperature of the medium (DIN 19 207 and 19 211) and the medium, e.g.

For liquids and gases,
PN 10 to PN 160: Thread G½
Welding connection 21.3 mm diam.
PN 250 and PN 315: Welding connection 21.3 mm diam.

For steam,
PN 10 to PN 100: Thread G½
Welding connection 21.3 mm diam.
PN 160 to PN 315: Welding connection 24 mm diam.

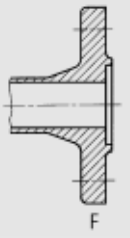
See page 1/107 for positions of the tapping sockets.

Design for flow in both directions (orifice disk aperture form D, Fig. 1/123), flanges to ANSI; material certificates and TÜV acceptance on request.

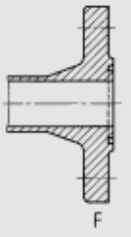


Sealing faces of the end flanges PN 10 to PN 315: plane

PN 160 to PN 315



PN 10 to PN 100: recess to DIN 2513



PN 10 to PN 160: groove to DIN 2512

DN	PN	a	b	k	End flange F	Pipe $D_a \times s$	Approx. kg
10	10 and 16	400	229	322	DIN 2633	18 × 4	4.5
	25 and 40		229	322	DIN 2635		5
	63 and 100		229	295	DIN 2637		6.5
	160		230	335	DIN 2638		6.5
	250		230	335	DIN 2628		10.5
	315		230	335	DIN 2629		10.5
15	10 and 16	550	379	325	DIN 2633	20 × 2.5	5
	25 and 40		379	325	DIN 2635	20 × 2.5	5.5
	63 and 100		379	300	DIN 2637	20 × 2.5	7.5
	160		380	340	DIN 2638	20 × 2.5	7.5
	250		380	340	DIN 2628	21.3 × 2.6	12.5
	315		380	340	DIN 2629	21.3 × 3.2	12.5
20	10 and 16	700	499	300	DIN 2633	25 × 2	6.5
	25 and 40				DIN 2535		7
25	10 and 16	900	649	310	DIN 2633	30 × 2.5	8
	25 and 40		649	310	DIN 2635	30 × 2.5	9
	63 and 100		649	310	DIN 2637	30 × 2.5	14
	160		650	350	DIN 2638	30 × 2.5	14
	250		650	350	DIN 2628	33.7 × 3.6	18
	315		650	350	DIN 2629	33.7 × 5	24
32	10 and 16	1100	799	310	DIN 2633	38 × 3	11.5
	25 and 40				DIN 2535		12.5
40	10 and 16	1300	999	320	DIN 2633	46 × 3	13
	25 and 40		999	320	DIN 2635	46 × 3	15
	63 and 100		999	320	DIN 2637	46 × 3	25
	160		1000	372	DIN 2638	46 × 3	22.5
	250		1000	372	DIN 2628	48.3 × 5	33.5
	315		1000	372	DIN 2629	48.3 × 6.3	43
50	10 and 16	1500	1199	332	DIN 2633	60 × 4	20
	25 and 40		1199	332	DIN 2635	60 × 4	22
	63		1199	332	DIN 2636	60 × 4	34
	100		1199	332	DIN 2637	60 × 4	34
	160		1200	380	DIN 2638	60 × 4	35
	250		1200	380	DIN 2628	60.3 × 6.3	41.5
	315		1200	380	DIN 2629	63.5 × 8	58

Fig. 1/139 Metering pipes for mounting between flanges, orifice plates with single tappings, flanged; dimensions and weights

Scope of delivery: One-piece orifice plate with tapping sockets; flanged between inlet and outlet pipes; with gaskets between orifice plate and flanges of the inlet and outlet pipes, including bolts and nuts.
Graphite flat gasket with metal washer insert (1.4401, 0.1 mm), application for liquids, steam, gases, liquid gases, acids, hydrocarbons, oils and oil products.

Further designs:
- Design to ANSI (30% extra charge) (specify in plain text)
- Acceptance test certificate B to EN 10 204, cold water pressure test at 1.5 × PN (extra charge)
- Metering pipes for corrosive media on request.

Ordering data

Order No.

Metering pipe for mounting between flanges **7ME1320– ■■■■■ – ■■■■ –Z**

Orifice plate with single tappings, flanged
Sealing face to the mating flanges: plane, with recess or with groove on request

For non-corrosive media	
Permissible operating temperature	–10 to + 400 °C
Pipes	P235G1TH, mat. No. 1.0305
Flanges	S235JRG2, mat. No. 1.0038 (up to PN 16), C22G2, mat. No. 1.0460 (PN 25 and above)
Support ring and tapping sockets	C22G2, mat. No. 1.0460
Orifice plate, welded	X 6 CrNiMoTi 17-12-2, mat. No. 1.4571

Tapping sockets		**Threaded connection**	**Welded connection**
(Tapping sockets opposite one another ≙180 °); specify other angles in plain text.)			
DN	PN		
10	10 and 16	**1AC35–1A**	–
	25 and 40	**1AE35–1A**	–
	63	**1AF35–1A**	–
	100	**1AG35–1A**	–
	160	**1AH35–1A**	**1AH35–1D**
	250	**1AJ35–1A**	**1AJ35–1D**
	315	**1AK35–1A**	**1AK35–1D**
15	10 and 16	**1BC35–1A**	–
	25 and 40	**1BE35–1A**	–
	63	**1BF35–1A**	–
	100	**1BG35–1A**	–
	160	**1BH35–1A**	**1BH35–1D**
	250	**1BJ35–1A**	**1BJ35–1D**
	315	**1BK35–1A**	**1BK35–1D**
20	10 and 16	**1CC35–1A**	–
	25 and 40	**1CE35–1A**	–
25	10 and 16	**1DC35–1A**	–
	25 and 40	**1DE35–1A**	–
	63	**1DF35–1A**	–
	100	**1DG35–1A**	–
	160	**1DH35–1A**	**1DH35–1D**
	250	**1DJ35–1A**	**1DJ35–1D**
	315	**1DK35–1A**	**1DK35–1D**
32	10 and 16	**1EC35–1A**	–
	25 and 40	**1EE35–1A**	–
40	10 and 16	**1FC35–1A**	–
	25 and 40	**1FE35–1A**	–
	63	**1FF35–1A**	–
	100	**1FG35–1A**	–
	160	**1FH35–1A**	**1FH35–1D**
	250	**1FJ35–1A**	**1FJ35–1D**
	315	**1FK35–1A**	**1FK35–1D**
50	10 and 16	**1GC35–1A**	–
	25 and 40	**1GE35–1A**	–
	63	**1GF35–1A**	–
	100	**1GG35–1A**	–
	160	**1GH35–1A**	**1GH35–1D**
	250	**1GJ35–1A**	**1GJ35–1D**
	315	**1GK35–1A**	**1GK35–1D**

Shape of orifice disk aperture (Fig. 1/123)	Orifice plate form A	**A**
	Quarter-circle nozzle form B	**B**
Manufacture according to pressure equipment guideline (see page 1/118 for description)		
• Without		**0**
• According to Article 3, Paragraph 3		**1**
• According to category 1		**2**
• According to category 2		**3**
• According to category 3		**4**
Calculation of orifice disk aperture	Enclose calculation sheet (page 1/121) with order	**A11**
Orifice plate without calculation	Specify in plain text: Diameter of orifice disk aperture **d = ... mm** Internal diameter of pipe **D = ... mm** Radius of quarter-circle nozzle **r = ... mm**	**Y01**
Tapping sockets not opposite one other; angle to DIN 19205	Specify in plain text: **Angle between the tapping sockets ...°**	**Y02**

Order code [1])

Scope of delivery and further designs: See page 1/116.

Accessories: See page 1/83

Pressure equipment guideline 97/23/EC

Pressure equipment guideline 97/23/EC

The pressure equipment guideline 97/23/EC is provided to uniform the regulations for pressure devices in the European member states. Pressure devices in the sense of this guideline are vessels, pipelines and their associated fittings with a maximum permissible pressure above 0.5 bar.

Pressure devices must comply with the safety requirements of the guideline.

The owner of devices is responsible for splitting up the measuring point according to categories. This division is carried out according to danger potential, medium, max. permissible pressure PS and volume or nominal diameter DN.

The respective category can be determined from four diagrams (for pipes).

Pressure devices which cannot be included in categories I to IV (max. III with orifice plates) must be designed and manufactured according to good engineering practice (Article 3, Paragraph 3) and must not be assigned a CE symbol.

The manufacturer must carry out a conformity evaluation for his product (provided the device is not covered by the scope of Article 3, Paragraph 3), assign a CE symbol, and provide a conformity declaration.

In addition, the manufacturer must provide compliance with various test modules depending on the category. The inspection reports, tests etc. are monitored by the usual monitoring authorities.

The pressure equipment guideline can be used from November 29, 1999 onwards, and is compulsory from May 30, 2002 onwards.

Ordering information:

When ordering orifice plates (see Ordering data), select the categories resulting from the measuring point data. Prices on request.

The limitations in the Instruction Manual/conformity declaration must be observed by the owner of the equipment prior to commissioning.

The measuring point category can be determined from the following 4 diagrams according to medium, danger potential, max. permissible pressure (PS) and nominal diameter (DN).

Note:

This regulation does not apply to devices for offshore applications, ships, aircraft, nuclear power plants and rockets.

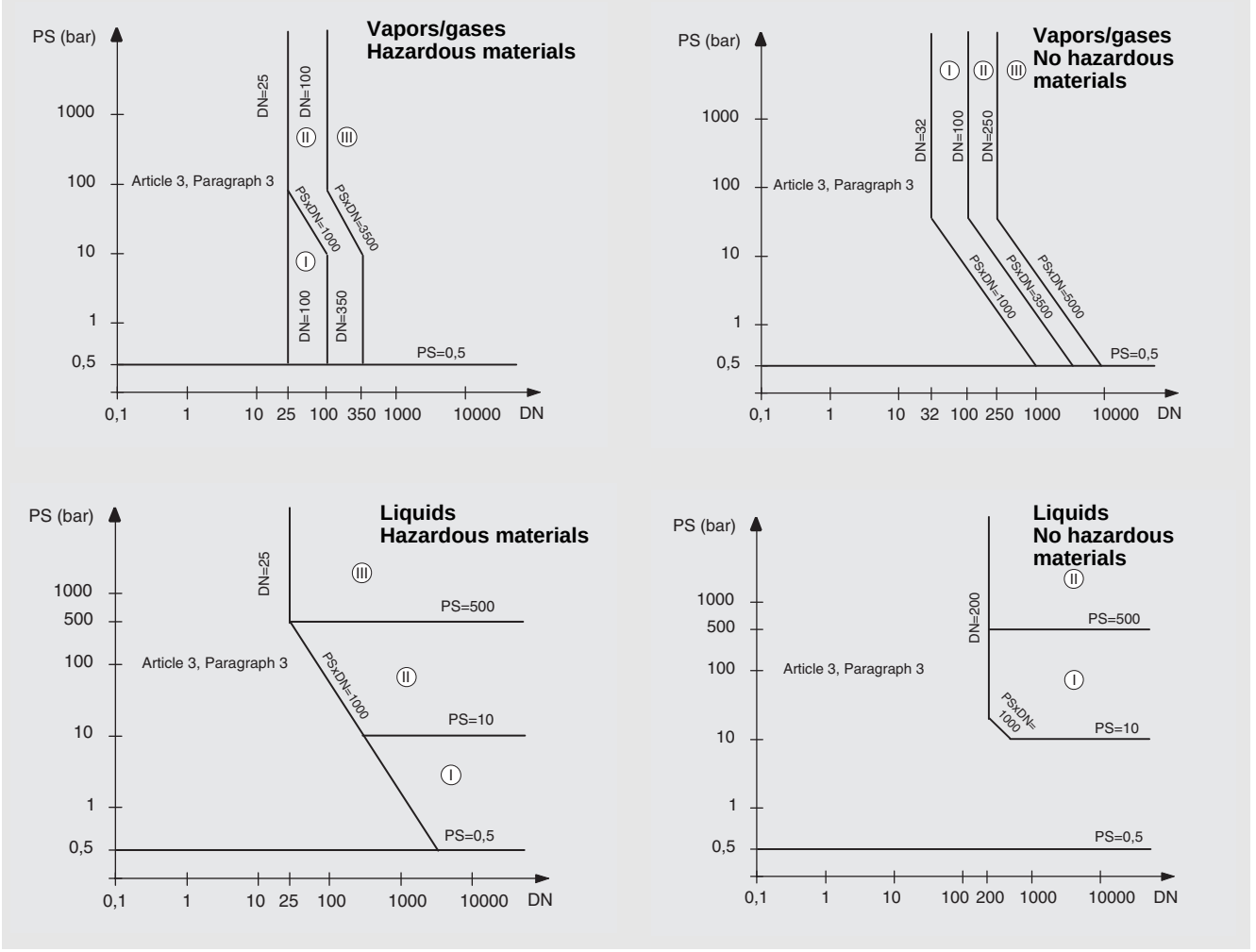


Fig. 1/140 Diagrams for definition of measuring point category

Selection of mounting point

The flow measuring regulations DIN EN ISO 5167 do not only consider the design of primary differential pressure devices, but also assume that their installation is in accordance with the standard so that the specified tolerances can be retained. Installation in accordance with the standard should already be considered when planning the pipeline. Particular attention must be paid to ensure that the primary device can be fitted in a sufficiently long straight section of pipe. Bends, valves and similar must be fitted so far upstream of the primary device that their effects have died away. Primary devices with a large diameter ratio are particularly sensitive to interferences. The table below lists the straight lengths of pipe required as multiples of the pipe diameter D.

Inlet and outlet pipe sections

Minimum values for undisturbed straight pipe sections in multiples of the pipe diameter D according to DIN EN ISO 5167.

Opening ratio m Diameter ratio β	0.01 0.10	0.04 0.20	0.06 0.25	0.09 0.30	0.12 0.35	0.16 0.40	0.20 0.45	0.25 0.50	0.30 0.55	0.36 0.60	0.42 0.65	0.49 0.70	0.56 0.75
Fittings upstream of primary device	Required straight pipe section in the **inlet**												
90° elbow or T-piece	10 (6)	10 (6)	10 (6)	10 (6)	12 (6)	14 (7)	14 (7)	14 (7)	16 (8)	18 (9)	22 (11)	28 (14)	36 (18)
Two or more 90° elbows													
In the same plane	14 (7)	14 (7)	14 (7)	16 (8)	16 (8)	18 (9)	18 (9)	20 (10)	22 (11)	26 (13)	32 (16)	36 (18)	42 (21)
In different planes	34 (17)	34 (17)	34 (17)	34 (17)	36 (18)	36 (18)	38 (19)	40 (20)	44 (22)	48 (24)	54 (27)	62 (31)	70 (35)
Adapter (from 2 D to D over a length of 1.5 D to 3 D)	5	5	5	5	5	5	5	6 (5)	8 (5)	9 (5)	11 (6)	14 (7)	22 (11)
Diffuser (from 0.5 D to D over a length of 1 D to 2 D)	16 (8)	16 (8)	16 (8)	16 (8)	16 (8)	16 (8)	17 (9)	16 (9)	20 (10)	22 (11)	25 (13)	30 (15)	38 (19)
Valve, fully open	18 (9)	18 (9)	18 (9)	18 (9)	18 (9)	20 (10)	20 (10)	20 (11)	24 (12)	26 (13)	28 (14)	32 (16)	36 (18)
Gate valve, fully open	12 (6)	12 (6)	12 (6)	12 (6)	12 (6)	12 (6)	12 (6)	12 (6)	14 (7)	14 (7)	16 (8)	20 (10)	24 (12)
For all fittings listed	Required straight pipe section in the **outlet**												
	4 (2)	4 (2)	4 (2)	5 (2.5)	5 (2.5)	6 (3)	6 (3)	6 (3)	6 (3)	7 (3.5)	7 (3.5)	7 (3.5)	8 (4)
Disturbance	Required straight pipe section in the **inlet** (for all diameter ratios β)												
Abrupt symmetrical reduction in diameter with a diameter ratio ≥0.5	30 (15)												
Thermometer case													
≤0.03 D	5 (3)												
0.03 to 0.13 D	20 (10)												
Data outside brackets:	Apply to orifice plates, nozzles and Venturi nozzles; pipe length measured in the outlet from the diffuser end.												
Data in brackets:	Apply to orifice plates, nozzles and Venturi nozzles; an additional tolerance of ±0.5% must be added arithmetically to the relative tolerance to DIN EN ISO 5167, September 1995.												

The data for T-pieces apply to T-pieces in the inlet where the flow is split into two parts and the measurement made in one part. A turbulence is formed downstream of T-pieces which combine two flows and requires longer inlet sections.

Calculation

Ordering data, tables

When ordering a primary differential pressure device, the calculation can be ordered at the same time.

Add the Order code **"A11"** to the Order No. of the primary device, and enclose a **filled-in calculation sheet** with the order. This calculation sheet can be found on page 1/121.

If the calculation sheet is not filled in completely, an extra charge will be made for the additionally required calculations.

Ordering data	Order No.
Calculation of orifice disk aperture of an orifice plate, orifice plate without support rings, ISA 1932 nozzle or Venturi nozzle (without measuring sheet or sketch)	**7ME1910–0A–Z**
Calculation of differential pressure or flow on an existing primary device	**7ME1910–0D–Z**
	Order code
Enclose calculation sheet (page 1/121) with order	**Y01**

Tables

Permissible pipe ID to DIN EN ISO 5167 and VDI 2041

Orifice plate	Corner taps	D = 50 to 1000 mm
	Flange taps	D = 50 to 1000 mm
	D and D/2 taps	D = 50 to 1000 mm
Quarter-circle nozzle	Corner taps	D = 40 to 150 mm

Table 4

Reference values of equivalent pipe roughness

Material	Characteristic	k [mm]
Brass	Plane, without deposits	< 0.03
Copper	Plane, without deposits	< 0.03
Aluminium	Plane, without deposits	< 0.03
Plastic	Plane, without deposits	< 0.03
Steel	New, seamless, cold-drawn	< 0.03
	New, seamless, hot-drawn	0.05 to 0.10
	New, seamless, rolled	0.05 to 0.10
	New, longitudinal welding seam	0.05 to 0.10
	New, spiral-welded	0.10
	Slightly rusty	0.10 to 0.20
	Rusty	0.20 to 0.30
	Coated	0.50 to 2.0
	Heavily coated	> 2
	Bituminized, new	0.03 to 0.05
	Bituminized, normal	0.10 to 0.20
	Galvanized	0.13
Cast iron	New	0.25
	Rusty	1.00 to 1.50
	Coated	> 1.5
	Bituminized, new	0.03 to 0.05
Asbestos cement	Coated; not coated, new	< 0.03
	Not coated, used	0.05

Table 5

Physical characteristics of technical gases

Gas		Density ρ_n [kg/m^3]	Real gas factor Z_n
Acetylene	C_2H_2	1.1715	0.9916
Ammonia	NH_3	0.7718	0.9844
Argon	Ar	1.7840	0.9990
Chlorine	Cl_2	3.210	0.9855
Hydrogen chloride	HCl	1.6422	0.9906
Ethane	C_2H_6	1.3550	0.9901
Ethylene	C_2H_4	1.2611	0.9925
Helium	He	1.17848	1.0005
Carbon dioxide	CO	1.2505	0.9994
Carbon dioxide	CO_2	1.9770	0.9932
Krypton	Kr	3.749	0.9972
Air (dry)	–	1.2930	0.9994
Methane	CH_4	0.7175	0.9976
Neon	Ne	0.8999	1.00048
Propane	C_3H_8	2.0109	0.9783
Oxygen	O_2	1.4290	0.9990
Sulphur dioxide	SO_2	2.9310	0.9751
Hydrogen sulphide	H_2S	1.5355	0.9901
Nitrogen oxide	NO	1.3402	0.9990
Dinitrogen monoxide	N_2O	1.9780	0.9927
Nitrogen	N_2	1.2504	0.9995
Hydrogen	H_2	0.08988	1.00006

Table 6 n= STP 0 °C and 1.01325 bar

Material for pipe and primary differential pressure device

Material No.	Material designation	Material No.	Material designation
1.0037	S235JR	1.0416	X6Cr17
1.0038	S235JRG2	1.4301	X4CrNi18-10
1.0254	P235T1	1.4401	X4GNiMo17-12-2
1.0255	P235T2	1.4541	X6CrNiTi18-10
1.0305	P235G1TH	1.4571	X6CrNiMoTi17-12-2
1.0308	P235G2T	1.4713	X10CrAl7
1.0309	DX55D	1.5415	16Mo3
1.0405	P255G1TH	1.7335	13CrMo4-5
1.0425	P265GH	1.7362	X12CrMo5
1.0460	C22G2	1.7380	10CrMo9-10
1.0562	P235N2		

Table 7

SIEMENS

Questionnaire for calculation of a primary differential pressure device to DIN EN ISO 5167

Tag (e.g. measuring-point number): _ _ _ _ _ _ _ _ _ _ _ _
Company: _ _ _ _ _ _ _ _ _ _ _ _

Description (is printed in report; max. 2 lines with 60 characters each):

____

____

Material: _

Hazardous ☐ **yes** ☐ **no**

If no data are entered, we assume a hazardous material for safety reasons (device will be more expensive)

☐ Liquid
☐ Vapor ⇒ ☐ Superheated; ☐ Saturated ρ_1; ☐ Saturated t_1; ☐ Steam
☐ Gas ⇒ ☐ Dry gas ☐ Moist gas

Only with gas
Real gas factor Z_n: ________ Z_1: ________ (without data: $Z_{n,1}$ = 1)
Relative humidity: φ ________ % at ______ °C (only with moist gas)

Operating temperature t_1: ________ ☐ **°C** ☐ K ☐ °F Other: ________
Boiling pressure $_{t1}$ (only with liquid): ______________ ☐ **bar** ☐ Pa Other: ________
Isentropic exponent (only with gas and vapor): ________
Absolute pressure: ________ ☐ **bar** ☐ Pa Other: ________
(pressure at measuring point plus atmospheric pressure at mounting location)
Dynamic viscosity: ________ ☐ **Pa · s** ☐ lb/ft · hr Other: ________
Density: ________ ☐ STP ☐ Operating state ☐ **kg/m³** Other: ________

Material of primary device: ______________________ Material No.: _ _ _ _ _ _ _ _ _ _ _
Material of pipeline: ______________________ Material No.: _ _ _ _ _ _ _ _ _ _ _
Pipe roughness: ______________________ ☐ **mm** ☐ inch
Pipe ID: ______________________ ☐ **mm** ☐ inch

Primary differential pressure device:
☐ Orifice plate ⇒ ☐ Corner ☐ D, D/2 ☐ Flange ☐ Segment
☐ Nozzle ⇒ ☐ ISA 1932 ☐ Longitudinal radius ☐ Quarter-circle ☐ Venturi
☐ Venturi tube ⇒ ☐ Rough cast iron ☐ Machined ☐ Sheet-steel
☐ Other ⇒ ______________________ C: ________ ; ε: ________

Calculation of: ☐ **"d";** ☐ Diff. pressure; ☐ Flow

Design: ☐ **2/3 of max. flow;** ☐ Max. flow

Max. flow: ______________
☐ q_m kg/h (mass flow for all media)
☐ q_v m³/h (volume flow for liquid and gas)
☐ q_n m³/h (volume flow for gas at STP)

Differential pressure: ______________ ☐ **mbar;** Other: ________

Orifice disk aperture "d": ______________ ☐ **mm** ☐ inch

Max. remaining pressure loss: ____________ ☐ **mbar;** Other: ________

For clarification of any questions:

Name: ______________________ ☎ ______________________ **Fax:** ______________________