



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

Technical Information

Deltatop DO61W, DO62C, DO63C, DO64P, DO65F

Differential pressure flow measurement with orifices
and Deltabar differential pressure transmitter

The universal measuring system for steam, gases and liquids



Application

- Flow measurement of gases, steam and liquids
- nominal diameters from DN 10 (3/8") to DN 1000 (40")
- medium temperatures -200 °C (-328 °F) to 1000 °C (1830 °F)
- pressure up to 420 bar (6300 psi)
- Compliant to DGRL 97/23/EC
- NACE compliant materials

Deltabar differential pressure transmitter

- Approvals for hazardous area: ATEX, FM, CSA
- Relevant safety aspects: SIL
- Connection to all common process control systems: Profibus, HART, Foundation Fieldbus

Your benefits

- selectable according to the application:
 - operational compact version: minimizes installation costs
 - modular remote version: for demanding process conditions (high temperature, high pressure) and difficult installation conditions
- optimized for minimum pressure loss, highest accuracy and maximum measuring dynamics
- Measuring range of the Deltabar differential pressure transmitter adjusted on delivery
- measurement method globally standardized according to ISO 5167
- optional symmetric orifice for bidirectional measurements
- robust design; no moving parts

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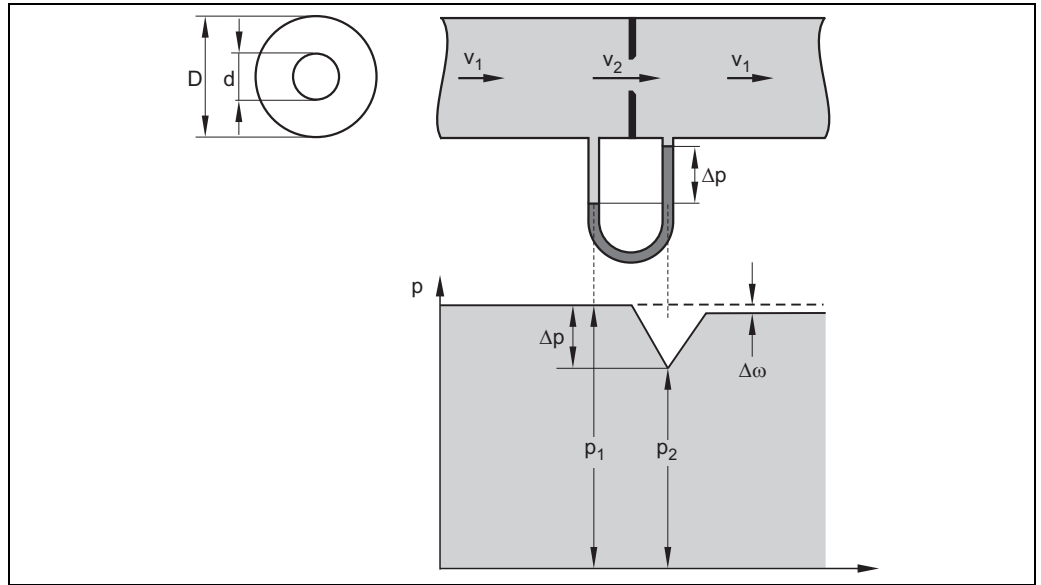
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Function and system design

Measuring principle



P01-DOxxx-15-00-00-xx-001

Within the orifice the flow velocity is larger than in the rest of the tube. According to the Bernoulli equation this results in a reduction of the static pressure. The pressure difference between the static pressures upstream and downstream of the orifice plate is measured by a differential pressure transmitter.

The value of the differential pressure is very much depending on the diameter ratio (β) of the internal diameter of the orifice bore (d) to the internal diameter of the pipe (D):

$$\beta = d/D$$

Orifice plates and other similar devices are also designated as primary elements.

The relationship between flow rate (Q) and differential pressure (Δp) is a square root function.

$$Q \sim \sqrt{\Delta p}$$

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Behind the orifice the pressure recovers partly to its original value. There is a remaining **pressure loss** $\Delta\omega$.

Differential pressure flow measurement with orifice plates (and other types of restrictions) is standardized by ISO5167. This refers to the geometries, system configurations and to the rules of measured value calculation.

Sizing and optimization

The relationship between differential pressure, permanent pressure loss, flow rate and the diameter ratio β as well as the dependencies on further parameters are described in detail by the international standard ISO5167. Endress+Hauser executes all orifice calculations according to ISO5167-2 based on the application specific process parameters given by the user. Therefore a questionnaire (sizing sheet – data sheet, see page 85) should be completed for each measuring point. All primary elements (orifice) will be delivered by Endress+Hauser with an enclosed calculation sheet. This provides the benefit to the user not to be involved in the complicated sizing calculations anymore.

An orifice measurement can be sized with different diameter ratios β . By changing β the measuring point can be optimized to a wide variety of different applications. Endress+Hauser optimizes each measuring point according to one of the following optimization criteria which can be chosen by the user.

- **Optimized by Endress+Hauser**

Endress+Hauser completely calculates and optimizes the measuring point in consideration of the given process parameters. The optimum solution provides the best achievable compromise between differential pressure, measuring cell selection, measurement dynamics, measurement uncertainty and permanent pressure loss.

- **Maximum measurement dynamics (small β)**

Endress+Hauser calculates and optimizes the measuring point to the smallest reasonably achievable diameter ratio β in order to provide maximum measurement dynamics and minimum measurement uncertainty.

- **Low permanent pressure loss (large β)**

Endress+Hauser calculates and optimizes the measuring point to the largest reasonably achievable diameter ratio β in order to keep the permanent pressure loss as low as possible.

- **Maximum allowable permanent pressure loss**

Endress+Hauser calculates the measuring point in consideration of the maximum allowable pressure loss at the layout point (maximum flow rate).

- **Fixed diameter ratio β**

The sizing has to be executed with a user defined diameter ratio β . Endress+Hauser calculates the measuring point accordingly.

- **Fixed differential pressure**

The sizing has to be executed with a user defined differential pressure. Endress+Hauser calculates the primary element in order to meet the requested differential pressure at the layout point.

- **Fixed sizing calculation**

A complete sizing calculation already exists. Endress+Hauser verifies the calculation and manufactures the primary element according to the given sizing calculation.

**Selection and sizing tool
"Applicator"**

The Applicator software of Endress+Hauser is a convenient selection and sizing tool for planning processes (for details see the booklet IN013F). Applicator of Endress+Hauser may be used free of charge both via the Internet and in form of a CD. You can order the CD version quite conveniently online.
<http://www.products.endress.com/applicator>

Applicator Sizing Flow

The "Applicator Sizing Flow" module calculates all necessary data for the selected primary device:

- Differential pressure
- Pressure loss
- Measuring uncertainty
- Diameter ratio β of the orifice
- Upstream and downstream straight lengths
- Pressure ratings
- Medium parameters

Additional options

- Sizing sheet - Data sheet
- Calculation sheet
- Determination of the mounting position

Sizing sheet - Data sheet

To ensure that the Deltatop measuring point exactly matches the requirements of the process, the completed Sizing sheet - Data sheet (see page 85) has to be attached to the order. Endress+Hauser uses the data of this form to determine the optimum configuration of the measuring point. The Sizing sheet - Data sheet can be generated by the "Applicator" selection and sizing tool.

**Selecting the differential
pressure transmitter and the
measuring cell**

If they are ordered together with the primary element, it is possible to order the Deltabar differential pressure transmitter with a suitable measuring cell and calibration even without knowing the complete calculation data. In this case code "78" or "88" ("prepared for Deltatop") has to be selected in the "nominal range" feature. The code "88" for PMD75 must only be selected for static pressures above 160 bar. Also, code "8" ("adjusted for Deltatop") has to be selected in the "calibration" feature.

The best suitable measuring cell will be selected by Endress+Hauser according to the calculation results for the Pitot tube. The differential pressure transmitter will be delivered completely configured and preadjusted to the calculated values.

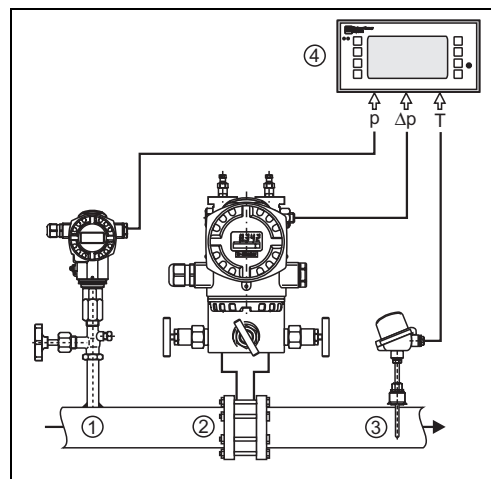
This allows easy and convenient ordering and commissioning of the measuring point even for the less experienced user.

Temperature and pressure compensation

Separate process connections

Two additional probes are required for temperature and pressure compensation:

- **An absolute pressure sensor**
According to ISO 5167, this probe must always be mounted on the upstream side of the orifice.
- **A temperature probe**
In order to avoid disturbances of the flow profile, this probe must be mounted on the downstream side of the orifice.

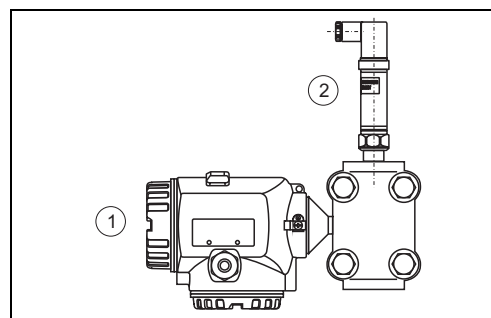


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- 1: Absolute pressure sensor
- 2: orifice and differential pressure transmitter
- 3: temperature probe
- 4: evaluation unit

Combined process connection for absolute and differential pressure

An adapter (e.g. oval flange adapter PZO, see page 84) can be used to screw a pressure transmitter or a pressure transducer into the Deltabar flange. The absolute pressure transmitter must be mounted at the "+" side of the Deltabar.



P01-DOxxxxxx-14-xx-xx-xx-013

- 1: Deltabar
- 2: Transmitter for absolute pressure

Calculation of the compensated volume or mass flow

- **for steam:**
by the Energy Manager RMS621 from Endress+Hauser;
for details see Technical Information TI092R
- **for all media:**
by the Flow and Energy Manager RMC621 from Endress+Hauser;
for details see Technical Information TI098R
- **for all media:**
by a PLC;
in this case the compensation calculation has to be programmed by the user.

Calculation formula for the temperature and pressure compensation

At first the starting point for the compensation has to be defined. The starting point is the calculation sheet, which accompanies every primary element. On the calculation sheet, layout data can be found for a specific operating condition (pressure and temperature).

The relationship between flow and differential pressure is described by a square root function:

$$Q_m = \sqrt{2 \Delta p \rho} \quad \text{for the mass flow (or volume flow at normal or standard conditions)}$$

and

$$Q_v = \sqrt{\frac{2 \Delta p}{\rho}} \quad \text{for the volume flow}$$

where

ρ = the density of the medium.

If the current output of the Deltabar transmitter is set to flow values, the square root function is already implemented. Otherwise the square root function must be computed externally, e.g. in a PLC. Please make sure that the square root function is not applied twice.

Whenever the real operating conditions differ from the conditions used in the calculation sheet, the density of the gas will change and thus also the calculated flow rate will change according to the above-mentioned formula.

$$\rho_2 = \rho_1 \frac{P_2}{P_1} \frac{T_1}{T_2} \frac{Z_1}{Z_2}$$

where

P = absolute pressure

T = absolute temperature (K)

Z = compressibility factor

1 = operating condition according to the calculation sheet

2 = actually measured operating condition

The compensation can now be computed as follows:

$$Q_2 = Q_1 \sqrt{\frac{P_2}{P_1} \frac{T_1}{T_2} \frac{Z_1}{Z_2}} \quad \text{for the mass flow (or volume flow at standard conditions)}$$

$$Q_2 = Q_1 \sqrt{\frac{P_1}{P_2} \frac{T_2}{T_1} \frac{Z_2}{Z_1}} \quad \text{for the volume flow}$$

The compressibility factor Z can be neglected if its value is close to 1. If the compressibility factor is to be included in the compensation, the value must be determined according to the actually measured pressure and temperature. Compressibility factors are available in the corresponding literature in tables or graphs or can be calculated, e.g. using the Soave-Redlich-Kwong procedure.

Split range (expansion of the measuring range)

The square root function has a very steep slope in the vicinity of the zero point. Therefore, the measuring range is limited from below, which results in a measuring dynamics of typically 6:1 (max. 12:1).

If the differential pressure is high enough, it is possible to increase the dynamics by connecting multiple differential pressure transmitters with different measuring ranges.

The following Endress+Hauser instruments can be used to evaluate the measuring signals simultaneously:

- Energy Manager RMS621 (see Technical Information TI092R)
- Energy Manager RMC621 (see Technical Information TI098R)



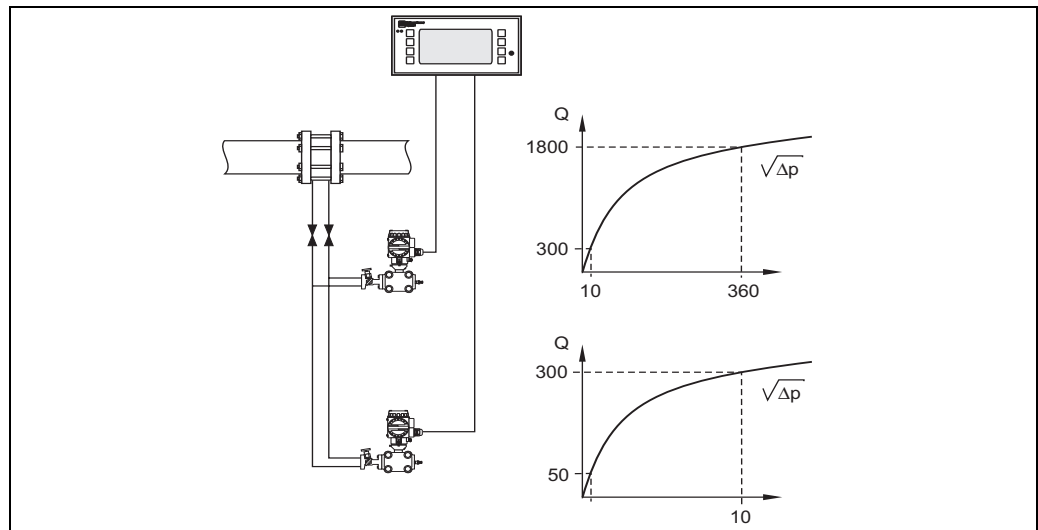
Note!

The maximum available measuring range depends on the differential pressure available.



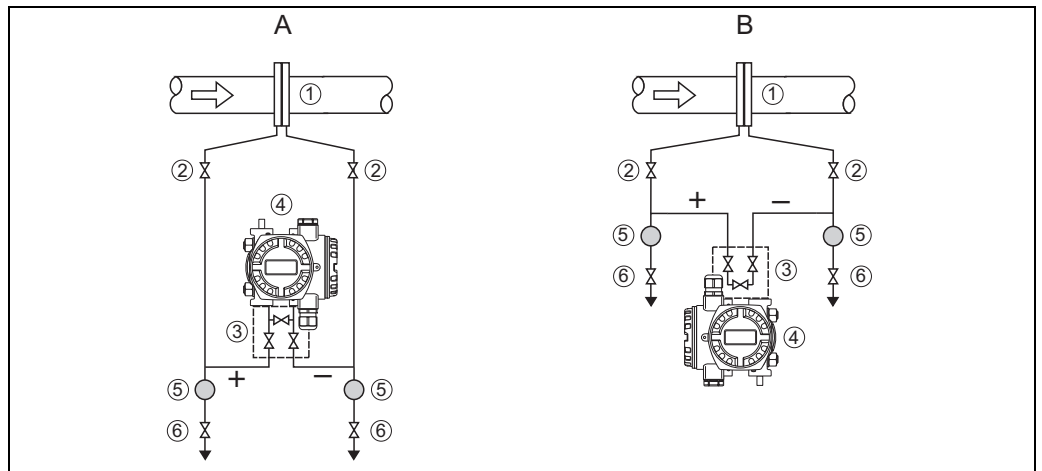
Note!

The same method can be used to implement redundant measurements.

Example

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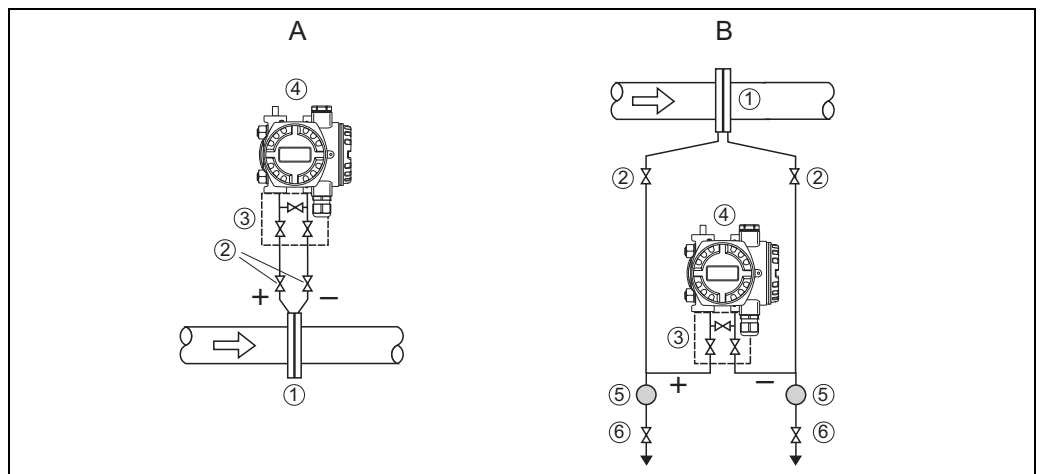
Flow measurements in liquids With liquid applications, the transmitter must be mounted below the pipe. All impulse pipes must be installed with a slope of at least 1:15 to the process connection - coming from the transmitter. This ensures that trapped air and bubbles rise back to the process pipe and thus do not influence the measurement.



P01-DOxxxxxx-11-xx-xx-xx-011

A: Preferred configuration; **B:** alternative configuration (requires less space; only possible for clean media)
1: Orifice plate; **2:** Shut-off valves; **3:** Three valve manifold; **4:** Differential pressure transmitter Deltabar; **5:** Separator; **6:** Drain valve

Flow measurement in gases With gas applications, the transmitter must be mounted above the pipe. All impulse pipes must be installed with a slope of at least 1:15 to the process connection - coming from the transmitter. This ensures that any condensate flows back into the process pipe and thus does not influence the measurement.



P01-DOxxxxxx-11-xx-xx-xx-012

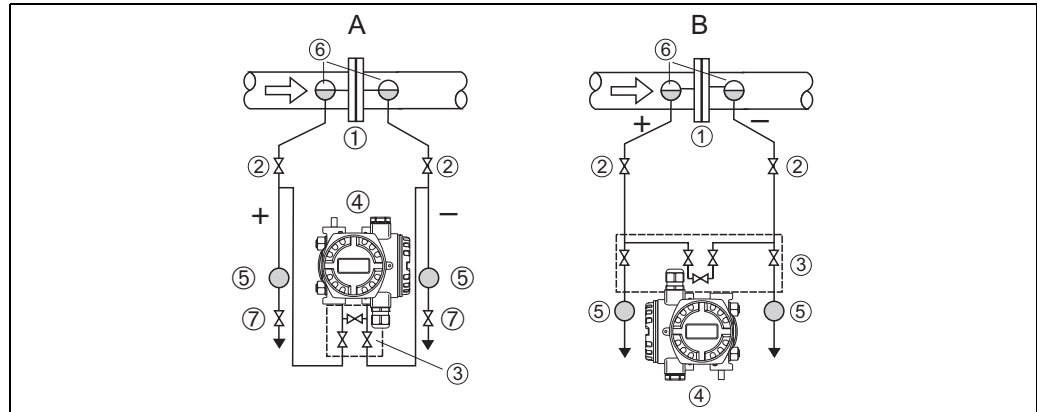
A: Preferred configuration; **B:** Alternative configuration (if the transmitter can not be mounted above the pipe; only possible for clean media)
1: Orifice plate; **2:** Shut-off valves; **3:** Three-valve manifold; **4:** Differential pressure transmitter Deltabar; **5:** Separator; **6:** Drain valves

Flow measurement in steam

With steam applications, two condensate chambers have to be applied. They must be mounted on the same level. The transmitter must be located below the pipe. The pipes between the transmitter and the condensate chambers must be completely filled with water on both sides.

A 5-valve manifold allows simple piping and can be used instead of T-sections and additional blow-out valves. The impulse pipes must be installed a gradient of 1:15 to reliably ensure rising of trapped air in the water of the impulse line to the transmitter.

It is recommended to use flange pairs - or preferably welded connections - for steam applications. Behind the condensate chambers, continue piping with Ermeto 12S.



P01-DOxxxxxx-11-xx-xx-xx-013

A: with 3-valve manifold; for easy venting of the transmitter; especially for small differential pressures;

B: with 5-valve manifold for cleaning of the transmitter;

1: Orifice plate; **2:** Shut-off valves; **3:** Valve manifold; **4:** Differential pressure transmitter Deltabar; **5:** Separator; **6:** Condensate chambers; **7:** Drain valves

Function of the condensate chambers

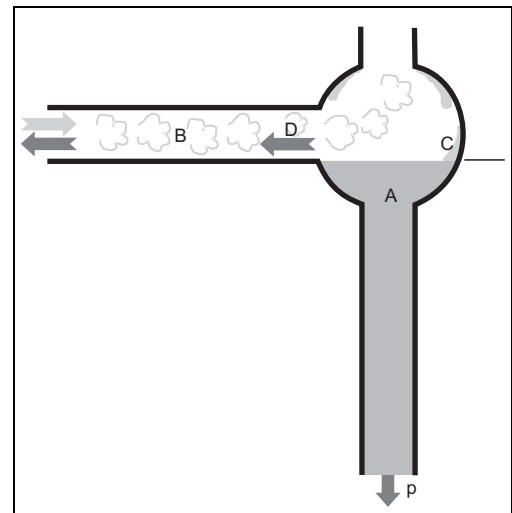
The condensate chambers make sure that the impulse lines are always completely filled with water and that the membrane of the transmitter is not exposed to hot steam. The water level is maintained by condensing steam. Excess condensate flows back and is re-evaporated.

Using the condensate chambers considerably reduces fluctuations of the water column. The stabilized measuring signal and the increased zero point stability ensure a consistent measuring quality.

The water column transfers the pressure to the transmitter membrane.

Operating conditions

- Both condensate chambers must be mounted at the same level.
- Both condensate chambers must be completely filled before commissioning.



P01-DOxxxxxx-15-xx-xx-xx-007

A: water; **B:** steam; **C:** condensing steam; **D:** excess condensate flows back

Mounting positions

Versions

Compact version

With the compact version of the Deltatop, the orifice, the manifold and the transmitter are delivered readily mounted. Additional piping and additional valves are not required. Thus, leakage problems are eliminated.

Remote version

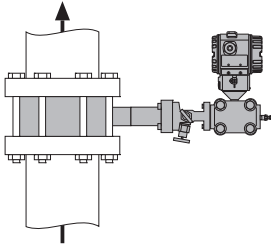
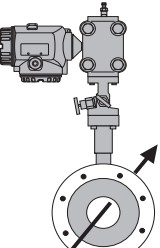
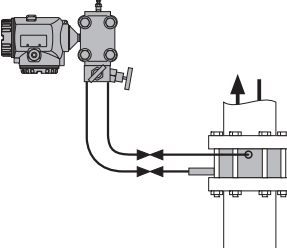

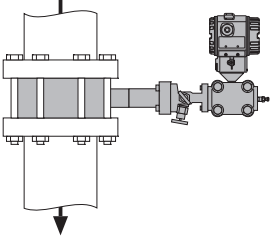
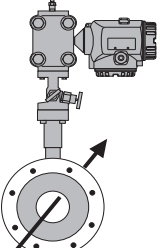
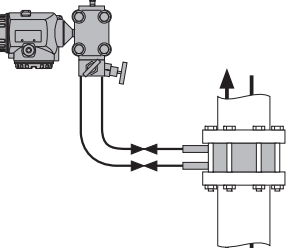
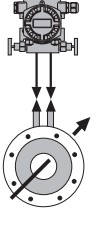
With the remote version of the Deltatop, the orifice, the manifolds, the shut-off valves and the transmitter are delivered separately and must be mounted on-site. This version is recommended:

- for high process temperatures which impede a direct mounting of the transmitter.
- if due to shortage of space the transmitter can not be mounted directly at the orifice.

Flow direction

- The flow direction is marked by an arrow on the holding ring (DO62C, DO63C, DO65F) or by a labelling of the handle for orifice plates (DO64P) and measuring flanges (DO61W). The labelling is always located on the upstream side of the orifice (+).
- "Mounting left" and "Mounting right" refer to the flow direction.
For compact instruments, which are mounted from above or from below, the instrument is shipped in a way that the transmitter is mounted at the left or right side, respectively (with respect to the flow direction).
For steam versions, which are mounted laterally, the condensate chambers and the transmitter are mounted on the left or right side, respectively (with respect to the flow direction).
- For compact versions the transmitter is always mounted in a way such that the display can be read in the specified mounting position and needs not to be rotated.

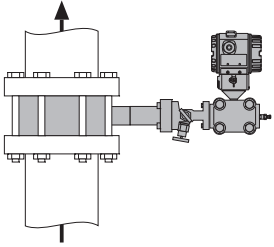
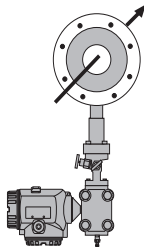
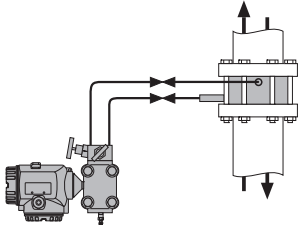
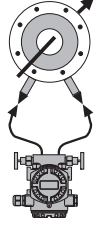
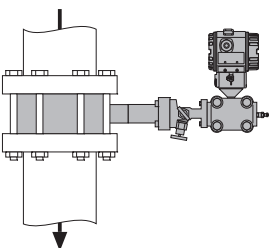
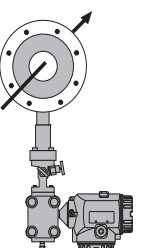
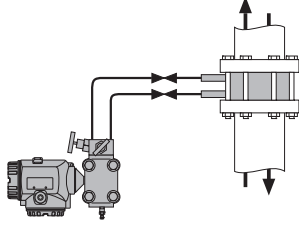
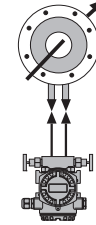
Gas measurements

compact; vertical ¹⁾	compact; horizontal ²⁾	remote; vertical	remote, horizontal
flow upwards DO6xxxx-CM...  P01-DO61Wxxx-11-00-00-xx-001	mounting left DO6xxxx-CB...  P01-DO61Wxxx-11-00-00-xx-007	taps 90° DO6xxxx-BT...  P01-DO61Wxxx-11-00-00-xx-013	tap angle according to DIN DO6xxxx-BF...  P01-DO61Wxxx-11-00-00-xx-019
flow downwards DO6xxxx-CP...  P01-DO61Wxxx-11-00-00-xx-002	mounting right DO6xxxx-CC...  P01-DO61Wxxx-11-00-00-xx-008	taps 0° DO6xxxx-BS...  P01-DO61Wxxx-11-00-00-xx-014	taps 0° DO6xxxx-BE  P01-DO61Wxxx-11-00-00-xx-020

1) recommended housing version for the Deltabar S: T14 (for use of the Deltabar Display)

2) recommended housing version for the Deltabar S: T15 (for use of the Deltabar Display)

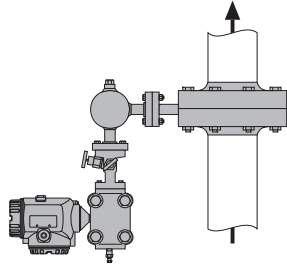
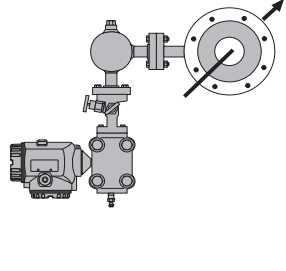
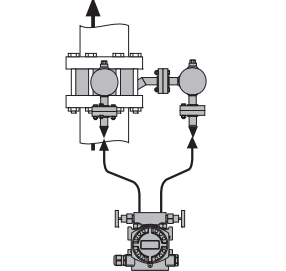
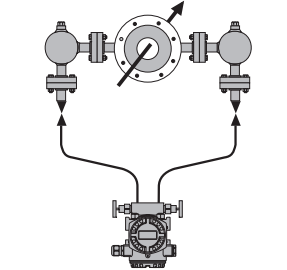
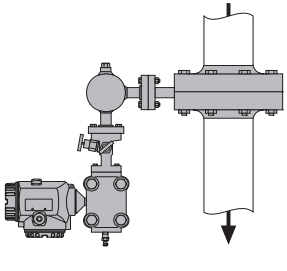
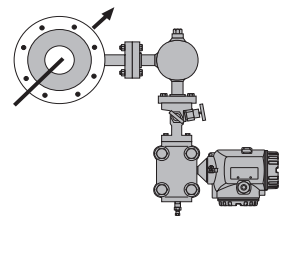
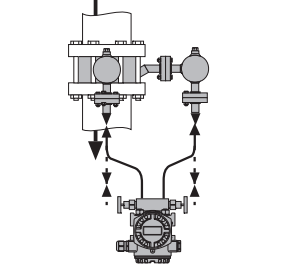
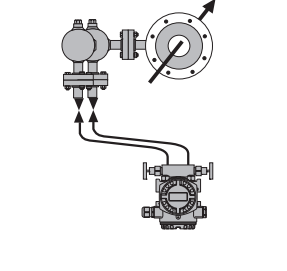
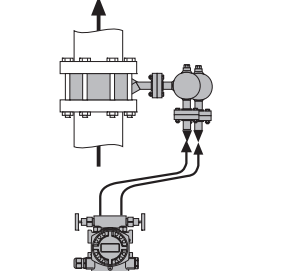
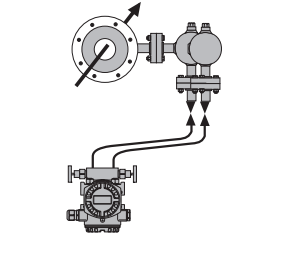
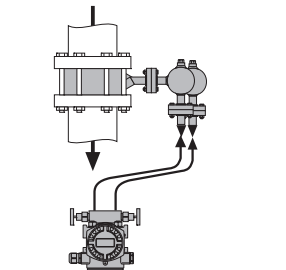
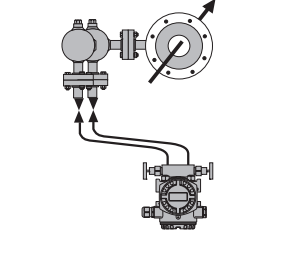
Liquid measurements

compact; vertical ¹⁾	compact; horizontal ²⁾	remote; vertical	remote; horizontal
<p>flow upwards DO6xxx-EM...</p>  <p>P01-DO61Wxxx-11-00-00-xx-001</p>	<p>mounting left DO6xxx-EB...</p>  <p>P01-DO61Wxxx-11-00-00-xx-009</p>	<p>taps 90° DO6xxx-DT...</p>  <p>P01-DO61Wxxx-11-00-00-xx-015</p>	<p>tap angle according to DIN DO6xxx-DF...</p>  <p>P01-DO61Wxxx-11-00-00-xx-021</p>
<p>flow downwards DO6xxx-EP...</p>  <p>P01-DO61Wxxx-11-00-00-xx-002</p>	<p>mounting right DO6xxx-EC...</p>  <p>P01-DO61Wxxx-11-00-00-xx-010</p>	<p>taps 0° DO6xxx-DS...</p>  <p>P01-DO61Wxxx-11-00-00-xx-016</p>	<p>taps 0° DO6xxx-DE...</p>  <p>P01-DO61Wxxx-11-00-00-xx-022</p>

1) recommended housing version for the Deltabar S: T14 (for use of the Deltabar Display)

2) recommended housing version for the Deltabar S: T15 (for use of the Deltabar Display)

Steam measurements

compact; vertical ¹⁾	compact; horizontal ¹⁾	remote; vertical	remote; horizontal
<p>flow upwards DO6xxxx-GM...</p>  <p>P01-DO61Wxxx-11-00-00-xx-005</p>	<p>mounting left DO6xxxx-GB...</p>  <p>P01-DO61Wxxx-11-00-00-xx-011</p>	<p>taps 90°; flow upwards DO6xxxx-FN...</p>  <p>P01-DO61Wxxx-11-00-00-xx-017</p>	<p>taps 180° DO6xxxx-FG...</p>  <p>P01-DO61Wxxx-11-00-00-xx-023</p>
<p>flow downwards DO6xxxx-GP...</p>  <p>P01-DO61Wxxx-11-00-00-xx-006</p>	<p>mounting right DO6xxxx-GC...</p>  <p>P01-DO61Wxxx-11-00-00-xx-012</p>	<p>taps 90°; flow downwards DO6xxxx-FR...</p>  <p>P01-DO61Wxxx-11-00-00-xx-026</p>	<p>taps 180°; mounting left DO6xxxx-FB...</p>  <p>P01-DO61Wxxx-11-00-00-xx-024</p>
	<p>taps 0°; flow upwards DO6xxxx-FM...</p>  <p>P01-DO61Wxxx-11-00-00-xx-018</p>	<p>taps 0°; mounting right DO6xxxx-FD...</p>  <p>P01-DO61Wxxx-11-00-00-xx-025</p>	
	<p>taps 0°; flow downwards DO6xxxx-FP...</p>  <p>P01-DO61Wxxx-11-00-00-xx-027</p>	<p>taps 0°; mounting left DO6xxxx-FC...</p>  <p>P01-DO61Wxxx-11-00-00-xx-024</p>	

1) recommended housing version for the Deltabar S: T15 (for use of the Deltabar Display)

Installation and process conditions

Up- and downstream lengths

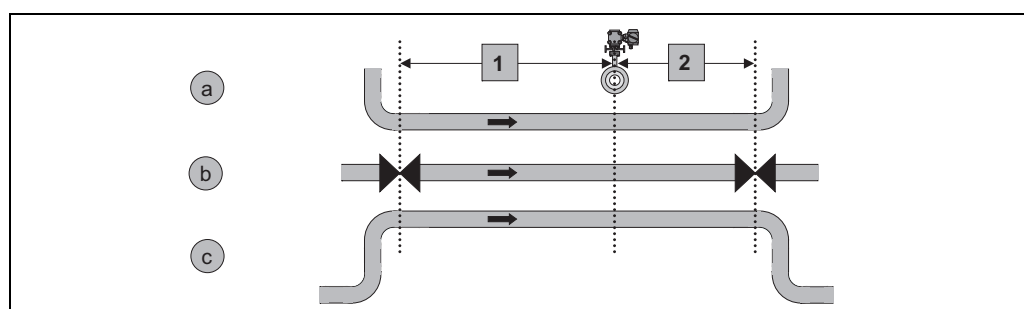
In order to ensure a homogeneous flow profile it is necessary to mount the orifice in a sufficient distance to narrowings or bends of the pipe. The required upstream lengths for different types of obstacles are summarized in the following table. Detailed specifications can be obtained from ISO 5767-2.

Type of obstacle	$\beta \leq 0,2$		$\beta = 0,5$		$\beta = 0,75$	
	A ¹⁾	B ²⁾	A ¹⁾	B ²⁾	A ¹⁾	B ²⁾
Upstream length						
90° bend	6 x D	3 x D	22 x D	9 x D	44 x D	20 x D
2x90° bend ³⁾ in the same plane	10 x D	-	22 x D	10 x D	44 x D	22 x D
2x90° bend in perpendicular planes	19 x D	18 x D	44 x D	18 x D	44 x D	20 x D
concentric reducer	5 x D	-	8 x D	5 x D	13 x D	8 x D
concentric expander	6 x D	-	20 x D	9 x D	36 x D	18 x D
ball/gate valve, fully open	12 x D	6 x D	12 x D	6 x D	24 x D	12 x D
Downstream length						
any obstacle	4 x D	2 x D	6 x D	3 x D	8 x D	4 x D

D: inner pipe diameter; $\beta = d/D$: opening ratio (d : inner orifice diameter)

- 1) for 0% of additional uncertainty
- 2) for 0,5% of additional uncertainty
- 3) The required lengths depend on the distance of the two elbows; typical values are given in this table. For detailed specifications refer to ISO 5167-2. The upstream length is also calculated by the selection and sizing tool "Applicator".

Examples (schematic)



1: upstream length; **2:** downstream length;
a: 90° bend; **b:** valve, open; **c:** 2x90° bend



Note!
The requirements concerning the pipe as stated in ISO 5167 must be met (weld seams, roughness etc).



Note!
The required upstream length can be reduced by a rectifier (see page 81). Details are specified in ISO5167-2.

Homogeneity

The fluid must be homogeneous. **No changes of the state of aggregation** (liquid, gas, steam) may occur. The pipe must always be **completely filled**.

Temperature, Pressure

	Compact version	Remote version
max. temperature	<ul style="list-style-type: none"> ■ for gases and liquids: 200 °C (390 °F) ■ for steam: 300 °C (570 °F) 	<ul style="list-style-type: none"> ■ with standard material: approx. 500 °C (930 °F) ■ with special material: approx. 1000 °C (1830 °F)
max. pressure	420 bar (6000 psi)	

Temperature and pressure may **not be subject to large fluctuations**.

If required, a **temperature and pressure compensation** must be applied for gases and steam (see page 8).

Reynolds number

A turbulent flow is required for differential pressure flow measurement. The Reynolds number Re determines whether the flow is laminar or turbulent. Re is a non-dimensional parameter which describes the dependency of the flow on the velocity, the internal diameter of the tube as well as the medium density and viscosity. For a reliable measurement the Reynolds number should not fall below the values given in the following table:

Type of orifice	approximate minimum Reynolds number ¹⁾
sharp	5000
quarter circle nozzle	500
double cone	80
segmental orifice	5000
bidirectional	5000

1) The exact conditions depend on the type of pressure tapping and of the aperture ratio β .



Note!

The Reynolds number and the application limits are calculated by the Applicator selection and sizing tool.

Temperature limits of the materials applied
DIN/EN

Designation	Short designation	Material code	Max. temperature	Reference
Steels				
H11 (Kesselblech)	P265 GH	1.0425	400 °C (750 °F)	DIN EN10222-2 ¹⁾
C22.8	P250 HG	1.0460	480 °C (890 °F)	DIN EN10222-2 ¹⁾
Heat-resistant steels				
	16 Mo 3	1.5415	530 °C (980 °F)	DIN EN10222-2 ¹⁾
	13 CrMo 4-5	1.7335	570 °C (1050 °F)	DIN EN10222-2 ¹⁾
	10 CrMo 9-10	1.7380	600 °C (1110 °F)	DIN EN10222-2 ¹⁾
	X10 CrMoVNb 9-1	1.4903	670 °C (1230 °F)	DIN EN10222-2 ¹⁾
Stainless steels				
	X 5 CrNi 18-10	1.4301	500 °C (930 °F)	DIN EN10222-5 ²⁾
	X 5 CrNiMo17-12-2	1.4401	350 °C (660 °F)	DIN EN10222-5 ²⁾
	X 2 CrNiMo 17-12-2	1.4404	500 °C (930 °F)	DIN EN10222-5 ²⁾
	X 6 CrNiMoTi 17-12-2	1.4571	500 °C (930 °F)	500 °C (930 °F) ²⁾
Duplex	X 2 CrNiMoN 22-5-3	1.4462	280 °C (530 °F)	VdTÜV material data sheet 418
	X 1 NiCrMoCuN 22-20-5	1.4539	400 °C (750 °F)	manufacturer information

- 1) Values for forgings: Maximum temperature specification for fatigue strength and 1 % creep limit.
 2) Values for forgings: Maximum temperature specification for ultimate tensile strength.

Other materials

Designation	Short designation	Material code	Max. temperature	Reference
Monel 400	(S-)NiCu 30 Fe	2.4360	425 °C (790 °F)	VdTÜV material data sheet 263
Hastelloy C4	NiMo 16 Cr 16 Ti	2.4610	400 °C (750 °F)	VdTÜV material data sheet 424
Hastelloy C276	NiMo 16 Cr 15 W	2.4819	450 °C (840 °F)	VdTÜV material data sheet 400
Alloy 625	NiCr 22 Mo 9 Nb	2.4856	ca. 900 °C (1650 °F)	Key to steel ¹⁾
Alloy 825	NiCr 21 Mo	2.4858	450 °C (840 °F)	VdTÜV material data sheet 432

- 1) Values for forgings: Maximum temperature specification for fatigue strength and 1% creep limit.

ASME/AISI/ASTM

Designation	Short designation	Material code	Max. temperature	Reference
Steels				
C-Si	A105	K03504	425 °C (790 °F)	ASME B16.5 ¹⁾
Heat-resistant steels				
C-1/2Mo	A182 Gr. F1	K12822	465 °C (860 °F)	ASME B16.5 ¹⁾
1 1/4Cr-1/2Mo-Si	A 182 Gr. F11 Cl.2	K11572	590 °C (1090 °F)	ASME B16.5 ¹⁾
2 1/4Cr-1Mo	A 182 Gr. F22 Cl.3	K21590	590 °C (1090 °F)	ASME B16.5 ¹⁾
Stainless steels				
18Cr-8Ni	A 182 Gr. F304	S30400	538 °C (1000 °F)	ASME B16.5 ¹⁾
16Cr-12Ni-2Mo	A 182 Gr. F316	S31600	538 °C (1000 °F)	ASME B16.5 ¹⁾
16Cr-12Ni-2Mo	A 182 Gr. F316L	S31603	450 °C (840 °F)	ASME B16.5 ¹⁾
22Cr-5Ni-3Mo-N	A 182 Gr. F51	S31803	315 °C (600 °F)	ASME B16.5 ¹⁾
	A 182 Gr. F904L	N08904	375 °C (700 °F)	ASME B16.5 ¹⁾

1) Values for flanges: Maximum recommended temperature for permanent use or maximum temperature specification of the pressure-temperature ratings.

Plastics

Designation	Short designation	Max. temperature	Reference
PVC	polyvinyl chloride	up to approx. 70 °C (150 °F)	manufacturer specification
PP	polypropylene	up to approx. 90 °C (190 °F)	manufacturer specification
PE	polyethylene	up to approx. 80 °C (170 °F)	manufacturer specification
PVDF	polyvinylidene fluoride	up to approx. 130 °C (260 °F)	manufacturer specification
PTFE	polytetrafluoroethylene	up to approx. 150 °C (300 °F)	manufacturer specification

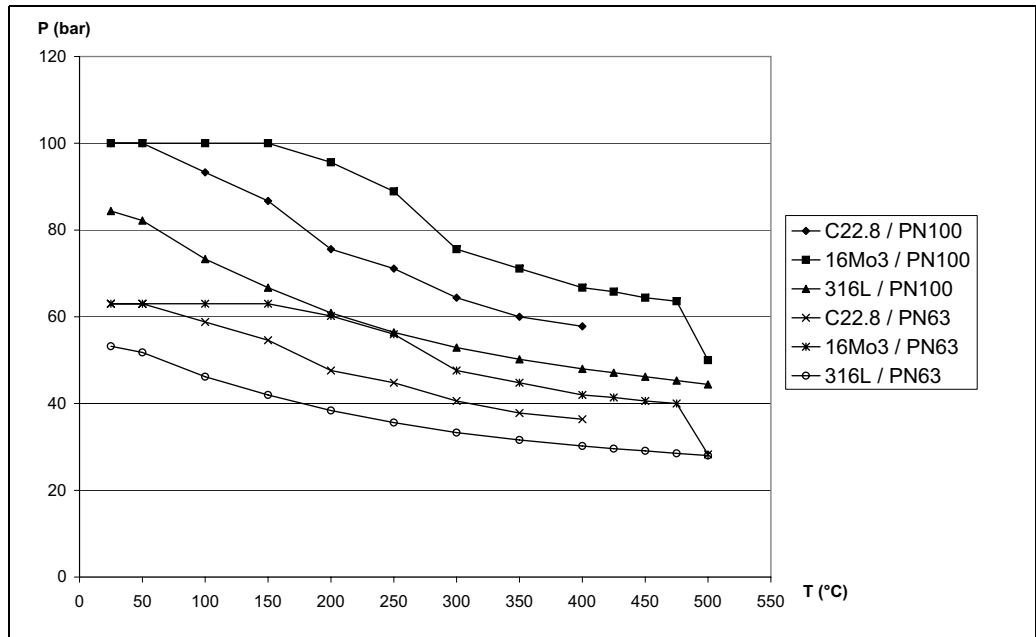


Note!

All temperature specifications are only guide values. The temperature limits have to be checked for the individual case. Depending on the pressure and the medium they may strongly deviate from these values.

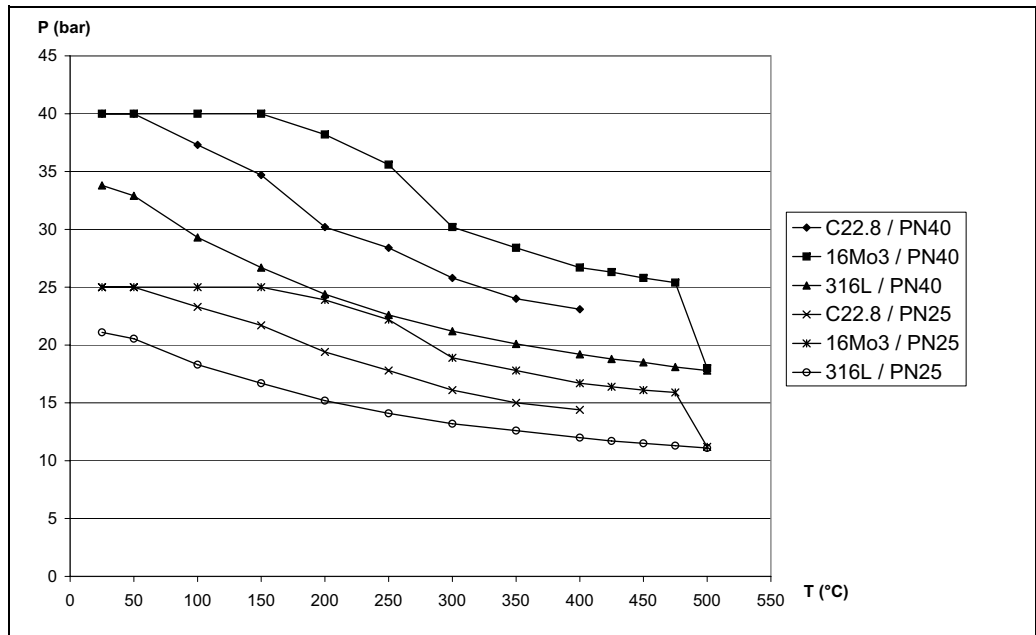
Pressure-temperature curves
for flanges according to
EN1092-1:2001

PN100 /PN63



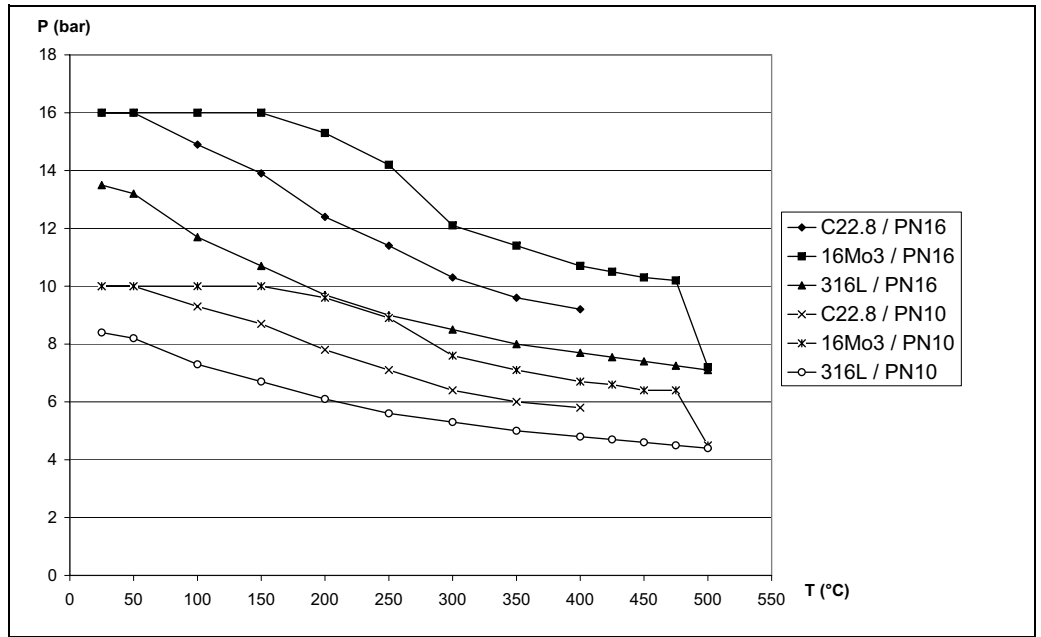
P01-DOxxxxxx-05-xx-xx-xx-006

PN40 /PN25



P01-DOxxxxxx-05-xx-xx-xx-005

PN16 / PN10



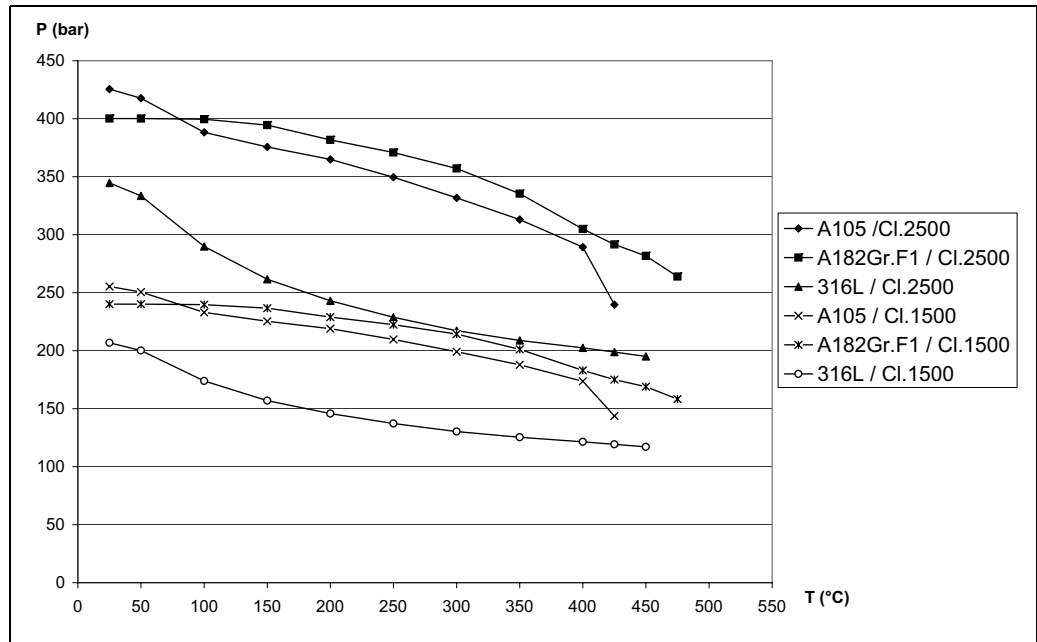
P01-DOxxxxxx-05-xx-xx-xx-004



Note!
The values for 316L refer to the 0,2% yield strength.

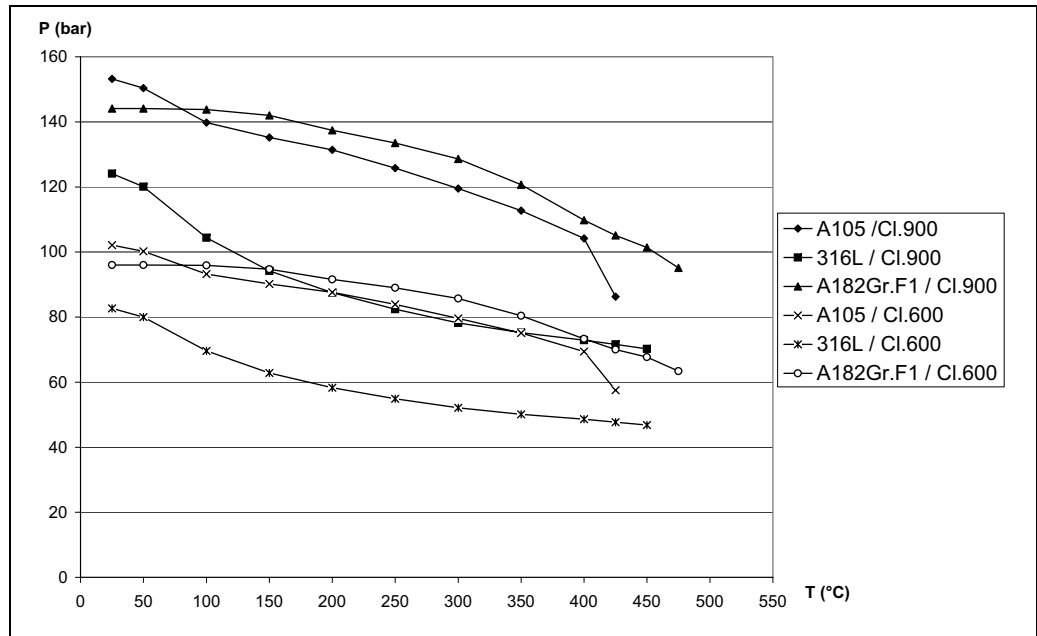
Pressure-temperature curves
for flanges according to
ANSI B16.5-2003

Cl. 2500 / Cl. 1500



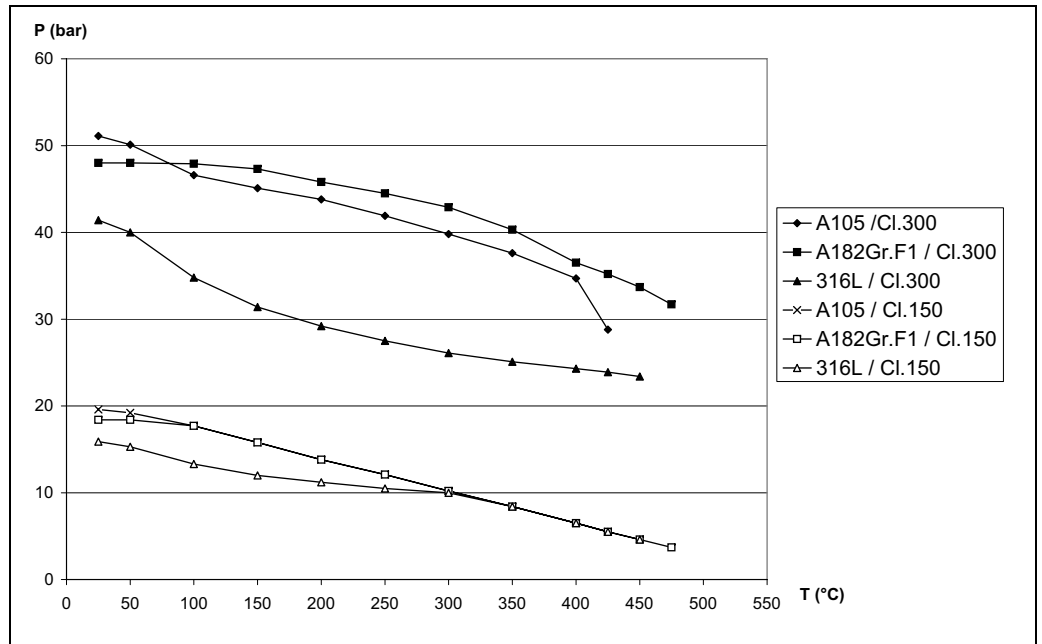
P01-DOxxxxxx-05-xx-xx-xx-003

Cl. 900 / Cl. 600



P01-DOxxxxxx-05-xx-xx-xx-002

Cl. 300 / Cl. 150



P01-DOxxxxxx-05-xx-xx-xx-001



Note!

The values for 316L refer to the 0,2% yield strength.

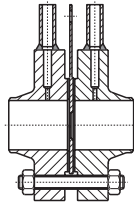
Mechanical construction

Product overview / Types of pressure tapping

The type of pressure tapping has a crucial influence on the mechanical construction of the orifice and on the mounting into the pipe. The product family Deltatop comprises all types of pressure tapping described in ISO5167.

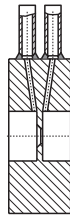
Flange tapping

The pressure is tapped at a distance of 1" (25.4 mm) before (+) and after (-) the orifice. Usually the tapping is realised by a bore through the flange. Standardized measuring flanges are available for flange tapping (DIN19214 or ASME B16.36). The orifice plate is exchangeable. Flange tapping is preferred wherever ASME applies.

Product	Remarks	Example
DO61W	<ul style="list-style-type: none"> ■ Flange tapping ■ Welding neck flange for welding in into the pipe included ■ Exchangeable orifice plate 	 <p style="text-align: right; font-size: small;">P01-DOxxxxxx-14-xx-xx-xx-006</p>

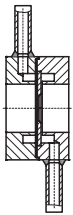
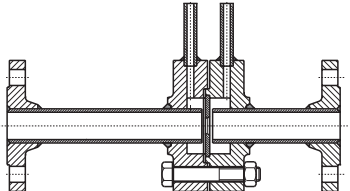
Corner tapping with single bore

The pressure is tapped immediately before (+) and after (-) the orifice. The tapping is often realised by a bore through the carrier rings. The orifice with the carrier rings is mounted between two flanges. Corner tapping is preferred wherever DIN is valid.

Product	Remarks	Example
DO62C	<ul style="list-style-type: none"> ■ Corner tapping with single bore ■ Undivided orifice; carrier rings and orifice rings are of one piece ■ Mounted between two flanges 	 <p style="text-align: right; font-size: small;">P01-DOxxxxxx-14-xx-xx-xx-007</p>

Corner tapping with annular chamber

The pressure is tapped directly before (+) and after (-) the orifice. An annular chamber in the carrier rings enables averaging of the pressure along the complete circumference of the pipe. The averaging reduces the influence of obstacles in the pipe. The orifice with the carrier rings is mounted between two flanges. Annular chamber tapping is preferred if a high measuring accuracy is required (e.g. accounting measurements, calibrated meter runs).

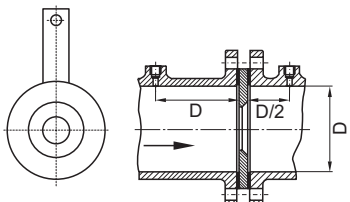
Product	Remarks	Example
DO63C	<ul style="list-style-type: none"> Corner tapping with annular chamber Three-piece orifice; carrier rings and orifice plate are separate pieces Exchangeable orifice plate Mounted between two flanges 	 <p>P01-DOxxxxxx-14-xx-xx-xx-008</p>
DO65F	<ul style="list-style-type: none"> Corner tapping with annular chamber Upstream and downstream lengths included Independent of the precise inner diameter of the pipe End flanges for mounting into the pipe included Wet calibration possible 	 <p>P01-DOxxxxxx-14-xx-xx-xx-019</p>

D-D/2 tapping

The pressure is tapped in a distance of 1D before (+) and 0.5 D after (-) the orifice. D is the inner pipe diameter. Usually the tapping is realised by a single bore in the pipe. The orifice is typically an exchangeable orifice plate. D-D/2 tapping is especially useful for later mounting of a measurement into an existing pipe.

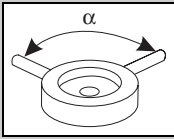
Pipe tapping

The pressure is tapped in a distance of 2.5D before (+) and 8 D after (-) the orifice. D is the inner pipe diameter. Usually the tapping is realised by a single bore in the pipe. The orifice is an exchangeable orifice plate. With pipe tapping the differential pressure is equal to the remaining pressure loss.

Product	Remarks	Example
DO64P	<ul style="list-style-type: none"> Orifice plate for mounting between two flanges All types of tapping possible; ideal for D-D/2 tapping and pipe tapping and as a replacement for flange tappings 	 <p>P01-DOxxxxxx-14-xx-xx-xx-017</p>

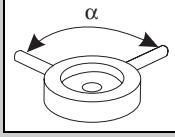
Position of the pressure taps

Pressure taps according to DIN19205-1, tables 1 and 4 (order code F)

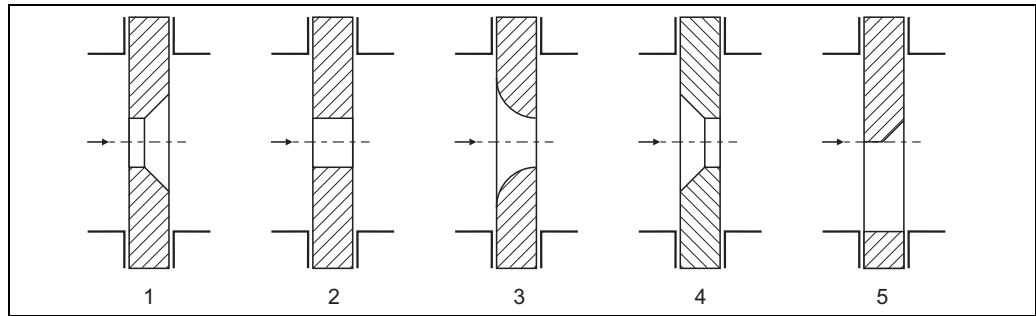
DN (mm)								
	PN6	PN10	PN16	PN25	PN40	PN63	PN100	PN160 ¹⁾
32	135°	135°	135°	135°	135°	135°	135°	135°
40	135°	135°	135°	135°	135°	135°	135°	135°
50	135°	135°	135°	135°	135°	135°	135°	135°
65	135°	135°	135°	90°	90°	90°	90°	90°
80	135°	90°	90°	90°	90°	90°	90°	90°
100	135°	90°	90°	90°	90°	90°	90°	90°
125	90°	90°	90°	90°	90°	90°	90°	90°
150	90°	90°	90°	90°	90°	90°	60°	60°
200	90°	90°	60°	60°	60°	60°	60°	60°
250	60°	60°	60°	60°	60°	60°	60°	60°
300	60°	60°	60°	45°	45°	45°	45°	45°
350	60°	45°	45°	45°	45°	45°	45°	
400	45°	45°	45°	45°	45°	45°	45°	
450	45°	36°	36°	36°				
500	36°	36°	36°	36°	36°	36°	36°	
600	36°	36°	36°	36°	36°	36°		
700	30°	30°	30°	30°	30°			
800	30°	30°	30°	30°				
900	30°	26°	26°	26°				
1000	26°	26°	26°	26°				

1) similar to DIN19205-1

Pressure taps for flanges according to ASME B16.5 and ASME B16.47 similar to DIN19205-1 (Order code F)

DN (inch)						
	Cl. 150	Cl. 300	C. 600	Cl. 900	Cl. 1500	Cl. 2500
1 1/2"	135°	135°	135°	135°	135°	135°
2"	135°	90°	90°	90°	90°	90°
2 1/2"	135°	90°	90°	90°	90°	90°
3"	135°	90°	90°	90°	90°	90°
4"	90°	90°	90°	90°	90°	90°
5"	90°	90°	90°	90°	90°	90°
6"	90°	60°	60°	60°	60°	90°
8"	90°	60°	60°	60°	60°	60°
10"	60°	45°	45°	45°	60°	60°
12"	60°	45°	36°	36°	45°	60°
14"	60°	36°	36°	36°	45°	
16"	45°	36°	36°	36°	45°	
18"	45°	30°	36°	36°	45°	
20"	36°	30°	30°	36°	45°	
24"	36°	30°	30°	36°	45°	
28"	26°	26°	26°	36°		
32"	26°	26°	26°	36°		
36"	22,5°	22,5°	26°	36°		
40"	20°	22,5°	22,5°	30°		

Inlet edge orifice



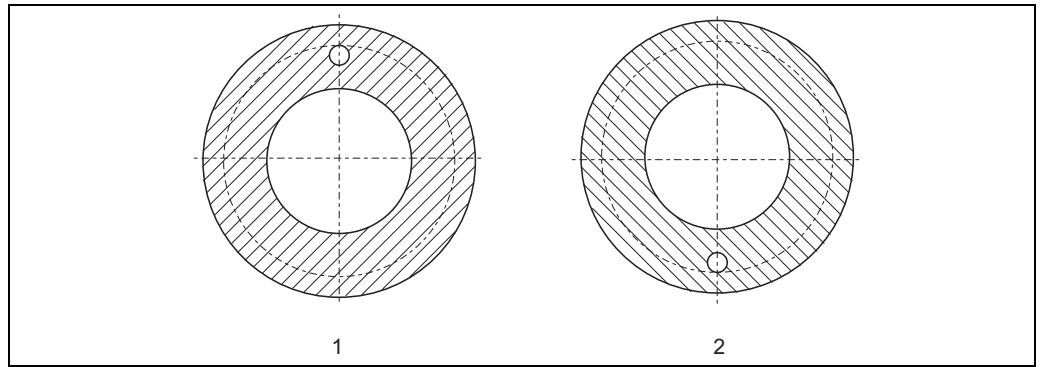
No	Inlet edge	min. Reynolds number	Application
1	sharp	$Re \geq 5000$	Standard; should always be used if the Reynolds number is large enough.
2	bidirectional	$Re \geq 5000$	apply if flows in both directions are to be measured.
3	quarter circle nozzle	$Re \geq 500$	only for $Re \leq 5000$
4	conical inlet	$Re \geq 80$	only for $Re \leq 500$
5	segmental orifice	$Re \geq 5000$	<ul style="list-style-type: none"> ■ for liquids with gas content (aperture at the top) ■ for liquids with solid content (aperture at the bottom)



Note!

- The sizing of a flow measuring point can be performed by the Endress+Hauser selection and sizing tool "Applicator". Among other things, "Applicator" determines the suitable edge type for your application.
- The inlet edge of the orifice is selected in feature 80 of the respective product structure.

Vent/Drain hole



1: Orifice plate with vent hole; 2: Orifice plate with drain hole

P01-DOxxxxx-15-xx-xx-xx-012

- Orifice plates with vent hole are applied for liquids with gas formation. Gas can pass the orifice plate through the vent hole.
- Orifice plates with drain hole are applied for gases with condensate formation. Condensate can pass the orifice plate through the drain hole.



Note!

- Orifice plates with vent or drain hole can only be applied in horizontal pipes.
- Vent and drain hole are not available for the annular chamber (DO63C) and the meter run (DO65F).
- Vent or drain hole are selected in feature 90 of the respective product structure.

Dimensions

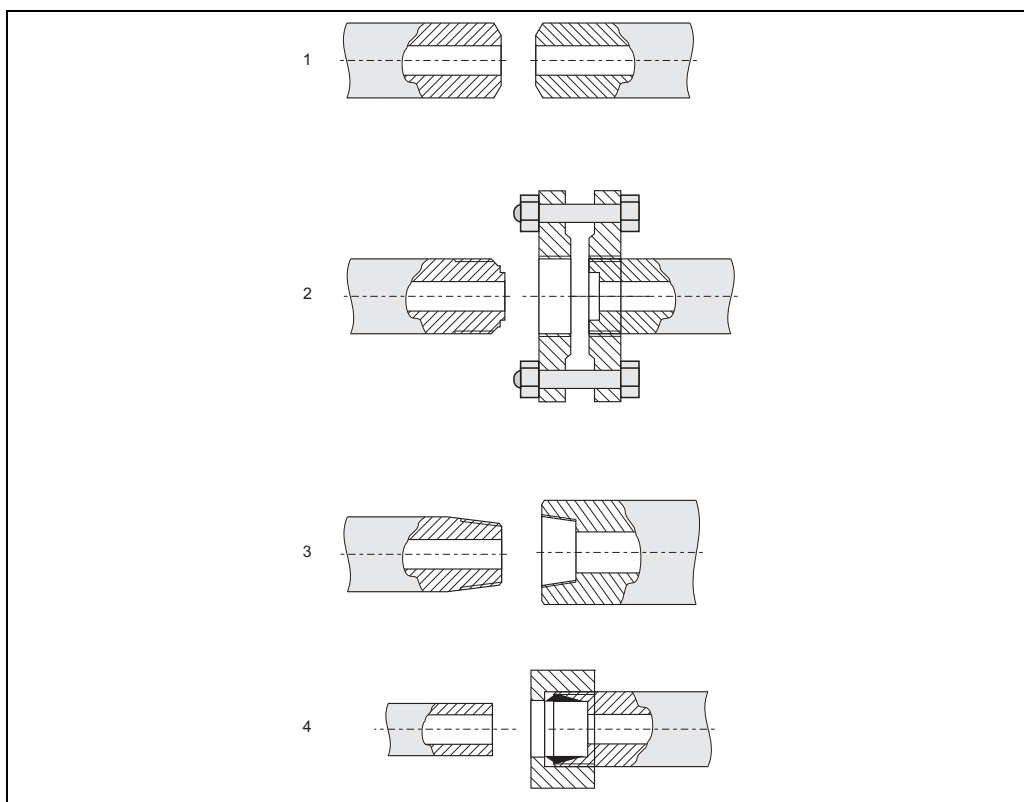
The diameter of the vent or drain hole depends on the diameter of the orifice:

Diameter of the orifice [mm (inch)]	Diameter of the vent or drain hole [mm (inch)]
25,4 - 88,9 (1.000 - 3.500)	2,4 (3/32)
89,0 - 104,8 (3.501 - 4.125)	3,2 (1/8)
104,9 - 127,0 (4.126 - 5.000)	4,0 (5/32)
127,1 - 152,4 (5.001 - 6.000)	4,8 (3/16)
152,4 - 171,5 (6.001 - 6.750)	5,6 (7/32)
171,5 - 190,5 (6.751 - 7.500)	6,4 (1/4)
190,6 - 212,7 (7.501 - 8.375)	7,1 (9/32)
212,8 - 235,0 (8.376 - 9.250)	8,0 (5/16)
235,1 - 254,0 (9.251 - 10.000)	8,7 (11/32)
254,0 - 276,2 (10.001 - 10.875)	9,5 (3/8)
276,3 - 295,3 (10.876 - 11.625)	10,3 (13/32)
295,3 - 317,5 (11.626 - 12.500)	11,1 (7/16)
317,5 - 336,6 (12.501 - 13,250)	11,9 (15/32)
> 336,6 (> 13.251)	12,7 (1/2)

Differential pressure connection

Differential pressure connection for the remote version

For the remote version, the following connections are available for the impulse line between the individual components:

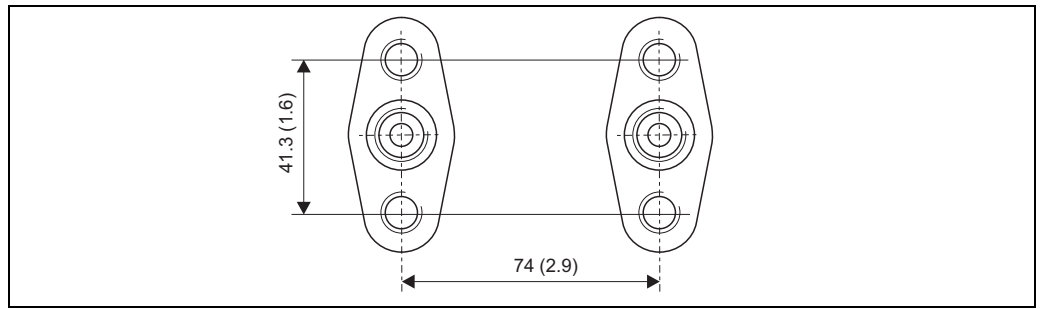


P01-DOxxxxx-15-xx-xx-xx-020

No.	Outlet (from the primary element)	Inlet (to the accessory)	Application/Remarks
1	welding connection 14/21,3/24 mm	welding connection 14/21,3/24 mm	for highly demanding applications; permanent joint
2	G½ DIN 19207	G½ DIN 19207 + 2 flanges ¹⁾	disconnectable; especially suited for steam
3	MNPT½	FNPT½	simple mounting; not suited for steam
4	pipe 12 mm	Cutting ring (Ermeto 12S)	simple mounting; easily disconnectable; not suited for steam

1) The flanges are included in the scope of supply of the accessory.

Differential pressure connection for the compact version (IEC61518)



P01-DOxxxx-15-xx-xx-xx-014

Abmessungen in mm (inch)



Note!

The differential pressure connection is selected in feature 100 of the product structure.

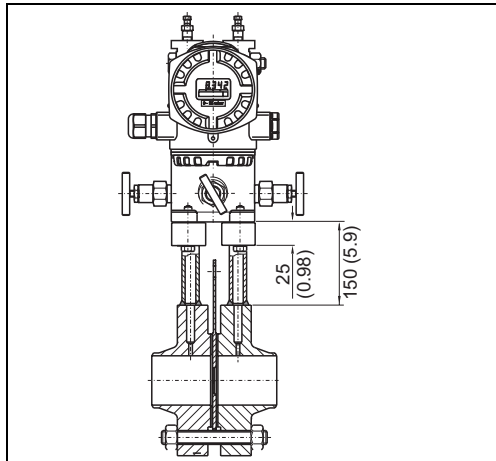
Overview of the product structures

Feature	Name	Description	valid for				
			DO61W	DO62C	DO63C	DO64P	DO65F
Primary element							
10	Application; Version	<ul style="list-style-type: none"> ■ Application: "Gas", "Liquid" oder "Steam" ■ Version: "remote" oder "compact" See chapter "Mounting positions" (page 13). For DO64P: Definition of the type of pressure tapping (for the calculation)68	x	x	x	x	x
20	Pipe; Orientation	<ul style="list-style-type: none"> ■ Pipe: "Horizontal", "Vertical" ■ Orientation: <ul style="list-style-type: none"> – "left", "right", "top/bottom" for horizontal pipes – "upwards", "downwards", "upwards/downwards" for vertical pipes Additionally, the angle of the differential pressure taps must be selected See chapter "Mounting positions" (page 13). For tap angles according to DIN see page 26.	x	x	x		x
30	Orifice	Defines: <ul style="list-style-type: none"> ■ the pressure rating of the orifice plate ■ the material of the orifice plate For the temperature limits of the materials see page 18.				x	
40	Process Connection; Orifice	Defines: <ul style="list-style-type: none"> ■ the pressure rating of the mounting flange or the carrier ring ■ the material of the flange or carrier ring ■ the material of the orifice plate For the temperature limits of the materials see page 18. Example: Selection BAN -> PN6 B1, C22.8; 316L means: PN6: pressure rating of the flange/carrier ring B1: form of the gasket surface C22.8: material of the flange/carrier ring 316L: material of the orifice plate	x	x	x		x
50	Thickness	Defines the thickness of the orifice plate.					x
60	Carrier length; Material	Defines: <ul style="list-style-type: none"> ■ the thickness of the carrier ring (length L on page 42) ■ the material of the carrier ring 		x	x		
70	<ul style="list-style-type: none"> ■ Seal ■ Seal Annular Chamber 	Defines the type of seal <ul style="list-style-type: none"> ■ between the orifice plate and the flange (for DO61W) ■ between the orifice plate and the carrier ring (for DO63C and DO65F) 	x		x		x
80	Inlet Edge Orifice	Defines the type of the inlet edge of the orifice (see page 28).	x	x	x	x	x
90	Vent/Drain	Defines if the orifice plate has a vent hole or drain hole (see page 29).	x	x	x	x	x
100	Diff. Pressure Connection; Seal	Defines: <ul style="list-style-type: none"> ■ the type of differential pressure connection (see page 30) ■ the material of the seal at the differential pressure connection 	x	x	x		x

Feature	Name	Description	valid for				
			DO61W	DO62C	DO63C	DO64P	DO65F
Accessory: Condensate Chambers							
200	2x Condens. Chamber Mat.; Volume; PN	Defines: <ul style="list-style-type: none"> ■ the material of the condensate chambers ■ the volume of the condensate chambers ■ the pressure rating of the condensate chambers For details see page 70.  Note! If "not selected" is chosen, no condensate chambers are included in the order. In this case "not needed" has to be selected in the features 210 to 230.	x	x	x		x
210	Filling Cap Condens. Chamber	Defines the type of filling cap (see page 70).	x	x	x		x
220	Inlet	Defines the inlet (from the process) of the condensate chamber (see page 30).	x	x	x		x
230	Outlet	Defines the outlet of the condensate chamber (see page 30).	x	x	x		x
Accessory: Shut-off valve							
250	2 x Shut-Off Valve; Gasket	Defines: <ul style="list-style-type: none"> ■ the type of shut-off valve ■ the material of the gasket For details see page 67.  Note! If "not selected" is chosen, no shut-off valves are included in the order. In this case "not needed" has to be selected in the features 260 to 280.	x	x	x		x
260	Material Shut-Off Valve	Defines the material of the shut-off valve. For the temperature limits of the materials see page 18.	x	x	x		x
270	Inlet Shut-Off Valve	Defines the inlet (from the process) of the shut-off valve (see page 30).	x	x	x		x
280	Outlet Shut-Off Valve	Defines the outlet of the shut-off valve (see page 30).	x	x	x		x
Accessory: Manifold							
300	Manifold Version	Defines the manifold version (see page 72 ff.)  Note! If "not selected" is chosen, no manifold is included in the order. In this case "not needed" has to be selected in the features 310 to 330.	x	x	x		x
310	Gasket Manifold	Defines the material of the gasket of the manifold. For the temperature limits of the materials see page 18.	x	x	x		x
320	Process Connection Manifold	Defines the process connection of the manifold (see page 30).	x	x	x		x
330	Seal Manifold, Screws	Defines: <ul style="list-style-type: none"> ■ The material of the seal between the manifold and the transmitter ■ The size of the manifold screws For the temperature limits of the materials see page 18.  Caution! The manifold screws must be selected in accordance with the Deltabar differential pressure transmitter.	x	x	x		x
Differential pressure transmitter							
450	DP-Transmitter Deltabar	Defines if a Deltabar differential pressure transmitter is included in the order.	x	x	x		x
Additional options							
500	Add. Option Orifice	These features are used to define additional characteristics of the respective components (e.g. material inspection certificates). The features are optional, which means: <ul style="list-style-type: none"> ■ It is not necessary to select an option in these features. ■ Multiple options can be selected in these features. 	x	x	x		x
520	Add. Option Condens. Chamber		x	x	x		x
530	Add. Option Shut-Off Valve		x	x	x		x
540	Add. Option Manifold		x	x	x		x
550	Add. Option General		x	x	x	x	x

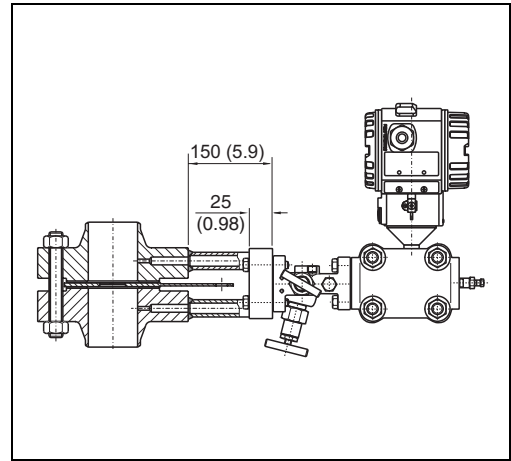
Deltatop DO61W: Flange tap

Typical configurations



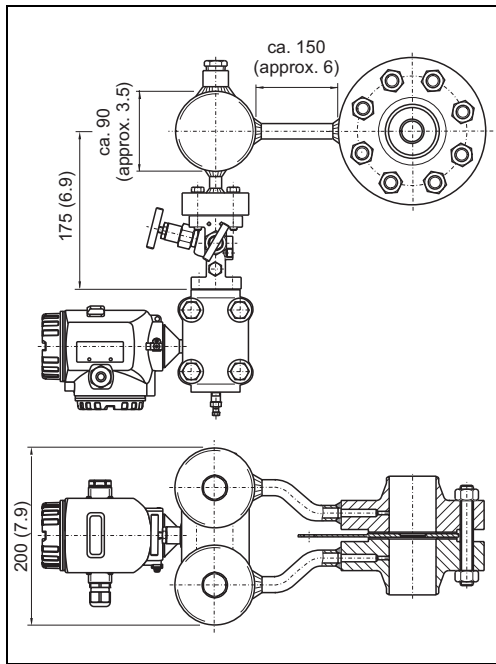
P01-DOxxxxxx-06-xx-00-xx-006

For liquids and gases in horizontal pipes;
dimensions in mm (inch)



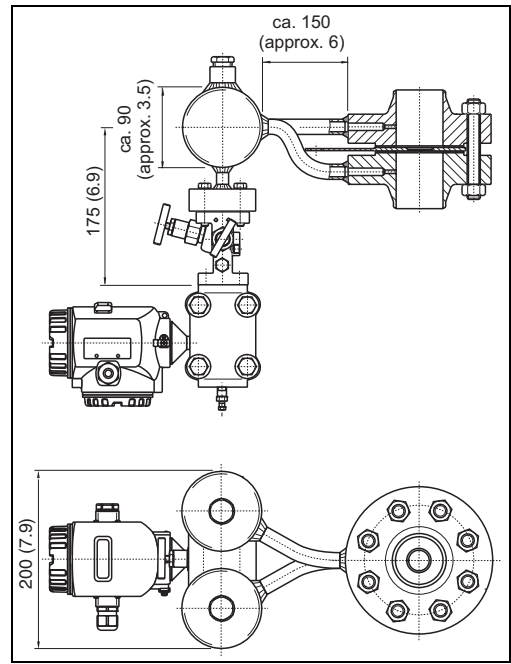
P01-DOxxxxxx-06-xx-00-xx-007

For liquids and gases in vertical pipes;
dimensions in mm (inch)



P01-DOxxxxxx-06-xx-00-xx-008

For steam in horizontal pipes;
dimensions in mm (inch)



P01-DOxxxxxx-06-xx-00-xx-009

For steam in vertical pipes;
dimensions in mm (inch)

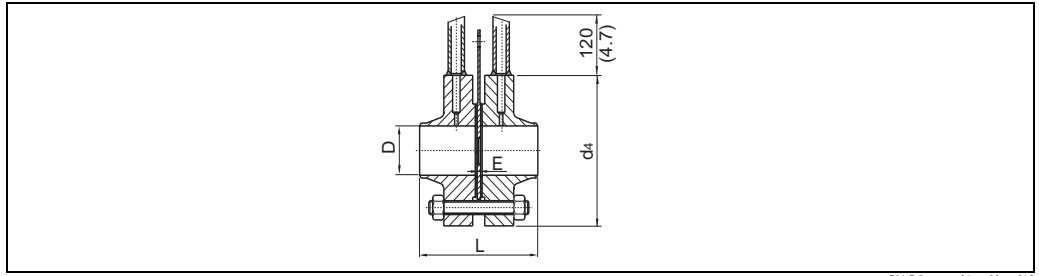
Design Measuring flange with exchangeable orifice plate in compact or remote design; accessories included

Type of pressure tapping Flange tapping

Materials

	Version High-carbon steel (C-22.8, A105)	Stainless steel (316L)
Flanges DIN	C22.8 (1.0460)	316L (1.4404)
Flanges ASME	A105	316L
Orifice plate	316L (1.4404)	316L (1.4404)
Seal between orifice plate and flange	<ul style="list-style-type: none"> ■ Standard (Klingsil or graphite, depending on the application) ■ Spiral seal: 316L/graphite 	

Dimensions; Weight



P01-DOxxxxx-06-xx-00-xx-010

DO61W Flanges according to DIN 19214										
Version	D (mm)	L [mm (inch)]							E ¹⁾ [mm (inch)]	Weight ²⁾ [kg (lbs)]
		PN10	PN16	PN25	PN40	PN64	PN100	PN160		
DO61W50	50	133 (5.24)	133 (5.24)	135 (5.31)	135 (3.31)	150 (5.91)	159 (6.26)	³⁾	3 (0.118)	16 (35)
DO61W65	65	133 (5.24)	133 (5.24)	139 (5.47)	139 (5.47)	162 (6.38)	170 (6.69)	³⁾	3 (0.118)	18 (40)
DO61W80	80	140 (5.51)	140 (5.51)	148 (5.83)	148 (5.83)	167 (6.57)	170 (6.69)	³⁾	4 (0.157)	21 (46)
DO61W1H	100	144 (5.67)	144 (5.67)	162 (6.38)	162 (6.38)	175 (6.89)	191 (7.52)	³⁾	4 (0.157)	27 (60)
DO61W1Z	125	146 (5.75)	146 (5.75)	164 (6.46)	164 (6.46)	187 (7.36)	222 (8.74)	³⁾	4 (0.157)	37 (82)
DO61W1F	150	146 (5.75)	146 (5.75)	174 (6.85)	174 (6.85)	201 (7.91)	242 (9.53)	³⁾	4 (0.157)	49 (108)
DO61W2H	200	156 (6.14)	156 (6.14)	180 (7.09)	188 (7.40)	232 (9.13)	272 (10.7)	³⁾	4 (0.157)	77 (170)
DO61W2F	250	164 (6.46)	168 (6.61)	192 (7.56)	217 (8.54)	262 (10.3)	326 (11.8)	³⁾	4 (0.157)	107 (236)
DO61W3H	300	164 (6.46)	180 (7.09)	196 (7.72)	237 (9.33)	292 (11.5)	352 (13.9)	³⁾	4 (0.157)	131 (189)
DO61W3F	350	164 (6.46)	184 (7.24)	257 (10.1)	257 (10.1)	312 (12.3)	390 (15.4)	³⁾	4 (0.157)	177 (390)
DO61W4H	400	172 (6.77)	186 (7.32)	277 (10.9)	277 (10.9)	332 (13.1)			4 (0.157)	215 (474)
DO61W4F	450	³⁾	³⁾	³⁾	³⁾				³⁾	³⁾
DO61W5H	500	176 (6.93)	194 (7.64)	289 (11.4)	289 (11.4)				6 (0.236)	245 (540)
DO61W6H	600	³⁾	³⁾	³⁾	³⁾				³⁾	³⁾

- 1) minimum values; the precise value is determined during the sizing
- 2) The weight depends on the inner diameter of the pipe. The table gives only approximate values.
- 3) in preparation; following DIN19214

DO61W Flanges according to ASME B16.36												
Version	D [inch]	L [mm (inch)]					E ¹⁾ [mm (inch)]	Weight ²⁾ [kg (lbs)]				
		Cl. 300	Cl. 600	Cl. 900	Cl. 1500	Cl. 2500		Cl. 300	Cl. 600	Cl. 900	Cl. 1500	Cl. 2500
DO61W25	1	175 (6.9)	175 (6.9)		156 (6.1)	188 (7.4)	3 (0.118)	15 (33)	15 (33)		12 (26)	16 (32)
DO61W40	1½	181(7.1)	181(7.1)		175 (6.9)	232 (9.1)	3 (0.118)	17 (37)	17 (37)		18 (40)	34 (75)
DO61W50	2	179 (7.0)	179 (7.0)		213 (8.4)	264 (10.4)	3 (0.118)	19 (42)	19 (42)		34 (75)	57 (125)
DO61W65	2½	184 (7.2)	184 (7.2)		220 (8.7)	296 (11.7)	3 (0.118)	23 (51)	23 (51)		49 (108)	71 (156)
DO61W80	3	184 (7.2)	197 (7.6)	213 (8.4)	245 (9.6)	347 (13.7)	3 (0.118)	31 (68)	31 (68)	42 (92)	65 (143)	128 (282)
DO61W1H	4	190 (7.5)	222 (8.7)	239 (9.4)	258 (10.2)	391 (15.4)	3 (0.118)	45 (99)	66 (146)	69 (152)	99 (218)	197 (433)
DO61W1Z	5	207 (8.1)	248 (9.8)	264 (10.4)	321 (12.6)	467 (18.4)	3 (0.118)	57 (126)	102 (225)	117 (257)	177 (389)	333 (733)
DO61W1F	6	207 (8.1)	254 (10.0)	289 (11.4)	353 (13.9)	556 (21.9)	3 (0.118)	67 (148)	118 (260)	150 (330)	225 (495)	516 (1135)
DO61W2H	8	228 (9.0)	286 (11.3)	334 (13.1)	435 (17.1)	645 (25.4)	6 (0.236)	93 (205)	165 (364)	238 (524)	375 (825)	789 (1736)
DO61W2F	10	241 (9.5)	324 (12.8)	378 (14.9)	518 (20.4)	848 (33.4)	6 (0.236)	129 (284)	265 (584)	354 (779)	618 (1360)	1464 (3221)
DO61W3H	12	266 (10.5)	330 (13.0)	410 (16.1)	575 (22.6)	³⁾	6 (0.236)	192 (423)	321 (708)	441 (970)	939 (2066)	³⁾
DO61W3F	14	292 (11.5)	350 (13.8)	435 (17.1)	607 (23.9)		6 (0.236)	260 (573)	470 (1036)	543 (1195)	1278 (2812)	
DO61W4H	16	301 (11.8)	379 (15.0)	442 (17.4)	632 (24.9)		10 (0.394)	345 (761)	638 (1407)	675 (1485)	1701 (3742)	
DO61W4F	18	328 (12.9)	391 (15.4)	467 (18.4)	664 (26.1)		10 (0.394)	420 (924)	680 (1496)	924 (2033)	2211 (4864)	
DO61W5H	20	333 (13.1)	403 (15.9)	502 (19.8)	721 (28.4)		10 (0.394)	510 (1124)	927 (2044)	1128 (2482)	2790 (6138)	
DO61W6H	24	345 (13.6)	429 (16.9)	594 (23.4)	823 (32.4)		12 (0.472)	667 (1470)	1257 (2771)	2040 (4488)	4530 (9966)	

1) minimum values; the precise value is determined during the sizing

2) The weight depends on the inner diameter of the pipe. The table gives only approximate values.

3) in preparation

Versions

Version	Nominal Diameter
DO61W25	1"
DO61W40	1-1/2"
DO61W50	DN50 / 2"
DO61W65	DN65 / 2-1/2"
DO61W80	DN80 / 3"
DO61W1H	DN100 / 4"
DO61W1Z	DN125 / 5"
DO61W1F	DN150 / 6"
DO61W2H	DN200 / 8"
DO61W2F	DN250 / 10"
DO61W3H	DN300 / 12"
DO61W3F	DN350 / 14"
DO61W4H	DN400 / 16"
DO61W4F	DN450 / 18"
DO61W5H	DN500 / 20"
DO61W6H	DN600 / 24"

Product structure

10	Application; Version
B	Gas; remote
C	Gas; compact
D	Liquid; remote
E	Liquid; compact
F	Steam; remote
G	Steam; compact
Y	special version, to be specified
20	Pipe; Orientation
B	Horizontal; left
C	Horizontal; right
E	Horizontal; top/bottom 0° tap
F	Horizontal; top/bottom tap angle DIN
G	Horizontal; 180° tap
M	Vertical upwards; 0° tap
N	Vertical upwards; 90° tap
P	Vertical downwards; 0° tap
R	Vertical downwards ; 90° tap
S	Vertical upwards/downwards 0° tap
T	Vertical upwards/downwards 90° tap
Y	special version, to be specified
40	Process Connection; Orifice
EN flanges	
BBN	PN10 B1, C22.8; 316L
BBS	PN10 B1, 316L; 316LL
BCN	PN16 B1, C22.8; 316L
BCS	PN16 B1, 316L; 316LL
BDN	PN25 B1, C22.8; 316L
BDS	PN25 B1, 316L; 316L
BEN	PN40 B1, C22.8; 316L
BES	PN40 B1, 316L; 316L
BFN	PN63 B2, C22.8; 316L
BFS	PN63 B2, 316L; 316L
BGN	PN100 B2, C22.8; 316L
BGS	PN100 B2, 316L; 316L
BHN	PN160 E, C22.8; 316L
BHS	PN160 E, 316L; 316L
ANSI flanges	
FBQ	Cl.300 RF, A105; 316L
FBS	Cl.300 RF, 316L; 316L
FCQ	Cl.600 RF, A105; 316L
FCS	Cl.600 RF, 316L; 316L
FDQ	Cl.900 RF, A105; 316L
FDS	Cl.900 RF, 316L; 316L
FEQ	Cl.1500 RF, A105; 316L
FES	Cl.1500 RF, 316L; 316L
FFQ	Cl.2500 RF, 316L; 316L
FFS	Cl.2500 RF, 316L; 316L

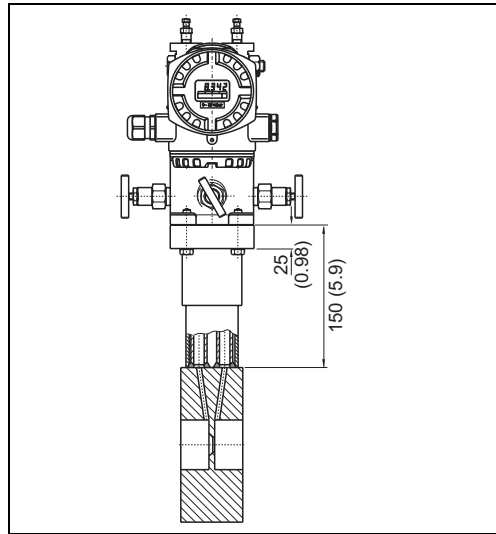
40	Process Connection; Orifice
FKQ	Cl.900 RTJ, A105; 316L
FKS	Cl.900 RTJ, 316L; 316L
FLQ	Cl.1500 RTJ, A105; 316L
FLS	Cl.1500 RTJ, 316L; 316L
FMQ	Cl.2500 RTJ, A105; 316L
FMS	Cl.2500 RTJ, 316L; 316L
Y99	special version, to be specified
70	Seal
1	Standard
2	Spiral, 316L/Graphite
9	special version, to be specified
80	Inlet Edge Orifice
R	Sharp, Re>5000
S	Quarter circle nozzle, Re 500-5000
U	Segmental orifice
W	Bidirectional
Y	special version, to be specified
90	Vent/Drain
A	not selected
B	vent hole
C	drain hole
Y	special version, to be specified
100	Diff. Pressure Connection; Seal
B	IEC61518; PTFE
C	IEC61518; FKM
D	IEC61518 cranked, humid gas; PTFE
E	IEC61518 cranked, humid gas; FKM
F	FNPT; w/o
G	Wwelding conn. compact (steam); w/o
H	Tap, MNPT1/2; w/o
K	Tap, pipe 12mm; w/o
L	Welding conn. 21,3mm; w/o
T	Tap, G1/2 DIN19207; w/o
Y	special version, to be specified
200	2x Condens. Chamber Mat.; Volume; PN
1	not selected
2	H11 (265 GH); 300cm ³ ; PN100
3	316L, 300cm ³ , PN100
5	16Mo3, 250cm ³ , PN250
9	special version, to be specified
210	Filling Cap Condens. Chamber
A	not needed
B	NPT1/2
Y	special version, to be specified
220	Input Condens. Chamber
A	not needed
E	Welding conn. 21,3mm
H	Welding conn. compact (steam)
V	G1/2 DIN19207 steel + 2x flange
W	G1/2 DIN19207 stainl. steel + 2x flange
Y	special version, to be specified
230	Output Condens. Chamber
A	not needed
E	Welding conn. 21,3mm
H	Welding conn. compact (steam)
M	Tap, 12mm
N	Tap, G1/2 DIN19207
R	IEC61518, PTFE
S	IEC61518, FKM
Y	special version, to be specified
250	2x Shut-Off Valve; Gasket
1	not selected
2	Valve; PTFE gasket <200°C/392°F

250	2x Shut-Off Valve; Gasket
3	Valve; pure graphite gasket <300°C/572°F
4	Valve HT; pure graphite gasket >300°C/572°F
9	special version, to be specified
260	Material Shut-Off Valve
A	not needed
C	C22.8
D	316Ti
G	16Mo3
Y	special version, to be specified
270	Input Shut-Off Valve
A	not needed
B	Ermeto 12S
C	FNPT 1/2
E	Welding conn. 21,3mm
V	G1/2 DIN19207 steel + 2x flange
W	G1/2 DIN19207 stainl. steel + 2x flange
Y	special version, to be specified
280	Output Shut-Off Valve
A	not needed
B	Cutting ring (Ermeto 12S)
C	FNPT1/2
L	Welding conn. 14mm
Y	special version, to be specified
300	Manifold Version
111	not selected
AA1	3 valve, steel, forging
AA2	3 valve, 316Ti, forging
AB1	3 valve, steel, milled
AB2	3 valve, 316L, milled
BB1	5 valve, steel, milled, vent
BB2	5 valve, 316L, milled, vent
CA1	5 valve, steel, forging, purge valve
CA2	5 valve, 316Ti, forging, purge valve
DA1	5 valve HT, steel, 16Mo3, forging, purge valve
DA2	5 valve HT, 316Ti, forging, purge valve
KA1	3 valve, steel, forging, IEC61518, both side
KA2	3 valve, 316Ti, forging, IEC61518, both side
LA2	5 valve, 316Ti, forging, IEC61518 both side, vent
YY9	special version, to be specified
310	Gasket Manifold
A	not needed
B	PTFE, 200 °C
C	PTFE/pure graphite, HT
Y	special version, to be specified
320	Process Connection Manifold
A	not needed
B	FNPT1/2
C	Cutting ring (Ermeto 12S)
D	Welding conn. 14mm
E	IEC61518
Y	special version, to be specified
330	Seal Manifold; Screws
A	not needed
B	PTFE; UNF7/16, max PN420
C	PTFE; M10, max PN160
D	Viton; UNF7/16, max PN420
E	Viton; M10, max PN160
F	Viton; M12, max PN420
Y	special version, to be specified
450	DP-Transmitter Deltabar
D	Provided, sep. item
W	not provided

500	Add. Option Orifice (optional; multiple options can be selected)
A1	EN10204-3.1 material (wetted parts) inspection certificate
A2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
A3	EN10204-3.2 material (wetted parts) inspection certificate
A4	PMI test
A5	Cleaned fromn oil+grease
A6	Oxygen service
A7	Cleaned for silicone-free service
520	Add. Option Condensation Chamber (optional; multiple options can be selected)
C1	EN10204-3.1 material (wetted parts) inspection certificate
C2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
C3	EN10204-3.2 material (wetted parts) inspection certificate
C4	PMI test
530	Add. Option Shut-Off Valve (optional; multiple options can be selected)
D1	EN10204-3.1 material (wetted parts) inspection certificate
D2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
D3	EN10204-3.2 material (wetted parts) inspection certificate
D4	PMI test
D5	Cleaned from oil+grease
D6	Oxygen service
D7	Cleaned for silicone-free service
540	Add. Option Manifold (optional; multiple options can be selected)
E1	EN10204-3.1 material (wetted parts) inspection certificate
E2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
E3	EN10204-3.2 material (wetted parts) inspection certificate
E4	PMI test
E5	Cleaned from oil+grease
E6	Oxygen service
E7	Cleaned for silicone-free service
550	Add. Option General (optional; multiple options can be selected)
F8	Pressure test + certificate
895	Marking
Z1	Tagging (TAG), see additional spec.

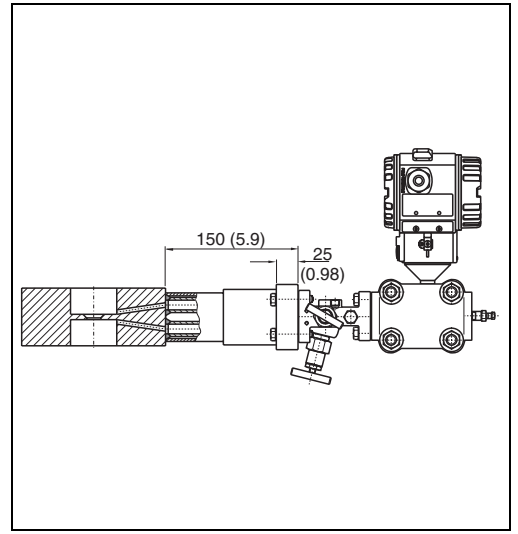
Deltatop DO62C: Corner tap

Typical configurations



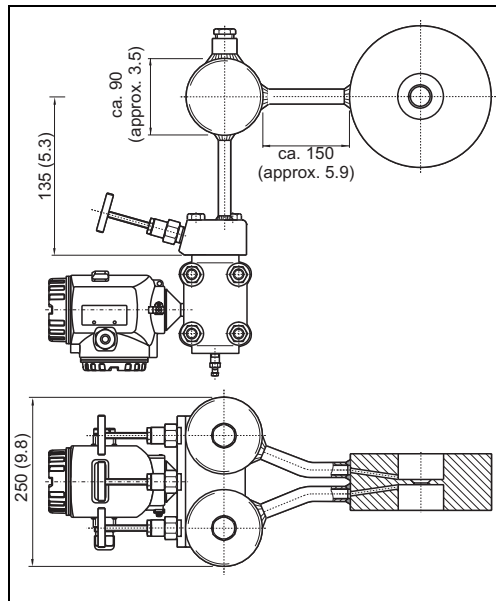
P01-DOxxxxxx-06-xx-00-xx-011

For liquids and gases in horizontal pipes;
Dimensions in mm (inch)



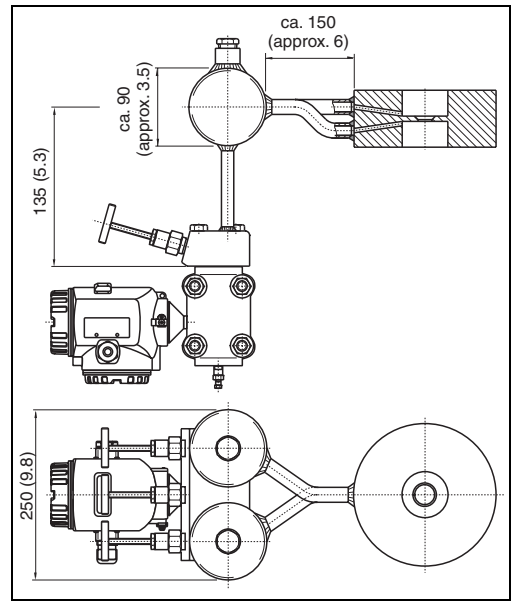
P01-DOxxxxxx-06-xx-00-xx-012

For liquids and gases in vertical pipes;
Dimensions in mm (inch)



P01-DOxxxxxx-06-xx-00-xx-013

For steam in horizontal pipes;
Dimensions in mm (inch)



P01-DOxxxxxx-06-xx-00-xx-014

For steam in horizontal pipes;
Dimensions in mm (inch)

Design

Undivided standard orifice with carrier ring in compact or remote design; accessories included

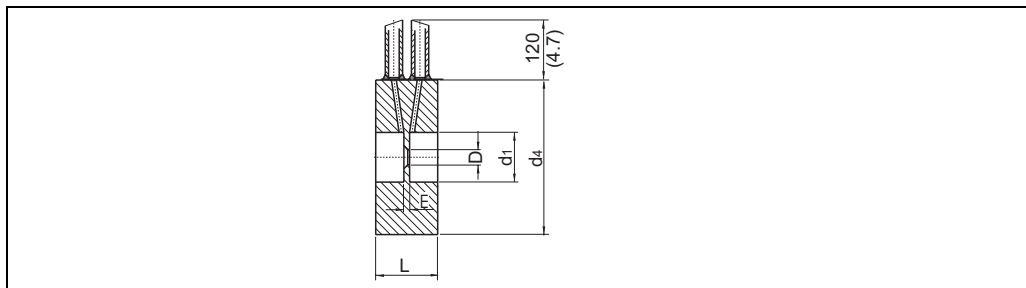
Type of pressure tapping

Corner tapping with single bore

Materials

	High carbon steel	Stainless steel	High temperature version
Carrier ring DIN	C22.8 (1.0460)	316L (1.4404)	16Mo3 (1.5415)
Carrier ring ASME	C22.8	316L	A182 Gr. F1
Orifice plate	316L (1.4404)	316L (1.4404)	316L (1.4404)

Dimensions



P01-DOxxxxx-06-xx-00-xx-015

Dimensions in mm (inch)

DO62C/DO63C Flanges according to DIN EN											
Version	d ₄ [mm (inch)]									E [mm (inch)]	d ₁
	D [mm]	PN6 ¹⁾	PN10 ¹⁾	PN16 ¹⁾	PN25 ¹⁾	PN40 ¹⁾	PN63 ¹⁾	PN100 ¹⁾	PN160 ²⁾		
DO62C25	25	64 (2.52)	71 (2.80)	71 (2.80)	71 (2.80)	71 (2.80)	82 (3.23)	82 (3.23)	82 (3.23)	3 (0,118)	D + 1 mm (1 mm = 0.0394")
DO62C40	40	86 (3.39)	92 (3.62)	92 (3.62)	92 (3.62)	92 (3.62)	103 (4.29)	103 (4.29)	103 (4.29)	3 (0,118)	
DO62C50	50	96 (3.78)	107 (4.21)	107 (4.21)	107 (4.21)	107 (4.21)	112 (4.41)	119 (4.69)	119 (4.69)	3 (0,118)	
DO62C65	65	116 (4.57)	127 (5.00)	127 (5.00)	127 (5.00)	127 (5.00)	137 (5.39)	143 (5.63)	143 (5.63)	3 (0,118)	
DO62C80	80	132 (5.20)	142 (5.59)	142 (5.59)	142 (5.59)	142 (5.59)	147 (5.79)	153 (6.02)	153 (6.02)	3 (0,118)	
DO62C1H	100	152 (5.98)	162 (6.38)	162 (6.38)	167 (6.57)	167 (6.57)	173 (6.81)	180 (7.09)	180 (7.09)	3 (0,118)	
DO62C1Z	125	182 (7.17)	192 (7.56)	192 (7.56)	193 (7.60)	193 (7.60)	210 (8.27)	217 (8.54)	217 (8.54)	3 (0,118)	
DO62C1F	150	207 (8.15)	217 (8.54)	217 (8.54)	223 (8.78)	223 (8.78)	247 (9.72)	257 (10.1)	257 (10.1)	3 (0,118)	D + 2 mm (2 mm = 0.0787")
DO62C2H	200	262 (10.3)	272 (10.7)	272 (10.7)	283 (11.1)	290 (11.4)	309 (12.2)	324 (12.8)	324 (12.8)	4 (0.157)	
DO62C2F	250	317 (12.5)	327 (12.9)	328 (12.9)	340 (13.4)	352 (13.9)	364 (14.3)	391 (15.4)	388 (15.3)	4 (0.157)	
DO62C3H	300	372 (14.6)	377 (14.8)	383 (15.1)	400 (15.7)	417 (16.4)	424 (16.7)	458 (18.0)	458 (18.0)	4 (0.157)	
DO62C3F	350	422 (16.6)	437 (17.2)	443 (17.4)	457 (18.0)	474 (18.7)	486 (19.1)	512 (20.2)		4 (0.157)	
DO62C4H	400	472 (18.6)	488 (19.2)	495 (19.5)	514 (20.2)	546 (21.5)	543 (21.4)	572 (22.5)		4 (0.157)	D + 4 mm (4 mm = 0.157")
DO62C4F	450	527 (20.7)	538 (21.1)	557 (21.9)	565 (22.2)					4 (0.157)	
DO62C5H	500	577 (22.7)	593 (23.3)	617 (24.3)	625 (24.6)	628 (24.7)	657 (25.9)	704 (27.7)		6 (0.236)	
DO62C6H	600	678 (26.7)	695 (27.4)	734 (28.9)	731 (28.8)	747 (29.4)	764 (30.1)			6 (0.236)	
DO62C7H	700	783 (30.8)	810 (31.9)	804 (31.7)	833 (32.8)					8 (0.315)	
DO62C8H	800	890 (35.0)	917 (36.1)	911 (35.9)	942 (37.1)					8 (0.315)	
DO62C9H	900	990 (39.0)	1017 (40.0)	1011 (39.8)	1042 (41.0)					8 (0.315)	
DO62C1T	1000	1090 (42.9)	1124 (44.3)	1128 (44.4)	1154 (45.4)					10 (0.394)	

1) according to EN 1092-1

2) according to DIN 2638

DO62C/DO63C Flanges according to ASME B16.5 and ASME B16.47 Series A									
Version	d ₄ [mm (inch)]							E [mm (inch)]	d ₁
	D [inch]	Cl. 150	Cl. 300	Cl. 600	Cl. 900	Cl. 1500	Cl. 2500		
DO62C25	1	67 (2.6)	73 (2.9)	73 (2.9)	79 (3.1)	79 (3.1)	86 (3.4)	3 (0,118)	D + 1 mm (1 mm = 0.0394")
DO62C40	1½	86 (3.4)	95 (3.7)	95 (3.7)	98 (3.9)	98 (3.9)	117 (4.6)	3 (0,118)	
DO62C50	2	105 (4.1)	111 (4.4)	111 (4.4)	143 (5.6)	143 (5.6)	146 (5.7)	3 (0,118)	
DO62C65	2½	124 (4.9)	130 (5.1)	130 (5.1)	165 (6.5)	165 (6.5)	168 (6.6)	3 (0,118)	
DO62C80	3	137 (5.4)	149 (5.9)	149 (5.9)	168 (6.6)	175 (6.9)	197 (7.8)	3 (0,118)	
DO62C1H	4	175 (6.9)	181 (7.1)	194 (7.6)	206 (8.1)	210 (8.3)	235 (9.3)	3 (0,118)	
DO62C1Z	5	197 (7.8)	216 (8.5)	241 (9.5)	248 (9.8)	254 (10.0)	279 (11.0)	3 (0,118)	D + 2 mm (2 mm = 0.0787")
DO62C1F	6	222 (8.8)	251 (9.9)	267 (10.5)	289 (11.4)	283 (11.1)	318 (12.5)	3 (0,118)	
DO62C2H	8	279 (11.0)	308 (12.1)	321 (12.6)	359 (14.1)	352 (13.8)	387 (15.2)	4 (0.157)	
DO62C2F	10	340 (13.3)	362 (14.3)	400 (15.7)	435 (17.1)	435 (17.1)	476 (18.7)	4 (0.157)	
DO62C3H	12	410 (16.1)	422 (16.6)	457 (18.0)	499 (19.6)	521 (20.5)	549 (21.6)	4 (0.157)	
DO62C3F	14	451 (17.8)	486 (19.1)	492 (19.4)	521 (20.5)	578 (22.8)		4 (0.157)	
DO62C4H	16	514 (20.3)	540 (21.3)	565 (22.2)	575 (22.6)	641 (25.2)		4 (0.157)	D + 4 mm (4 mm = 0.157")
DO62C4F	18	549 (21.6)	597 (23.5)	613 (24.1)	638 (25.1)	705 (27.8)		4 (0.157)	
DO62C5H	20	606 (23.9)	654 (25.7)	683 (26.9)	699 (27.5)	756 (29.8)		6 (0.236)	
DO62C6H	24	718 (27.9)	775 (30.5)	791 (31.1)	838 (32.0)	902 (35.5)		6 (0.236)	
DO62C7H	28	832 (32.8)	898 (35.4)	915 (36.0)	946 (37.3)			6 (0.236)	
DO62C8H	32	940 (37.0)	1006 (39.6)	1022 (40.2)	1073 (42.3)			8 (0.315)	
DO62C9H	36	1048 (41.3)	1118 (44.0)	1130 (44.5)	1200 (47.2)			8 (0.315)	
DO62C1T	40	1162 (45.7)	1114 (43.9)	1156 (45.5)	1251 (49.3)			10 (0.394)	

Weight

Version	Weight ¹⁾ [kg (lbs)]		
	L = 25 mm (0.98")	L = 40 mm (1.57")	L = 65 mm (2.56")
DO62C25	2)	2)	
DO62C40	2)	2)	
DO62C50	4 (8)	6 (13)	10 (22)
DO62C65	4,2 (9)	6,3 (14)	10,5 (23)
DO62C80	4,8 (10)	7,2 (16)	12 (26)
DO62C1H	5,2 (11)	7,8 (17)	13 (29)
DO62C1Z	5,6 (12)	8,4 (18)	14 (31)
DO62C1F	6 (13)	9 (20)	15 (33)
DO62C2H	7,2 (16)	10,8 (24)	18 (40)
DO62C2F	8,8 (19)	13,2 (29)	22 (49)
DO62C3H	10,8 (24)	16,2 (36)	27 (60)
DO62C3F	12,4 (27)	18,6 (41)	31 (68)
DO62C4H	13,2 (29)	19,8 (44)	33 (73)
DO62C4F	2)	2)	2)
DO62C5H	14,8 (33)	22,2 (49)	37 (82)
DO62C6H	18 (40)	27 (60)	45 (99)
DO62C7H	22,8 (50)	34,2 (75)	57 (126)
DO62C8H	26,8 (59)	40,2 (88)	67 (148)
DO62C9H	30,8 (68)	46,2 (102)	77 (170)
DO62C1T	35,2 (77)	52,8 (116)	88 (194)

1) The weight depends on the inner diameter of the pipe. The table gives only approximate values.

2) in preparation

Versions

Variante	nominal diamter
DO62C25	DN25 / 1"
DO62C40	DN40 / 1-1/2"
DO62C50	DN50 / 2"
DO62C65	DN65 / 2-1/2"
DO62C80	DN80 / 3"
DO62C1H	DN100 / 4"
DO62C1Z	DN125 / 5"
DO62C1F	DN150 / 6"
DO62C2H	DN200 / 8"
DO62C2F	DN250 / 10"
DO62C3H	DN300 / 12"
DO62C3F	DN350 / 14"
DO62C4H	DN400 / 16"
DO62C4F	DN450 / 18"
DO62C5H	DN500 / 20"
DO62C6H	DN600 / 24"
DO62C7H	DN700 / 28"
DO62C8H	DN800 / 32"
DO62C9H	DN900 / 36"
DO62C1T	DN1000 / 40"

Product structure

10	Application; Version
B	Gas; remote
C	Gas; compact
D	Liquid; remote
E	Liquid; compact
F	Steam; remote
G	Steam; compact
Y	special version, to be specified
20	Pipe; Orientation
B	Horizontal; left
C	Horizontal; right
E	Horizontal; top/bottom 0deg tap
F	Horizontal; top/bottom tap angle DIN
G	Horizontal; 180deg tap
M	Vertical upwards; 0deg tap
N	Vertical upwards; 90deg tap
P	Vertical downwards; 0deg tap
R	Vertical downwards; 90deg tap
S	Vertical upwards/downwards; 0deg tap
T	Vertical upwards/downwards; 90deg tap
Y	special version, to be specified
40	Carrier Ring; Orifice
EN flanges	
BAN	PN6 B1, C22.8; 316L
BAS	PN6 B1, 316L; 316L
BAU	PN6 B1, 16Mo3; 316L
BBN	PN10 B1, C22.8; 316L
BBS	PN10 B1, 316L; 316LL
BBU	PN10 B1, 16Mo3; 316L
BCN	PN16 B1, C22.8; 316L
BCS	PN16 B1, 316L; 316LL
BCU	PN16 B1, 16Mo3; 316L
BDN	PN25 B1, C22.8; 316L
BDS	PN25 B1, 316L; 316L
BDU	PN25 B1, 16Mo3; 316L
BEN	PN40 B1, C22.8; 316L
BES	PN40 B1, 316L; 316L
BEU	PN40 B1, 16Mo3; 316L
BFN	PN63 B2, C22.8; 316L
BFS	PN63 B2, 316L; 316L
BFU	PN63 B2, 16Mo3; 316L
BGN	PN100 B2, C22.8; 316L
BGS	PN100 B2, 316L; 316L
BGU	PN100 B2, 16Mo3; 316L

40	Carrier Ring; Orifice
BHN	PN160 E, C22.8; 316L
BHS	PN160 E, 316L; 316L
BHU	PN160 E, 16Mo3; 316L
	ANSI flanges
FAN	Cl.150 RF, C22.8; 316L
FAS	Cl.150 RF, 316L; 316L
FAW	Cl.150 RF, A182 Gr.F1; 316L
FBN	Cl.300 RF, C22.8; 316L
FBS	Cl.300 RF, 316L; 316L
FBW	Cl.300 RF, A182 Gr.F1; 316L
FCN	Cl.600 RF, C22.8; 316L
FCS	Cl.600 RF, 316L; 316L
FCW	Cl.600 RF, A182 Gr.F1; 316L
FDN	Cl.900 RF, C22.8; 316L
FDS	Cl.900 RF, 316L; 316L
FDW	Cl.900 RF, A182 Gr.F1; 316L
FEN	Cl.1500 RF, C22.8; 316L
FES	Cl.1500 RF, 316L; 316L
FEW	Cl.1500 RF, A182 Gr.F1; 316L
FFN	Cl.2500 RF, C22.8; 316L
FFS	Cl.2500 RF, 316L; 316L
FFW	Cl.2500 RF, A182 Gr.F1; 316L
FKN	Cl.900 RTJ, C22.8; 316L
FKS	Cl.900 RTJ, 316L; 316L
FKW	Cl.900 RTJ, A182 Gr.F1; 316L
FLN	Cl.1500 RTJ, C22.8; 316L
FLS	Cl.1500 RTJ, 316L; 316L
FLW	Cl.1500 RTJ, A182 Gr.F1; 316L
FMN	Cl.2500 RTJ, C22.8; 316L
FMS	Cl.2500 RTJ, 316L; 316L
FMW	Cl.2500 RTJ, A182 Gr.F1; 316L
Y99	special version, to be specified
60	Carrier Length; Material
A1	25mm, C22.8
A2	25mm, 316L
A3	25mm, 16Mo3
B1	40mm, C22.8
B2	40mm, 316L
B3	40mm, 16Mo3
C1	65mm, C22.8
C2	65mm, 316L
C3	65mm, 16Mo3
Y9	special version, to be specified
80	Inlet Edge Orifice
R	Sharp, Re>5000
S	Quarter circle nozzle, Re 500-5000
T	Conical entrance, Re 50-500
U	Segmental orifice
W	Bidirectional
Y	special version, to be specified
90	Vent/Drain
A	not selected
B	Vent hole
C	Drain hole
Y	special version, to be specified
100	Diff. Pressure Connection; Seal
B	IEC61518; PTFE
C	IEC61518; FKM
D	IEC61518 cranked, humid gas; PTFE
E	IEC61518 cranked, humid gas; FKM
G	Welding conn. compact (steam); w/o
H	Tap, MNPT1/2; w/o
K	Tap, pipe 12mm; w/o
L	Welding conn. 21,3mm; w/o
M	Tap, welding conn. 17,2mm; w/o
T	Tap, G1/2 DIN19207; w/o

100	Diff. Pressure Connection; Seal
Y	special version, to be specified
200	2x Condens. Chamber Mat.; Volume; PN
1	not selected
2	HII (265 GH); 300cm ³ ; PN100
3	316L, 300cm ³ , PN100
5	16Mo3, 250cm ³ , PN250
9	special version, to be specified
210	Filling Cap Condens. Chamber
A	not needed
B	NPT1/2
Y	special version, to be specified
220	Input Condens. Chamber
A	not needed
E	Welding conn. 21,3mm
H	Welding conn. compact (steam)
K	Tap, welding conn. 17,2mm
V	G1/2 DIN19207 steel + 2x flange
W	G1/2 DIN19207 stainl. steel + 2x flange
Y	special version, to be specified
230	Output Condens. Chamber
A	not needed
E	Welding conn. 21,3mm
H	Welding conn. compact (steam)
M	Tap, 12mm
N	Tap, G1/2 DIN19207
R	IEC61518, PTFE
S	IEC61518, FKM
Y	special version, to be specified
250	Shut-Off Valve; Gasket
1	not selected
2	Valve; PTFE gasket <200°C/392°F
3	Valve; pure graphite gasket <300°C/572°F
4	Valve HT; pure graphite gasket >300°C/572°F
9	special version, to be specified
260	Material Shut-Off Valve
A	not needed
C	C22.8
D	316Ti
G	16Mo3
Y	special version, to be specified
270	Input Shut-Off Valve
A	not needed
B	Ermeto 12S
C	FNPT 1/2
E	Welding conn. 21,3mm
K	Tap, welding conn. 17,2mm
V	G1/2 DIN19207 steel + 2x flange
W	G1/2 DIN19207 stainl. steel + 2x flange
Y	special version, to be specified
280	Output Shut-Off Valve
A	not needed
B	Cutting ring (Ermeto 12S)
C	FNPT1/2
L	Welding conn. 14mm
Y	special version, to be specified
300	Manifold Version
111	not selected
AA1	3 valve, steel, forging
AA2	3 valve, 316Ti, forging
AB1	3 valve, steel, milled
AB2	3 valve, 316L, milled
BB1	5 valve, steel, milled, vent
BB2	5 valve, 316L, milled, vent

300	Manifold Version
CA1	5 valve, steel, forging, purge valve
CA2	5 valve, 316Ti, forging, purge valve
DA1	5 valve HT, steel, 16Mo3, forging, purge valve
DA2	5 valve HT, 316Ti, forging, purge valve
KA1	3 valve, steel, forging, IEC61518, both side
KA2	3 valve, 316Ti, forging, IEC61518, both side
LA2	5 valve, 316Ti, forging, IEC61518 both side, vent
YY9	special version, to be specified
310	Gasket Manifold
A	not needed
B	PTFE, 200°C/392°F
C	PTFE/pure graphite, HT
Y	special version, to be specified
320	Process Connection Manifold
A	not needed
B	FNPT1/2
C	Cutting ring (Ermeto 12S)
D	Welding conn. 14mm
E	IEC61518
Y	special version, to be specified
330	Seal Manifold; Screws
A	not needed
B	PTFE; UNF7/16, max PN420
C	PTFE; M10, max PN160
D	Viton; UNF7/16, max PN420
E	Viton; M10, max PN160
F	Viton; M12, max PN420
Y	special version, to be specified
450	DP-Transmitter Deltabar
D	provided, sep. item
W	not provided
500	Add. Option Orifice (optional; multiple options can be selected)
A1	EN10204-3.1 material (wetted parts) inspection certificate
A2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
A3	EN10204-3.2 material (wetted parts) inspection certificate
A4	PMI test
A5	Cleaned from oil+grease
A6	Oxygen service
A7	Cleaned for silicone-free service
520	Add. Option Condensation Chamber (optional; multiple options can be selected)
C1	EN10204-3.1 material (wetted parts) inspection certificate
C2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
C3	EN10204-3.2 material (wetted parts) inspection certificate
C4	PMI test
530	Add. Option Shut-Off Valve (optional; multiple options can be selected)
D1	EN10204-3.1 material (wetted parts) inspection certificate
D2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
D3	EN10204-3.2 material (wetted parts) inspection certificate
D4	PMI test
D5	Cleaned from oil+grease
D6	Oxygen service
D7	Cleaned for silicone-free service
540	Add. Option Manifold (optional; multiple options can be selected)
E1	EN10204-3.1 material (wetted parts) inspection certificate
E2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
E3	EN10204-3.2 material (wetted parts) inspection certificate
E4	PMI test
E5	Cleaned from oil+grease
E6	Oxygen service
E7	Cleaned for silicone-free service

550	Add. Option General (optional; multiple options can be selected)
F8	Pressure test + certificate
895	Marking
Z1	Tagging (TAG), see additional spec.

Deltatop DO63C: Annular chamber

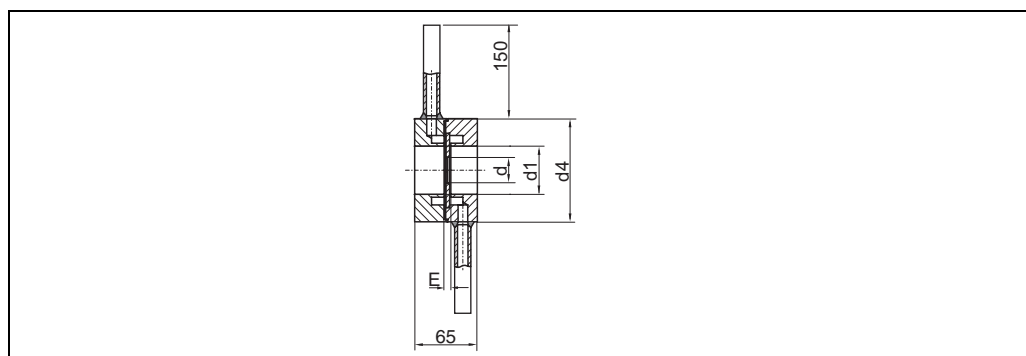
Design Three-piece orifice with carrier rings in compact or remote design; accessories included

Type or pressure tapping Corner tapping with annular chamber

Materials

	High-carbon steel	Stainless steel
Carrier ring DIN	C22.8 (1.0460)	316L (1.4404)
Carrier ring ASME	C22.8	316L
Orifice plate	316L (1.4404)	316L (1.4404)
Seal between orifice plate and carrier ring	<ul style="list-style-type: none"> ■ Standard (Klingsil or graphite, depending on the application) ■ spiral seal 316L/graphite 	

Dimensions



For the dimensions refer to the tables of DO62C (page 42).

Versions

Version	nominal diameter
DO63C50	DN50 / 2"
DO63C65	DN65 / 2-1/2"
DO63C80	DN80 / 3"
DO63C1H	DN100 / 4"
DO63C1Z	DN125 / 5"
DO63C1F	DN150 / 6"
DO63C2H	DN200 / 8"
DO63C2F	DN250 / 10"
DO63C3H	DN300 / 12"
DO63C3F	DN350 / 14"
DO63C4H	DN400 / 16"
DO63C4F	DN450 / 18"
DO63C5H	DN500 / 20"
DO63C6H	DN600 / 24"
DO63C7H	DN700 / 28"
DO63C8H	DN800 / 32"
DO63C9H	DN900 / 36"
DO63C1T	DN1000 / 40"

Product structure

10	Application; Version
B	Gas; remote
C	Gas; compact
D	Liquid; remote
E	Liquid; compact
F	Steam; remote
G	Steam; compact
Y	special version, to be specified
20	Pipe; Orientation
B	Horizontal; left
C	Horizontal; right
E	Horizontal; top/bottom 0° tap
F	Horizontal; top/bottom tap angle DIN
G	Horizontal; 180° tap
M	Vertical upwards; 0° tap
N	Vertical upwards; 90° tap
P	Vertical downwards; 0° tap
R	Vertical downwards ; 90° tap
S	Vertical upwards/downwards 0° tap
T	Vertical upwards/downwards 90° tap
Y	special version, to be specified
40	Carrier Ring; Orifice
EN flanges	
BAN	PN6 B1, C22.8; 316L
BAS	PN6 B1, 316L; 316L
BBN	PN10 B1, C22.8; 316L
BBS	PN10 B1, 316L; 316LL
BCN	PN16 B1, C22.8; 316L
BCS	PN16 B1, 316L; 316LL
BDN	PN25 B1, C22.8; 316L
BDS	PN25 B1, 316L; 316L
BEN	PN40 B1, C22.8; 316L
BES	PN40 B1, 316L; 316L
BFN	PN63 B2, C22.8; 316L
BFS	PN63 B2, 316L; 316L
BGN	PN100 B2, C22.8; 316L
BGS	PN100 B2, 316L; 316L
ANSI flanges	
FAN	Cl.150 RF, C22.8; 316L
FAS	Cl.150 RF, 316L; 316L
FBN	Cl.300 RF, C22.8; 316L
FBS	Cl.300 RF, 316L; 316L
FCN	Cl.600 RF, C22.8; 316L
FCS	Cl.600 RF, 316L; 316L
Y99	special version, to be specified

60	Carrier Length
C	65mm
Y	special version, to be specified
70	Seal Annular Chamber
1	Standard
9	special version, to be specified
80	Inlet Edge Orifice
R	Sharp, Re>5000
S	Quarter circle nozzle, Re 500-5000
T	Conical entrance, Re 50-500
W	Bidirectional
Y	special version, to be specified
90	Vent/Drain
A	not selected
Y	special version, to be specified
100	Diff. Pressure Connection; Seal
B	IEC61518; PTFE
C	IEC61518; FKM
D	IEC61518 cranked, humid gas; PTFE
E	IEC61518 cranked, humid gas; FKM
G	Welding conn. compact (steam); w/o
H	Tap, MNPT1/2; w/o
K	Tap, pipe 12mm; w/o
L	Welding conn. 21,3mm; w/o
T	Tap, G1/2 DIN19207; w/o
Y	special version, to be specified
200	2x Condens. Chamber Mat.; Volume; PN
1	not selected
2	HII (265 GH); 300cm ³ ; PN100
3	316L, 300cm ³ , PN100
5	16Mo3, 250cm ³ , PN250
9	special version, to be specified
210	Filling Cap Condens. Chamber
A	not needed
B	NPT1/2
Y	special version, to be specified
220	Input Condens. Chamber
A	not needed
E	Welding conn. 21,3mm
H	Welding conn. compact (steam)
V	G1/2 DIN19207 steel + 2x flange
W	G1/2 DIN19207 stainl. steel + 2x flange
Y	special version, to be specified
230	Output Condens. Chamber
A	not needed
E	Welding conn. 21,3mm
H	Welding conn. compact (steam)
M	Tap, 12mm
N	Tap, G1/2 DIN19207
R	IEC61518, PTFE
S	IEC61518, FKM
Y	special version, to be specified
250	2x Shut-Off Valve; Gasket
1	not selected
2	Valve; PTFE gasket <200°C/392°F
3	Valve; pure graphite gasket <300°C/572°F
4	Valve HT; pure graphite gasket >300°C/572°F
9	special version, to be specified
260	Material Shut-Off Valve
A	not needed
C	C22.8
D	316Ti
G	16Mo3

260	Material Shut-Off Valve
Y	special version, to be specified
270	Input Shut-Off Valve
A	not needed
B	Ermeto 12S
C	FNPT 1/2
E	Welding conn. 21,3mm
V	G1/2 DIN19207 steel + 2x flange
W	G1/2 DIN19207 stainl. steel + 2x flange
Y	special version, to be specified
280	Output Shut-Off Valve
A	not needed
B	Cutting ring (Ermeto 12S)
C	FNPT1/2
L	Welding conn. 14mm
Y	special version, to be specified
300	Manifold Version
111	not selected
AA1	3 valve, steel, forging
AA2	3 valve, 316Ti, forging
AB1	3 valve, steel, milled
AB2	3 valve, 316L, milled
BB1	5 valve, steel, milled, vent
BB2	5 valve, 316L, milled, vent
CA1	5 valve, steel, forging, purge valve
CA2	5 valve, 316Ti, forging, purge valve
DA1	5 valve HT, steel, 16Mo3, forging, purge valve
DA2	5 valve HT, 316Ti, forging, purge valve
KA1	3 valve, steel, forging, IEC61518, both side
KA2	3 valve, 316Ti, forging, IEC61518, both side
LA2	5 valve, 316Ti, forging, IEC61518 both side, vent
YY9	special version, to be specified
310	Gasket Manifold
A	not needed
B	PTFE, 200°C/392°F
C	PTFE/pure graphite, HT
Y	special version, to be specified
320	Process Connection Manifold
A	not needed
B	FNPT1/2
C	Cutting ring (Ermeto 12S)
D	Welding conn. 14mm
E	IEC61518
Y	special version, to be specified
330	Seal Manifold; Screws
A	not needed
B	PTFE; UNF7/16, max PN420
C	PTFE; M10, max PN160
D	Viton; UNF7/16, max PN420
E	Viton; M10, max PN160
F	Viton; M12, max PN420
Y	special version, to be specified
450	DP-Transmitter Deltabar
D	Provided, sep. item
W	not provided
500	Add. Option Orifice (optional; multiple options can be selected)
A1	EN10204-3.1 material (wetted parts) inspection certificate
A2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
A3	EN10204-3.2 material (wetted parts) inspection certificate
A4	PMI test
A5	Cleaned from oil+grease
A6	Oxygen service
A7	Cleaned for silicone-free service

520	Add. Option Condensation Chamber (optional; multiple options can be selected)
C1	EN10204-3.1 material (wetted parts) inspection certificate
C2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
C3	EN10204-3.2 material (wetted parts) inspection certificate
C4	PMI test
530	Add. Option Shut-Off Valve (optional; multiple options can be selected)
D1	EN10204-3.1 material (wetted parts) inspection certificate
D2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
D3	EN10204-3.2 material (wetted parts) inspection certificate
D4	PMI test
D5	Cleaned from oil+grease
D6	Oxygen service
D7	Cleaned for silicone-free service
540	Add. Option Manifold (optional; multiple options can be selected)
E1	EN10204-3.1 material (wetted parts) inspection certificate
E2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
E3	EN10204-3.2 material (wetted parts) inspection certificate
E4	PMI test
E5	Cleaned from oil+grease
E6	Oxygen service
E7	Cleaned for silicone-free service
550	Add. Option General (optional; multiple options can be selected)
F8	Pressure test + certificate
895	Marking
Z1	Tagging (TAG), see additional spec.

Deltatop DO64P: Plate

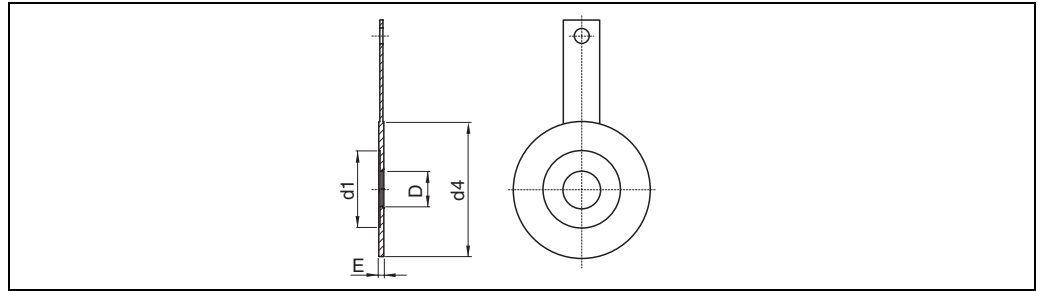
Design Orifice plate for mounting between two flanges

Type of pressure tapping

- Flange tapping
- D-D/2 tapping

Material 316L (1.4404)

Dimensions



P01-DOxxxxxx-06-xx-00-xx-040

DO64P Flanges according to EN 1092-1										
Version	d ₄ [mm (inch)]								E [mm (inch)]	d ₁
	D [mm]	PN6	PN10	PN16	PN25	PN40	PN63	PN100		
DO64P25	25	64 (2.52)	71 (2.80)	71 (2.80)	71 (2.80)	71 (2.80)	82 (3.23)	82 (3.23)	3 (0,118)	D + 1 mm (1 mm = 0.0394")
DO64P40	40	86 (3.39)	92 (3.62)	92 (3.62)	92 (3.62)	92 (3.62)	103 (4.29)	103 (4.29)	3 (0,118)	
DO64P50	50	96 (3.78)	107 (4.21)	107 (4.21)	107 (4.21)	107 (4.21)	112 (4.41)	119 (4.69)	3 (0,118)	
DO64P65	65	116 (4.57)	127 (5.00)	127 (5.00)	127 (5.00)	127 (5.00)	137 (5.39)	143 (5.63)	3 (0,118)	
DO64P80	80	132 (5.20)	142 (5.59)	142 (5.59)	142 (5.59)	142 (5.59)	147 (5.79)	153 (6.02)	3 (0,118)	
DO64P1H	100	152 (5.98)	162 (6.38)	162 (6.38)	167 (6.57)	167 (6.57)	173 (6.81)	180 (7.09)	3 (0,118)	
DO64P1Z	125	182 (7.17)	192 (7.56)	192 (7.56)	193 (7.60)	193 (7.60)	210 (8.27)	217 (8.54)	3 (0,118)	
DO64P1F	150	207 (8.15)	217 (8.54)	217 (8.54)	223 (8.78)	223 (8.78)	247 (9.72)	257 (10.1)	3 (0,118)	D + 2 mm (2 mm = 0.0787")
DO64P2H	200	262 (10.3)	272 (10.7)	272 (10.7)	283 (11.1)	290 (11.4)	309 (12.2)	324 (12.8)	4 (0.157)	
DO64P2F	250	317 (12.5)	327 (12.9)	328 (12.9)	340 (13.4)	352 (13.9)	364 (14.3)	391 (15.4)	4 (0.157)	
DO64P3H	300	372 (14.6)	377 (14.8)	383 (15.1)	400 (15.7)	417 (16.4)	424 (16.7)	458 (18.0)	4 (0.157)	D + 4 mm (4 mm = 0.157")
DO64P3F	350	422 (16.6)	437 (17.2)	443 (17.4)	457 (18.0)	474 (18.7)	486 (19.1)	512 (20.2)	4 (0.157)	
DO64P4H	400	472 (18.6)	488 (19.2)	495 (19.5)	514 (20.2)	546 (21.5)	543 (21.4)	572 (22.5)	4 (0.157)	
DO64P4F	450	527 (20.7)	538 (21.1)	557 (21.9)	565 (22.2)				4 (0.157)	
DO64P5H	500	577 (22.7)	593 (23.3)	617 (24.3)	625 (24.6)	628 (24.7)	657 (25.9)	704 (27.7)	6 (0.236)	
DO64P6H	600	678 (26.7)	695 (27.4)	734 (28.9)	731 (28.8)	747 (29.4)	764 (30.1)		6 (0.236)	
DO64P7H	700	783 (30.8)	810 (31.9)	804 (31.7)	833 (32.8)				8 (0.315)	
DO64P8H	800	890 (35.0)	917 (36.1)	911 (35.9)	942 (37.1)				8 (0.315)	
DO64P9H	900	990 (39.0)	1017 (40.0)	1011 (39.8)	1042 (41.0)				8 (0.315)	
DO64P1T	1000	1090 (42.9)	1124 (44.3)	1128 (44.4)	1154 (45.4)				10 (0.394)	

DO64P									
Flanges according to ASME B16.5 and ASME B16.47 Series A									
Version	D [inch]	d ₄ [mm (inch)]						E [mm (inch)]	d ₁
		Cl. 150	Cl. 300	Cl. 600	Cl. 900	Cl. 1500	Cl. 2500		
DO64P25	1	67 (2.6)	73 (2.9)	73 (2.9)	79 (3.1)	79 (3.1)	86 (3.4)	3 (0,118)	D + 1 mm (1 mm = 0.0394")
DO64P40	1½	86 (3.4)	95 (3.7)	95 (3.7)	98 (3.9)	98 (3.9)	117 (4.6)	3 (0,118)	
DO64P50	2	105 (4.1)	111 (4.4)	111 (4.4)	143 (5.6)	143 (5.6)	146 (5.7)	3 (0,118)	
DO64P65	2½	124 (4.9)	130 (5.1)	130 (5.1)	165 (6.5)	165 (6.5)	168 (6.6)	3 (0,118)	
DO64P80	3	137 (5.4)	149 (5.9)	149 (5.9)	168 (6.6)	175 (6.9)	197 (7.8)	3 (0,118)	
DO64P1H	4	175 (6.9)	181 (7.1)	194 (7.6)	206 (8.1)	210 (8.3)	235 (9.3)	3 (0,118)	
DO64P1Z	5	197 (7.8)	216 (8.5)	241 (9.5)	248 (9.8)	254 (10.0)	279 (11.0)	3 (0,118)	D + 2 mm (2 mm = 0.0787")
DO64P1F	6	222 (8.8)	251 (9.9)	267 (10.5)	289 (11.4)	283 (11.1)	318 (12.5)	3 (0,118)	
DO64P2H	8	279 (11.0)	308 (12.1)	321 (12.6)	359 (14.1)	352 (13.8)	387 (15.2)	4 (0.157)	
DO64P2F	10	340 (13.3)	362 (14.3)	400 (15.7)	435 (17.1)	435 (17.1)	476 (18.7)	4 (0.157)	
DO64P3H	12	410 (16.1)	422 (16.6)	457 (18.0)	499 (19.6)	521 (20.5)	549 (21.6)	4 (0.157)	
DO64P3F	14	451 (17.8)	486 (19.1)	492 (19.4)	521 (20.5)	578 (22.8)		4 (0.157)	
DO64P4H	16	514 (20.3)	540 (21.3)	565 (22.2)	575 (22.6)	641 (25.2)		4 (0.157)	D + 4 mm (4 mm = 0.157")
DO64P4F	18	549 (21.6)	597 (25.5)	613 (24.1)	638 (25.1)	705 (27.8)		4 (0.157)	
DO64P5H	20	606 (23.9)	654 (25.7)	683 (26.9)	699 (27.5)	756 (29.8)		6 (0.236)	
DO64P6H	24	718 (27.9)	775 (30.5)	791 (31.1)	838 (32.0)	902 (35.5)		6 (0.236)	
DO64P7H	28	832 (32.8)	898 (35.4)	915 (36.0)	946 (37.3)			6 (0.236)	
DO64P8H	32	940 (37.0)	1006 (39.6)	1022 (40.2)	1073 (42.3)			8 (0.315)	
DO64P9H	36	1048 (41.3)	1118 (44.0)	1130 (44.5)	1200 (47.2)			8 (0.315)	
DO64P1T	40	1162 (45.7)	1114 (43.9)	1156 (45.5)	1251 (49.3)			10 (0.394)	

Versions

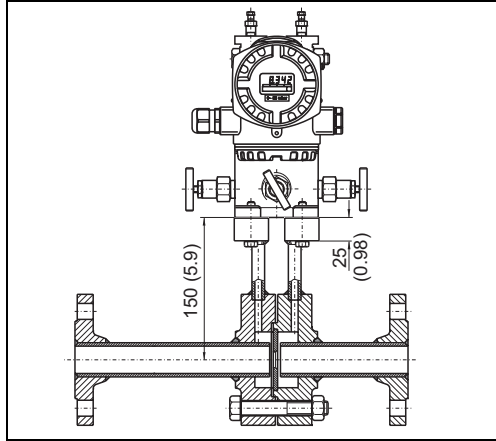
Version	nominal diameter
DO64P25	1"
DO64P40	1-1/2"
DO64P50	DN50 / 2"
DO64P65	DN65 / 2-1/2"
DO64P80	DN80 / 3"
DO64P1H	DN100 / 4"
DO64P1Z	DN125 / 5"
DO64P1F	DN150 / 6"
DO64P2H	DN200 / 8"
DO64P2F	DN250 / 10"
DO64P3H	DN300 / 12"
DO64P3F	DN350 / 14"
DO64P4H	DN400 / 16"
DO64P4F	DN450 / 18"
DO64P5H	DN500 / 20"
DO64P6H	DN600 / 24"
DO64P7H	DN700 / 28"
DO64P8H	DN800 / 32"
DO64P9H	DN900 / 36"
DO64P1T	DN1000 / 40"

Product structure

10	Version
M	Orifice flange tapping
N	Orifice tapping D + D/2
Y	special version, to be specified
30	Orifice
	EN flanges
BAC	PN6 B1, 316L
BBC	PN10 B1, 316L
BCC	PN16 B1, 316L
BDC	PN25 B1, 316L
BEC	PN40 B1, 316L
BFC	PN63 B2, 316L
BGC	PN100 B2, 316L
	ANSI flanges
FAC	Cl.150 RF, 316L
FBC	Cl.300 RF, 316L
FCC	Cl.600 RF, 316L
FDC	Cl.900 RF, 316L
FEC	Cl.1500 RF, 316L
FFC	Cl.2500 RF, 316L
FKC	Cl.900 RTJ, 316L
FLC	Cl.1500 RTJ, 316L
FMC	Cl.2500 RTJ, 316L
Y99	special version, to be specified
50	Thickness
1	Standard
9	special version, to be specified
80	Inlet Edge Orifice
R	Sharp, Re>5000
S	Quarter circle nozzle, Re 500-5000
T	Conical entrance, Re 50-500
U	Segmental orifice
W	Bidirectional
Y	special version, to be specified
90	Vent/Drain
A	not selected
B	Vent hole
C	Drain hole
Y	special version, to be specified
550	Add. Option General (option; multiple options can be selected)
F1	EN10204-3.1 material (wetted parts) inspection certificate
F2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
F4	PMI test
F5	Cleaned from oil+grease
F6	Oxygen service
F7	Cleaned for silicone-free service
895	Marking
Z1	Tagging (TAG), see additional spec.

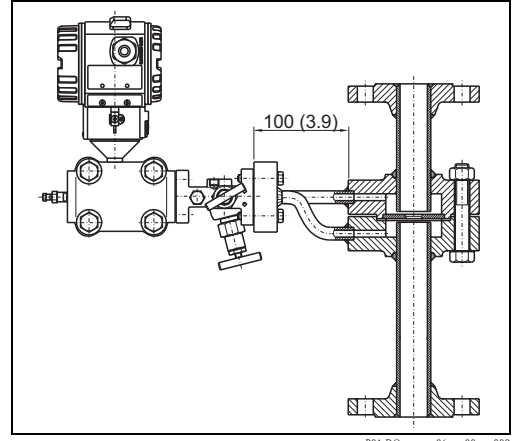
Deltatop DO65F: Meter Run

Typical configurations



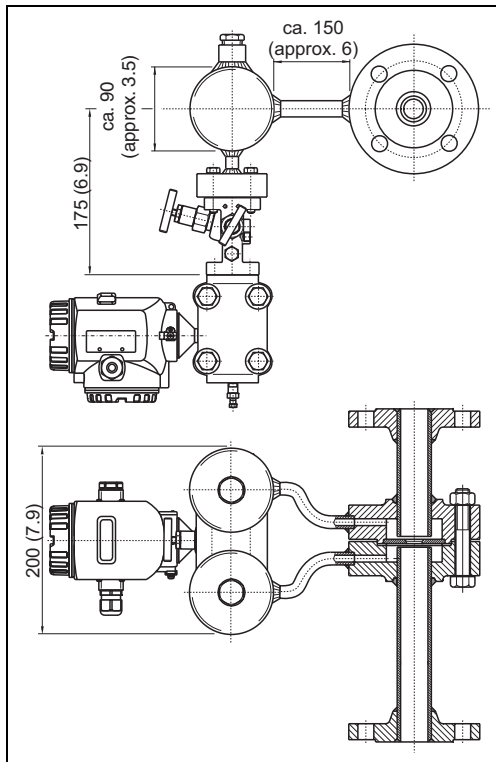
P01-DOxxxxxx-06-xx-00-xx-001

For liquids and gases in horizontal pipes;
Dimensions in mm (inch)



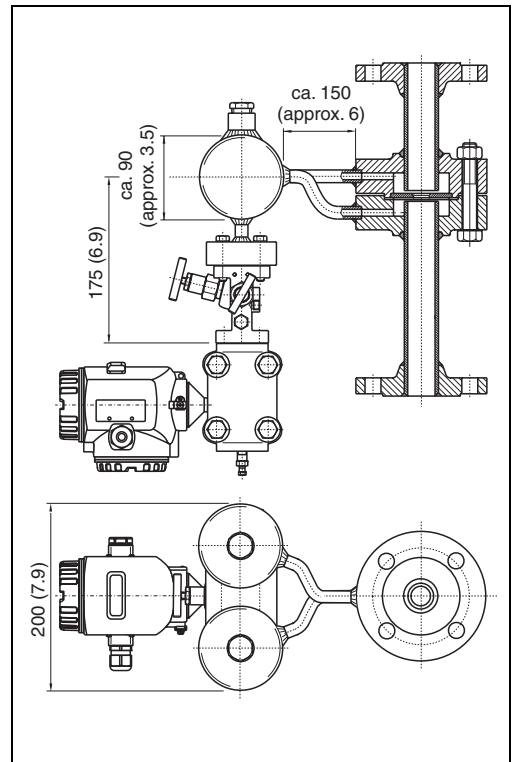
P01-DOxxxxxx-06-xx-00-xx-002

For liquids and gases in vertical pipes;
Dimensions in mm (inch)



P01-DOxxxxxx-06-xx-00-xx-003

For steam in horizontal pipes;
Dimensions in mm (inch)



P01-DOxxxxxx-06-xx-00-xx-004

For steam in vertical pipes;
Dimensions in mm (inch)

Design Meter run with standard orifice in compact or remote version; accessories included

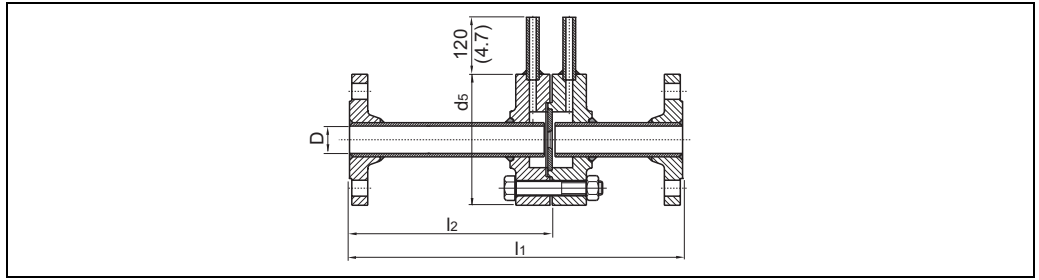
- Up to PN1900 / Cl.900: three-piece standard orifice
- From PN160 / Cl. 1500: completely welded version

Type of pressure tapping Corner tapping with annular chamber

Materials

	High-carbon	Stainless steel	High temperature version
Meter run DIN (pipe)	St35.8 (1.0305)	316L (1.4404)	16Mo3 (1.5415)
Annular chamber and flanges DIN	C22.8 (1.0460)	316L (1.4404)	16Mo3 (1.5415)
Meter run ASME (pipe)	A106	316L	
Annular chamber ASME	C22.8	316L	
Flanges ASME	A105	316L	
Orifice plate	316L (1.4404)	316L (1.4404)	316L (1.4404)
Seal between orifice plate and carrier ring	<ul style="list-style-type: none"> ■ standard (Klingsil or graphite, depending on the application) ■ welded 		<ul style="list-style-type: none"> ■ standard (graphite) ■ welded

Dimensions; weight



P01-DOxxxxx-06-xx-00-xx-005

Version	D	l ₁ [mm (inch)]	l ₂ [mm(inch)]	Weight [kg (lbs)]
DO65F10	DN10; 3/8"	400 (15.7)	230 (9.06)	ca. 11 (approx. 24)
DO65F15	DN15; 1/2"	550 (21.7)	380 (14.9)	ca. 12 (approx. 26)
DO65F20	DN20; 3/4"	700 (27.6)	500 (19.7)	ca. 16 (approx. 35)
DO65F25	DN25; 1"	900 (35.4)	650 (25.6)	ca. 19 (approx. 42)
DO65F32	DN32; 1¼"	1100 (43.3)	800 (31.5)	ca. 22 (approx. 49)
DO65F40	DN40; 1½"	1300 (51.2)	1000 (39.4)	ca. 25 (approx. 55)
DO65F50	DN50; 2"	1)	1	1

1) in preparation

Version	d ₅ [mm (inch)]							
	Cl. 150	Cl. 300 Cl. 600	Cl. 1500	Cl. 2500	PN6	PN16 PN40	PN63 PN100	PN160
DO65F10	1)	1	1	1	75 (2.9)	90 (3.5)	100 (3.9)	1
DO65F15	88,9 (3.5)	95,2 (3.75)	1	1	80 (3.1)	95 (3.7)	105 (4.1)	1
DO65F20	98,6 (3.9)	117,3 (4.6)	1	1	90 (3.5)	105 (4.1)	1	1
DO65F25	108,0 (4.25)	124,0 (4.9)	1	1	100 (3.9)	115 (4.5)	140 (5.5)	1
DO65F32	1	1	1	1	120 (4.7)	140 (5.5)	155 (6.1)	1
DO65F40	127,0 (5.0)	155,4 (6.1)	1	1	130 (5.1)	150 (5.9)	170 (6.7)	1
DO65F50	1	1	1	1	1	1	1	1

1) in preparation

Versions	Version	Nominal Diameter; Overall Length
	DO65F10	DN10 / 3/8", 400mm
DO65F15	DN15 / 1/2", 500 mm	
DO65F20	DN20 / 3/4", 700mm	
DO65F25	DN25 / 1", 900mm	
DO65F32	DN32 / 1-1/4", 1100mm	
DO65F40	DN40 / 1-1/2", 1300	
DO65F50	DN50 / 2", 1500mm	

Product structure	10	Application; Version
	B	Gas; remote
C	Gas; compact	
D	Liquid; remote	
E	Liquid; compact	
F	Steam; remote	
G	Steam; compact	
Y	special version, to be specified	
20	Pipe; Orientation	
B	Horizontal; left	
C	Horizontal; right	
E	Horizontal; top/bottom 0° tap	
F	Horizontal; top/bottom tap angle DIN	
G	Horizontal; 180° tap	
M	Vertical upwards; 0° tap	
N	Vertical upwards; 90° tap	
P	Vertical downwards; 0° tap	
R	Vertical downwards ; 90° tap	
S	Vertical upwards/downwards 0° tap	
T	Vertical upwards/downwards 90° tap	
Y	special version, to be specified	
40	Process Connection; Orifice	
	EN flanges	
BAN	PN6 B1, C22.8; 316L	
BAS	PN6 B1, 316L; 316L	
BCN	PN16 B1, C22.8; 316L	
BCS	PN16 B1, 316L; 316LL	
BEN	PN40 B1, C22.8; 316L	
BES	PN40 B1, 316L; 316L	
BFN	PN63 B2, C22.8; 316L	
BFS	PN63 B2, 316L; 316L	
BGN	PN100 B2, C22.8; 316L	
BCS	PN100 B2, 316L; 316L	
BGU	PN100 B2, 16Mo3; 316L	
BHN	PN160 E, C22.8; 316L	
BHS	PN160 E, 316L; 316L	
BHU	PN160 E, 16Mo3; 316L	
	ANSI flanges	
FAQ	Cl.150 RF, A105; 316L	
FAS	Cl.150 RF, 316L; 316L	
FBQ	Cl.300 RF, A105; 316L	
FBS	Cl.300 RF, 316L; 316L	
FCQ	Cl.600 RF, A105; 316L	
FCS	Cl.600 RF, 316L; 316L	
FEQ	Cl.1500 RF, A105; 316L	
FES	Cl.1500 RF, 316L; 316L	
FFQ	Cl.2500 RF, A105; 316L	
FFS	Cl.2500 RF, 316L; 316L	
FLQ	Cl.1500 RTJ, A105; 316L	
FLS	Cl.1500 RTJ, 316L; 316L	
FMQ	Cl.2500 RTJ, A105; 316L	
FMS	Cl.2500 RTJ, 316L; 316L	
Y99	special version, to be specified	
70	Seal Annular Chamber	
1	Sandard	
9	special version, to be specified	

80	Inlet Edge Orifice
R	Sharp, Re>5000
S	Quarter circlenozzle, Re 500-5000
T	Conical entrance, Re 50-500
W	Bidirectional
Y	special version, to be specified
90	Vent/Drain
A	not selected
Y	special version, to be specified
100	Diff. Pressure Connection; Seal
B	IEC61518; PTFE
C	IEC61518; FKM
D	IEC61518 cranked, humid gas; PTFE
E	IEC61518 cranked, humid gas; FKM
G	Welding conn. compact (steam); w/o
H	Tap, MNPT1/2; w/o
K	Tap, pipe 12mm; w/o
L	Welding conn. 21,3mm; w/o
T	Tap, G1/2 DIN19207; w/o
Y	special version, to be specified
200	2x Condens. Chamber Mat.; Volume; PN
1	not selected
2	HII (265 GH); 300cm ³ ; PN100
3	316L, 300cm ³ , PN100
5	16Mo3, 250cm ³ , PN250
9	special version, to be specified
210	Filling Cap Condens. Chamber
A	not needed
B	NPT1/2
Y	special version, to be specified
220	Input Condens. Chamber
A	not needed
E	Welding conn. 21,3mm
H	Welding conn. compact (steam)
V	G1/2 DIN19207 steel + 2x flange
W	G1/2 DIN19207 stainl. steel + 2x flange
Y	special version, to be specified
230	Output Condens. Chamber
A	not needed
E	Welding conn. 21,3mm
H	Welding conn. compact (steam)
M	Tap, 12mm
N	Tap, G1/2 DIN19207
R	IEC61518, PTFE
S	IEC61518, FKM
Y	special version, to be specified
250	2x Shut-Off Valve; Gasket
1	not selected
2	Valve; PTFE gasket <200°C/392°F
3	Valve; pure graphite gasket <300°C/572°F
4	Valve HT; pure graphite gasket >300°C/572°F
9	special version, to be specified
260	Material Shut-Off Valve
A	not needed
C	C22.8
D	316Ti
G	16Mo3
Y	special version, to be specified
270	Input Shut-Off Valve
A	not needed
B	Ermeto 12S
C	FNPT 1/2
E	Welding conn. 21,3mm
V	G1/2 DIN19207 steel + 2x flange

270	Input Shut-Off Valve
W	G1/2 DIN19207 stainl. steel + 2x flange
Y	special version, to be specified
280	Output Shut-Off Valve
A	not needed
B	Cutting ring (Ermeto 12S)
C	FNPT1/2
L	Welding conn. 14mm
Y	special version, to be specified
300	Manifold Version
111	not selected
AA1	3 valve, steel, forging
AA2	3 valve, 316Ti, forging
AB1	3 valve, steel, milled
AB2	3 valve, 316L, milled
BB1	5 valve, steel, milled, vent
BB2	5 valve, 316L, milled, vent
CA1	5 valve, steel, forging, purge valve
CA2	5 valve, 316Ti, forging, purge valve
DA1	5 valve HT, steel, 16Mo3, forging, purge valve
DA2	5 valve HT, 316Ti, forging, purge valve
KA1	3 valve, steel, forging, IEC61518, both side
KA2	3 valve, 316Ti, forging, IEC61518, both side
LA2	5 valve, 316Ti, forging, IEC61518 both side, vent
YY9	special version, to be specified
310	Gasket Manifold
A	not needed
B	PTFE, 200°C/392°F
C	PTFE/pure graphite, HT
Y	special version, to be specified
320	Process Connection Manifold
A	not needed
B	FNPT1/2
C	Cutting ring (Ermeto 12S)
D	Welding conn. 14mm
E	IEC61518
Y	special version, to be specified
330	Seal Manifold; Screws
A	not needed
B	PTFE; UNF7/16, max PN420
C	PTFE; M10, max PN160
D	Viton; UNF7/16, max PN420
E	Viton; M10, max PN160
F	Viton; M12, max PN420
Y	special version, to be specified
450	DP-Transmitter Deltabar
D	Provided, sep. item
W	not provided
500	Add. Option Orifice (optional; multiple options can be selected)
A1	EN10204-3.1 material (wetted parts) inspection certificate
A2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
A3	EN10204-3.2 material (wetted parts) inspection certificate
A4	PMI test
A5	Cleaned from oil+grease
A6	Oxygen service
A7	Cleaned for silicone-free service
520	Add. Option Condensation Chamber (optional; multiple options can be selected)
C1	EN10204-3.1 material (wetted parts) inspection certificate
C2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
C3	EN10204-3.2 material (wetted parts) inspection certificate
C4	PMI test

530	Add. Option Shut-Off Valve (optional; multiple options can be selected)
D1	EN10204-3.1 material (wetted parts) inspection certificate
D2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
D3	EN10204-3.2 material (wetted parts) inspection certificate
D4	PMI test
D5	Cleaned from oil+grease
D6	Oxygen service
D7	Cleaned for silicone-free service
540	Add. Option Manifold (optional; multiple options can be selected)
E1	EN10204-3.1 material (wetted parts) inspection certificate
E2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
E3	EN10204-3.2 material (wetted parts) inspection certificate
E4	PMI test
E5	Cleaned from oil+grease
E6	Oxygen service
E7	Cleaned for silicone-free service
550	Add. Option General (optional; multiple options can be selected)
FE	Wet calibration
F8	Pressure test + certificate
895	Marking
Z1	Tagging (TAG), see additional spec.

Accessories

Overview

The following accessories are available for the differential-pressure flow measurement with orifices:

- DA61V: Shut-Off Valve (see page 67)
- DA61C: Condensate pot (see page 70)
- DA63M: Manifold (see page 72)
- DA63R: Rectifier (see page 81)

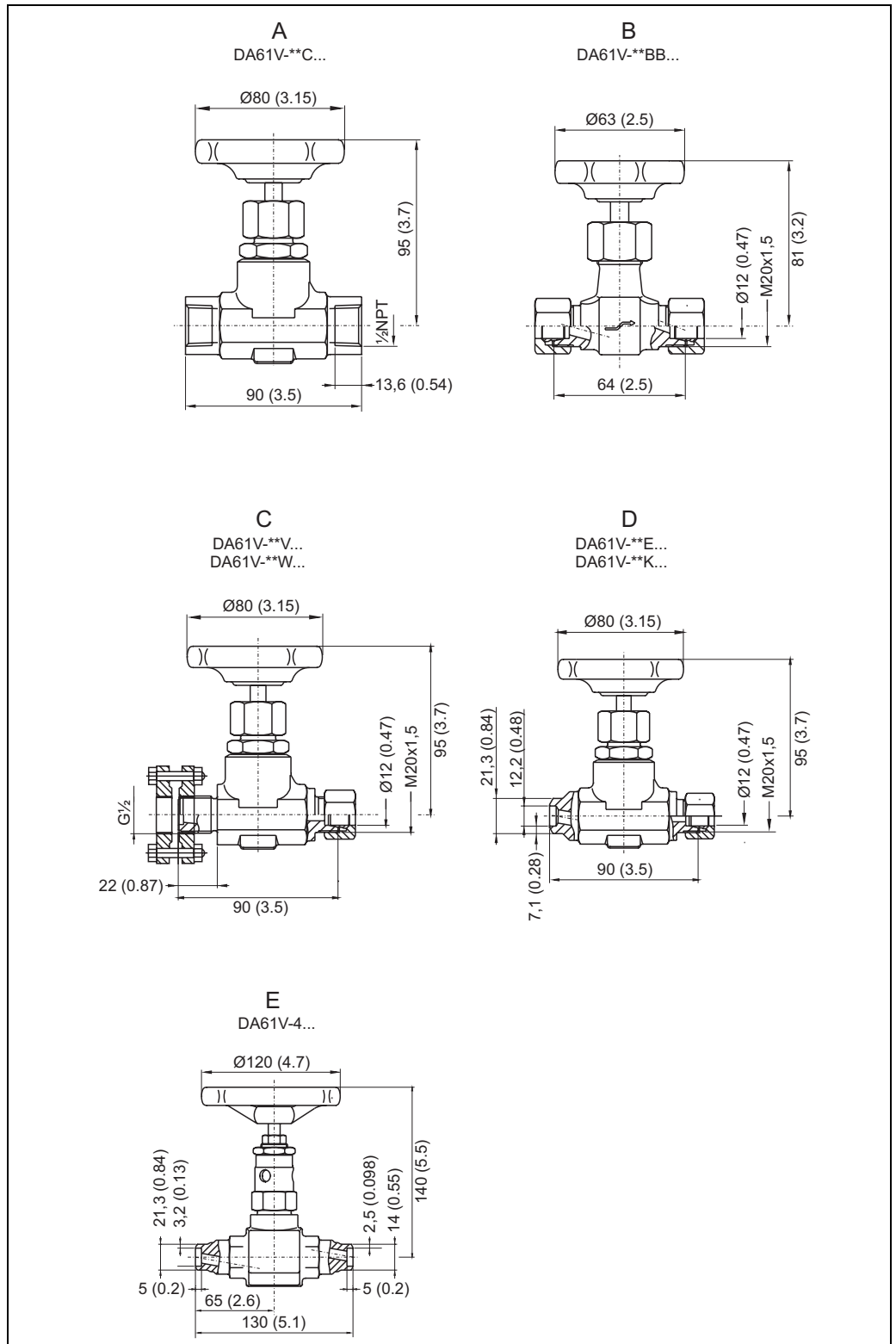
The condensate pots, shut-off valves and manifold can be ordered together with the orifice. They are included in the product structures DO61W, DO62C , DO63C and DO65F.

Alternatively, they can be ordered by their own product structures which are displayed in the following chapters.

The rectifier can only be ordered by its own product structure.

Deltatop DA61V: Shut-Off Valve (accessory)

Dimensions



P01-DOxxxxxx-06-xx-00-xx-023

- A: input FNPT1/2; output FNPT1/2;
- B: input cutting ring; output cutting ring;
- C: input tap DIN19207 and 2 flanges; output cutting ring;
- D: input welding connection; output cutting ring;
- E: high temperature version; input welding connection; output welding connection

Weight

Version ¹⁾	Order code	weight
A	DA61V-**CC*	approx. 0,8 kg (1.8 lbs)
B	DA61V-**BB*	approx. 0,47 kg (1.0 lbs)
C	DA61V-**V** DA61V-**W**	approx. 1,45 kg (3.2 lbs)
D	DA61V-**E** DA61V-**K*	approx. 0,73 kg (1.6 lbs)
E	DA61V-4****	approx. 1,6 kg (3.5 lbs)

1) see figure on page 67

Design

- Body: die-pressed part
- Surface: steel, phosphatized
- stem thread:
 - internal for DA61V-2..., DA61V-3...
 - external for DA61V-4...
- replaceable valve seat
- stem with cold rolled surface, back seat and non-rotating cone tip

Materials

	Feature 260 "Material"		
	C22.8	316Ti	16Mo3
Body	1.0460/C22.8	1.4571/316Ti	1.5415/16Mo3
Valve stem	1.4104	1.4571/316Ti	1.4021
Valve cone	1.4122v.	1.4571/316Ti	1.4122v.

Gasket

- PTFE
- pure graphite

Product structure

250	Version; Gasket
2	Valve; PTFE gasket <200°C/392°F
3	Valve; pure graphite gasket <300°C/572°F
4	Valve HT; pure graphite gasket >300°C/572°F
9	special version, to be specified
260	Material
C	C22.8
D	316Ti
G	16Mo3
Y	special version, to be specified
270	Inlet
B	Ermeto 12S
C	FNPT1/2
E	Welding conn. 21,3mm
K	Tap, welding conn. 17,2mm
V	G1/2 DIN19207 steel + 2x flange; PN160
W	G1/2 DIN19207 stainl. steel + 2x flange; PN160
Y	special version, to be specified
280	Outlet
B	Cutting ring (Ermeto 12S)
C	FNPT1/2
L	Welding conn. 14mm
Y	special version, to be specified
550	Additional Option
F1	EN10204-3.1 material (wetted parts) inspection certificate
F2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
F3	EN10204-3.2 material (wetted parts) inspection certificate
F4	PMI test
F5	Cleaned from oil+grease
F6	Oxygen service
F7	Cleaned for silicone-free service
895	Marking
Z1	Tagging (TAG), see additional spec.



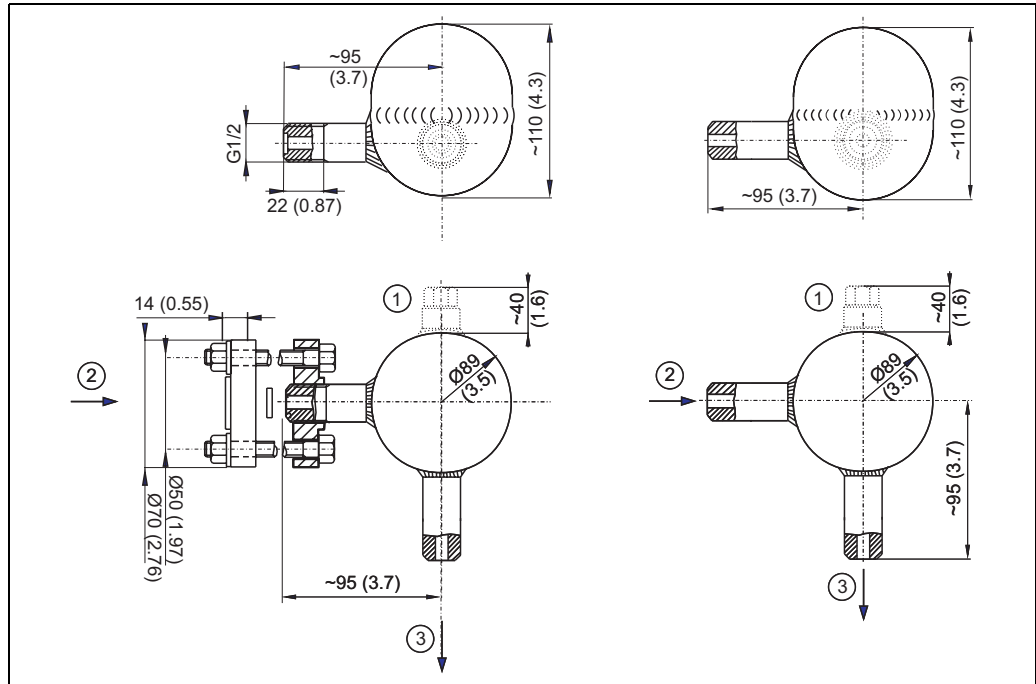
Note!

If ordering via this structure, the scope of delivery contains one valve. The weights specified in the above drawing also refer to one valve.

If ordering via the structures of the orifices (features 250 ... 280 of the product structures DO6xx), the scope of delivery always contains two valves.

Deltatop DA61C: Condensate pot (accessory)

Dimensions



1: filling cap NPT1/2 (option); 2: to process; 3: to transmitter

Weight

Material	Weight
HII (265 GH)	approx. 1,7 kg (3.8 lbs)
316L	approx. 1,7 kg (3.8 lbs)
16Mo3	approx. 2,2 kg (4.9 lbs)

Additional weight for flanges at the input (DA61C-**V... und DA61C-**W...):
approx. 0,7 kg (1.5 lbs)

Product structure

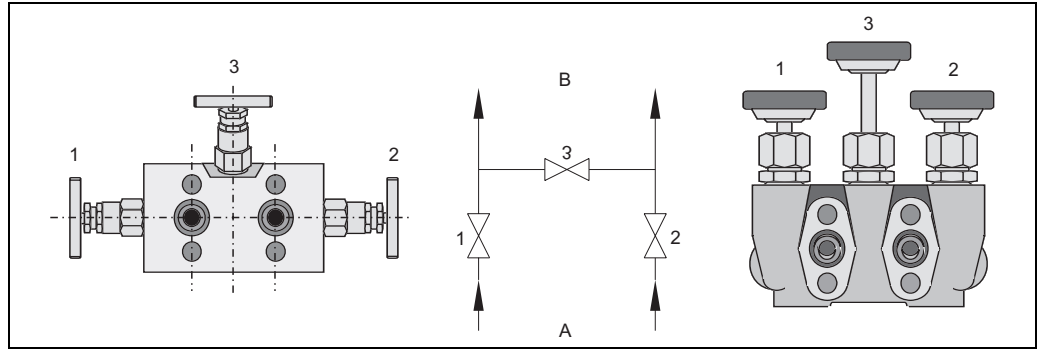
200	Material; Volume; PN
B	HII (265 GH); 300cm ³ ; PN100
C	316L; 300cm ³ ; PN100
K	16Mo3; 250cm ³ ; PN250
Y	special version, to be specified
210	Filling Cap
1	not selected
2	NPT1/2
9	special version, to be specified
220	Input
F	Welding conn. 21,3mm; w/o
K	Tap, welding conn. 17,2mm
V	G1/2 DIN19207 steel + 2x flange
W	G1/2 DIN19207 stainl. steel + 2x flange
Y	special version, to be specified
230	Output
E	Welding conn. 21,3mm
M	Tap, 12mm
N	Tap, G1/2 DIN19207
Y	special version, to be specified
550	Additional Option (optional; multiple options can be selected)
F1	EN10204-3.1 material (wetted parts) inspection certificate
F2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
F3	EN10204-3.2 material (wetted parts) inspection certificate
F4	PMI test
895	Marking
Z1	Tagging (TAG), see additional spec.

Deltatop DA63M: Manifold (accessory)

Usage

3-valve manifold

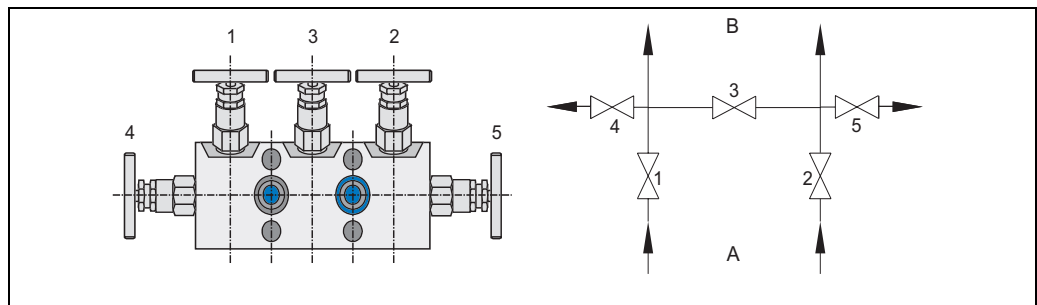
The manifold is used to connect the impulse pipes to the differential pressure transmitter. Valves 1 and 2 can be used to separate the transmitter from the impulse pipes. Valve 3 is used for a zero point adjustment between the impulse pipes.



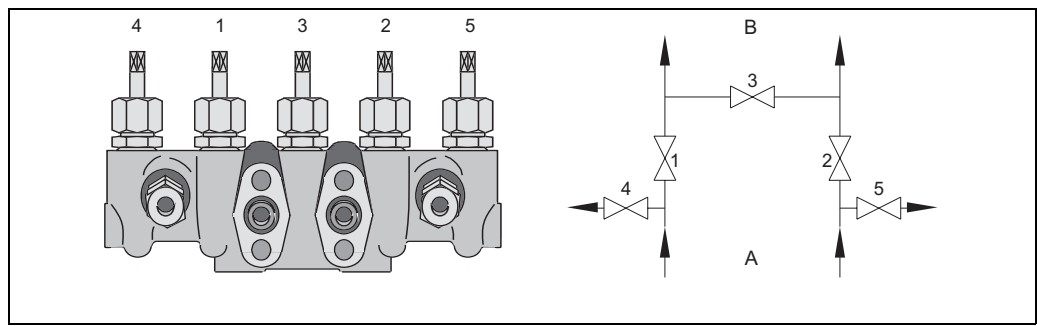
left: milled version (for gases and liquids); right: forged version (for steam);
A: process side; B: transmitter side

5-valve manifold

The manifold is used to connect the impulse pipes to the differential pressure transmitter. Valves 1 and 2 can be used to separate the transmitter from the impulse pipes. Valve 3 is used for a zero point adjustment between the impulse pipes. Valves 4 and 5 offer the possibility of venting or purging the impulse pipes.

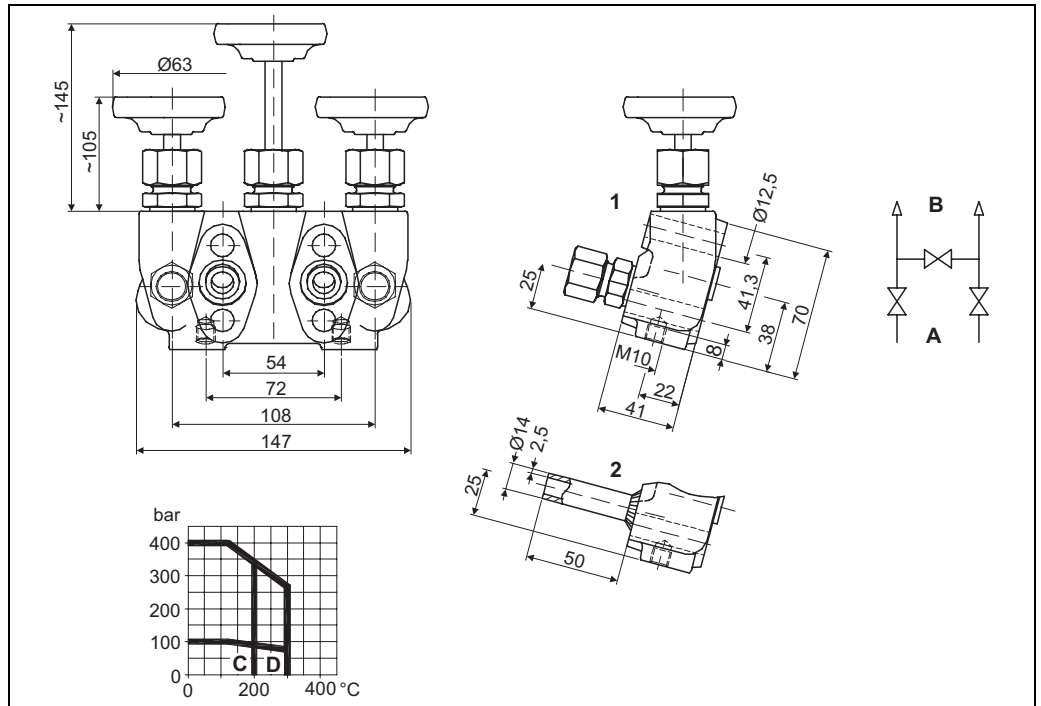


5-valve manifold with venting valve, milled version (for gases and liquids);
A: process side; B: transmitter side



5-valve manifold with purging valve, forged version (for steam);
A: process side; B: transmitter side

Version: 3-valve, forged



P01-DOxxxxxx-06-xx-06-xx-032

1: cutting ring; 2: welding connection;
 A: process side; B: transmitter side;
 C: PTFE gasket; D: pure graphite gasket

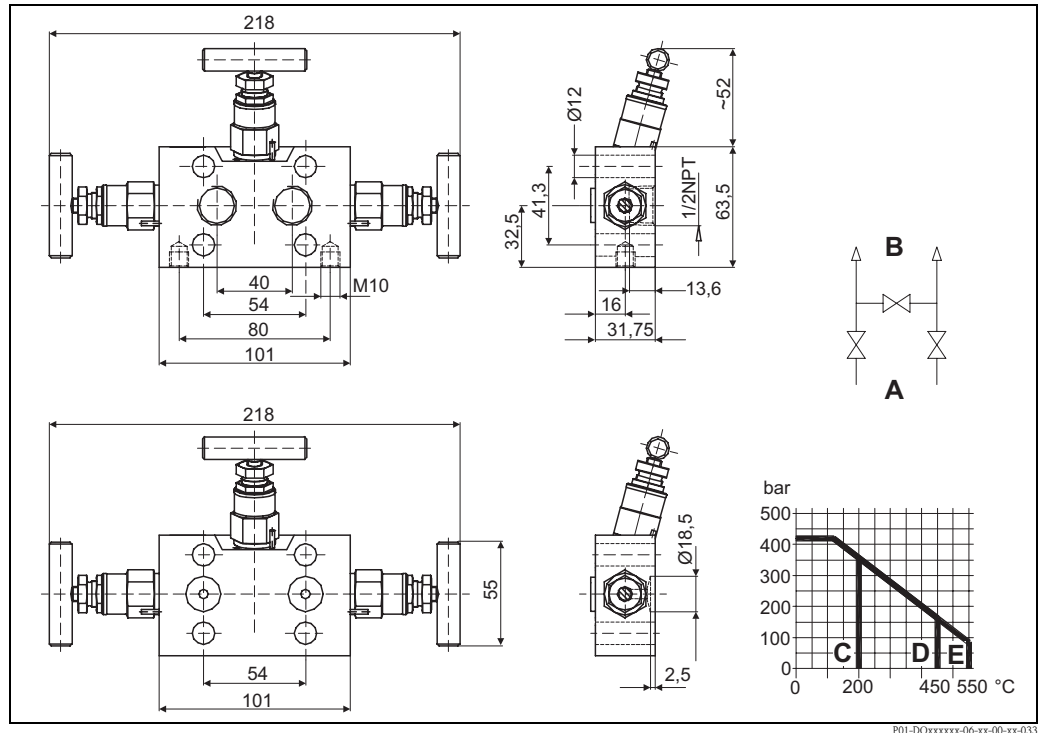
Design

- Body: die-pressed part
- Surface: steel phosphatized
- internal stem thread
- replaceable valve seat
- stem with cold rolled surface, back seat and non-rotating needle tip
- handwheels made of plastic
- Inlet:
 - tube fitting O.D. 12 mm line S, G 3/8
 - weld ends for tube O.D. 14 x 2,5 mm
- Outlet: IEC61518, Type A
- Weight: approx. 3,2 kg (7.0 lbs), including 4 screws with washers and 2 seals

Materials

Component	"steel" version	"316Ti" version
Body	1.0460	1.4571
Bonnet	1.0501	1.4571
Valve seat	1.4571	1.4571
Valve stem	1.4104	1.4571
Needle tip	1.4122	1.4571
Packing	<ul style="list-style-type: none"> ■ PTFE (up to 200 °C) ■ pure graphite (up to 300 °C) 	<ul style="list-style-type: none"> ■ PTFE (up to 200 °C) ■ pure graphite (up to 300 °C)
Union nut	steel	1.4571
Weld ends	1.4515	1.4571

Version: 3-valve, milled



A: process side; B: transmitter side;

C: PTFE gasket; D: pure graphite gasket 1.0460; E: pure graphite gasket 1.4404

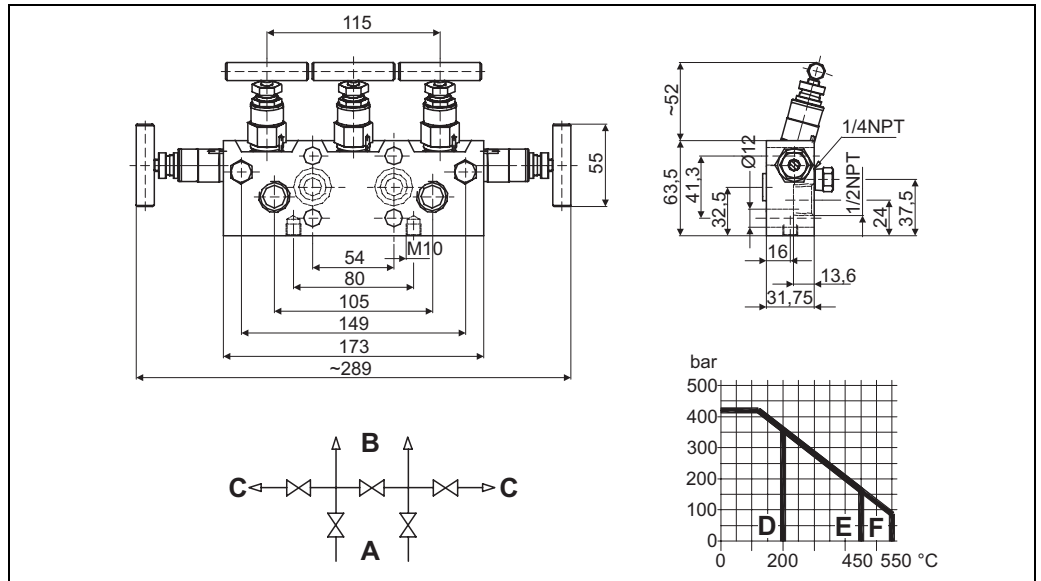
Design

- Surface: steel phosphatized
- External stem thread
- Stem with cold rolled surface, back seat and non-rotating needle tip
- Inlet: 1/2 NPT female
- Outlet: IEC61518, Type A
- Weight: approx. 2,0 kg (4.4 lbs), including 4 screws with washers and 2 seals

Materials

Component	"steel" version	"316L" version
Body	1.0460	1.4404 / 316L
Bonnet	1.4401 / 316	1.4401 / 316
Valve stem	1.4404	1.4404
Needle tip	1.4122	1.4517
Packing	<ul style="list-style-type: none"> ■ PTFE (up to 200 °C) ■ pure graphite (up to 550 °C) 	<ul style="list-style-type: none"> ■ PTFE (up to 200 °C) ■ pure graphite (up to 550 °C)
Gland nut	1.4301	1.4301
T-handle	stainless steel	stainless steel

Version: 5-valve, milled, vent



A: process side; **B:** transmitter side; **C:** vent
D: PTFE gasket; **E:** pure graphite gasket 1.0460; **F:** pure graphite gasket 1.4404

Usage

Gas and liquid applications

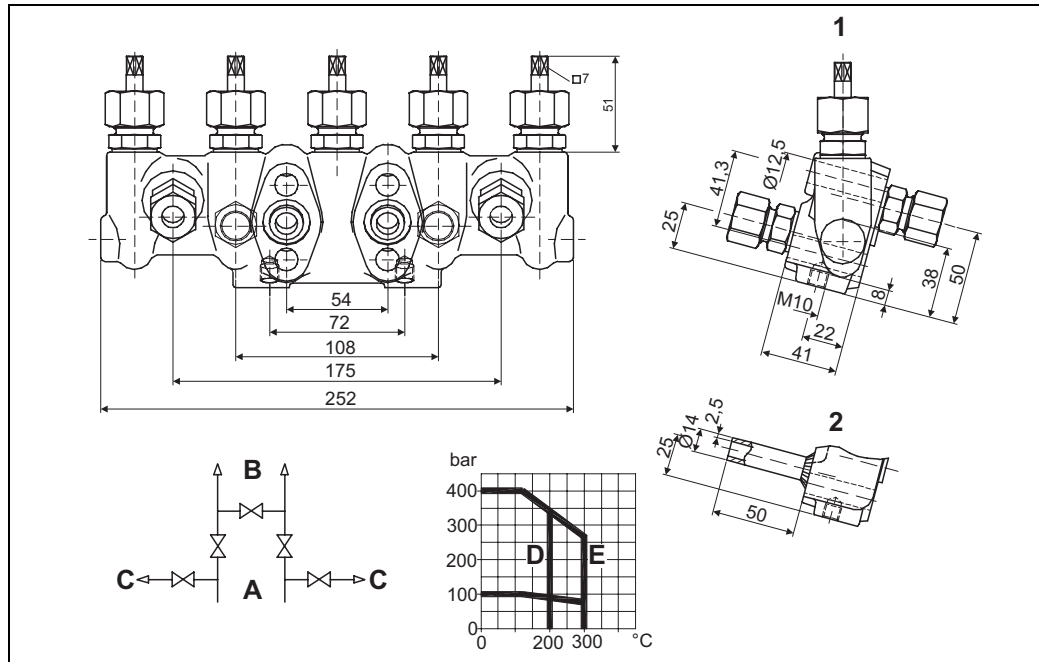
Design

- Surface: steel phosphatized
- external stem thread
- stem with cold rolled surface, back seat and non-rotating needle tip
- Inlet: 1/2 NPT female
- Outlet: IEC61518, Type A
- Weight: approx. 3,3 kg (7.3 lbs), including 4 screws with washers and 2 seals

Materials

Component	"steel" version	"316L" version
Body	1.0460	1.4404 / 316L
Bonnet	1.4401 / 316	1.4401 / 316
Valve stem	1.4404	1.4404
Needle tip	1.4122	1.4571
Packing	<ul style="list-style-type: none"> ■ PTFE (up to 200 °C) ■ pure graphite (up to 550 °C) 	<ul style="list-style-type: none"> ■ PTFE (up to 200 °C) ■ pure graphite (up to 550 °C)
Gland nut	1.4301	1.4301
T-handle	stainless steel	stainless steel
Screw plug	1.0501	1.4404

Version: 5-valve, forged, purge valve



1: cutting ring; 2: welding connection;
 A: process side; B: transmitter side; C: purge valve;
 D: PTFE gasket; E: pure graphite gasket

Usage

Steam applications

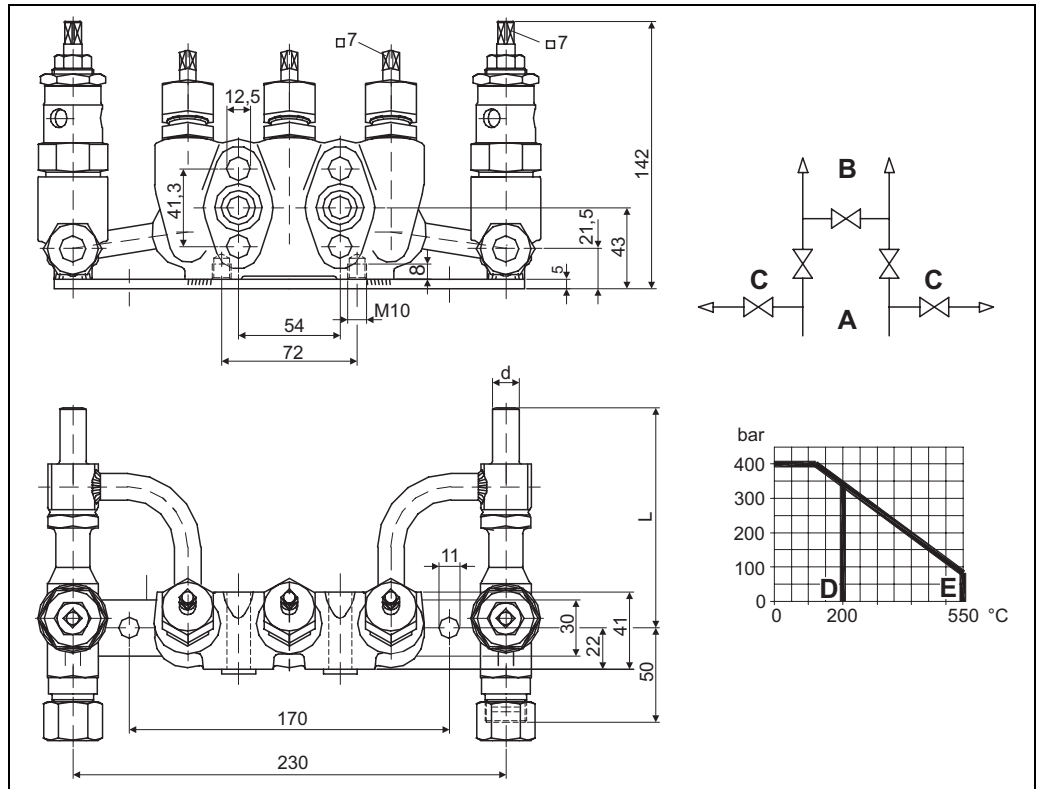
Design

- Body: die-pressed part
- Surface: steel phosphatized
- internal stem thread
- replaceable valve seat
- stem with cold rolled surface, back seat and non-rotating needle tip
- Inlet/Blow-off:
 - tube fitting, O.D. 12 mm, line S, G 3/8
 - weld ends for tube O.D. 14 x 2,5 mm
- Outlet: IEC61518, Type A
- Weight: approx. 4,6 kg (10.2 lbs), including 4 screws with washers and 2 seals

Materials

Component	"steel" version	"316L" version
Body	1.0460	1.4571
Bonnet	1.0501	1.4571
Valve seat	1.4571	1.4571
Valve stem	1.4104	1.4571
Needle tip	1.4122	1.4571
Packing	<ul style="list-style-type: none"> ■ PTFE (up to 200 °C) ■ pure graphite (up to 300 °C) 	<ul style="list-style-type: none"> ■ PTFE (up to 200 °C) ■ pure graphite (up to 300 °C)
Union nut	steel	1.4571

Version: 5-valve HT, forged, purge valve



P01-DOxxxxxx-06-xx-00-xx-030

A: process side; B: transmitter side; C: purge valve; D: PTFE gasket; E: pure graphite gasket

Usage

High temperature steam applications

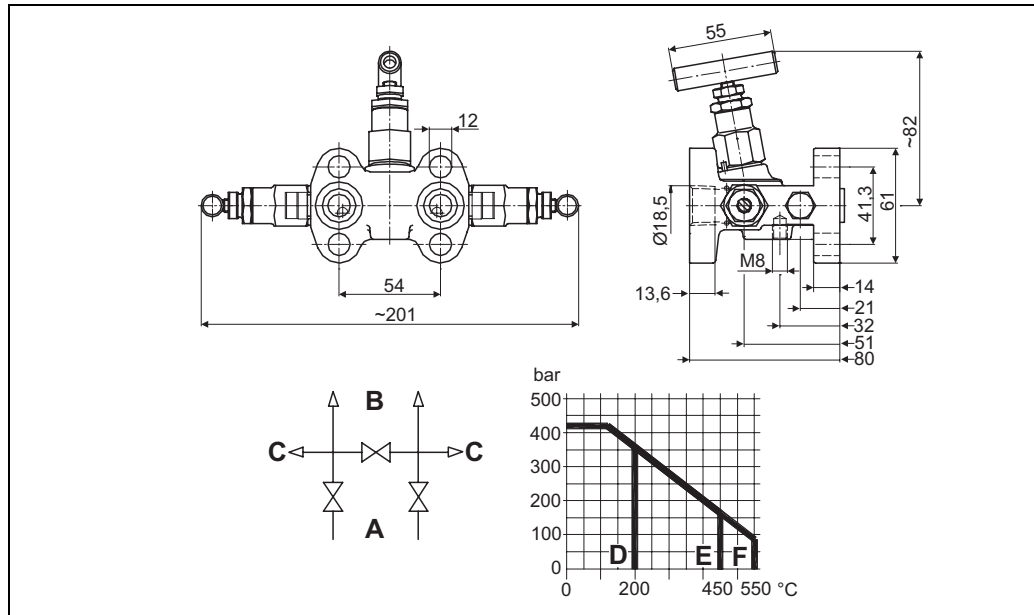
Design

- Body: die-pressed part
- Surface: steel phosphatized
- Manifold: internal stem thread
- Purge valves: external stem thread
- replaceable valve seat
- Stem with cold rolled surface, back seat and non-rotating needle tip
- Inlet: butt weld end for tube O.D. 14 x 2,5 mm
- Outlet manifold: IEC61518, Type A
- Outlet purge valve: tube fitting O.D. 12 mm
- Weight: approx. 5,6 kg (12.4 lbs), including 4 screws with washers and 2 seals

Materials

Component	"steel" version		"316Ti" version	
	manifold	purge valve	manifold	purge valve
Body	1.0460	1.5415	1.4571	1.4571
Bonnet	1.0501	1.7709	1.4571	1.4571
Valve seat	1.4571	1.4021	1.4571	1.4571
Valve stem	1.4104	1.4021	1.4571	1.4571
Needle tip	1.4122	1.4122	1.4571	1.4571
Packing	PTFE	graphite	PTFE	graphite
Union nut	steel	-	1.4571	-
Gland nut	-	2.0550	-	1.4301

Version: 3-valve, forged,
IEC61518, both side



P01-DOxxxxxx-06-xx-00-xx-037

A: process side; **B:** transmitter side; **C:** purge valve;
D: PTFE gasket; **E:** pure graphite gasket 1.0450; **F:** pure graphite gasket 1.4404

Usage

for the compact version of Deltatop

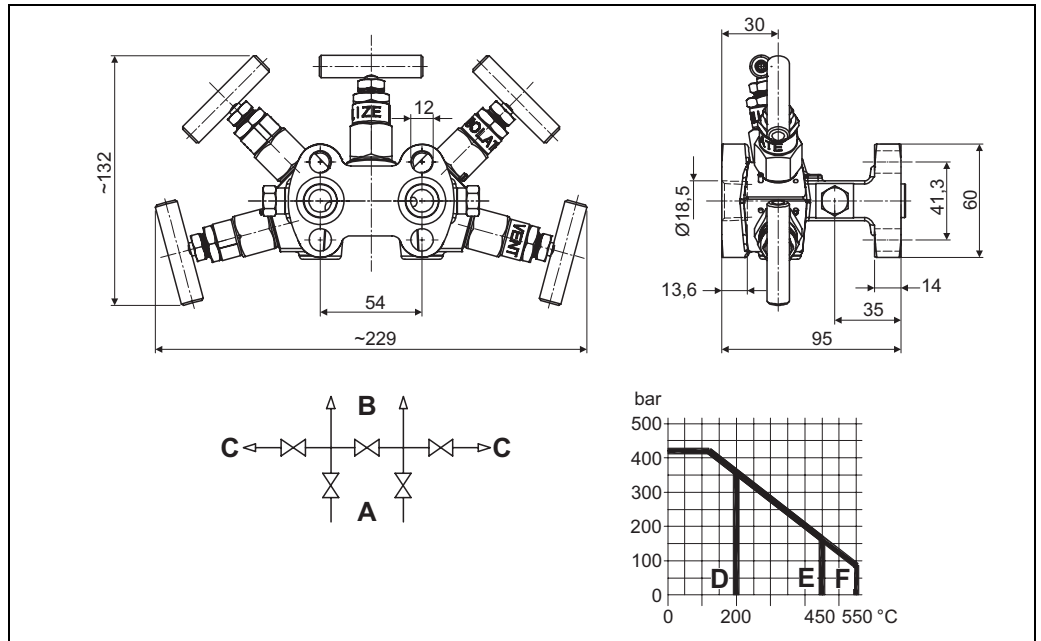
Design:

- Body: die-pressed part
- Surface: steel phosphatized
- External stem thread
- Stem with cold rolled surface, back seat and non-rotating needle tip
- Inlet: turned groove $\varnothing 18,5$ acc. to IEC61518
- IEC61518, Type A
- Weight: approx. 2,2 kg (4.9 lbs), including 4 screws with washers and 2 seals

Materials

Component	"steel" version	"316Ti" version
Body	1.0460	1.4404 /316L
Bonnet	1.4401 /316	1.4401 /316
Valve stem	1.4404	1.4404
Needle tip	1.4122	1.4571
Packing	<ul style="list-style-type: none"> ■ PTFE (up to 200 °C) ■ pure graphite (up to 550 °C) 	<ul style="list-style-type: none"> ■ PTFE (up to 300 °C) ■ pure graphite (up to 550 °C)
Gland nut	1.4301	1.4301
T-handle	stainless steel	stainless steel

Version: 5-valve, forged,
IEC61518, both side, vent



P01-DOxxxxxx-06-xx-00-xx-036

A: process side; **B:** transmitter side; **C:** vent;
D: PTFE gasket; **E:** pure graphite gasket 1.0460; **F:** pure graphite gasket 1.4404

Usage

for the compact version of Deltatop

Design

- Body: die-pressed part
- External stem thread
- Stem with cold rolled surface, back seat and non-rotating needle tip
- Inlet: turned groove Ø18,5 acc. to IEC61518
- Outlet (to transmitter): IEC61518, Type A
- Outlet (test/vent): 1/4 NPT female with screw plug
- Weight: approx. 3,3kg (7.3 lbs), including 4 screws with washers and 2 seals

Materials

Component	Material
Body	1.4404 / 316L
Bonnet	1.4401 / 316
Valve stem	1.4404
Needle tip	1.4571
Packing	<ul style="list-style-type: none"> ■ PTFE (up to 200 °C) ■ pure graphite (up to 550 °C)
Gland nut	1.4301
T-handle	stainless steel
Screw plug	1.4404

Product structure

300	Version
AA1	3 valve, steel, forging
AA2	3 valve, 316Ti, forging
AB1	3 valve, steel, milled
AB2	3 valve, 316L, milled
BB1	5 valve, steel, milled, vent
BB2	5 valve, 316L, milled, vent
CA1	5 valve, steel, forging, purge valve
CA2	5 valve, 316Ti, forging, purge valve
DA1	5 valve HT, steel, 16Mo3, forging, purge valve
DA2	5 valve HT, 316Ti, forging, purge valve
KA1	3 valve, steel, forging, IEC61518, both side
KA2	3 valve, 316Ti, forging, IEC61518, both side
LA2	5 valve, 316Ti, forging, IEC61518 both side, vent
YY9	special version, to be specified
310	Gasket
B	PTFE, 200°C/392°F
C	PTFE/pure graphite, HT
Y	special version, to be specified
320	Process Connection
B	FNPT1/2
C	Cutting ring (Ermeto 12S)
D	Welding conn. 14mm
E	IEC61518
Y	special version, to be specified
330	Seals; Screws
B	PTFE; UNF7/16, max PN420
C	PTFE; M10, max PN160
D	Viton; UNF7/16, max PN420
E	Viton; M10, max PN160
F	Viton; M12, max PN420
Y	special version, to be specified
540	Additional Option (optional, multiple options can be selected)
E1	EN10204-3.1 material (wetted parts) inspection certificate
E2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
E3	EN10204-3.2 material (wetted parts) inspection certificate
E5	Cleaned from oil+grease
E6	Oxygen service
E7	Cleaned for silicone-free service
895	Marking
Z1	Tagging (TAG), see additional spec.

Deltatop DA63R: Rectifier (accessory)

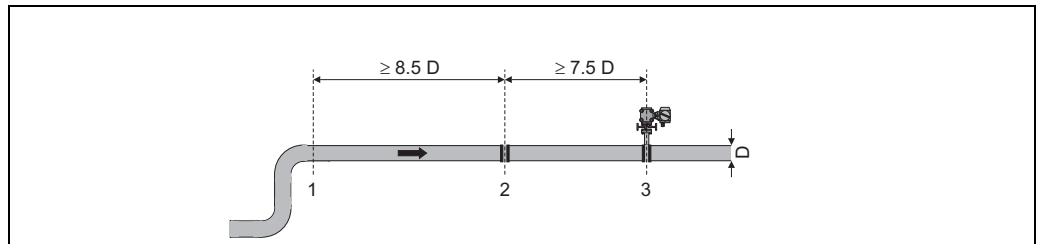
Usage

The rectifier can be used to reduce the required upstream length between an obstacle in the pipe and the orifice.

Installation conditions

- Distance between rectifier and obstacle: min. 8,5 D
- Distance between rectifier and orifice: min. 7,5 D

D: inner pipe diameter



P01-DOxxxxxx-11-xx-xx-xx-015

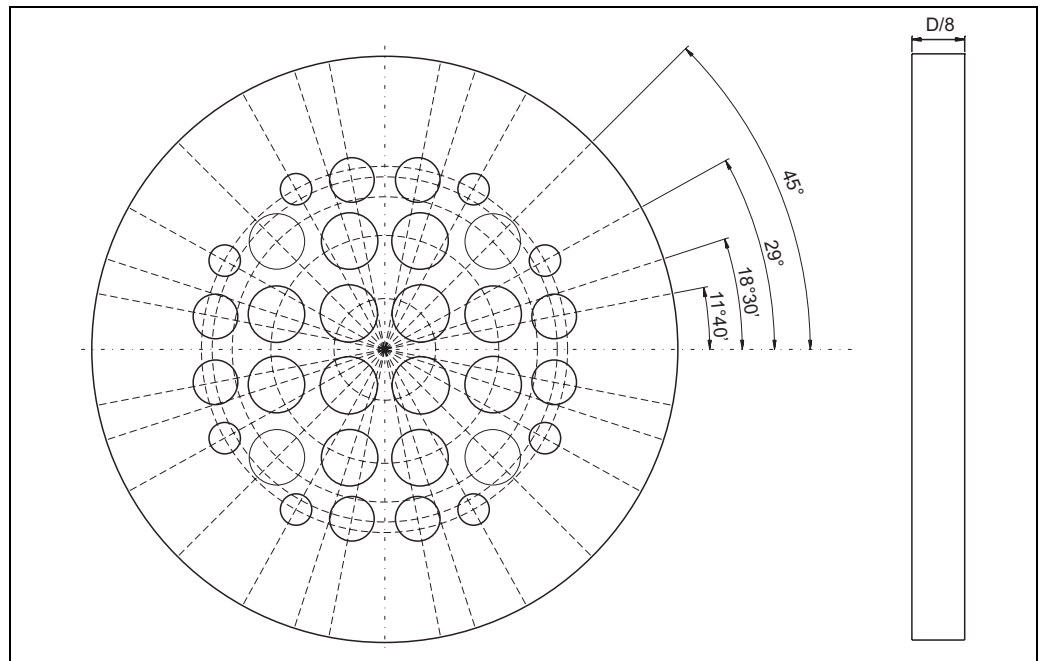
Pressure loss

Pressure loss across the rectifier:

$$\Delta p = 1,5 \rho v^2$$

- Δp : Pressure loss across the rectifier [Pa]
- ρ : Density of the fluid [kg/m^3]
- v : Flow velocity [m/s]

Dimensions



The Zanker perforated plate conditioner according to ISO 5167-2 consists of 32 bores in a circular symmetrical arrangement. The dimensions of the bores depend on the inner diameter D of the pipe:

- 4 bores, bore diameter $0,141 D$, reference diameter $0,25 D$
- 8 bores, bore diameter $0,139 D$, reference diameter $0,56 D$
- 4 bores, bore diameter $0,1365 D$, reference diameter $0,75 D$
- 8 bores, bore diameter $0,11 D$, reference diameter $0,85 D$
- 8 bores, bore diameter $0,077 D$, reference diameter $0,90 D$

The plate thickness is $1/8 D$.

The plate diameter is adjusted to the outer diameter of the flange (according to feature 30 "orifice").

Versions

Version	Nominal Diameter
DA63R25	DN25 / 1"
DA63R40	DN40 / 1-1/2"
DA63R50	DN50 / 2"
DA63R65	DN65 / 2-1/2"
DA63R80	DN80 / 3"
DA63R1H	DN100 / 4"
DA63R1Z	DN125 / 5"
DA63R1F	DN150 / 6"
DA63R2H	DN200 / 8"
DA63R2F	DN250 / 10"
DA63R3H	DN300 / 12"
DA63R3F	DN350 / 14"
DA63R4H	DN400 / 16"

Product structure

10	Version
S	Standard
Y	special version, to be specified

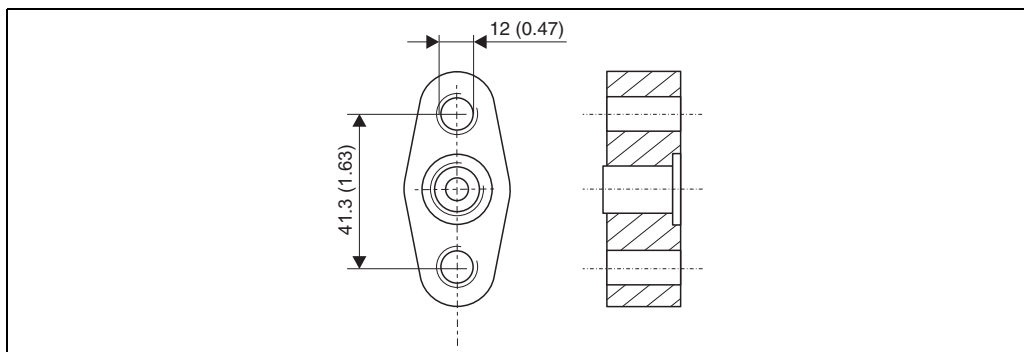
30	Conditioner
	EN flanges
BAC	PN6 B1, 316L
BBC	PN10 B1, 316L
BCC	PN16 B1, 316L
BDC	PN25 B1, 316L
BEC	PN40 B1, 316L
BFC	PN63 B2, 316L
BGC	PN100 B2, 316L
BHC	PN160 E, 316L
	ANSI flanges
FAC	Cl.150 RF, 316L
FBC	Cl.300 RF, 316L
FCC	Cl.600 RF, 316L
FDC	Cl.900 RF, 316L
FEC	Cl.1500 RF, 316L
FFC	Cl.2500 RF, 316L
FKC	Cl.900 RTJ, 316L
FLC	Cl.1500 RTJ, 316L
FMC	Cl.2500 RTJ, 316L
Y99	special version, to be specified

550	Additional Option (optional, multiple options can be selected)
F1	EN10204-3.1 material (wetted parts) inspection certificate
F2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate

895	Marking
Z1	Tagging (TAG), see additional spec.

Oval flange PZO for Deltabar S

Dimensions



P01-DOxxxxx-15-xx-xx-xx-022

Product structure PZO

010	Approval
R	Basic version
B	EN10204-3.1 material, oval flange inspection certificate
S	Cleaned from oil+grease, oxygen service
020	Process Connection
A	FNPT1/2-14
030	Material
2	Steel C22.8
1	316L
040	Seal
1	PTFE
2	FKM Viton
050	Mounting Screw
1	2x Mounting screw M10
4	2x Mounting screw M12
2	2x Mounting screw UNF7/16-20
3	Not selected

Sizing sheet - Data sheet

Sizing Sheet - data sheet / Orifice

Sheet 1 / 2

Fields marked with * are mandatory to be filled-in

Project:

Customer: **Project-no.:** **Contact partner:**

Order Code

	Order code	Order no.*	Position(s) *
Primary element	<input style="width: 95%; height: 15px;" type="text"/>	<input style="width: 95%; height: 15px;" type="text"/>	<input style="width: 95%; height: 15px;" type="text"/>
Transmitter	<input style="width: 95%; height: 15px;" type="text"/>	<input style="width: 95%; height: 15px;" type="text"/>	<input style="width: 95%; height: 15px;" type="text"/>

Tag:

Main Parameter

Medium: * **Status *** Gas Liquid Steam

Operating Conditions

Pressure * For gauge pressure the ambient pressure is additionally required if different from sea level. unit
 absolute gauge **ambient pressure:**

Only for gases: The values for requested flow resp. density of the medium are based on the following conditions:

	operating	normal	standard (acc. to reference conditions)	
Flow rate *	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reference temp.: <input style="width: 100px; height: 15px;" type="text"/>
Density *	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reference pressure: <input style="width: 100px; height: 15px;" type="text"/>
	minimum	nominal	maximum	unit *

Requested flow:	<input style="width: 95%; height: 15px;" type="text"/>	*	<input style="width: 95%; height: 15px;" type="text"/>
Pressure:	<input style="width: 95%; height: 15px;" type="text"/>	*	<input style="width: 95%; height: 15px;" type="text"/>
Temperature:	<input style="width: 95%; height: 15px;" type="text"/>	*	<input style="width: 95%; height: 15px;" type="text"/>
Density: 1)	<input style="width: 95%; height: 15px;" type="text"/>		<input style="width: 95%; height: 15px;" type="text"/>
Viscosity: 1)	<input style="width: 95%; height: 15px;" type="text"/>		<input style="width: 95%; height: 15px;" type="text"/>
Z-factor: 1,2)	<input style="width: 95%; height: 15px;" type="text"/>		<input style="width: 95%; height: 15px;" type="text"/>
Isentropic index: 1,2)	<input style="width: 95%; height: 15px;" type="text"/>		<input style="width: 95%; height: 15px;" type="text"/>

The sizing will be based on the maximum requested flow and nominal pressure and temperature.
 The maximum requested flow will be set as upper range value.

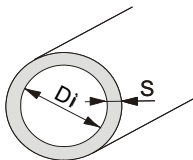
- 1) For clearly specified fluids (e.g. water or air) those entries are not mandatory.
- 2) For gases only. If there are no values available the sizing will be based on standard values or the ideal gas law.

Flowmeter

Nominal width: * **Pressure rating:***

Pipe dimensions * Mounting position s. sheet 2

Pipe (round) * unit



Inner diameter (DI):	<input style="width: 95%; height: 15px;" type="text"/>	<input style="width: 95%; height: 15px;" type="text"/>
Wall thickness (S):	<input style="width: 95%; height: 15px;" type="text"/>	<input style="width: 95%; height: 15px;" type="text"/>
Isolation thickness:	<input style="width: 95%; height: 15px;" type="text"/>	<input style="width: 95%; height: 15px;" type="text"/>
Pipe material:	<input style="width: 95%; height: 15px;" type="text"/>	<input style="width: 95%; height: 15px;" type="text"/>

The exact specification of the internal dimensions is absolutely necessary.
 Nominal widths of DIN pipes DNxxx are not sufficient. Nominal widths of ANSI pipes including schedules according to ASME are sufficient.

Additional Data

Optimization criteria unit

<input type="checkbox"/> Optimized by E+H	<input type="checkbox"/> Maximum allowable pressure loss	<input style="width: 95%; height: 15px;" type="text"/>
<input type="checkbox"/> Maximum Turn Down (small β)	<input type="checkbox"/> Fixed diameter ratio β	<input style="width: 95%; height: 15px;" type="text"/>
<input type="checkbox"/> Low pressure loss (large β)	<input type="checkbox"/> Fixed differential pressure	<input style="width: 95%; height: 15px;" type="text"/>
	<input type="checkbox"/> Fixed calculation (attachment)	<input style="width: 95%; height: 15px;" type="text"/>

Not applicable for orifice plates DO64P

Gas:

 <input type="checkbox"/> upwards	 <input type="checkbox"/> mounted left	 <input type="checkbox"/> up/down taps 0°	 <input type="checkbox"/> taps 0°
 <input type="checkbox"/> downwards	 <input type="checkbox"/> mounted right	 <input type="checkbox"/> up/down taps 90°	 <input type="checkbox"/> taps x° (DIN)

Steam:

 <input type="checkbox"/> upwards	 <input type="checkbox"/> mounted left	 <input type="checkbox"/> upwards, taps 0°	 <input type="checkbox"/> remote, horizontal
 <input type="checkbox"/> downwards	 <input type="checkbox"/> mounted right	 <input type="checkbox"/> upwards, taps 90°	 <input type="checkbox"/> mounted right
		 <input type="checkbox"/> downwards, taps 0°	 <input type="checkbox"/> taps 180°
		 <input type="checkbox"/> downwards, taps 90°	

Liquid:

 <input type="checkbox"/> upwards	 <input type="checkbox"/> mounted left	 <input type="checkbox"/> up/down taps 0°	 <input type="checkbox"/> taps 0°
 <input type="checkbox"/> downwards	 <input type="checkbox"/> mounted right	 <input type="checkbox"/> up/down taps 90°	 <input type="checkbox"/> taps x° (DIN)

Instructions for the completion of the sizing sheet - data sheet

- The order code of a primary element does not completely describe the final instrument. Further information is required. The optimized sizing and calculation of the primary element is based on the requested information about process parameters and pipe dimensions etc. Additionally Endress+Hauser checks if the given information matches the order code of the instrument. Furthermore the feasibility of the measuring point has to be checked as well. A completely filled-in questionnaire incl. information on project, order codes and tag-no. assures the correct assignment of primary elements to differential transmitters and accessories during order processing.
- The sizing sheet - data sheet can be filled-in and printed via the Endress+Hauser sizing software Applicator. All required data can be entered or are available in the database.
- All fields marked with an asterisk * have to be completed. The order cannot be processed and production of the device cannot be started as long as those points are not clarified.
- All parameters have to be filled-in with their value and complete and correct unit (e.g. flow rate in Nm³/h and not m³/h for flow at normal conditions).

Section	Field / Parameter	Explanation of the entry	mandatory		
			A ¹⁾	B ¹⁾	C ¹⁾
Project					
	Project Customer Project no.	Order specific customer data			
Order code					
Primary element	Order code	Order code of the selected primary element			
	Order no. * Positions*	Order position, to be assigned to this data sheet.			yes
Transmitter	Order code	Order code of the associated differential pressure transmitter.			
	Order no. * Positions*	Order position of the dp transmitter, to be assigned to the primary element.			yes
Tag					
	Tag	Tag no. for clear assignment of primary element and dp-transmitter.			
Main parameter					
	Medium* Status*	Exact designation of the fluid with name (e.g. water) or chemical formula (e.g. CH ₄). And type of fluid or state of aggregate of the medium at the given operating conditions - gas, liquid or steam. Depending on this entry further information will be required.	yes		
Operating conditions					
Process		The differential pressure calculation is based on the correct information about the process conditions. Generally, the layout point for the primary element is maximum requested flow rate at nominal pressure and nominal temperature.			
	Pressure* (absolute or gauge)	Clearly state whether the static pressure is given as absolute or gauge pressure.	yes	yes	
	Ambient pressure	The primary element calculation is always based on absolute static pressure in the pipe. If the static pressure is given as gauge pressure additionally the average ambient pressure (if different from sea level) or alternatively the height of the location above sea level has to be specified.	yes		
	Flow rate* Density* (at operating / normal / standard conditions)	For gases only: Values of flow rate and/or density can be related to the actual operating conditions (nominal pressure and temperature) or to normal or standard conditions. The resulting difference may be huge depending on pressure and temperature. Please check carefully. Please additionally clearly specify the units of flow rate and density (e.g. flow rate in Nm ³ /h and not m ³ /h for flow at normal conditions).	yes		
	Operating conditions	For gases only: The values of flow rate or density are related to the nominal process conditions (pressure and temperature).	yes		

Section	Field / Parameter	Explanation of the entry	mandatory		
			A ¹⁾	B ¹⁾	C ¹⁾
	Normal conditions	For gases only: The values of flow rate or density are related to normal conditions (pressure and temperature).: Pressure: 101,325 kPa abs. Temperature: 0°C (273,15 K)	yes		
	Standard conditions (acc. to reference conditions)	For gases only: The values of flow rate or density are related to standard conditions (pressure and temperature).: Pressure: 101,325 kPa abs. (14,696psi abs.) Temperature: 0°C (59 °F) If there are other reference conditions to be considered, the values for those conditions have to be clearly specified additionally.	yes		
	Reference temp.	Reference temperature at standard conditions	yes		
	Reference pressure	Reference pressure at at standard conditions	yes		
	Req. flow	Specification of the desired measuring range (minimum ... maximum) and of the operating point (nominal). The measuring dynamics is typically between 1:3 and 1:6 (minimum : maximum). A measuring dynamics of more than 1:10 usually requires cascading (split range) of several differential pressure transmitters (see page 10). Too large measuring dynamics between the nominal and the maximum flow can result in an increased measuring uncertainty at the operating point and should be avoided.	yes	yes	
	Pressure	Static pressure in the pipe upstream (plus side) of the primary element.	yes	yes	
	Temperature	Temperature of the fluid at the primary element.	yes	yes	
Fluid properties		Clearly defined liquids and gases like steam, oxygen, nitrogen, pure water or ethanol do not require further entries of fluid properties. All necessary information about these data is easily accessible in the relevant literature. Mixtures (e.g. natural gas) or brand names (e.g. Shell motor oil) do not provide sufficient information for the calculation. More information is required. If the fluid properties of a mixture are not clear, a list of ingredients and their composition can be attached to this datasheet for clarification. The Endress+Hauser sizing tool Applicator provides a large medium database with all necessary fluid properties for a big variety of fluids.			
	Density	The density is an essential input value of the flow calculation. This field must be completed in case of mixtures and brand names.	yes		
	Viscosity	The influence of the viscosity value on the calculation is normally very small but the Reynolds No. is a function of the viscosity. This may be a limiting factor for the measurement especially with highly viscous liquids.	yes		
	Z-Factor	For gases only: The compressibility factor Z does have an influence on the density especially at higher pressure and/or higher temperature. If the density is given at normal or standard conditions this may have a quite big impact on the calculation result. If this value is not available, the calculation will be done with the factor set to 1 or in case of clear defined mixtures with a factor calculated or estimated from the ingredients.	yes		
	Iisentropic index	For gases only: The isentropic index (or specific heat ratio) is required for the calculation of the expansion factor. If the value is not available, the calculation will be done with standard values: 1,65 for monoatomic gases (e.g. Helium He) 1,4 for diatomic gases (e.g. nitrogen N ₂) 1,28 for triatomic gases (e.g. carbon dioxide CO ₂)	yes		
Flowmeter					
	Nominal width*	Nominal width of the pipe according to the relevant standards, e.g. DN200 (DIN) or 8" (ASME)		yes	
	Pressure rating*	Pressure rating of the selected connection (e.g. flange) according to the relevant standard, e.g. PN40 (DIN) or Cl.600lbs (ASME).		yes	
Pipe dimensions					
	Pipe (round)	Orifices can only be applied in round pipes. Therefore, no other selection is possible.		yes	
	Inner diameter (DI)	Mean inner diameter of the pipe. All current standards for differential pressure calculation require the specification of the exact mean diameter. Incorrect specifications result in measuring errors. Usually the inner diameter is not equal to the nominal diameter. A pipe with a nominal diameter of DN200 according to ISO may have an inner diameter between 194 mm and 215 mm depending on the pressure rating. For pipes according to ASME, specification of the nominal diameter and the schedule number are sufficient.	yes	yes	

Section	Field / Parameter	Explanation of the entry	mandatory		
			A ¹⁾	B ¹⁾	C ¹⁾
	Wall thickness (S)	Exact specification of the wall thickness simplifies the checking of the pipe data on the basis of the relevant standards.		yes	
	Isolation thickness	Thickness of a possible thermal isolation of the pipe or of other covering shells. If the isolation is very thick, an extension of the taps or the neck of a compact version may be required.			
	Pipe material	Specification of the correct pipe material. The selected material of flanges or carrier rings should match the pipe material. If there are welding connections, weldability has to be ensured.		yes	
Additional Data					
Optimization criteria		For all optimization criteria: Endress+Hauser calculates the measuring point in consideration of the requested optimization criterium as far as reasonably achievable and in accordance with the valid standards.			
	Optimized by E+H	Endress+Hauser completely calculates and optimizes the measuring point in consideration of the given process parameters. The optimum solution provides the best achievable compromise between differential pressure, measuring cell selection, measurement dynamics, measurement uncertainty and permanent pressure loss.	yes		
	Maximum measurement dynamics (small β)	Endress+Hauser calculates and optimizes the measuring point to the smallest reasonably achievable diameter ratio β in order to provide maximum measurement dynamics and minimum measurement uncertainty.	yes		
	Low permanent pressure loss (large β)	Endress+Hauser calculates and optimizes the measuring point to the largest reasonably achievable diameter ratio β in order to keep the permanent pressure loss as low as possible.	yes		
	Maximum allowable permanent pressure loss	Endress+Hauser calculates the measuring point in consideration of the maximum allowable pressure loss at the layout point (maximum flow rate). The entry of the requested maximum permanent pressure loss is mandatory.	yes		
	Fixed diameter ratio β	The sizing has to be executed with a user defined diameter ratio β . Endress+Hauser calculates the measuring point accordingly. The entry of the requested fixed diameter ratio is mandatory.	yes		
	Fixed differential pressure	The sizing has to be executed with a user defined differential pressure. Endress+Hauser calculates the primary element in order to meet the requested differential pressure at the layout point. The entry of the requested fixed differential pressure is mandatory.	yes		
	Fixed sizing calculation (attachment)	A completed sizing calculation already exists. Endress+Hauser verifies the calculation and manufactures the primary element according to the given sizing calculation. The corresponding calculation sheet has to be attached.	yes		
Mounting position					
	Mounting position	A suitable mounting position in accordance with the situation on site can be chosen by marking the check box below the pictogram. The chosen mounting position has to match with the order code. Possibly existing order code exclusion will be checked by Endress+Hauser.		yes	

- 1) A: mandatory for differential pressure calculation;
 B: mandatory for instrument selection (material, pressure rating etc.);
 C: mandatory for order processing (assignment of devices)

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