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

TI422P/00/en/10.07

Endress+Hauser

People for Process Automation

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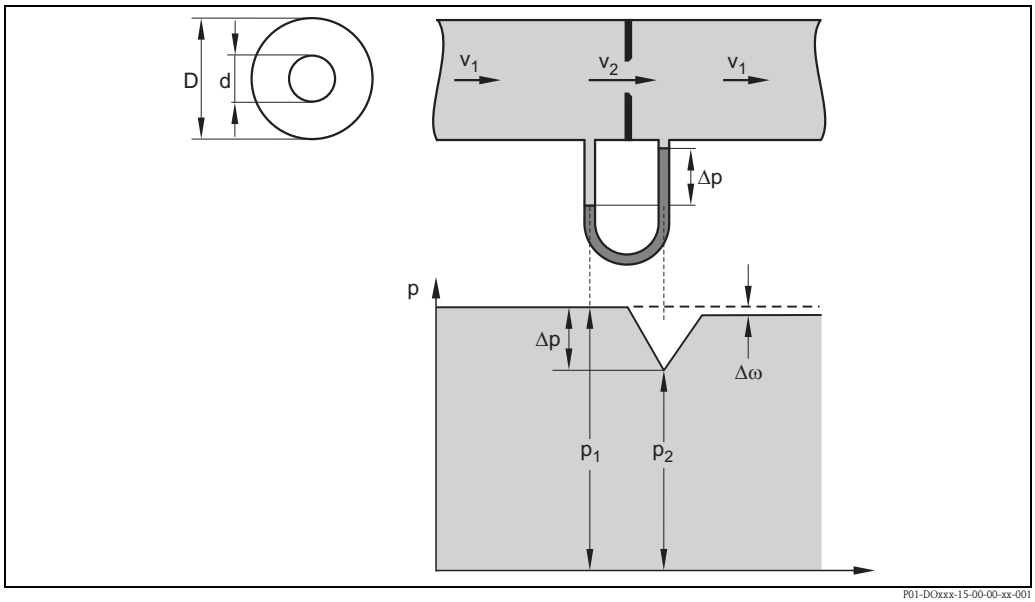
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# Function and system design

**Measuring principle**




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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 ($\beta$) 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 ($\Delta p$) 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 selecetion, 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 differntial 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
- Diamter 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.

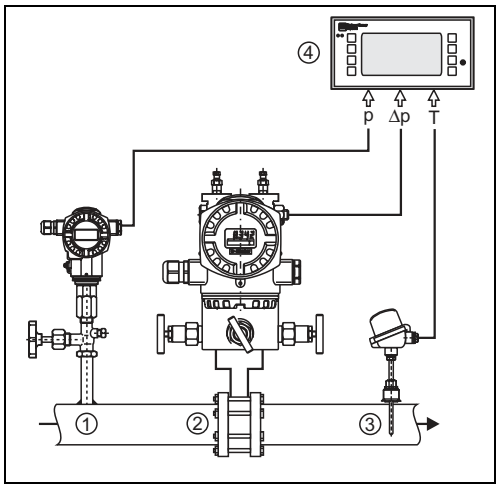
**Selecting the differential pressure transmitter and the measuring cell**

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:

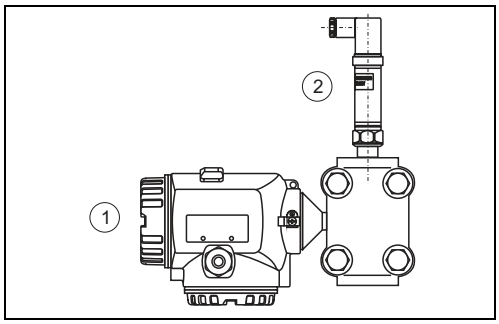
- **An absolute pressure sensor**
  According to ISO 5167, this probe must always be mounted on the upstream side of the orifice.
- **A temperature probe**
  In order to avoid disturbances of the flow profile, this probe must be mounted on the downstream side of the orifice.




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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.




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**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:

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

and

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

where
$\rho$ = 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:

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

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

The compressibility factor Z can be neglected if tis 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)**

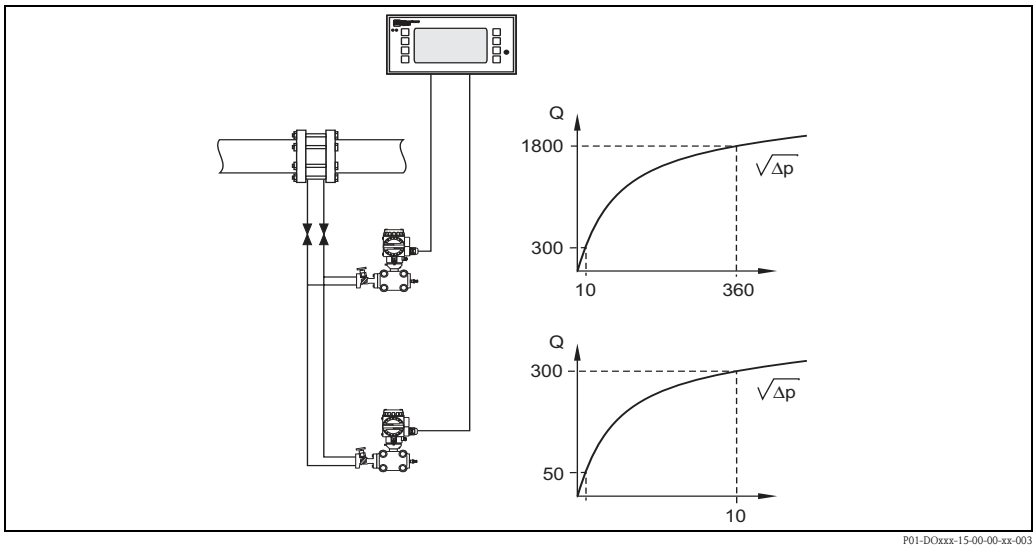
The square root function has a very steep slope in the vicinity of the zero point. Therefore, the measuring range is limited from below, which results in a measuring dynamics of typically 6:1 (max. 12:1).
If the differential pressure is high enough, it is possible to increase the dynamics by connecting 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.

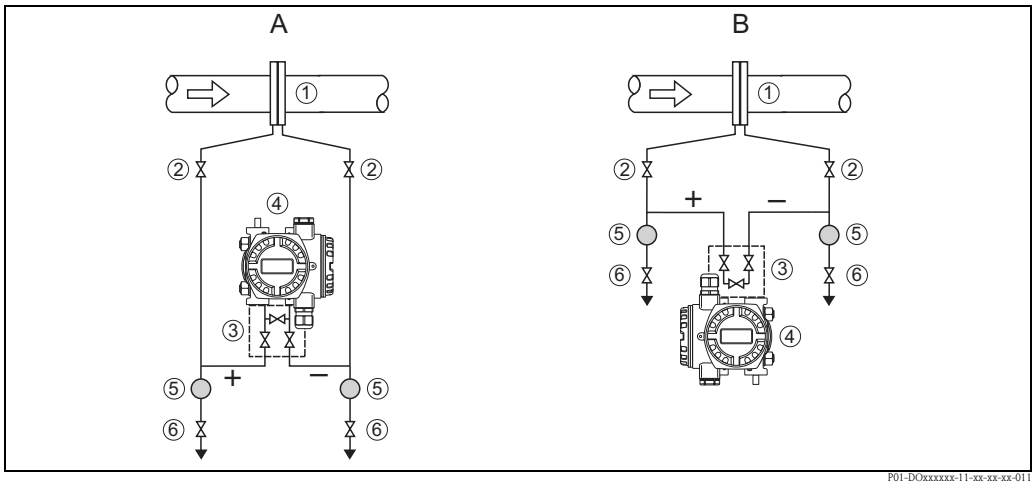
**Example**




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**Flow measurements in liquids**

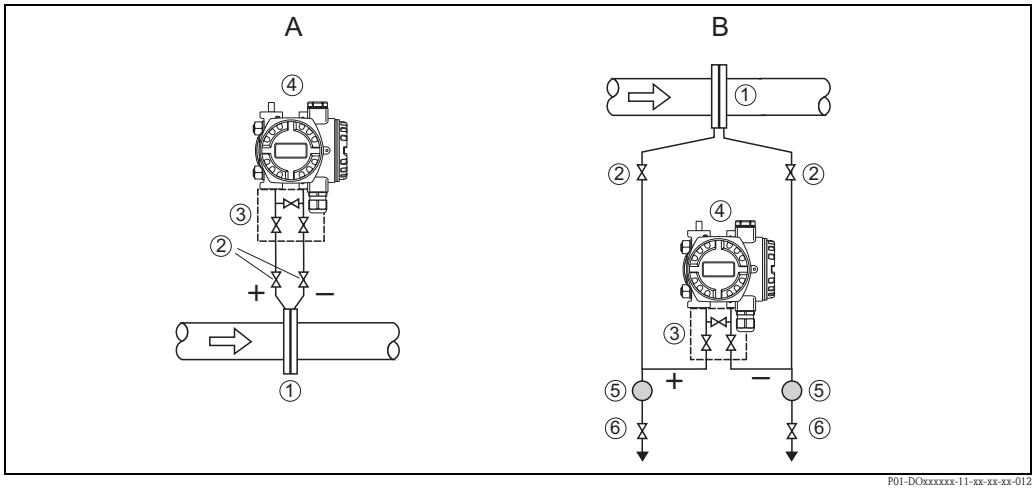
With liquid applications, the transmitter must be mounted below the pipe. All impulse pipes must be installed with a slope of at least 1:15 to the process connection – coming from the transmitter. This ensures that trapped air and bubbles rise back to the process pipe and thus do not influence the measurement.




**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**

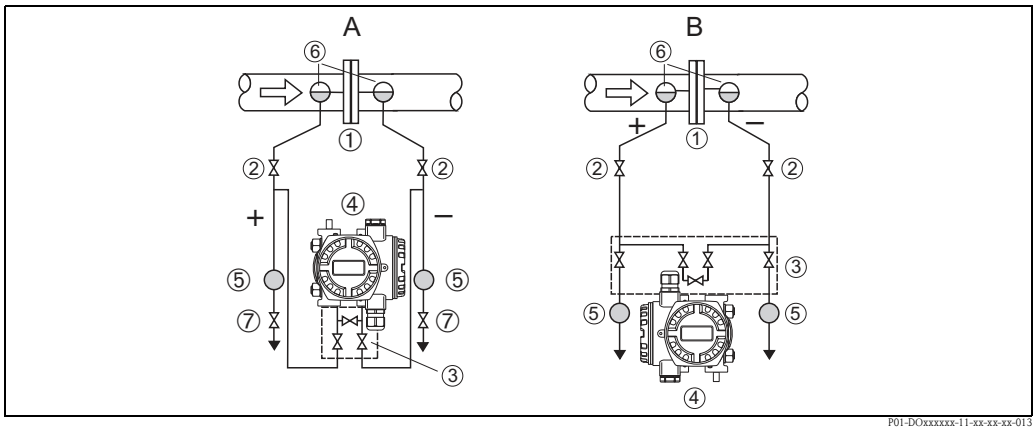
With gas applications, the transmitter must be mounted above the pipe. All impulse pipes must be installed with a slope of at least 1:15 to the process connection – coming from the transmitter. This ensures that any condensate flows back into the process pipe and thus does not influence the measurement.




**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.



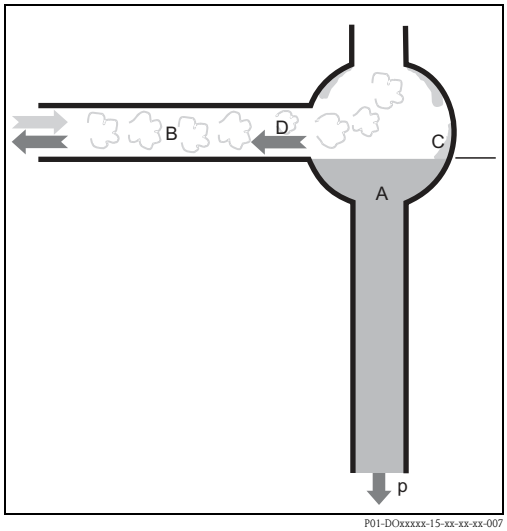

**A:** *with 3-valve manifold; for easy venting of the transmitter; especially for small differential pressures;*
**B:** *with 5-valve manifold for cleaning of the transmitter;*
**1:** *Orifice plate;* **2:** *Shut-off valves;* **3:** *Valve manifold;* **4:** *Differential pressure tranmsitter Deltabar;* **5:***Separator;*
**6:** *Condensate chambers;* **7:** *Drain valves*

### Function of the condensate chambers

The condensate chambers make sure that the impulse lines are alwas 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.




*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.

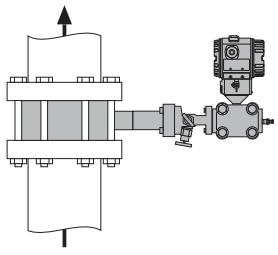
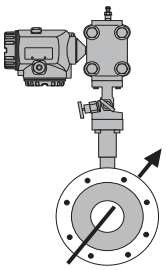
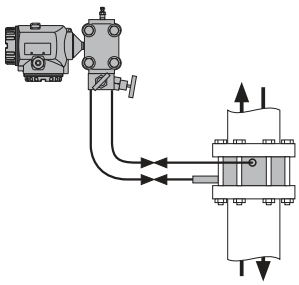
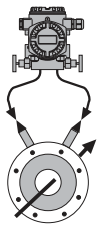
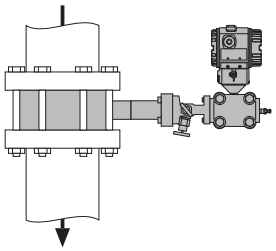
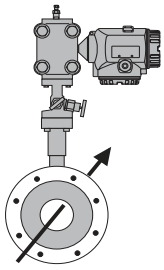
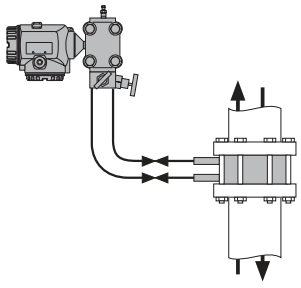
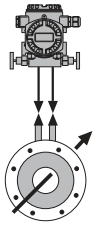
**Remote version**

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 transmitte.
- 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.

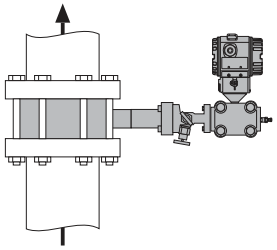
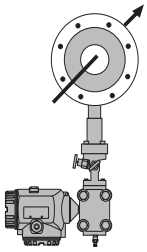
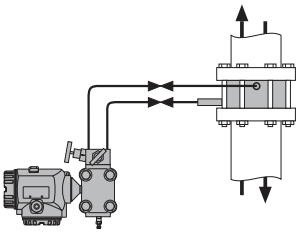
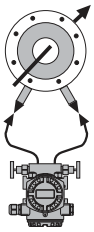
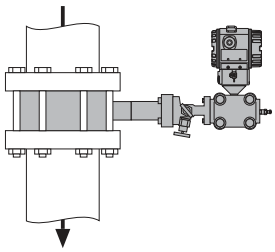
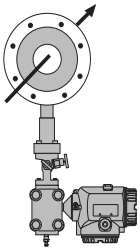
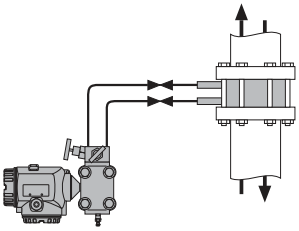
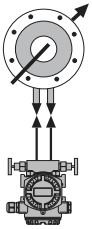
**Gas measurements**

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

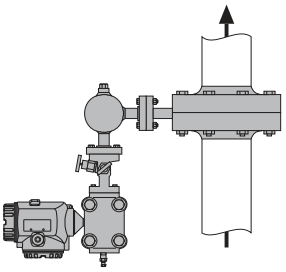
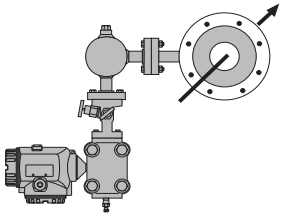
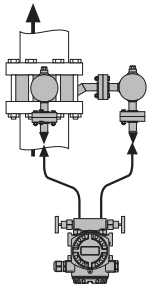
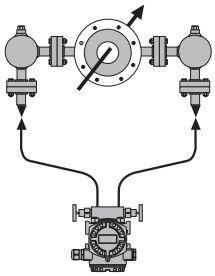
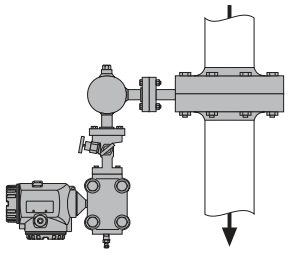
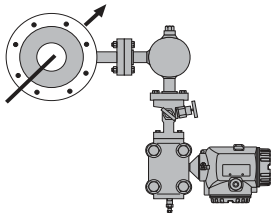
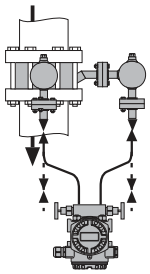
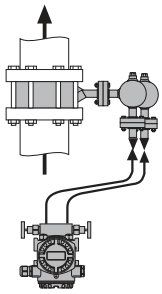
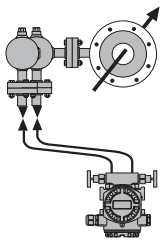
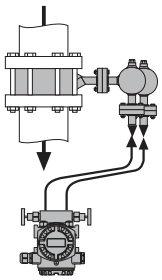
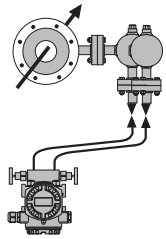
## Liquid measurements

| compact; vertical[1)] | compact; horizontal[2)] | remote; vertical | remote; horizontal |
|---|---|---|---|
| flow upwards<br>DO6xxxx-EM...<br><br>P01-DO61Wxxx-11-00-00-xx-001 | mounting left<br>DO6xxxx-EB...<br><br>P01-DO61Wxxx-11-00-00-xx-009 | taps 90°<br>DO6xxxx-DT...<br><br>P01-DO61Wxxx-11-00-00-xx-015 | tap angle according to DIN<br>DO6xxxx-DF...<br><br>P01-DO61Wxxx-11-00-00-xx-021 |
| flow downwards<br>DO6xxxx-EP...<br><br>P01-DO61Wxxx-11-00-00-xx-002 | mounting right<br>DO6xxxx-EC...<br><br>P01-DO61Wxxx-11-00-00-xx-010 | taps 0°<br>DO6xxxx-DS...<br><br>P01-DO61Wxxx-11-00-00-xx-016 | taps 0°<br>DO6xxxx-DE...<br><br>P01-DO61Wxxx-11-00-00-xx-022 |

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 |
|---|---|---|---|
| flow upwards<br>DO6xxxx-GM...<br><br>P01-DO61Wxxx-11-00-00-xx-005 | mounting left<br>DO6xxxx-GB...<br><br>P01-DO61Wxxx-11-00-00-xx-011 | taps 90°; flow upwards<br>DO6xxxx-FN...<br><br>P01-DO61Wxxx-11-00-00-xx-017 | taps 180°<br>DO6xxxx-FG...<br><br>P01-DO61Wxxx-11-00-00-xx-023 |
| flow downwards<br>DO6xxxx-GP...<br><br>P01-DO61Wxxx-11-00-00-xx-006 | mounting right<br>DO6xxxx-GC...<br><br>P01-DO61Wxxx-11-00-00-xx-012 | taps 90°; flow downwards<br>DO6xxxx-FR...<br><br>P01-DO61Wxxx-11-00-00-xx-026 | |
| | | taps 0°, flow upwards<br>DO6xxxx-FM...<br><br>P01-DO61Wxxx-11-00-00-xx-018 | taps 0°; mounting left<br>DO6xxxx-FB...<br><br>P01-DO61Wxxx-11-00-00-xx-024 |
| | | taps 0°; flow downwards<br>DO6xxxx-FP...<br><br>P01-DO61Wxxx-11-00-00-xx-027 | taps 0°; mounting right<br>DO6xxxx-FC...<br><br>P01-DO61Wxxx-11-00-00-xx-025 |

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 | β ≤ 0,2 | | β = 0,5 | | β = 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 |

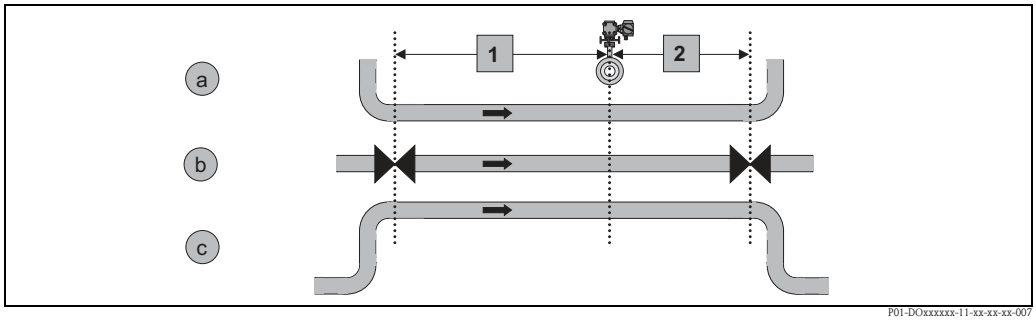
*D: inner pipe diameter;* $\beta = d/D$*: opening ratio (d: inner orifice diameter)*

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 conerning 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 | ■ for gases and liquids: 200°C (390 °F)<br>■ for steam: 300 °C (570 °F) | ■ with standard material: approx. 500 °C (930 °F)<br>■ 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 veolicty, 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** | | | | |
| HII (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 CrNioMoN 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**

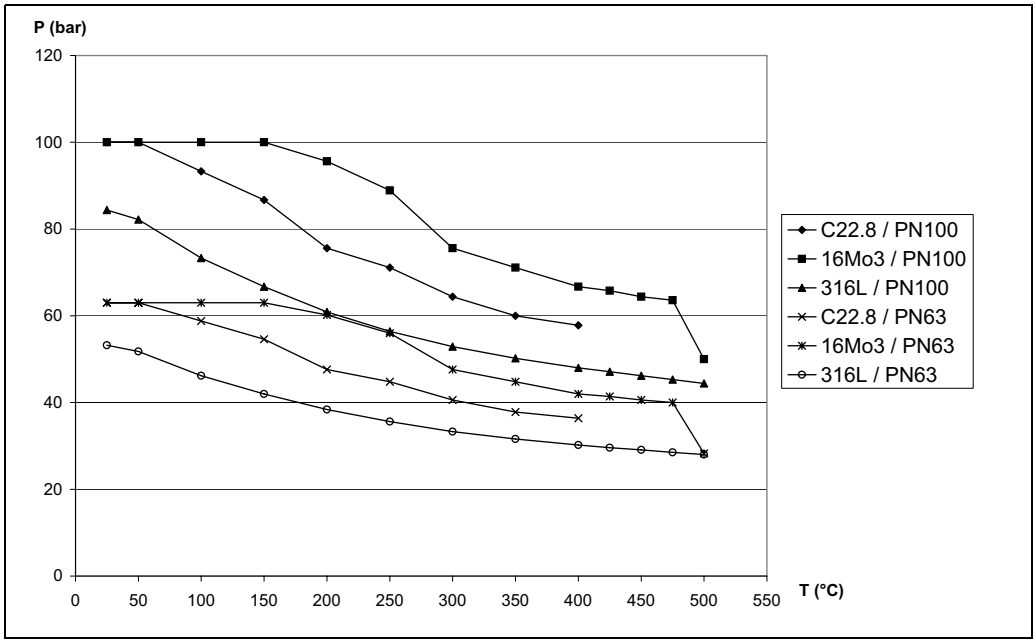
| Designation | Short designation | Max. temperature | Reference |
|---|---|---|---|
| PVC | polyvinyl chloride | up to approx. 70 °C (150 °F) | manufacturer specification |
| PP | polypropylene | up to approx. 90 °C (190 °F) | manufacturer specification |
| PE | polyethylene | up to approx. 80 °C (170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

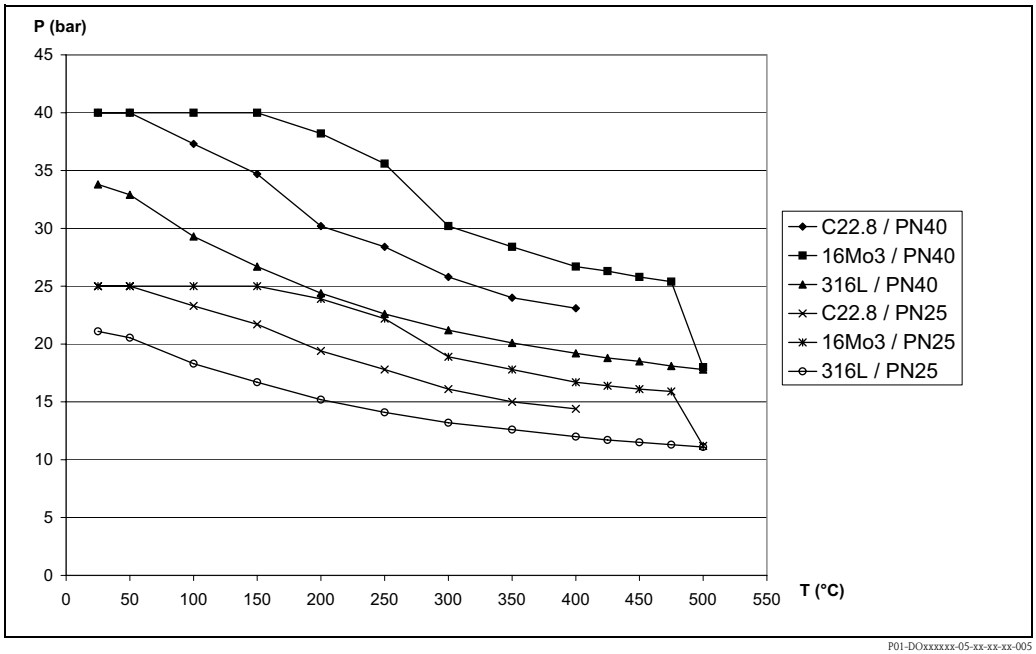
**Pressure-temperature curves for flanges according to EN1092-1:2001**

**PN100 /PN63**



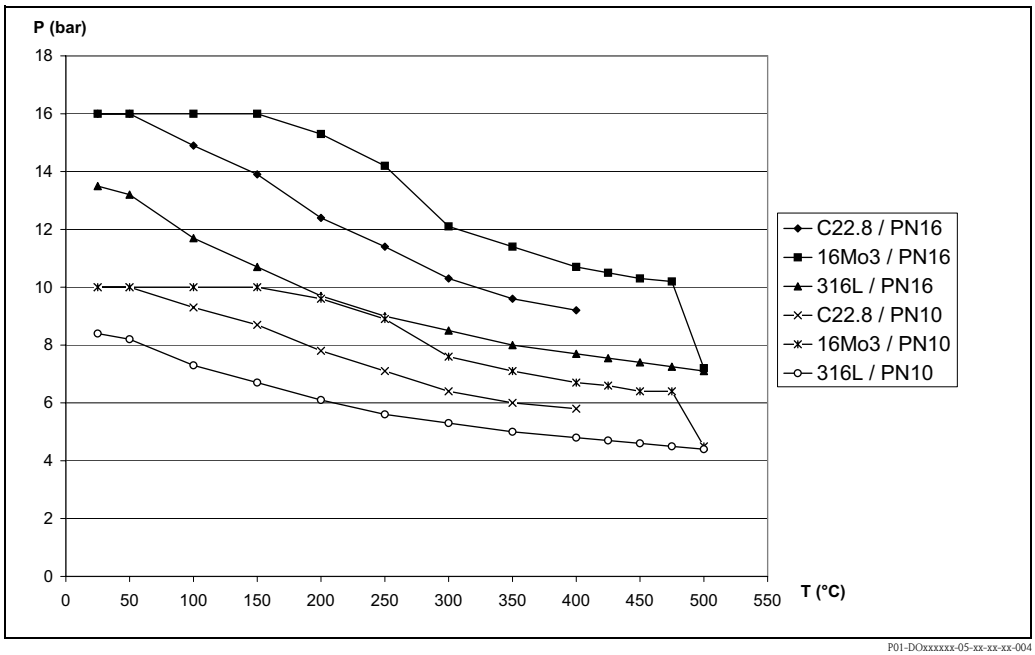

P01-DOxxxxxx-05-xx-xx-xx-006

**PN40 /PN25**




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

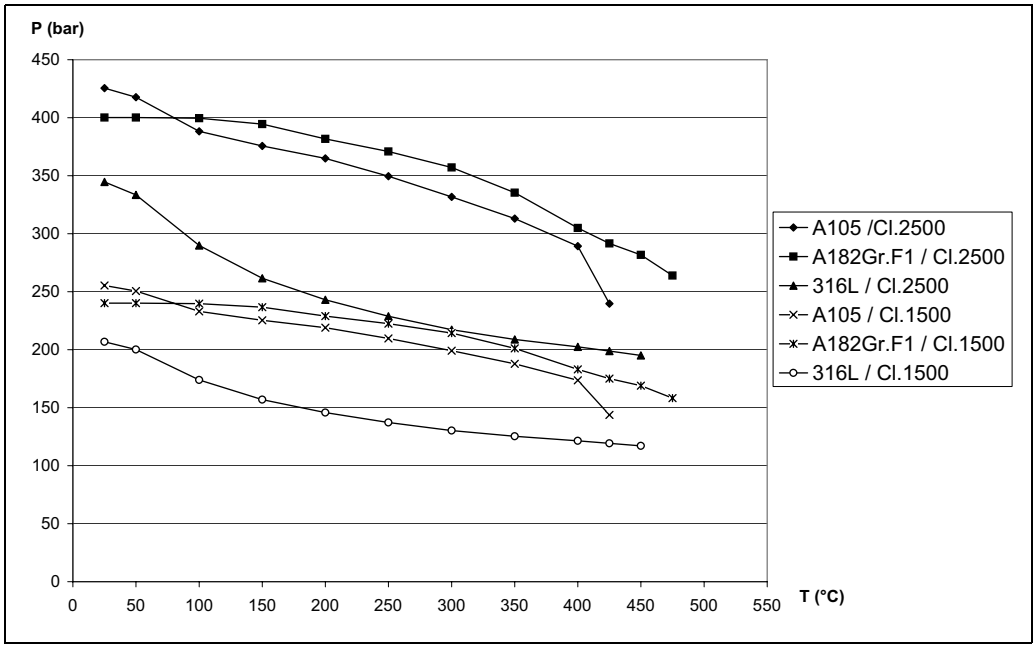
**PN16 / PN10**




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

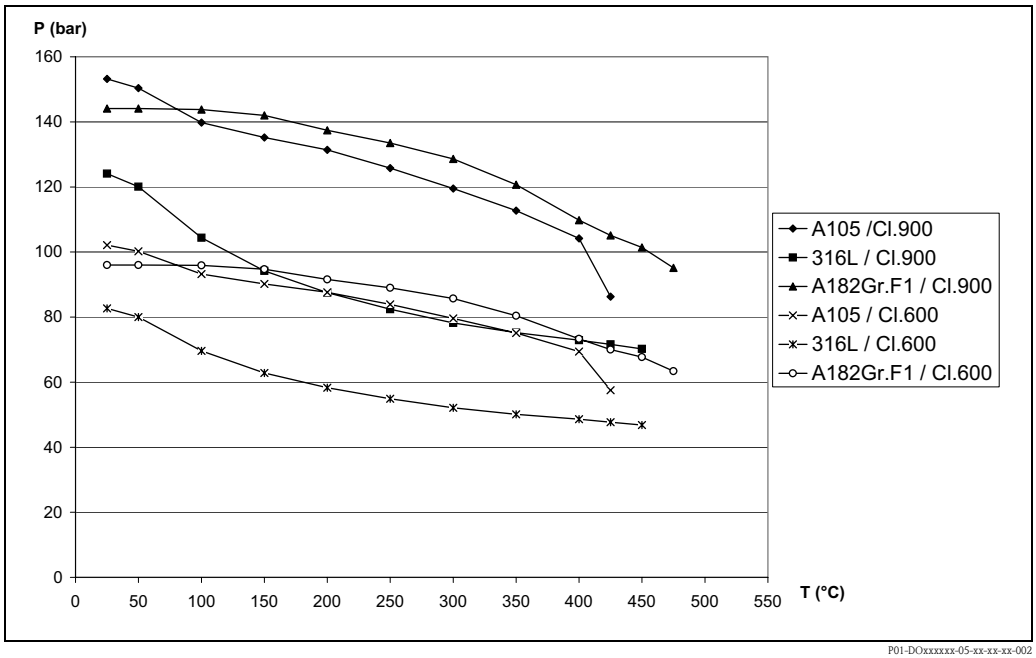
**Pressure-temperature curves for flanges according to ANSI B16.5-2003**

### Cl. 2500 /Cl. 1500



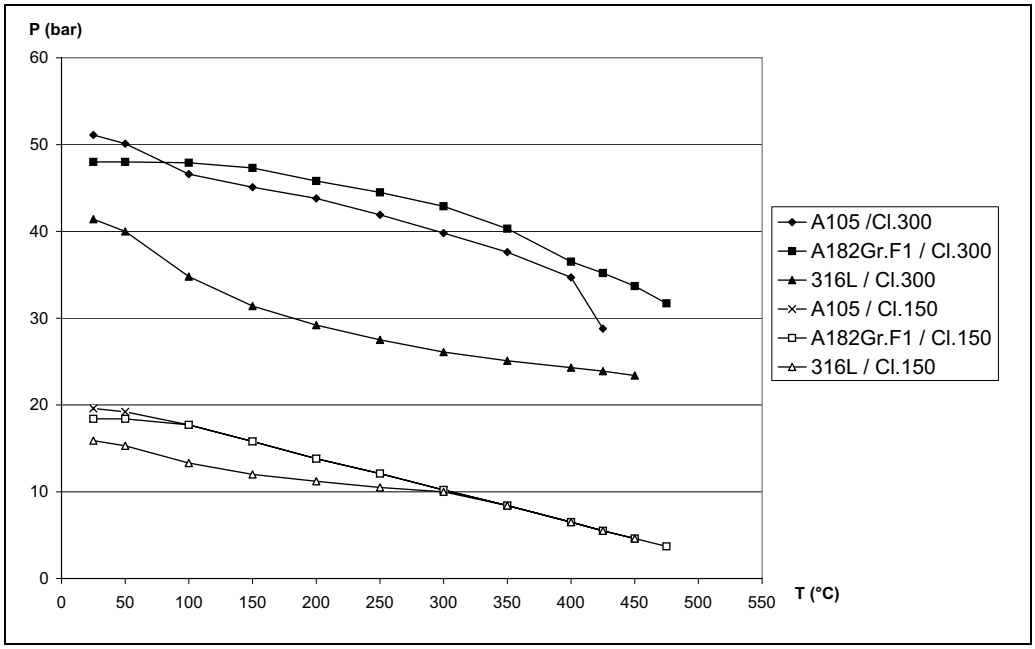

P01-DOxxxxxx-05-xx-xx-xx-003

### 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.

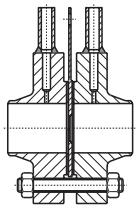
# Mechanical construction

**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.

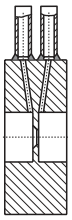
### Flange tapping

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 | ■ Flange tapping<br>■ Welding neck flange for welding in into the pipe included<br>■ Exchangeable orifice plate | <br>P01-DOxxxxxx-14-xx-xx-xx-006 |

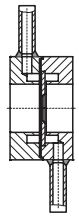
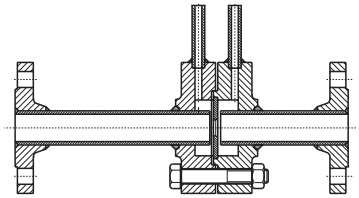
### Corner tapping with single bore

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 | ■ Corner tapping with single bore<br>■ Undivided orifice; carrier rings and orifice rings are of one piece<br>■ Mounted between two flanges | <br>P01-DOxxxxxx-14-xx-xx-xx-007 |

### 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).

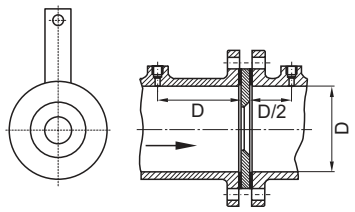
| Product | Remarks | Example |
|---|---|---|
| DO63C | ■ Corner tapping with annular chamber<br>■ Three-piece orifice; carrier rings and orifice plate are separate pieces<br>■ Exchangeable orifice plate<br>■ Mounted between two flanges | <br>P01-DOxxxxxx-14-xx-xx-xx-008 |
| DO65F | ■ Corner tapping with annular chamber<br>■ Upstream and downstream lengths included<br>■ Independent of the precise inner diameter of the pipe<br>■ End flanges for mounting into the pipe included<br>■ Wet calibration possible | <br>P01-DOxxxxxx-14-xx-xx-xx-019 |

### 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.

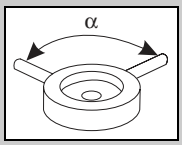
### Pipe tapping

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 | ■ Orifice plate for mounting between two flanges<br>■ All types of tapping possible; ideal for D-D/2 tapping and pipe tapping and as a replacement for flange tappings | <br>P01-DOxxxxxx-14-xx-xx-xx-017 |

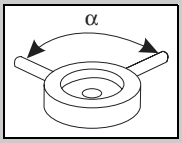
**Position of the pressure taps**

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

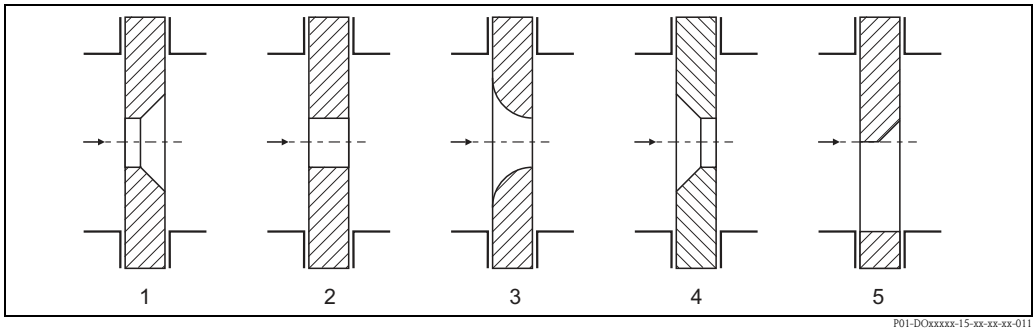
| DN (mm) |  | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PN6** | **PN10** | **PN16** | **PN25** | **PN40** | **PN63** | **PN100** | **PN160[1)]** |
| 32 | 135° | 135° | 135° | 135° | 135° | 135° | 135° | 135° |
| 40 | 135° | 135° | 135° | 135° | 135° | 135° | 135° | 135° |
| 50 | 135° | 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° | | |

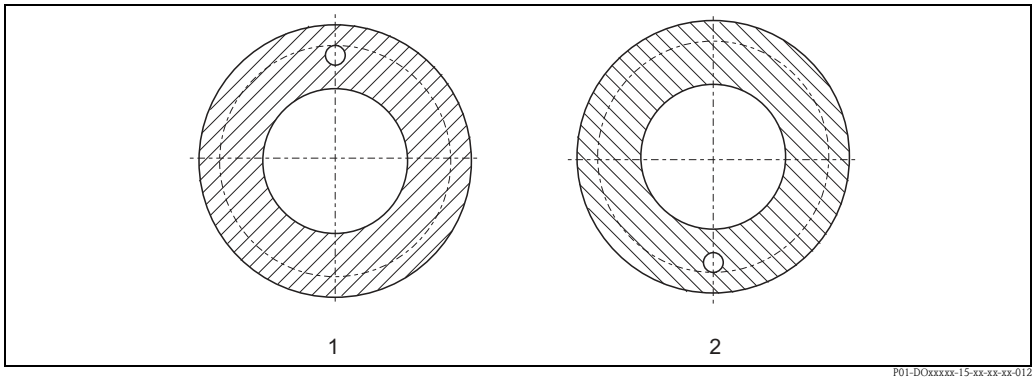
**Inlet edge orifice**




| No | Inlet edge | min. Reynolds number | Application |
|---|---|---|---|
| 1 | sharp | Re ≥ 5000 | Standard;<br>should always be used if the Reynolds number is large enough. |
| 2 | bidirectional | Re ≥ 5000 | apply if flows in both directions are to be measured. |
| 3 | quarter circle nozzle | Re ≥ 500 | only for Re ≤ 5000 |
| 4 | conical inlet | Re ≥ 80 | only for Re ≤ 500 |
| 5 | segmental orifice | Re ≥ 5000 | ■ for liquids with gas content (aperture at the top)<br>■ 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*

- 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**

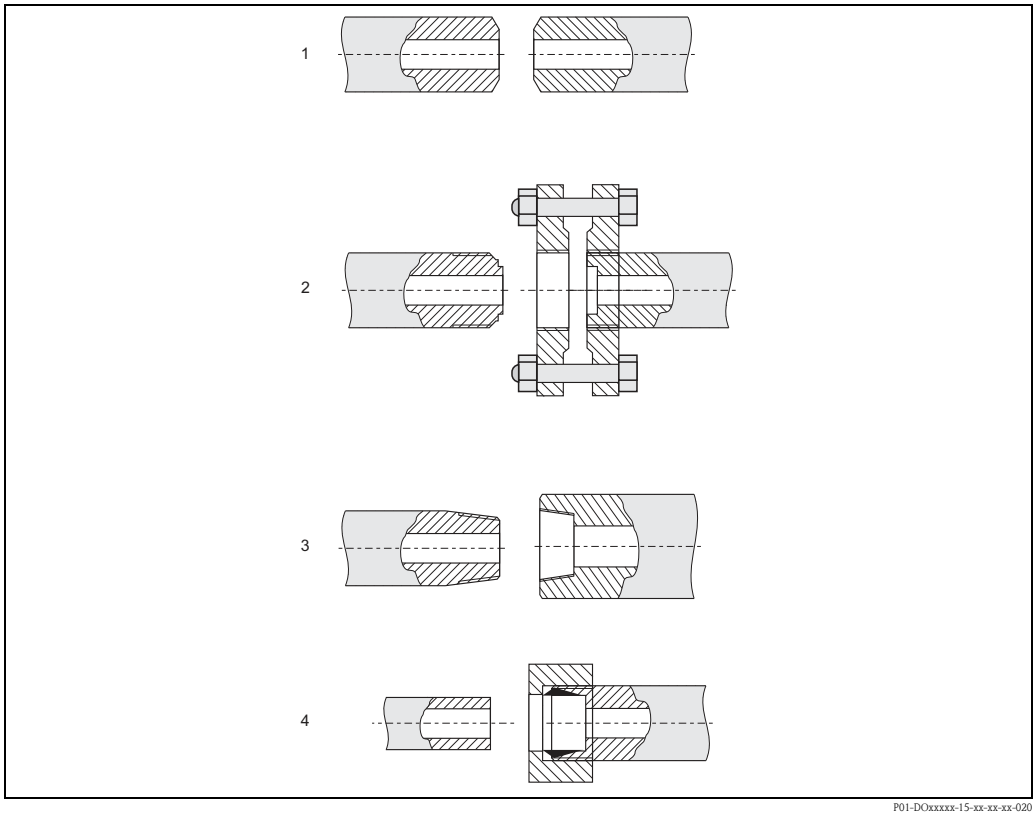
The diameter of the vent or drain hole depends on the diameter of the orifice:

| 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:

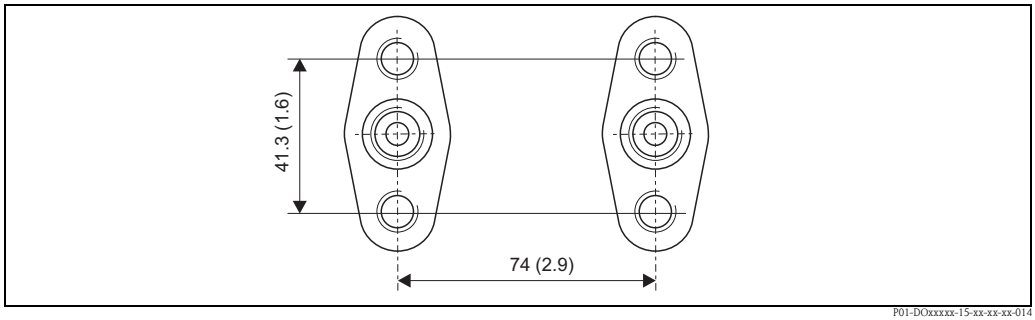



P01-DOxxxxx-15-xx-xx-xx-020

| 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)**




*Abmessungen in mm (inch)*

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

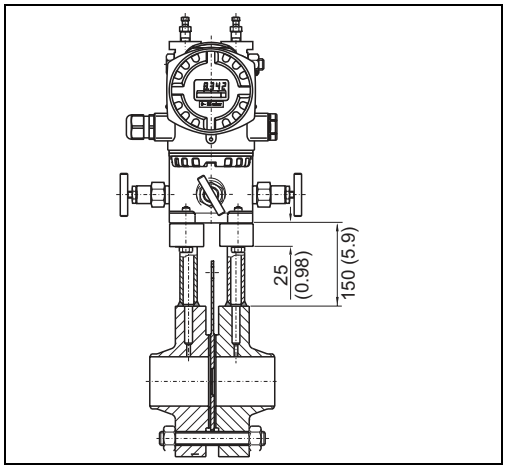
# Overview of the product structures

| Feature | Name | Description | valid for | | | | |
|---|---|---|---|---|---|---|---|
| | | | DO61W | DO62C | DO63C | DO64P | DO65F |
| **Primary element** | | | | | | | |
| 10 | Application; Version | ■ Application: "Gas", "Liquid" oder "Steam"<br>■ Version: "remote" oder "compact"<br>See chapter "Mounting positions" (page 13).<br>For DO64P: Definition of the type of pressure tapping (for the calculation)68 | x | x | x | x | x |
| 20 | Pipe; Orientation | ■ Pipe: "Horizontal", "Vertical"<br>■ Orientation:<br>– "left", "right", "top/bottom" for horizontal pipes<br>– "upwards", "downwards", "upwards/downwards" for vertical pipes<br>Additionally, the angle of the differential pressure taps must be selected<br>See chapter "Mounting positions" (page 13).<br>For tap angles according to DIN see page 26. | x | x | x | | x |
| 30 | Orifice | Defines:<br>■ the pressure rating of the orifice plate<br>■ the material of the orifice plate<br>For the temperature limits of the materials see page 18. | | | | x | |
| 40 | Process Connection; Orifice | Defines:<br>■ the pressure rating of the mounting flange or the carrier ring<br>■ the material of the flange or carrier ring<br>■ the material of the orifice plate<br>For the temperature limits of the materials see page 18.<br>**Example:**<br>Selection BAN -> PN6 B1, C22.8; 316L<br>means:<br>PN6: pressure rating of the flange/carrier ring<br>B1: form of the gasket surface<br>C22.8: material of the flange/carrier ring<br>316L: material of the orifice plate | x | x | x | | x |
| 50 | Thickness | Defines the thicklness of the orifice plate. | | | | x | |
| 60 | Carrier length; Material | Defines:<br>■ the thickness of the carrier ring (length L on page 42)<br>■ the material of the carrier ring | | x | x | | |
| 70 | ■ Seal<br>■ Seal Annular Chamber | Defines the type of seal<br>■ between the orifice plate and the flange (for DO61W)<br>■ 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:<br>■ the type of differential pressure connection (see page 30)<br>■ 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:<br>■ the material of the condensate chambers<br>■ the volume of the condensate chambers<br>■ the pressure rating of the condensate chambers<br>For details see page 70.<br>✎ Note!<br>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:<br>■ the type of shut-off valve<br>■ the material of the gasket<br>For details see page 67.<br>✎ Note!<br>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.<br>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.)<br>✎ Note!<br>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.<br>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:<br>■ The material of the seal between the manifold and the transmitter<br>■ The size of the manifold screws<br>For the temperature limits of the materials see page 18.<br>☝ Caution!<br>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).<br>The features are optional, which means:<br>■ It is not necessary to select an option in these features.<br>■ 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 |

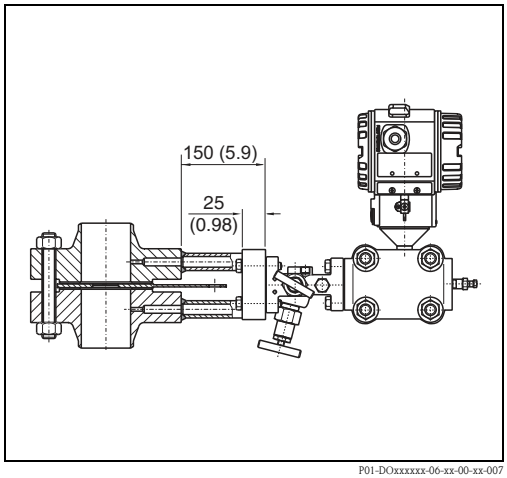
# Deltatop DO61W: Flange tap

**Typical configurations**



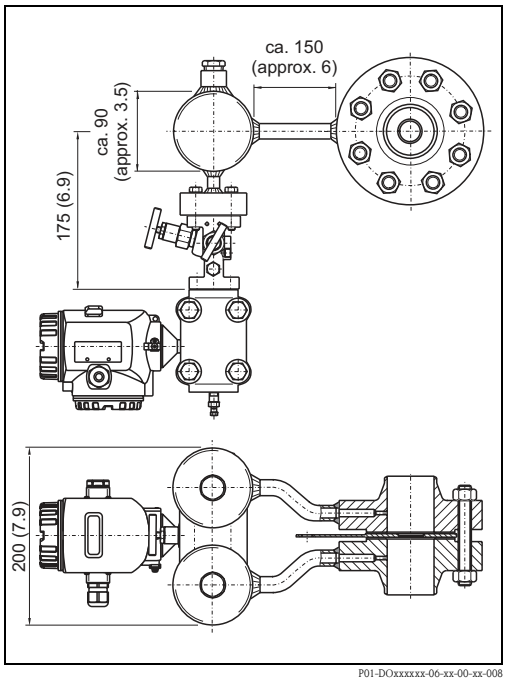

P01-DOxxxxxx-06-xx-00-xx-006

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



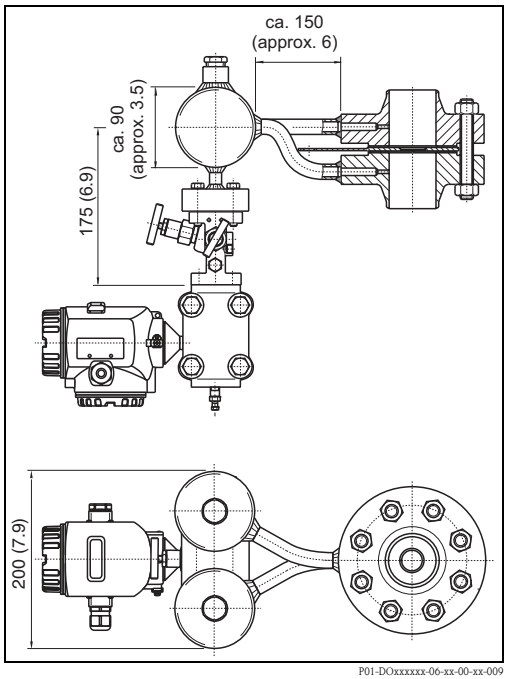

P01-DOxxxxxx-06-xx-00-xx-007

*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

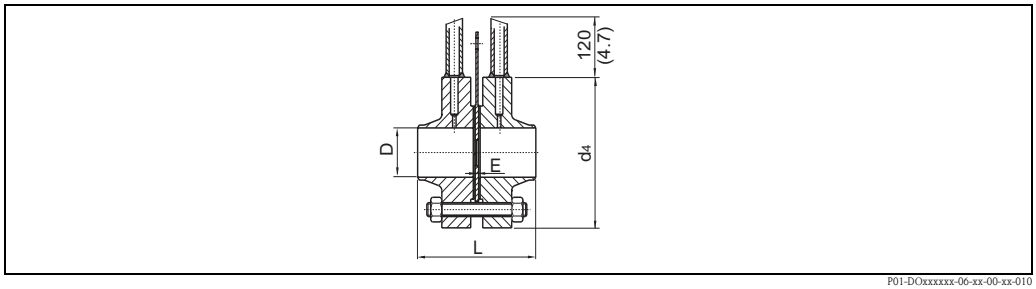
**Type of pressure tapping**

Flange tapping

**Materials**

| | **Version High-carbon steel (C-22.8, A105)** | **Stainless steel (316L)** |
|---|---|---|
| Flanges DIN | C22.8 (1.0460) | 316L (1.4404) |
| Falnges ASME | A105 | 316L |
| Orifice plate | 316L (1.4404) | 316L (1.4404) |
| Seal between orifice plate and flange | ■ Standard (Klingersil or graphite, depending on the application)<br>■ Spiral seal: 316L/graphite | |

**Dimensions; Weight**




P01-DOxxxxxx-06-xx-00-xx-010

| DO61W<br>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<br>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 | 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 |

| 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 |

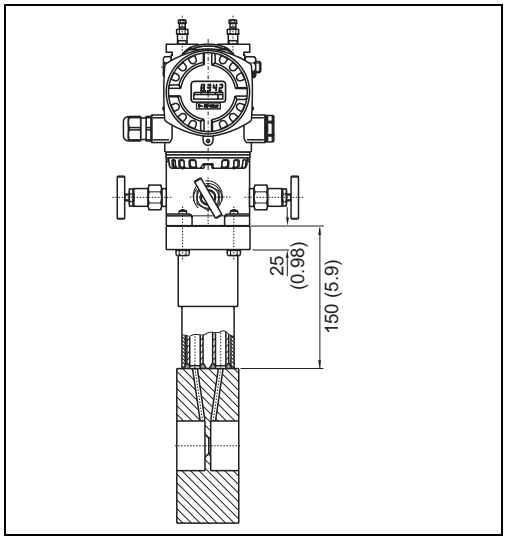
| 540 | **Add. Option Manifold (optional; multiple options can be selected)** |
|---|---|
| E1 | EN10204-3.1 material (wetted parts) inspection certificate |
| E2 | EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate |
| E3 | EN10204-3.2 material (wetted parts) inspection certificate |
| 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. |

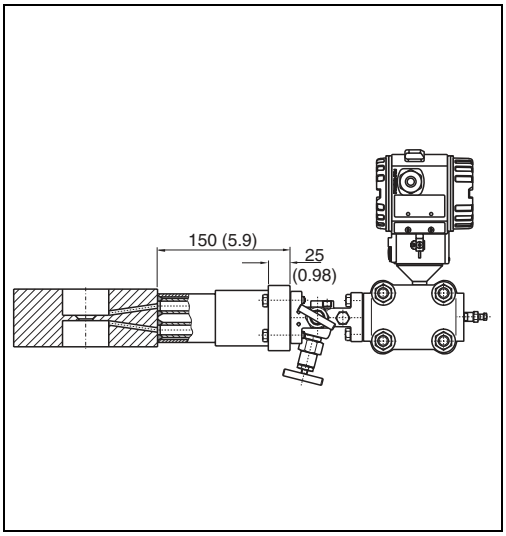
# Deltatop DO62C: Corner tap

**Typical configurations**



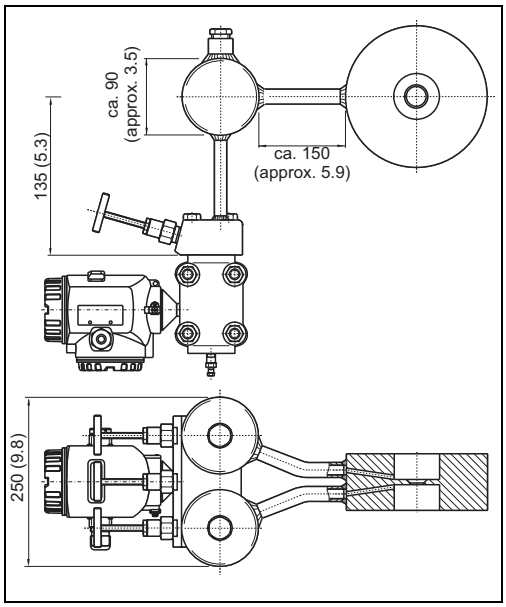

P01-DOxxxxxx-06-xx-00-xx-011

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



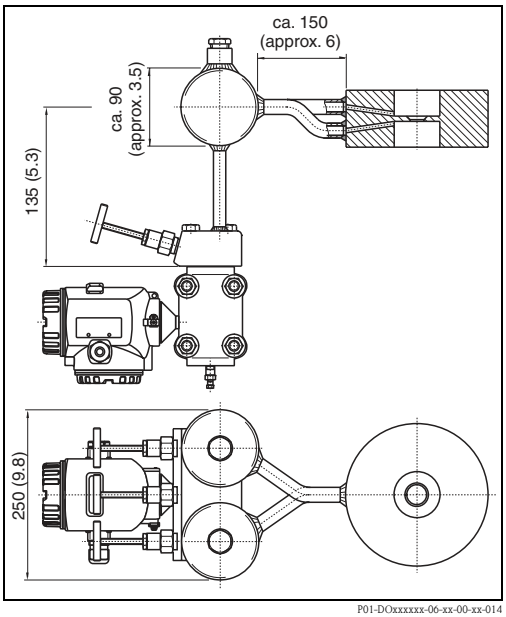

P01-DOxxxxxx-06-xx-00-xx-012

*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

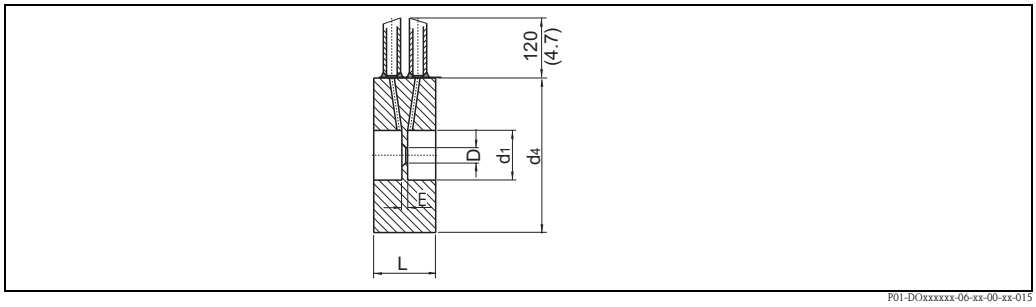
**Type of pressure tapping**

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




*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 |
| 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) | (1 mm = 0.0394") |
| 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 |
| 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) | (2 mm = 0.0787") |
| 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 |
| DO62C4F | 450 | 527 (20.7) | 538 (21.1) | 557 (21.9) | 565 (22.2) | | | | | 4 (0.157) | (4 mm = 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<br>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<br><br>(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<br><br>(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<br><br>(4 mm = 0.157") |
| DO62C4F | 18 | 549 (21.6) | 597 (25.5) | 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<br>(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<br>(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<br>(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<br>(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<br>(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

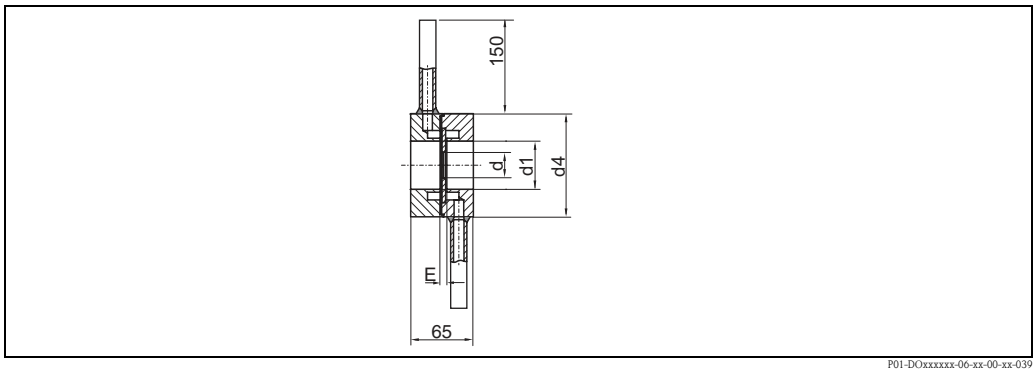
**Type or pressure tapping**

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 | ■ Standard (Klingersil or graphite, depending on the application)<br>■ spiral seal316L/graphite | |

**Dimensions**




P01-DOxxxxxx-06-xx-00-xx-039

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<br>(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

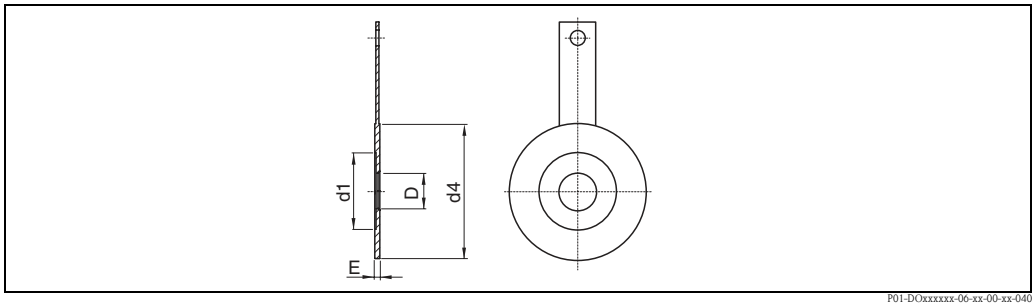
**Type of pressure tapping**

- Flange tapping
- D-D/2 tapping

**Material**

316L (1.4404)

**Dimensions**




| DO64P<br>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<br>(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<br>(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) | |
| 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) | D + 4 mm<br>(4 mm = 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<br>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** | | |
| 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 |
| DO64P40 | 1½ | 86 (3.4) | 95 (3.7) | 95 (3.7) | 98 (3.9) | 98 (3.9) | 117 (4.6) | 3 (0,118) | (1 mm = 0.0394") |
| 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 |
| DO64P1F | 6 | 222 (8.8) | 251 (9.9) | 267 (10.5) | 289 (11.4) | 283 (11.1) | 318 (12.5) | 3 (0,118) | (2 mm = 0.0787") |
| 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 |
| DO64P4F | 18 | 549 (21.6) | 597 (25.5) | 613 (24.1) | 638 (25.1) | 705 (27.8) | | 4 (0.157) | (4 mm = 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 diamteter |
|---|---|
| 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 |

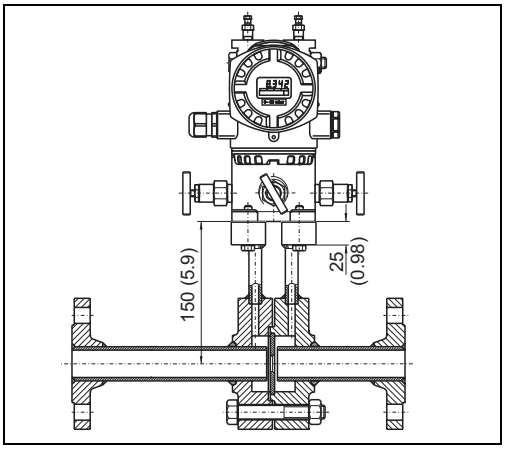
| 90 | Vent/Drain |
|---|---|
| A | not selected |
| B | Vent hole |
| C | Drain hole |
| Y | special version, to be specified |

| 550 | Add. Option General<br>(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. |

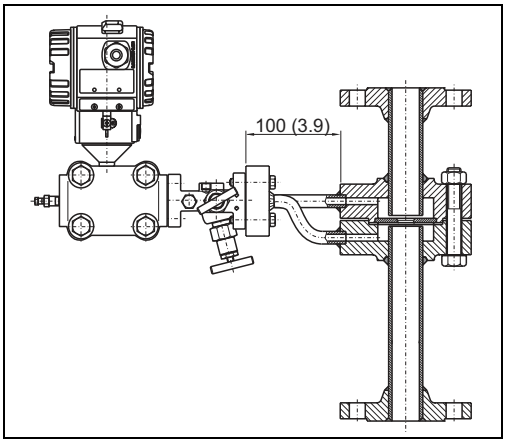
# Deltatop DO65F: Meter Run

**Typical configurations**



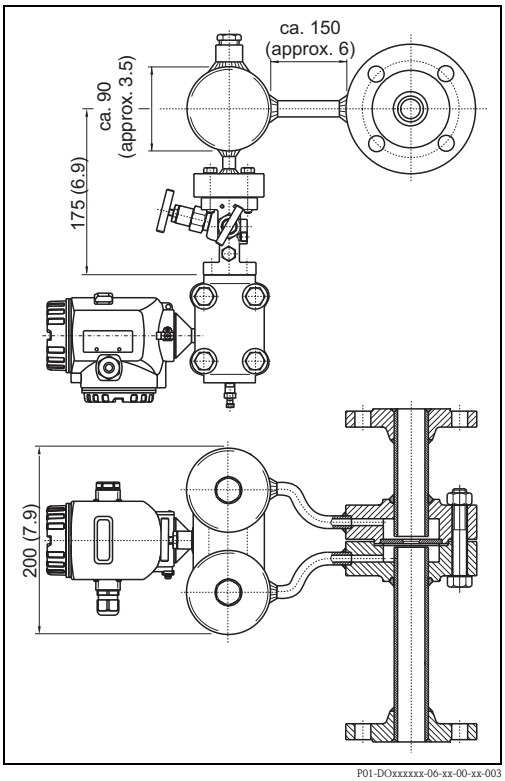

P01-DOxxxxxx-06-xx-00-xx-001

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



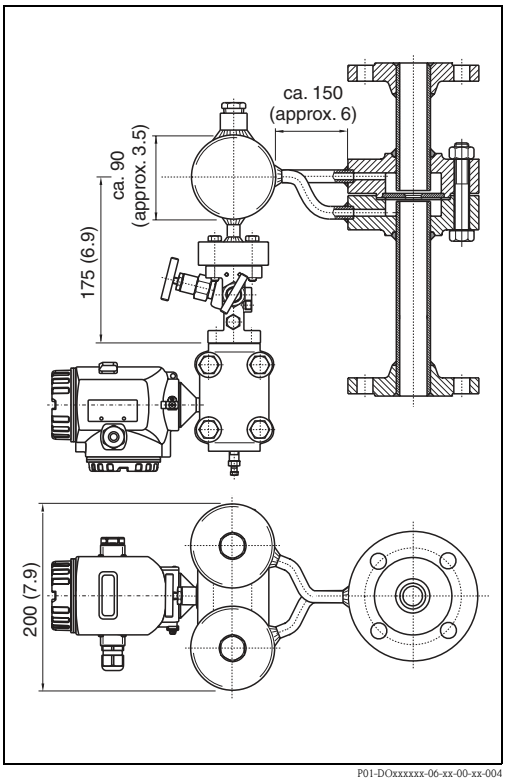

P01-DOxxxxxx-06-xx-00-xx-002

*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

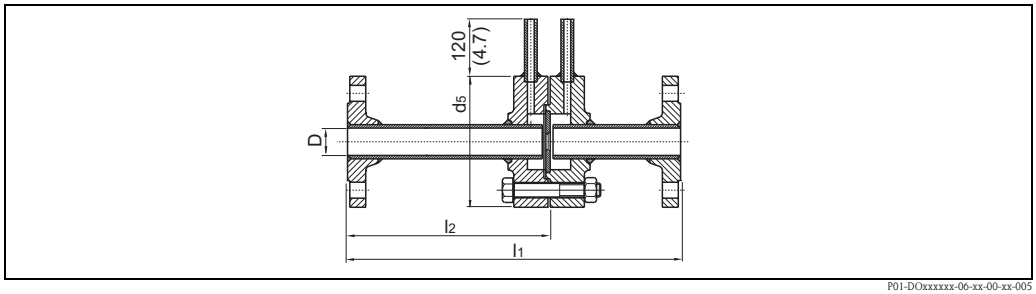
**Type of pressure tapping**

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 | ■ standard (Klingersil or graphite, depending on the application)<br>■ welded | | ■ standard (graphite)<br>■ welded |

**Dimensions; weight**




P01-DOxxxxxx-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<br>Cl. 600 | Cl. 1500 | Cl. 2500 | PN6 | PN16<br>PN40 | PN63<br>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 |
| BGS | 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<br>(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<br>(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<br>(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<br>(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<br>(optional; multiple options can be selected) |
|---|---|
| FE | Wet calibration |
| F8 | Pressure test + certificate |

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

# Accessories

**Overview**

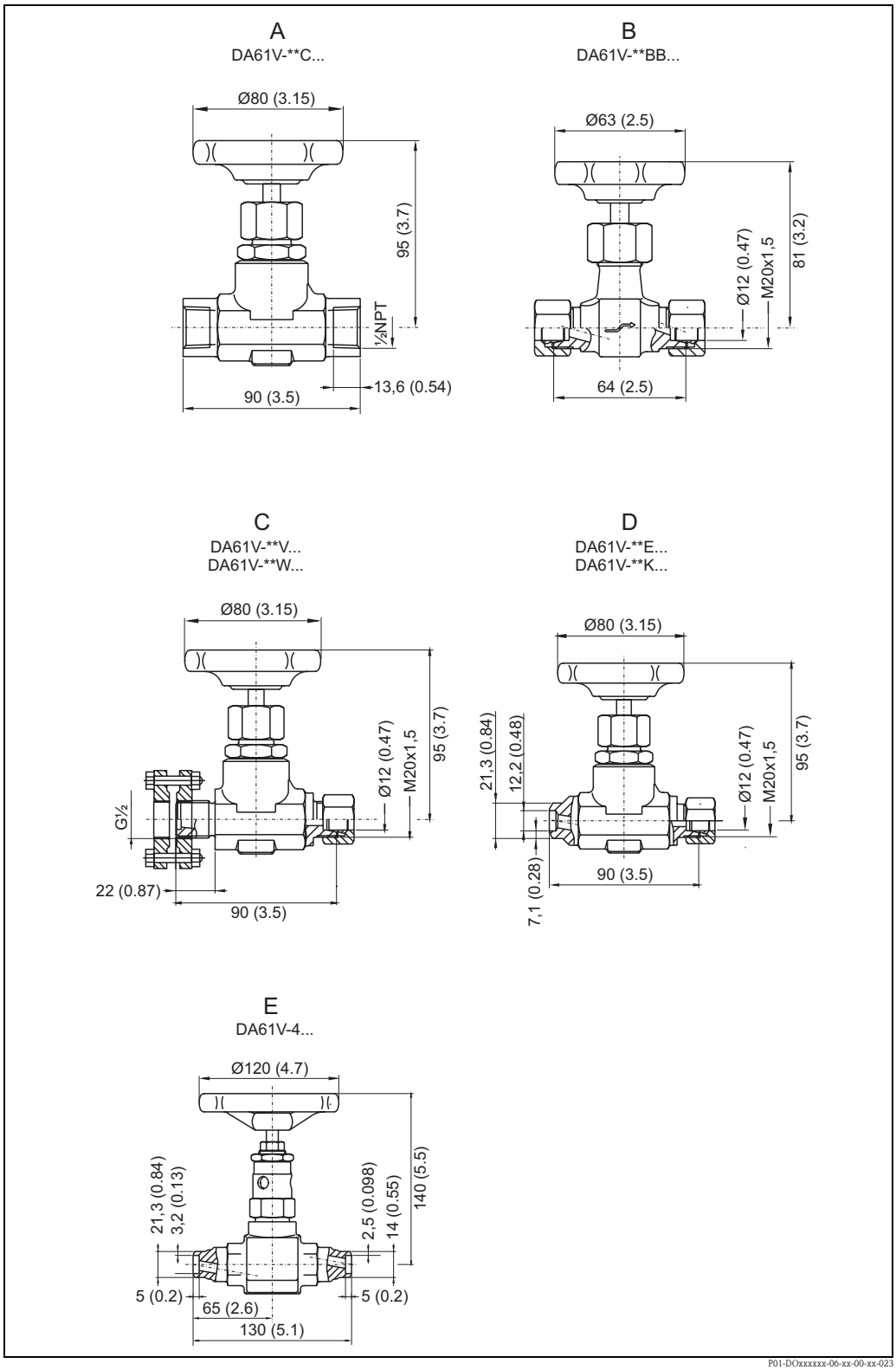
The following accessories are available for the differential-pressure flow measurement with orifices:

- 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**




*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**<br>DA61V-**W** | approx. 1,45 kg (3.2 lbs) |
| D | DA61V-**E**<br>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, phospahtized
- 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 |

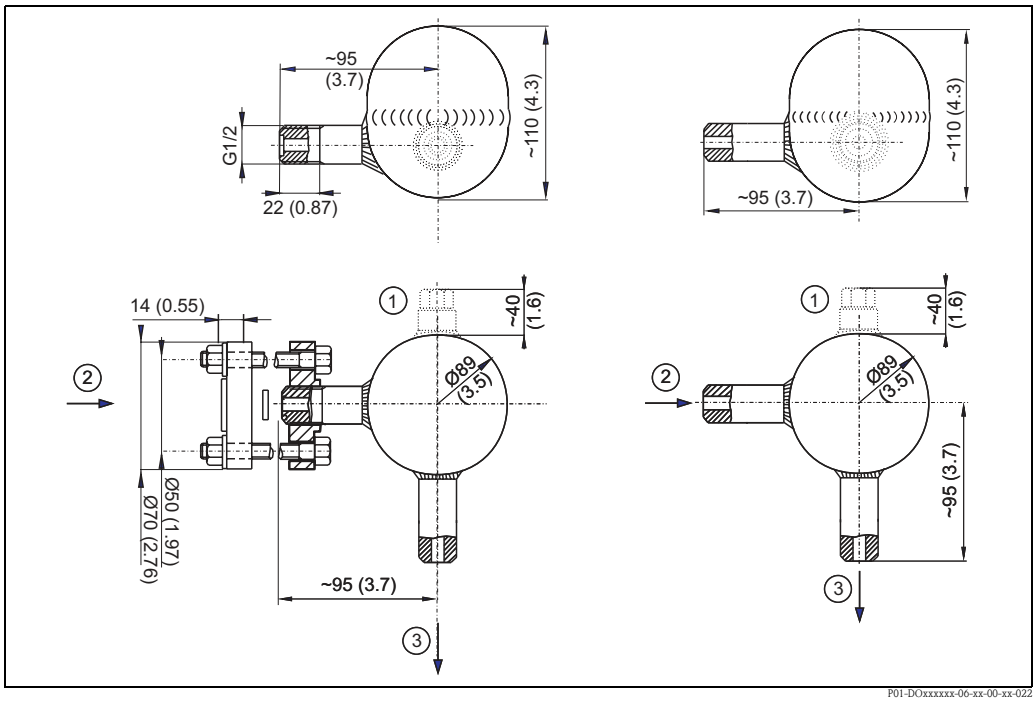
| 895 | Marking |
|---|---|
| Z1 | Tagging (TAG), see additional spec. |



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 delivera 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); 300cm³; PN100 |
| C | 316L; 300cm³; PN100 |
| K | 16Mo3; 250cm³; 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<br>(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 |

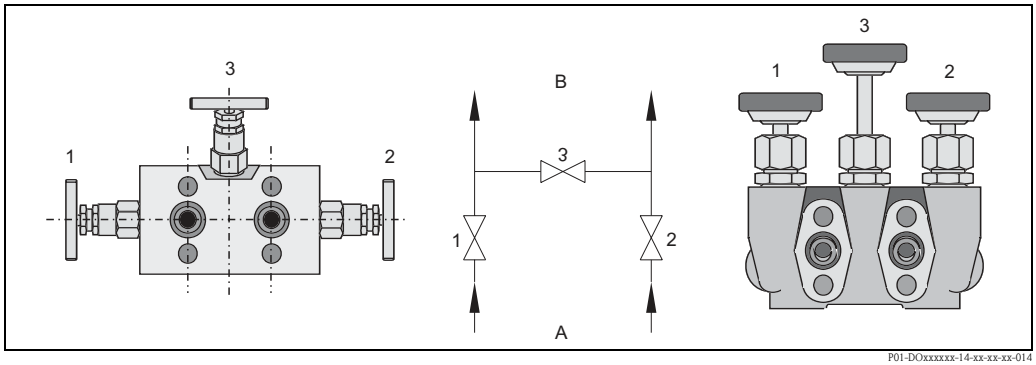
| 895 | Marking |
|---|---|
| Z1 | Tagging (TAG), see additional spec. |

# Deltatop DA63M: Manifold (accessory)

**Usage**

### 3-valve manifold

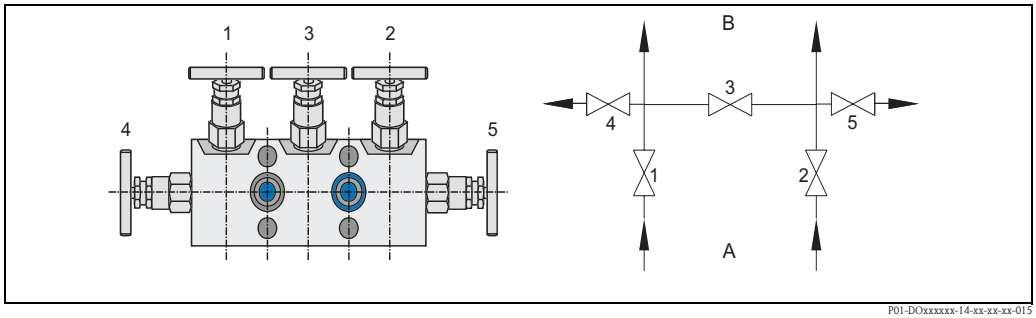
The manifold is used to connect the impulse pipes to the differential pressure transmitter. Valves 1 and 2 can be used to separate the transmitter from the impulse pipes.
Valve 3 is used for a zero point adjustment between the impulse pipes.



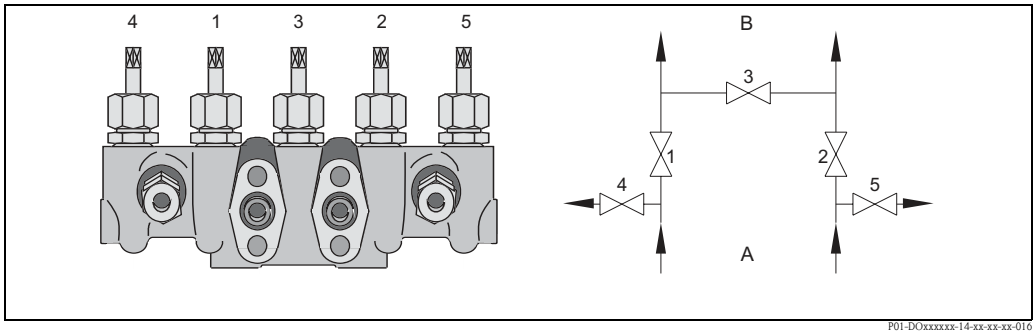

*left: milled version (for gases and liquids); right: forged version (for steam);*
*A: process side; B: transmitter side*

### 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.

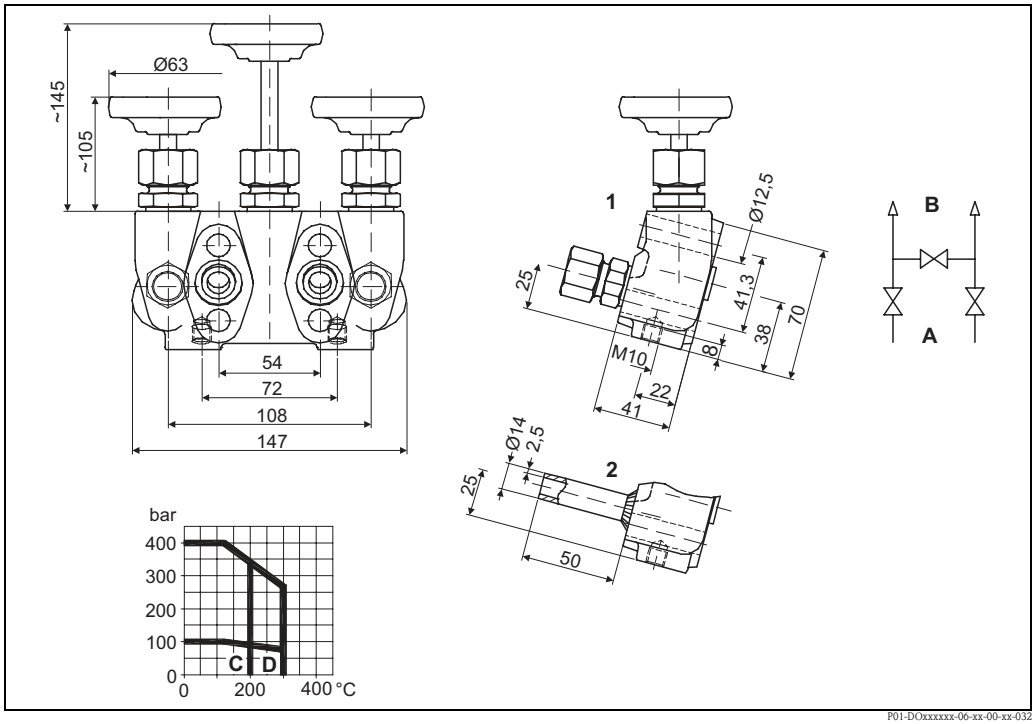



*5-valve manifold with venting valve, milled version (for gases and liquids);*
*A: process side; B: transmitter side*




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

**Version: 3-valve, forged**




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

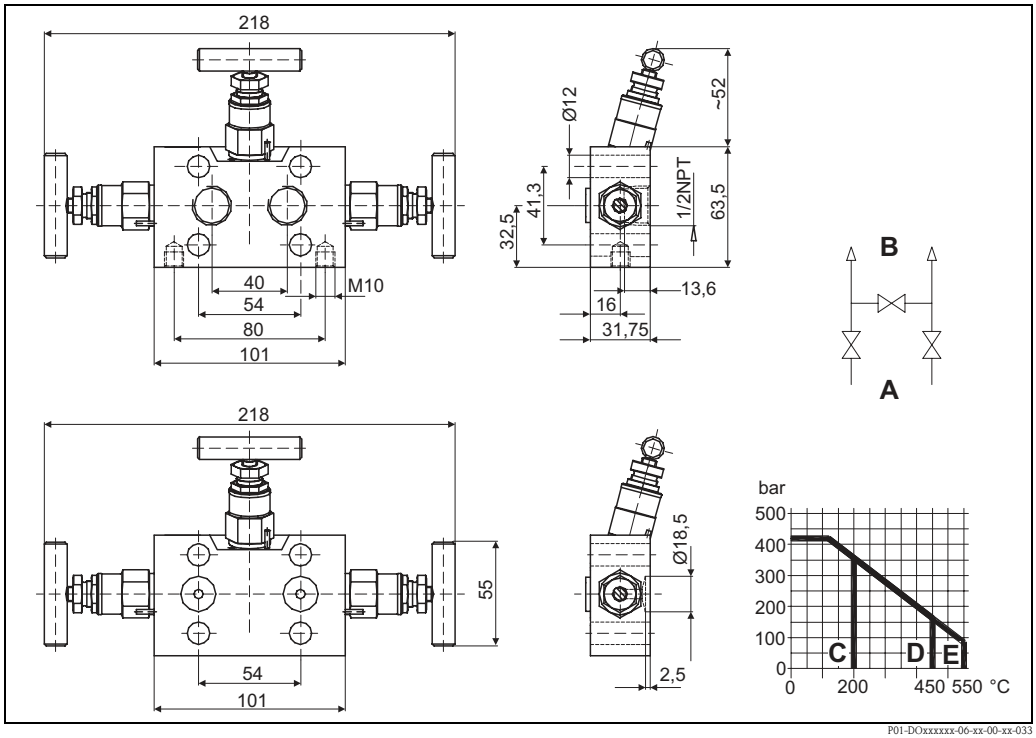
### Design

- 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 | ■ PTFE (up to 200 °C)<br>■ pure graphite (up to 300 °C) | ■ PTFE (up to 200 °C)<br>■ 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*

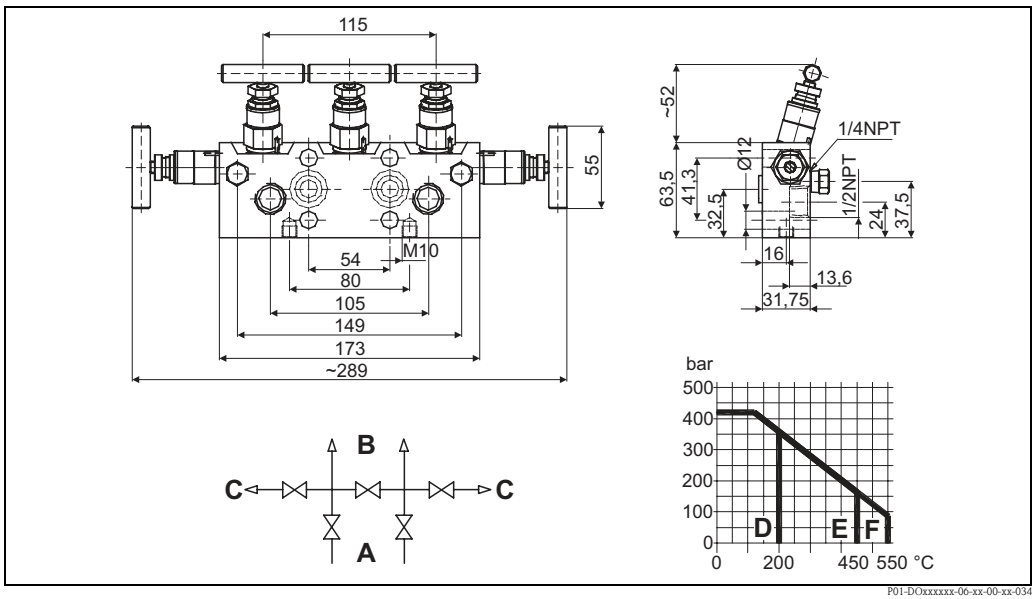
### Design

- Surface: steel phospahtized
- 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 | ■ PTFE (up to 200 °C)<br>■ pure graphite (up to 550 °C) | ■ PTFE (up to 200 °C)<br>■ 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

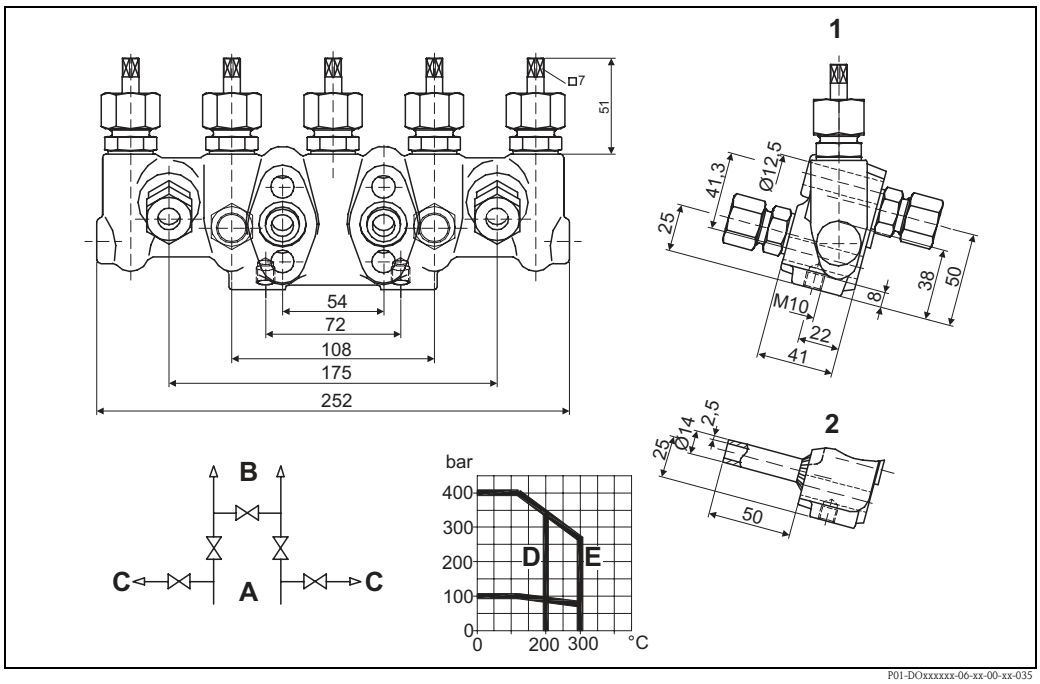
### Design

- 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 | ■ PTFE (up to 200 °C)<br>■ pure graphite (up to 550 °C) | ■ PTFE (up to 200 °C)<br>■ 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

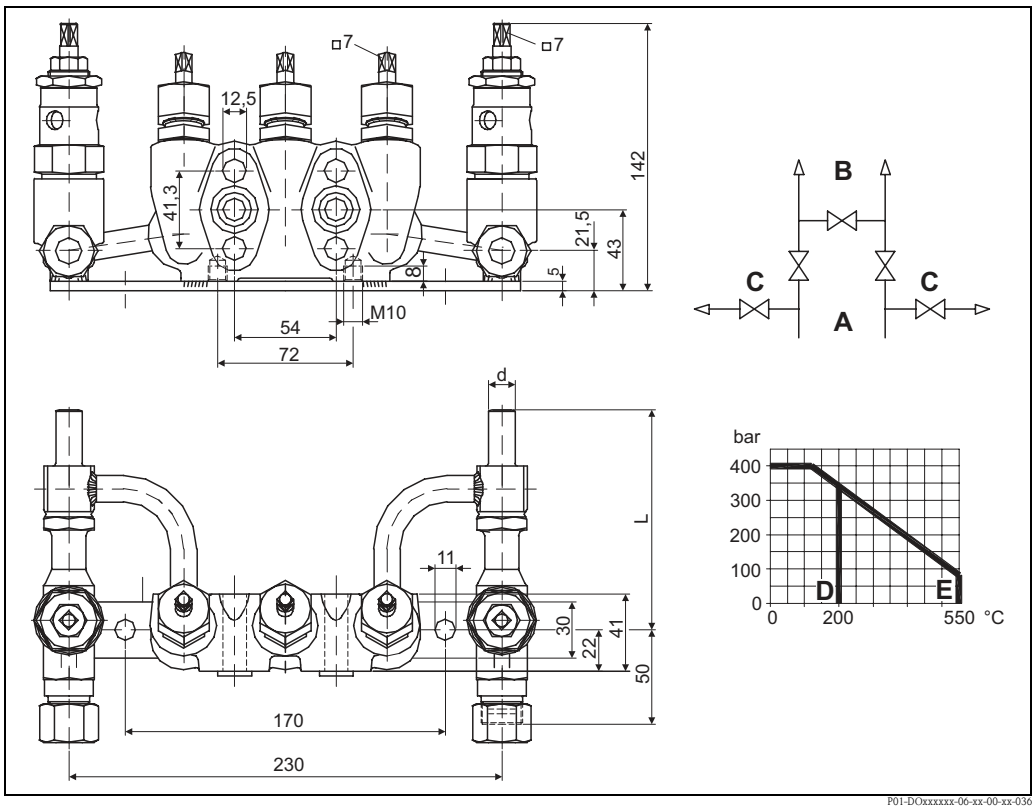
### Design

- 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 | ■ PTFE (up to 200 °C)<br>■ pure graphite (up to 300 °C) | ■ PTFE (up to 200 °C)<br>■ pure graphite (up to 300 °C) |
| Union nut | steel | 1.4571 |

**Version: 5-valve HT, forged, purge valve**




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

### Usage

High temperature steam applications

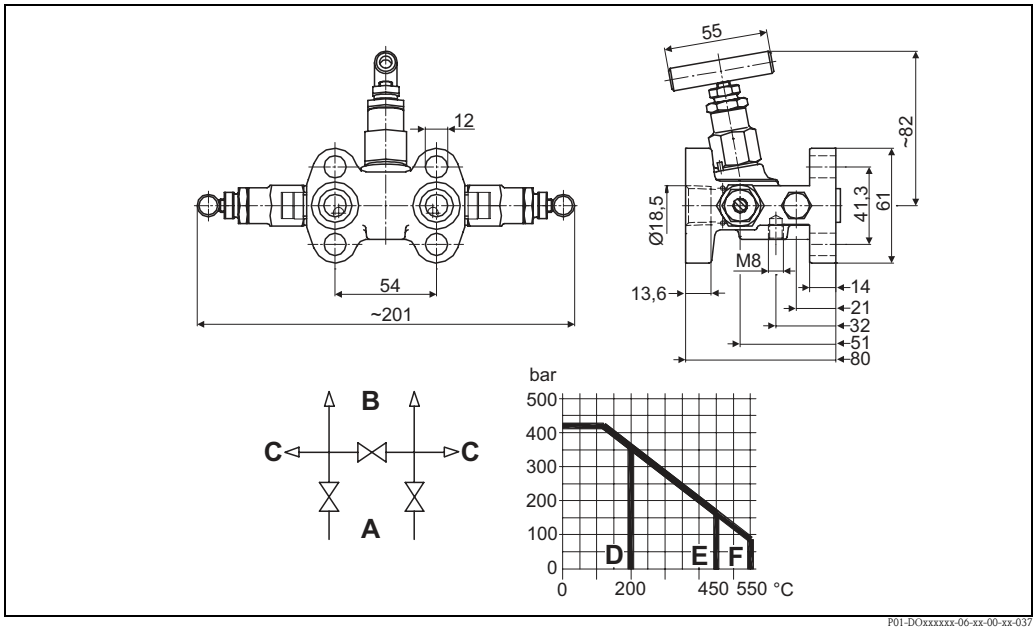
### Design

- 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**




**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

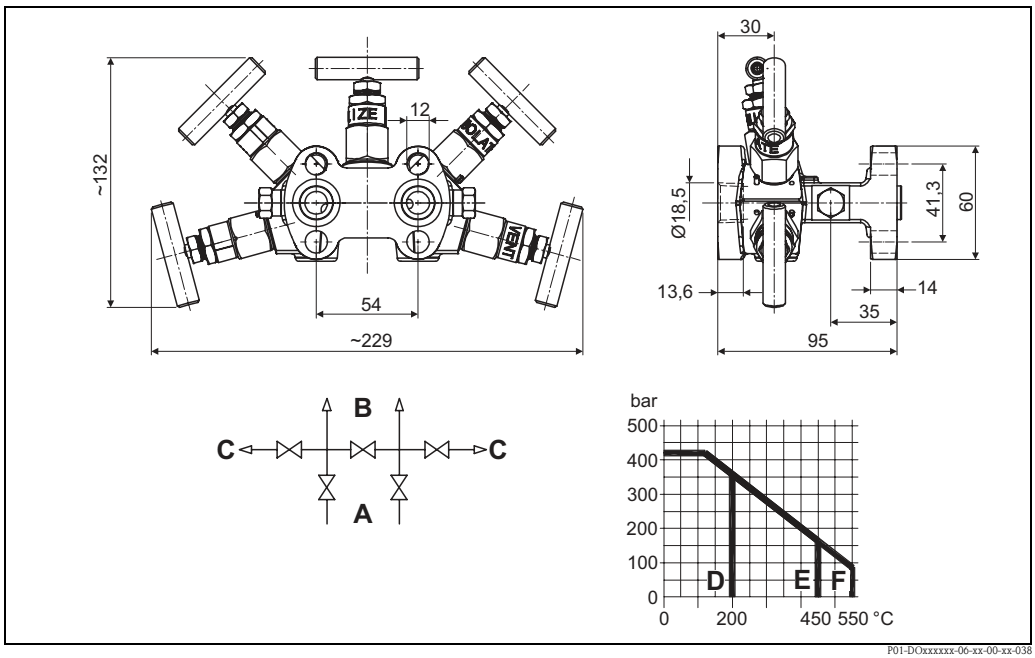
### Design:

- 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 ∅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 | ■ PTFE (up to 200 °C)<br>■ pure graphite (up to 550 °C) | ■ PTFE (up to 300 °C)<br>■ 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**




**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 ∅18,5 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 | ■ PTFE (up to 200 °C)<br>■ 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<br>(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)

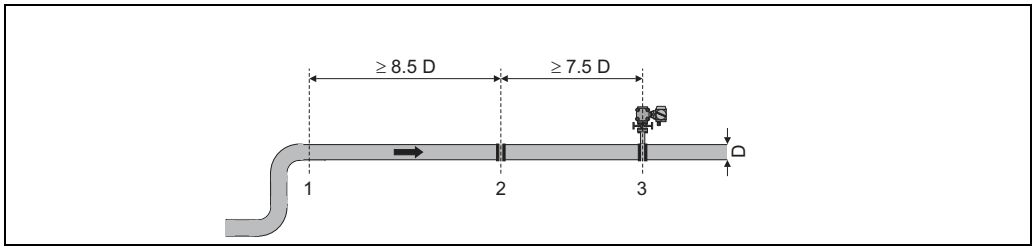
**Usage**

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

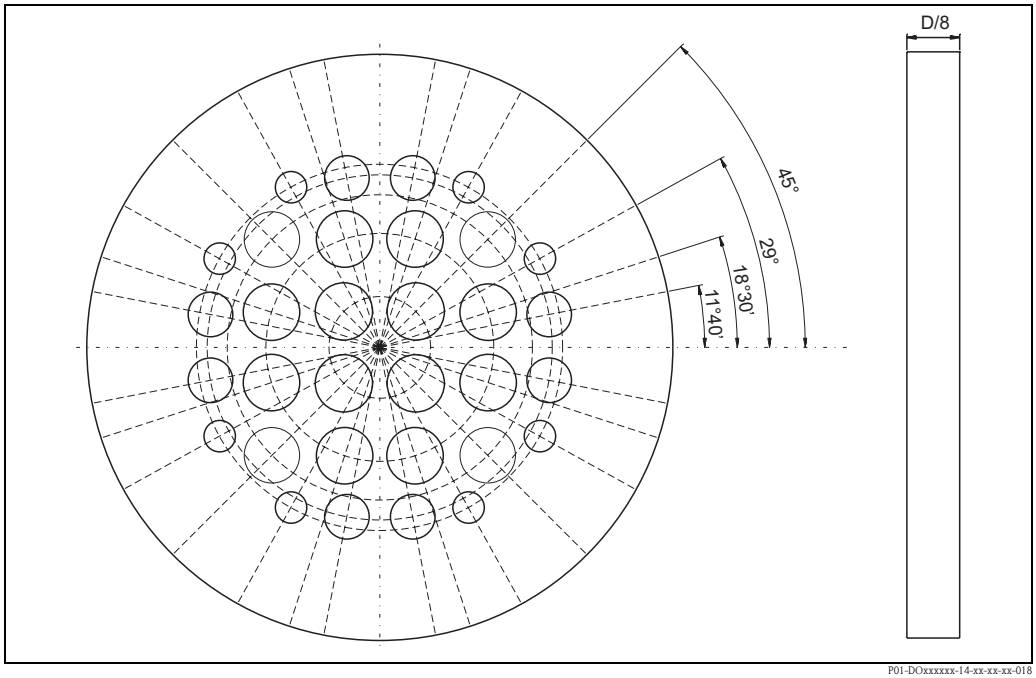
### Pressure loss

Pressure loss across the rectifier:

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

– $\Delta p$: Pressure loss across the rectifier [Pa]
– $\rho$: 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 |

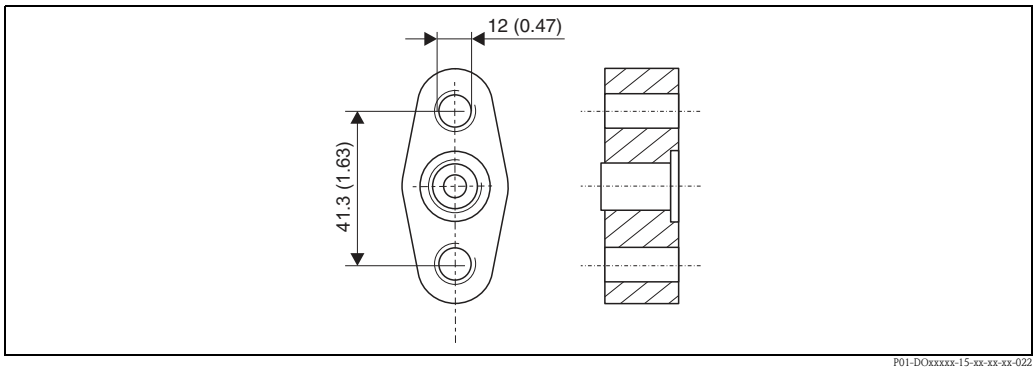
| 30 | Conditioner |
|---|---|
| | **EN flanges** |
| BAC | PN6 B1, 316L |
| BBC | PN10 B1, 316L |
| BCC | PN16 B1, 316L |
| BDC | PN25 B1, 316L |
| BEC | PN40 B1, 316L |
| BFC | PN63 B2, 316L |
| BGC | PN100 B2, 316L |
| BHC | PN160 E, 316L |
| | **ANSI flanges** |
| FAC | Cl.150 RF, 316L |
| FBC | 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<br>(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** | | | |
| **Transmitter** | | | |

**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.

☐ **absolute** ☐ **gauge** **ambient pressure:** unit

**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) | | unit |
|---|---|---|---|---|---|
| **Flow rate *** | ☐ | ☐ | ☐ | **Reference temp.:** | |
| **Density *** | ☐ | ☐ | ☐ | **Reference pressure:** | |

| | minimum | nominal | maximum | unit * |
|---|---|---|---|---|
| **Requested flow:** | | | * | |
| **Pressure:** | | * | | |
| **Temperature:** | | * | | |
| **Density: 1)** | | | | |
| **Viscosity: 1)** | | | | |
| **Z-factor: 1,2)** | | | | |
| **Isentropic index: 1,2)** | | | | |

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.

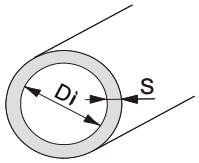
### Flowmeter

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

### Pipe dimensions *

**Mounting position s. sheet 2**

☐ **Pipe (round) ***




| | | unit |
|---|---|---|
| Inner diameter (DI): | | |
| Wall thickness (S): | | |
| Isolation thickness: | | |
| Pipe material: | | |

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**

☐ Optimized by E+H
☐ Maximum Turn Down (small ß)
☐ Low pressure loss (large ß)
☐ Maximum allowable pressure loss
☐ Fixed diameter ratio ß
☐ Fixed differential pressure
☐ Fixed calculation (attachment)

unit

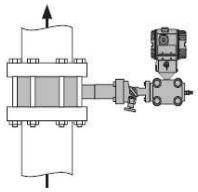
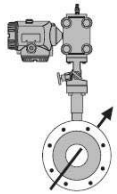
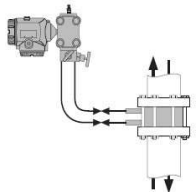
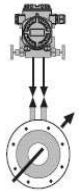
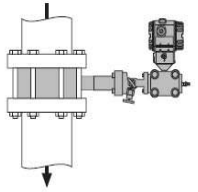
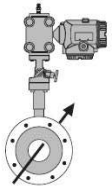
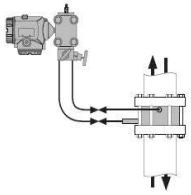
FLOWDATA1-EN

# Sizing Sheet - Mounting Position / Orifice

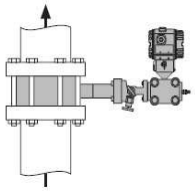
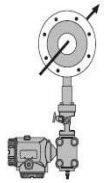
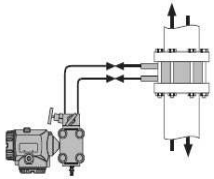
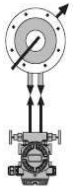
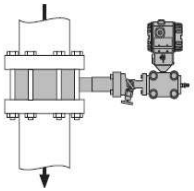
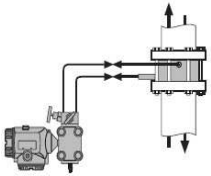


**Not applicaple for orifice plates DO64P**

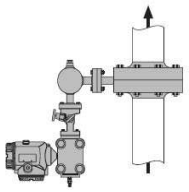
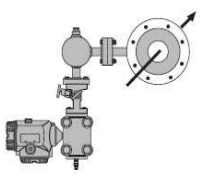
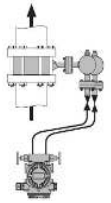
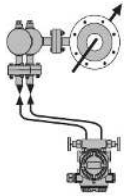
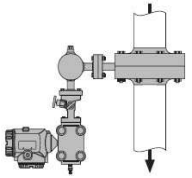
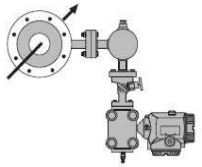
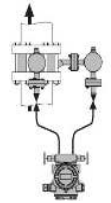
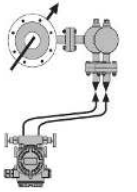
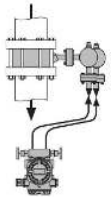
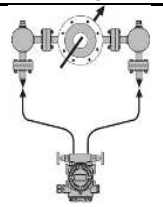
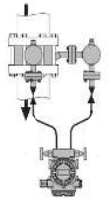
## Gas:

| compact, vertical | compact, horizontal | remote, vertical | remote, horizontal |
|---|---|---|---|
|  ☐ upwards |  ☐ mounted left |  ☐ up/down taps 0° |  ☐ taps 0° |
|  ☐ downwards |  ☐ mounted right |  ☐ up/down taps 90° |  ☐ taps x° (DIN) |

## Liquid:

| compact, vertical | compact, horizontal | remote, vertical | remote, horizontal |
|---|---|---|---|
|  ☐ upwards |  ☐ mounted left |  ☐ up/down taps 0° |  ☐ taps 0° |
|  ☐ downwards |  ☐ mounted right |  ☐ up/down taps 90° |  ☐ taps x° (DIN) |

## Steam:

| compact, vertical | compact, horizontal | remote, vertical | remote, horizontal |
|---|---|---|---|
|  ☐ upwards |  ☐ mounted left |  ☐ upwards, taps 0° |  ☐ mounted left |
|  ☐ downwards |  ☐ mounted right |  ☐ upwards, taps 90° |  ☐ mounted right |
|  ☐ downwards, taps 0° |  ☐ taps 180° | | |
|  ☐ downwards, taps 90° | | | |

**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 infomation matches the order code of the instrument. Furthermore the feasibilty of the measuring point has to be checked as well. A completely filled-in questionaire 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 $Nm^3/h$ and not $m^3/h$ for flow at normal conditions).

| Section | Field / Parameter | Explanation of the entry | mandatory | | |
|---|---|---|---|---|---|
| | | | A[1)] | B[1)] | C[1)] |
| **Project** | | | | | |
| | Project<br>Customer<br>Project no. | Order specific customer data | | | |
| **Order code** | | | | | |
| Primary element | Order code | Order code of the selected primary element | | | |
| | Order no.*<br>Positions* | Order position, to be assigned to this data sheet. | | | yes |
| Transmitter | Order code | Order code of the associated differential pressure transmitter. | | | |
| | Order no. *<br>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*<br>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*<br>(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*<br>Density*<br>(at operating / normal / standard conditions) | For gases only:<br>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:<br>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:<br>The values of flow rate or density are related to normal conditions (pressure and temperature).:<br>Pressure: 101,325 kPa abs.<br>Temperature: 0°C (273,15 K) | yes | | |
| | Standard conditions (acc. to reference conditions) | For gases only:<br>The values of flow rate or density are related to standard conditions (pressure and temperature).:<br>Pressure: 101,325 kPa abs. (14,696psi abs.)<br>Temperature: 0°C (59 °F)<br>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:<br>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 | | |
| | Isentropic index | For gases only:<br>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:<br>1,65 for monoatomic gases (e.g. Helium He)<br>1,4 for diatomic gases (e.g. nitrogen $N_2$)<br>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 diamter 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:<br>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 selecetion, measurement dynamics, measurement uncertainty and permanent pressure loss. | yes | | |
| | Maximum measurement dynamics (small $\beta$) | Endress+Hauser calculates and optimizes the measuring point to the smallest reasonably achievable diameter ratio $\beta$ in order to provide maximum measurement dynamics and minimum measurement uncertainty. | yes | | |
| | Low permanent pressure loss (large $\beta$) | Endress+Hauser calculates and optimizes the measuring point to the largest reasonably achievable diameter ratio $\beta$ 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 $\beta$ | The sizing has to be executed with a user defined diameter ratio $\beta$. 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 mouting position in accordance with the situation on site can be chosen by marking the check box below the pictogram. The chosen mouting 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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People for Process Automation

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