Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Deltatop
DP61D, DP62D, DP63D

Differential pressure flow measurement with Pitot tubes 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 40 to DN 12000
- medium temperatures from -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 and highest accuracy
- Deltabar differential pressure transmitter ready adjusted
- display configured for flow rate, differential pressure or 0...100%
- suited for bidirectional measurements
- robust design; no moving parts

TI425P/00/en/10.07

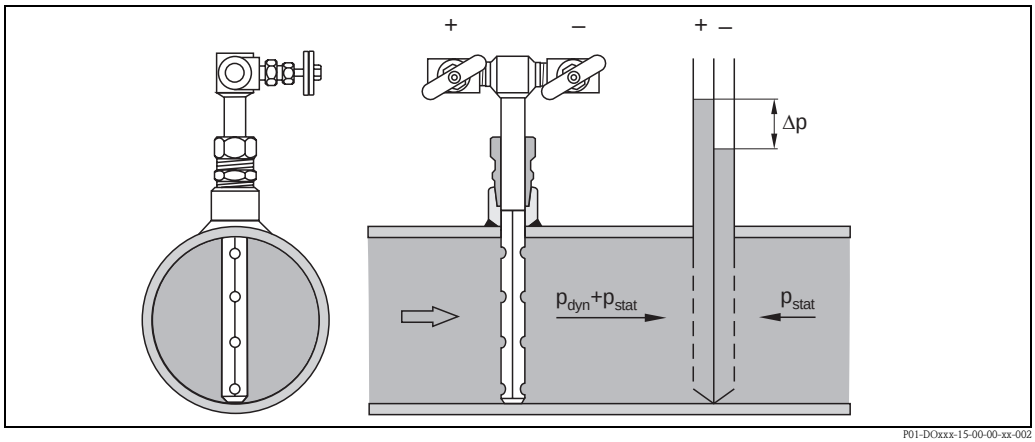
Endress+Hauser

People for Process Automation

Table of Contents

Function and System Design

Measuring principle



P01-DOxxx-15-00-00-xx-002

The front of the pitot tube is exposed to the static pressure p_{stat} plus the dynamic pressure p_{dyn}. The back of the tube is exposed only to the static pressure p_{stat}. The resulting **differential pressure Δp** can be used to calculate the **flow rate Q**.

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

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

P01-DOxxxxx-15-xx-xx-xx-008

Downstream of the Pitot tube the static pressure p_{stat} is reduced by the permanent pressure loss **Δω**. With Pitot tubes this pressure loss Δω is much less significant than with other primary elements.

Flow calculation

According to the continuity law derived by Bernoulli and the energy equation, the sum of the pressure energy and the potential and kinetic energy of a flowing fluid inside a pipe and in conditions of stationary and frictionless flow is the same at any time and in any part of the pipe:

$p_{stat} + p_{dyn} = \text{const.}$

From this law, the following flow equations can be derived:

Volumetric flow for gases under standard conditions

$$Q_{vn} = k\, A\, \varepsilon \sqrt{\frac{2\, \Delta p\, P_b\, Z_n\, T_n}{\rho_n\, P_n\, Z_b\, T_b}}$$

Volumetric flow for gases under operating conditions

$$Q_v = k\, A\, \varepsilon \sqrt{\frac{2\, \Delta p}{\rho_b}}$$

Mass flow for gases and steam

$$Q_m = k\, A\, \varepsilon \sqrt{2\, \Delta p\, \rho_b}$$

Mass flow for liquids

$$Q_m = k\, A \sqrt{2\, \Delta p\, \rho_b}$$

Volumetric flow for liquids

$$Q_v = k\, A \sqrt{\frac{2\, \Delta p}{\rho_b}}$$

Expansion factor

$$\varepsilon = \frac{\Delta p}{\kappa\, P_b} \left\{ \left(1 - \frac{2\, b}{\sqrt{\pi\, A}} \right)^2 0.31424 - 0.09484 \right\}$$

Definition of the symbols

Symbol	Quantity	Unit
Δp	Differential pressure at the probe profile	Pa
ρ_n	Medium density at standard conditions	kg/m^3
ρ_b	Medium density at operating conditions	kg/m^3
ε	Expansion factor	1
A	Cross sectional area of the pipe	m^2
b	Width of the probe profile perpendicular to the flow direction	m
k	k-factor of the Pitot tube	1
κ	Isentropic exponent of the gas[1)]	1
P_b	Operating pressure	Pa
P_n	Absolute pressure of the gas at standard conditions	Pa
Q_m	Mass flow	kg/s
Q_v	Volumetric flow	m^3/s
Q_{vn}	Volumetric flow at standard conditions	m^3/s
T_b	Temperature of the gas at operating conditions	K
T_n	Temperature of the gas at standard conditions	K
Z_b	Real gas factor at operating conditions	1
Z_n	Real gas factor at standard conditions	1

1) The isentropic exponent is: 1,66 for monoatomic gases; 1,4 for diatomic gases; 1,3 for triatomic gases

Sizing and optimization

The exact relationship between differential pressure, flow and pressure loss is described by the k-factor which depends on the shape and size of the Pitot tube.
The k-factors of the Deltatop Pitot tubes have been determined and verified in elaborate sample calibrations. Every Pitot tube is shipped with a calculation. The differential pressure, pressure loss, application limits and further parameters are calculated based on the cusotmer specifications. For this purpose a form (Sizing Sheet – Data Sheet, see page 67) has to be completed. The user doesn't need to be involved in the complicated sizing calculations.

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 online quite conveniently.
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
- k-factor
- 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 67) 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.

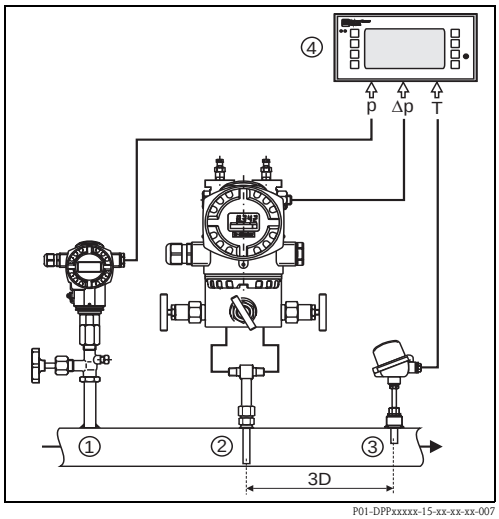
Selecting the differential pressure transmitter and the measuring cell

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 of the Deltabar. 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:

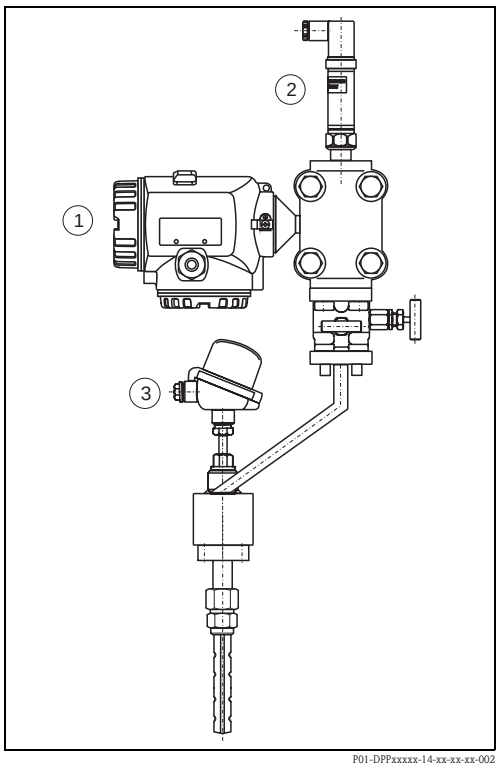
- **An absolute pressure sensor**
  This sensor must be mounted on the upstream side of the Pitot tube.
- **A temperature probe**
  In order to avoid disturbances of the flow profile, this probe must be mounted on the downstream side of the Pitot tube. The minimum distance between the Pitot tube and the temperature probe is 3D.
  (D: diameter of the pipe)



1: *absolute pressure probe*
2: *Pitot tube and differential pressure transmitter*
3: *temperature probe*
4: *evaluation unit*

Combined process connection for absolute and differential pressure and for the temperature
An adapter (e.g. oval flange PZO, see page 66) can be used to screw a pressure transmitter or a pressure sensor into the Deltabar flange.
The absolute pressure sensor must be mounted at the "+" side of the Deltabar.

Deltatop DP62D and DP63D are available in a version with integrated Pt100 temperature probe.



1: *Deltabar*
2: *Probe fo absolute pressure*
3: *Pt100 temperature probe*

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
ρ = the density of the medium.

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

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

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

where
P = absolute pressure
T = absolute temperature (K)
Z = compressibility factor
1 = operating condition according to the calculation sheet
2 = actually measured operating condition

The compensation can now be computed as follows:

$Q_2 = Q_1 \sqrt{\frac{P_2}{P_1} \frac{T_1}{T_2} \frac{Z_1}{Z_2}}$ 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 its value is close to 1. If the compressibility factor is to be included in the compensation, the value must be determined according to the actually measured pressure and temperature. Compressibility factors are available in the corresponding literature in tables or graphs or can be calculated, e.g. using the Soave-Redlich-Kwong procedure.

Split range (expansion of the measuring range)

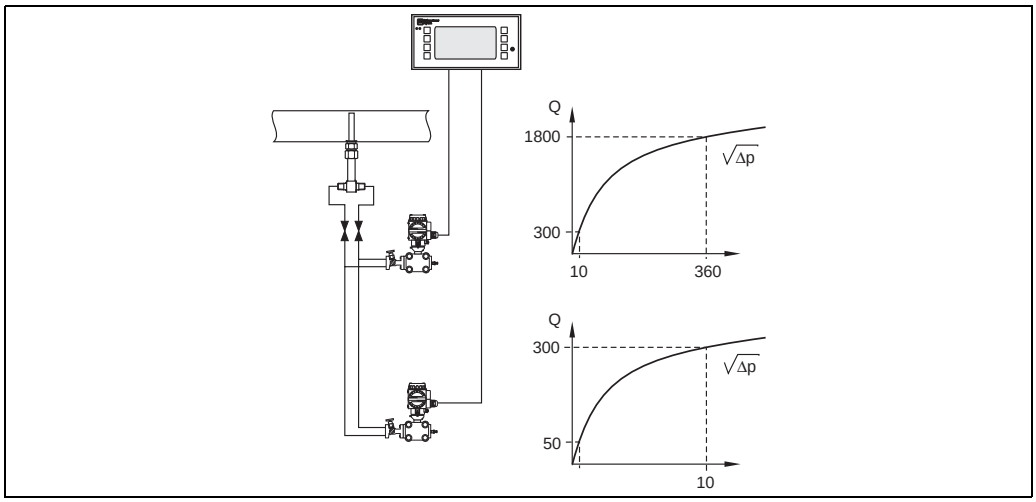
The square root function has a very steep slope in the vicinity of the zero point. Therefore, the measuring range is limited from below, which results in a measuring dynamics of typically 6:1 (max. 12:1).
If the differential pressure is high enough, it is possible to increase the dynamics by connecting multiple differential pressure transmitters with different measuring ranges.
The following Endress+Hauser instruments can be used to evaluate the measuring signals simultaneously:

- Energy Manager RMS621 (see Technical Information TI092R)
- Flow and 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.

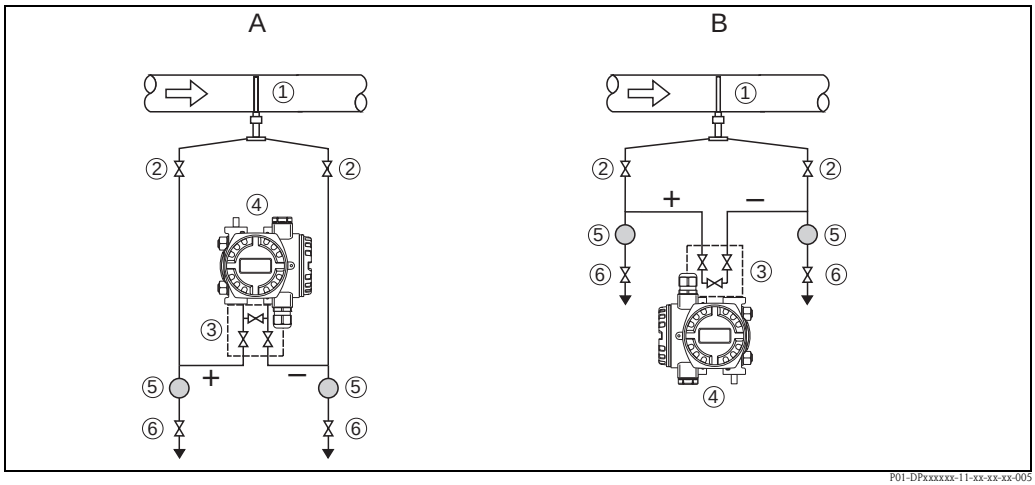
Example



P01-DPPxxxxx-15-xx-xx-xx-008

Flow measurements in liquids

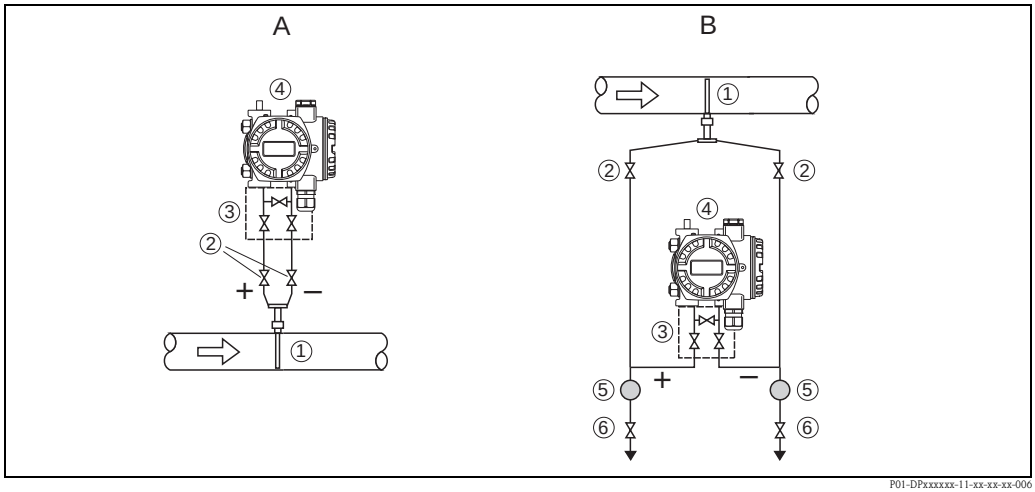
With liquid applications, the transmitter must be mounted below the pipe. All impulse pipes must be installed with a gradient of at least 1:15 to the process connection – coming from the transmitter. This ensures that trapped air and bubbles rise back to the process pipe and thus do not influence the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



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

Flow measurement in gases

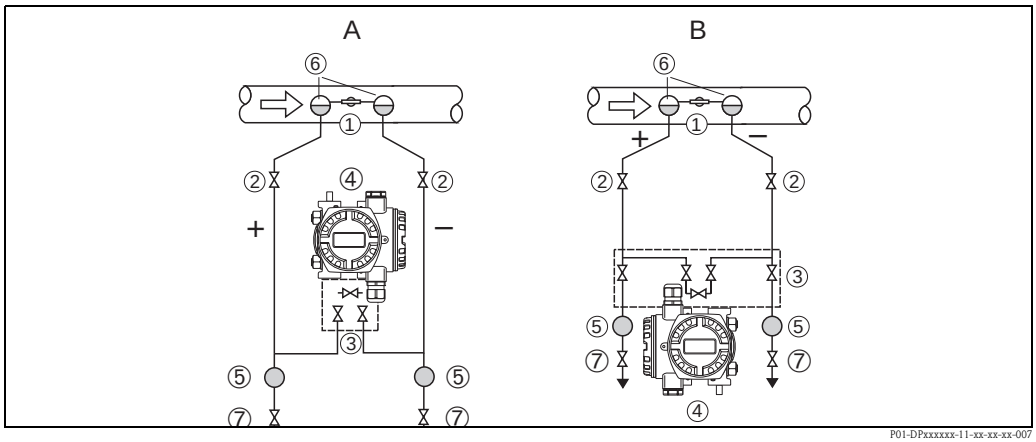
With gas applications, the transmitter must be mounted above the pipe. All impulse pipes must be installed with a gradient of at least 15:1 to the process connection – coming from the transmitter. This ensures that any condensate flows back into the process pipe and thus does not influence the measurement.



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

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 transmitter and 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 with a gradient of 1:15 to ensure reliable rising of entrapped 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.

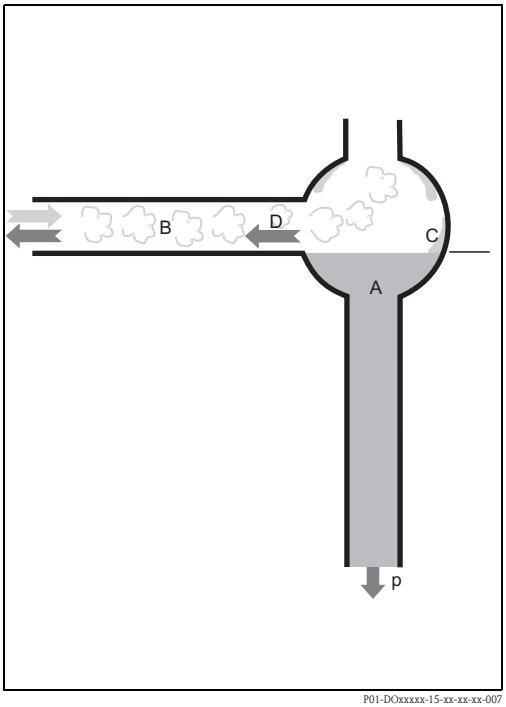


A: *with 3-valve manifold; for easy venting of the transmitter; especially for small differential pressures;*
B: *with 5-valve manifold for cleaning of the transmitter;*
1: *Pitot tube;* **2:** *Shut-off valves;* **3:** *Valve manifold;* **4:** *Differential pressure tranmsitter Deltabar;* **5:** *Separator;*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

Application of the condensate chambers
Application of the condensate chambers is recommended for gaseous media, which condense when cooling down in the impulse pipes. This is mainly the case in steam; depending on temperature and pressure it may also occur in other media (e.g. in alcohols).

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 Pitot tube, the manifold and the transmitter are delivered readily mounted. Additional piping and additional valves are not required. Thus, leakage problems are eliminated.

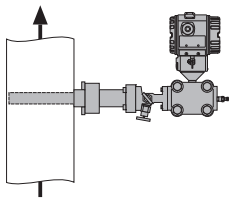
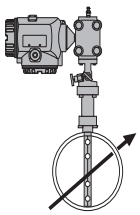
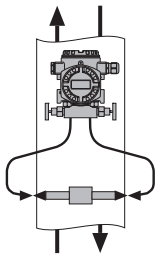
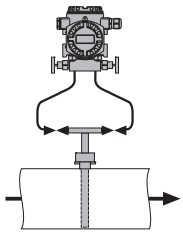
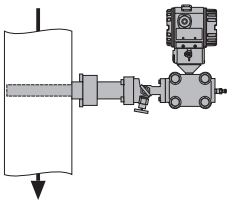
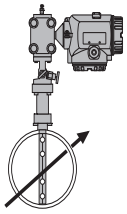
Remote version

With the remote version of the Deltatop, the Pitot tube, 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 make a direct mounting of the transmitter impossible.
- if due to shortage of space the transmitter can not be mounted directly at the Pitot tube.

Flow direction

- The flow direction is marked by an arrow on the flange plate (compact version) or on the probe head (remote version).
- "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.

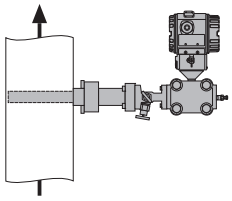
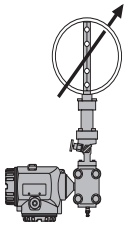
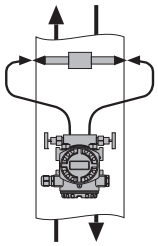
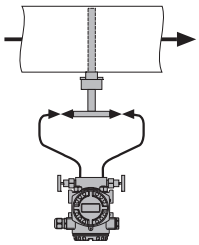
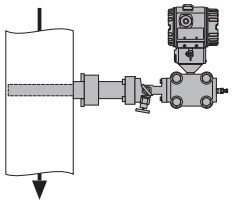
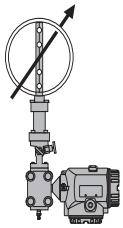
Gas measurements

<table>
<tr><th>compact; vertical[1)]</th><th>compact; horizontal[2)]</th><th>remote; vertical</th><th>remote; horizontal</th></tr>
<tr><td>flow upwards
DP6xD-CV...
 
P01-DP61Dxxx-11-00-00-xx-001</td><td>mounting left
DP6xD-CB...
 
P01-DP61Dxxx-11-00-00-xx-007</td><td rowspan="2">upwards/downwards
DP6xD-BW...
 
P01-DP61Dxxx-11-00-00-xx-013</td><td rowspan="2">top/bottom
DP6xD-BD...
 
P01-DP61Dxxx-11-00-00-xx-016</td></tr>
<tr><td>flow downwards
DP6xD-CU...
 
P01-DP61Dxxx-11-00-00-xx-002</td><td>mounting right
DP6xD-CC...
 
P01-DP61Dxxx-11-00-00-xx-008</td></tr>
</table>

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)

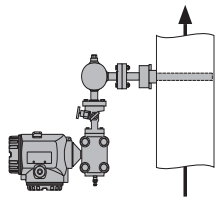
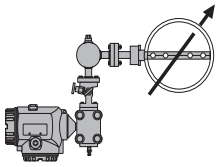
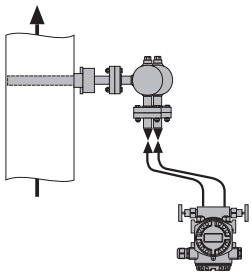
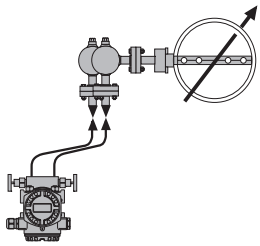
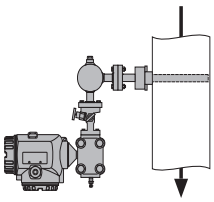
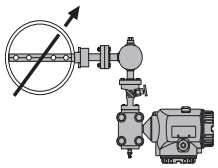
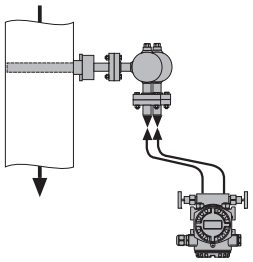
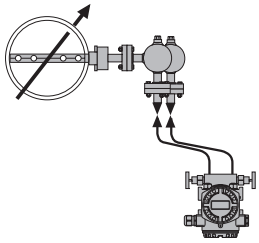
Liquid measurements

compact; vertical[1)]	**compact; horizontal**[2)]	**remote; vertical**	**remote; horizontal**
flow upwards DP6xD-EV...  P01-DP61Dxxx-11-00-00-xx-001	mounting left DP6xD-EB...  P01-DP61Dxxx-11-00-00-xx-009	upwards/downwards DP6xD-DW...  P01-DP61Dxxx-11-00-00-xx-014	top/bottom DP6xD-DD...  P01-DP61Dxxx-11-00-00-xx-017
flow downwards DP6xD-EU...  P01-DP61Dxxx-11-00-00-xx-002	mounting right DP6xD-EC...  P01-DP61Dxxx-11-00-00-xx-010		

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 DP6xD-GV...  P01-DP61Dxxx-11-00-00-xx-005	mounting left DP6xD-GB...  P01-DP61Dxxx-11-00-00-xx-011	flow upwards DP6xD-FV...  P01-DP61Dxxx-11-00-00-xx-015	mounting left DP6xD-FB...  P01-DP61Dxxx-11-00-00-xx-018
flow downwards DP6xD-GU...  P01-DP61Dxxx-11-00-00-xx-006	mounting right DP6xD-GC...  P01-DP61Dxxx-11-00-00-xx-012	flow upwards DP6xD-FU...  P01-DP61Dxxx-11-00-00-xx-020	mounting right DP6xD-FC...  P01-DP61Dxxx-11-00-00-xx-019

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

Installation and process conditions

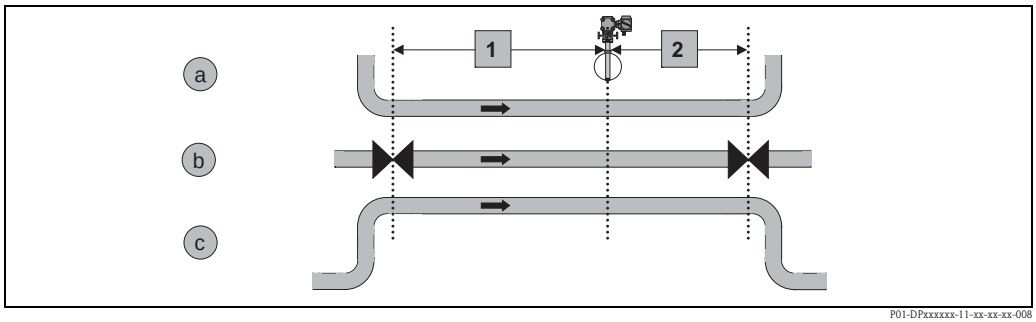
Up- and downstream lengths

In order to ensure a homogeneous flow profile it is necessary to mount the Pitot tube in a sufficient distance to narrowings or bends of the pipe. The required upstream and downstream lengths for different types of obstacles are summarized in the following table:

Type of obstacle	Min. upstream length	Min. downstream length
90° bend	7 x D	3 x D
2x90° bend in the same plane	9 x D	3 x D
2x90° bend in perpendicular planes	17 x D	4 x D
concentric reducer	7 x D	3 x D
concentric expander	7 x D	3 x D
ball/gate valve, fully open	24 x D	4 x D

D: Inner pipe diameter

Examples (schematic)



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

Note!
The requirments concerning the pipe according to ISO5167 have to be met (weld seams, roughness etc).

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) ■ for steam: 300 °C (570 °F)	■ with standard material: approx. 500 °C (930 °F) ■ with special material: approx. 1000 °C (1830 °F)
max. pressure	420 bar (6000 psi)	

Temperature and pressure may **not be subject to large fluctuations**.
If required, a **temperature and pressure compensation** must be applied for gases and steam (see page 6).

Reynolds number

A turbulent flow is required for differential pressure flow measurement. The Reynolds number Re determines whether the flow is laminar or turbulent. Re is a non-dimensional parameter which describes the dependency of the flow on the velocity, the internal diamter of the tube as well as the medium density and viscosity. For a reliable measurement with Pitot tubes the minimum Reynolds number is **Re ≥ 3150**.

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 (boiler plate)	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.

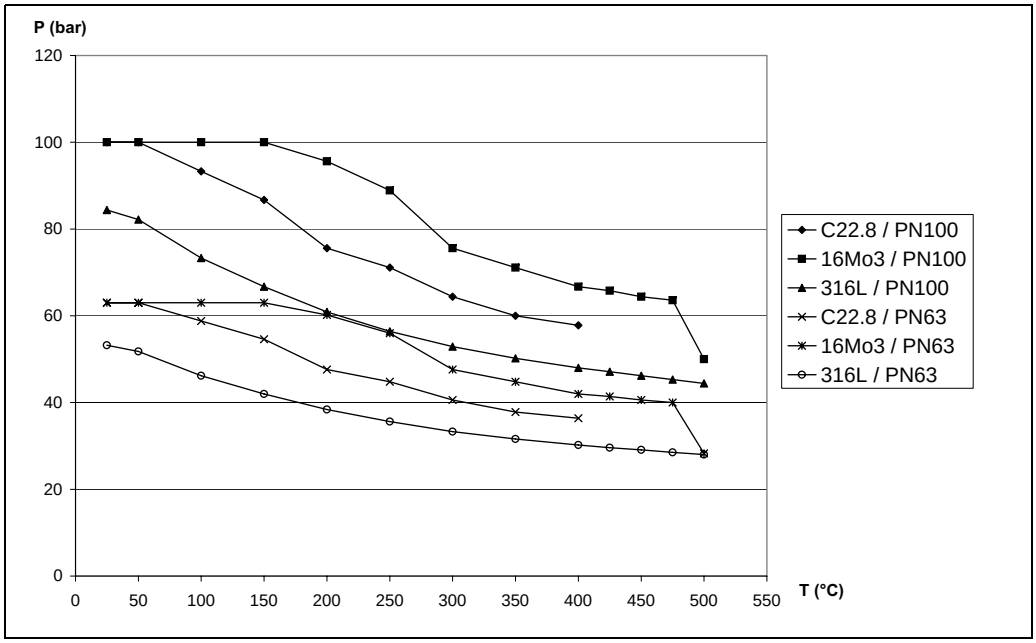
Plastics

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 in each case. Depending on the pressure and the medium, they may strongly deviate from these values.

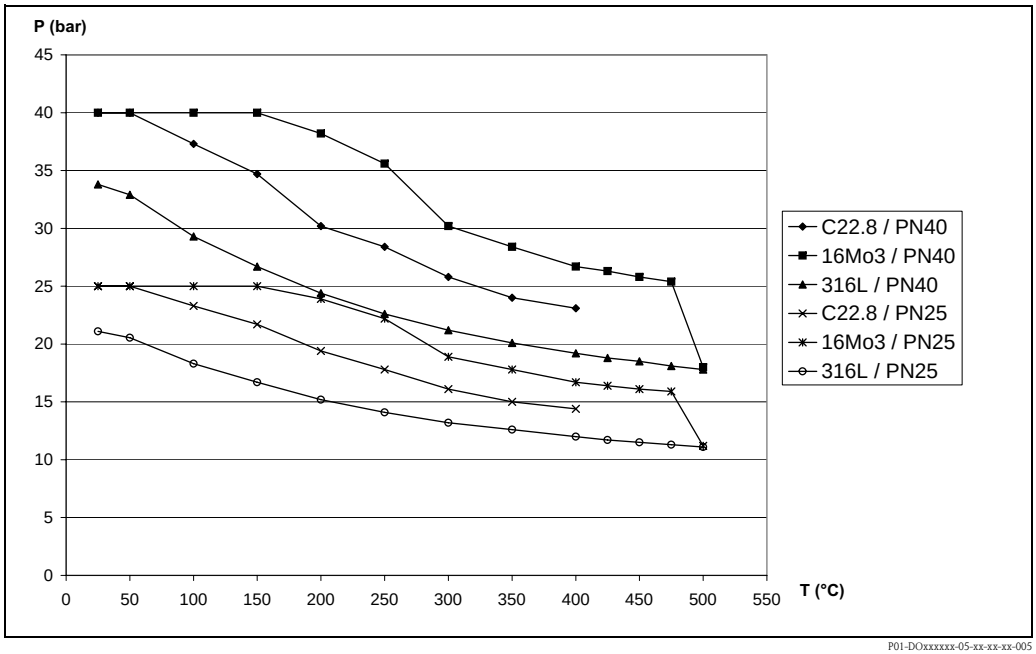
Pressure-temperature curves for flanges according to EN1092-1:2001

PN100 /PN63



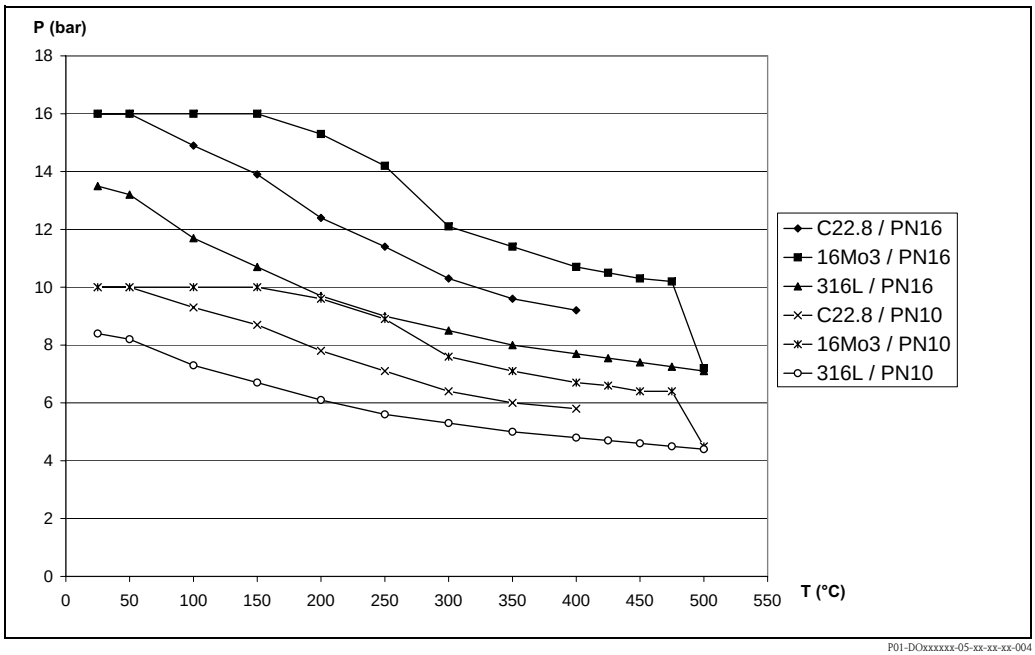
P01-DOxxxxxx-05-xx-xx-xx-006

PN40 /PN25



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

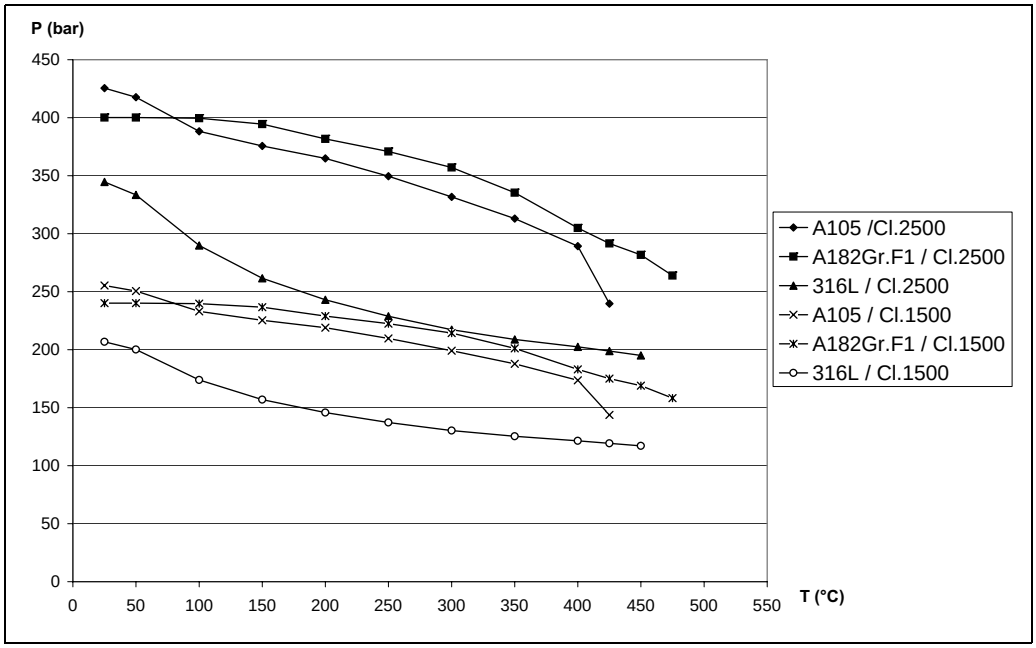
PN16 / PN10



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

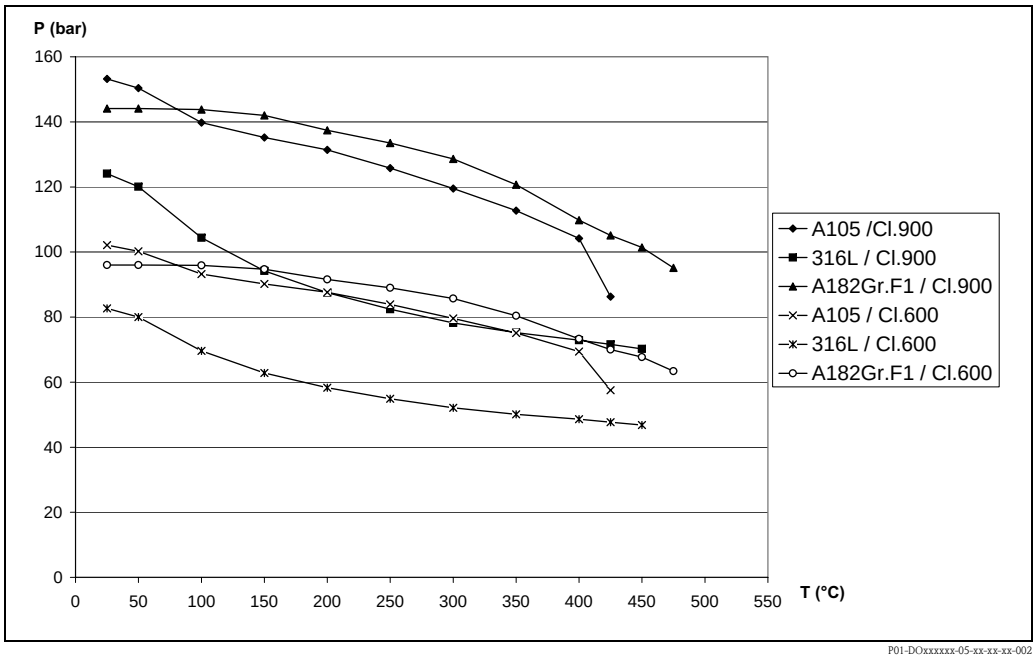
Pressure-temperature curves for flanges according to ANSI B16.5-2003

Cl. 2500 /Cl. 1500



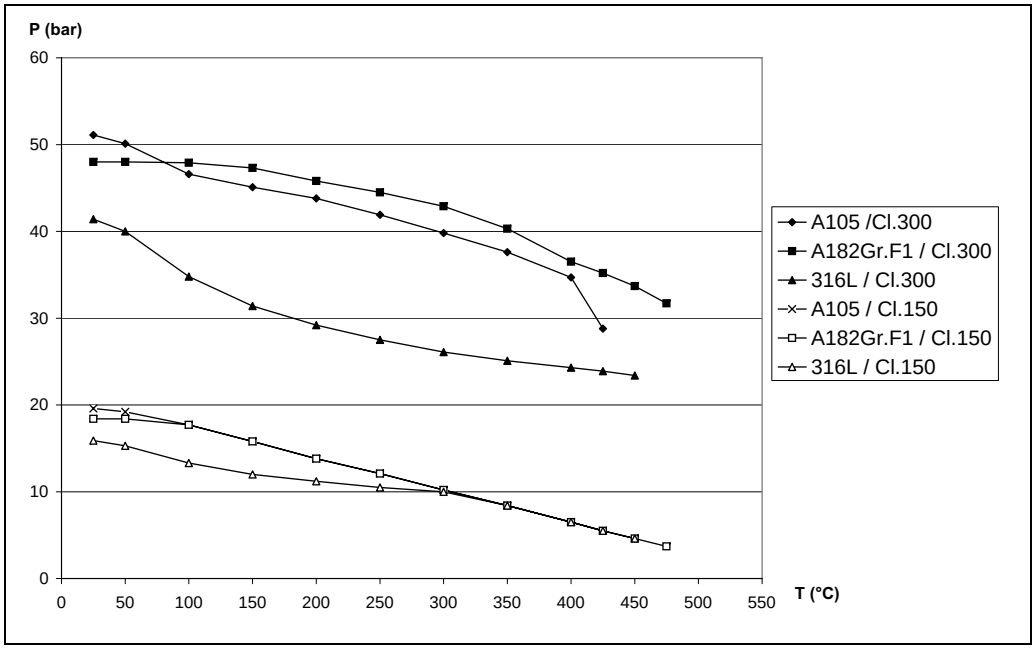
P01-DOxxxxxx-05-xx-xx-xx-003

Cl. 900 / Cl. 600



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

Cl. 300 /Cl. 150

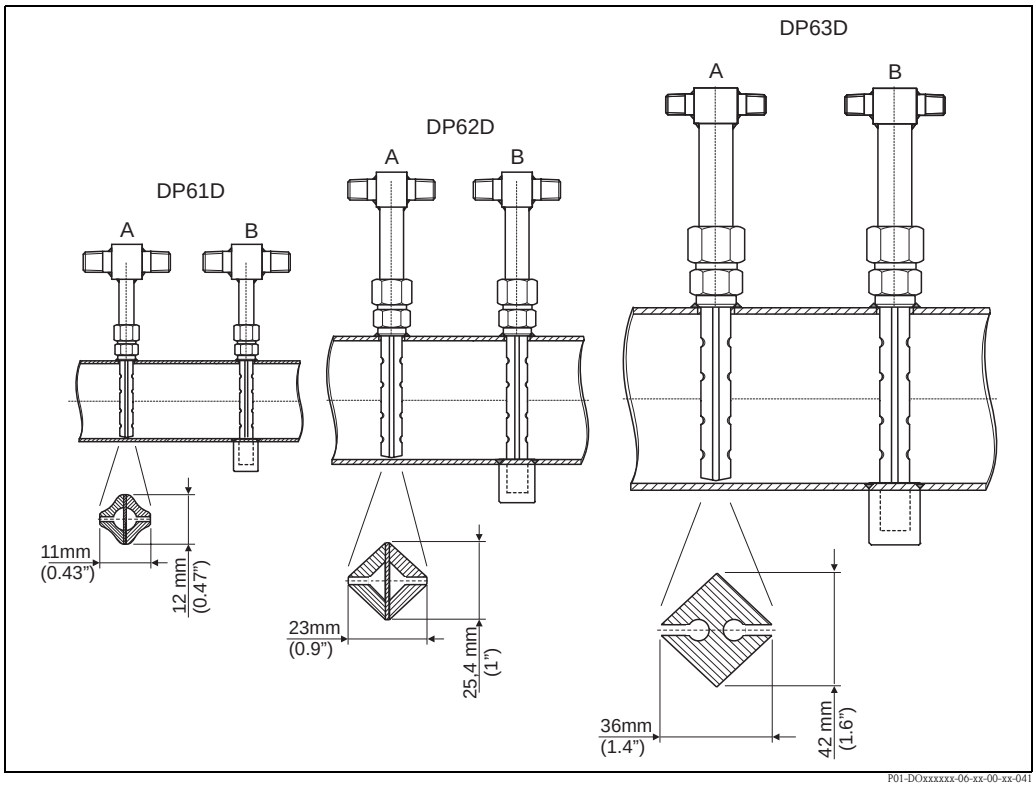


P01-DOxxxxxx-05-xx-xx-xx-001

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

Mechanical construction

Probe profile/probe length

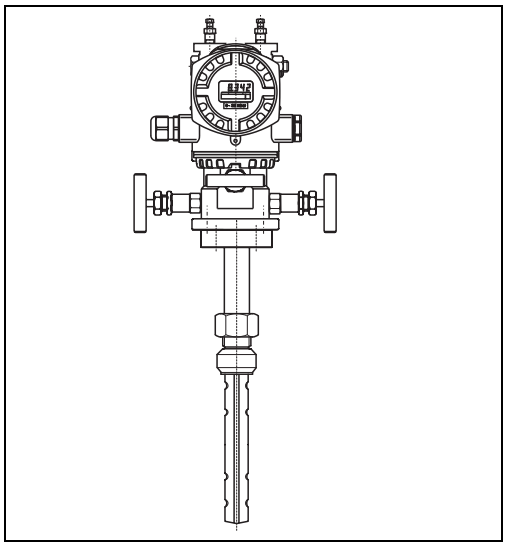


A: *without end support;* **B:** *with end support*

Probe	Probe length (inner pipe diameter + wall thickness)
DP61D	40 ... 140 mm (1.6 ... 5.5")
DP62D	95 ... 2100 mm (3.8 ... 82")
DP63D	300 ... 4000 mm (12 ... 157")

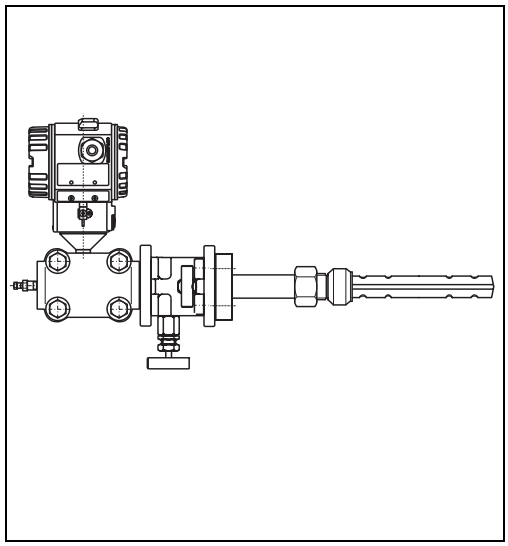
Note!
- For probe lengths above 750 mm an end support must always be used.
- The probe length to be specified is always the inner pipe diameter plus the wall thickness. If a probe with end support is ordered, the required additional length of the probe is taken into account by Endress+Hauser.

Typical configurations



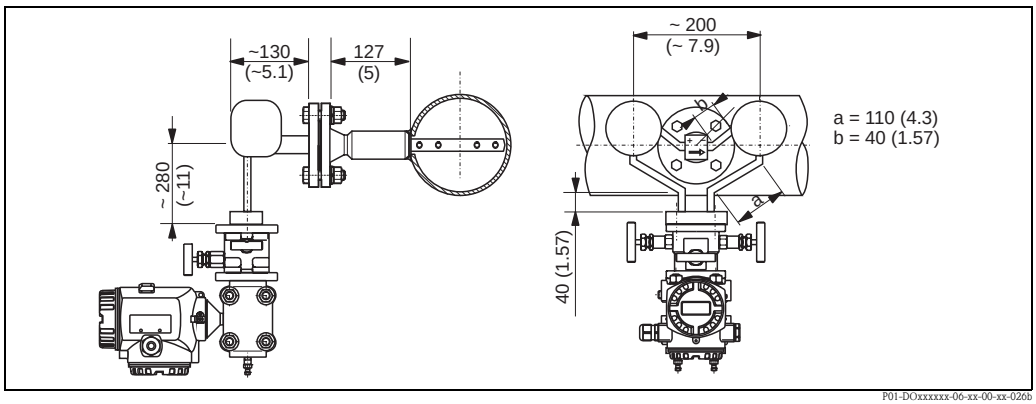
P01-DOxxxxxx-06-xx-00-xx-024

For liquids and gases in horizontal pipes; with cutting ring connection



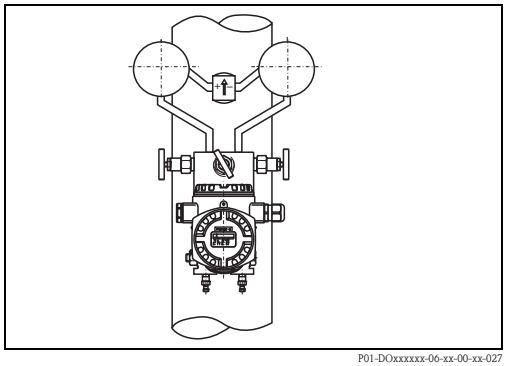
P01-DOxxxxxx-06-xx-00-xx-025

For liquids and gases in vertical pipes; with cutting ring connection



P01-DOxxxxxx-06-xx-00-xx-026b

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

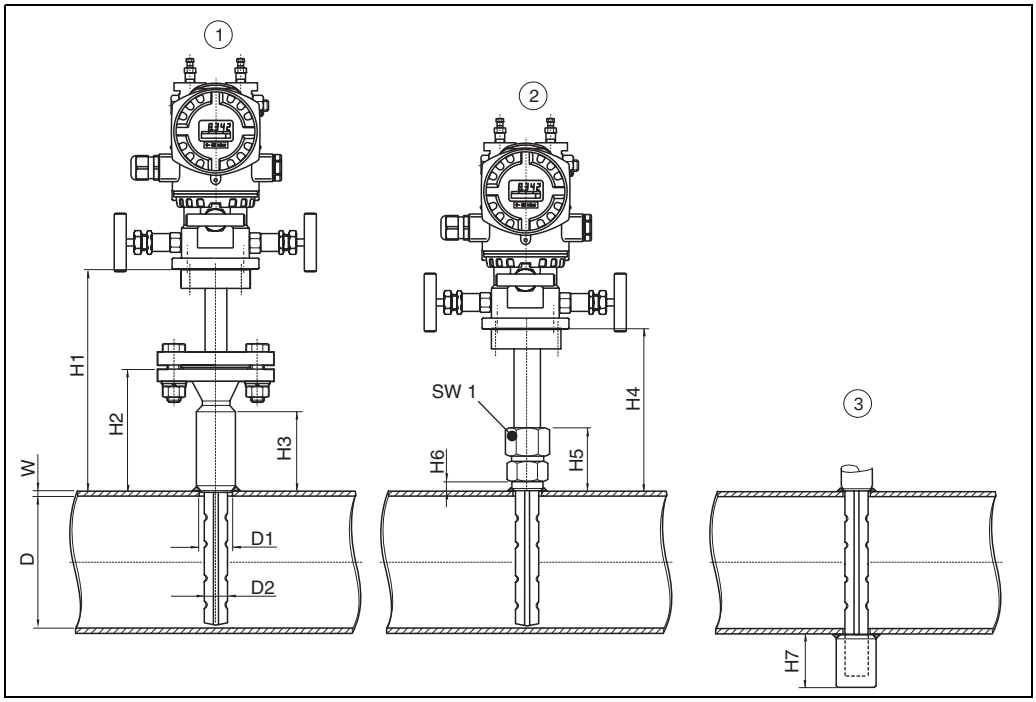


P01-DOxxxxxx-06-xx-00-xx-027

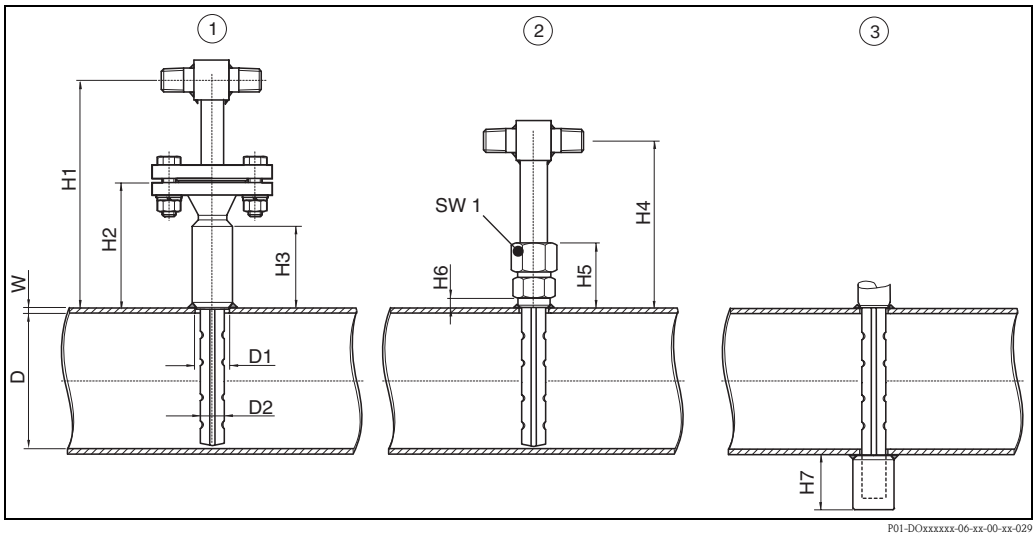
For steam in vertical pipes

Dimensions/weight

Dimensions of the compact version



Dimensions of the remote version

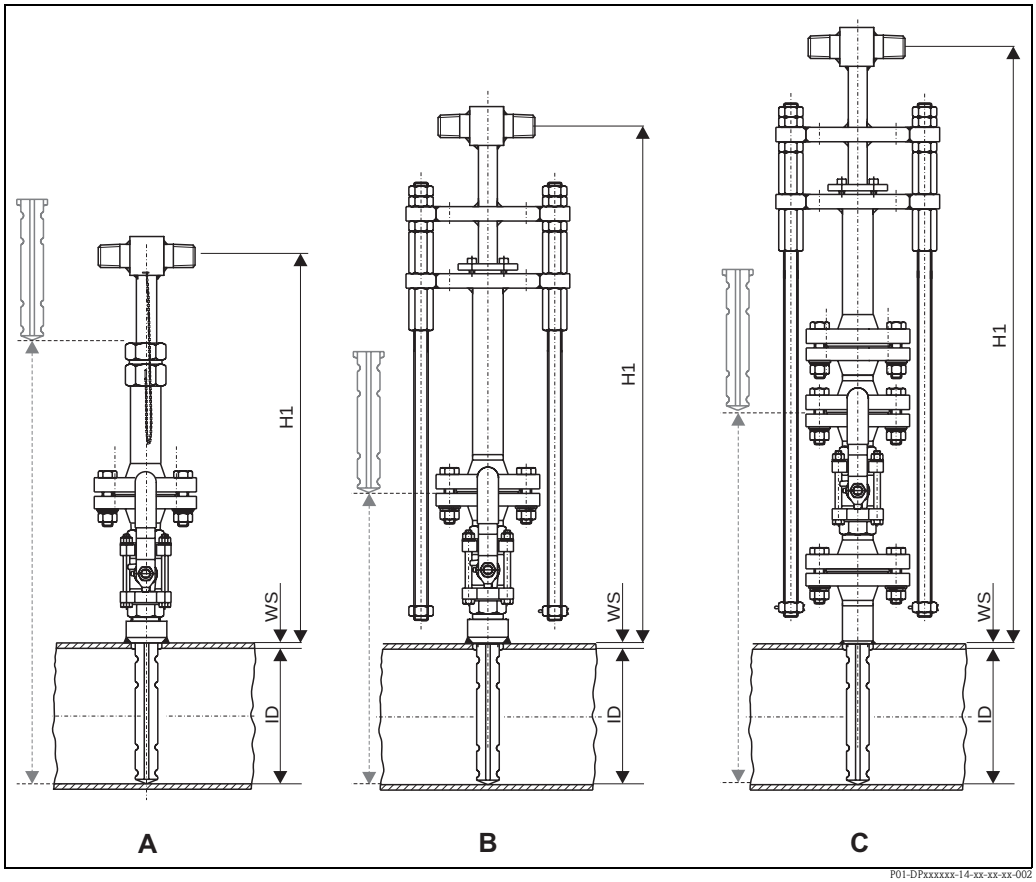


Probe	D1 [mm (inch)]	D2 [mm (inch)]	Flange ①		Cutting ring ②				End support ③
			H1 [mm (inch)]	H2 [mm (inch)]	H4 [mm (inch)]	H5 [mm (inch)]	H6 [mm (inch)]	SW1 [mm (inch)]	H7 [mm (inch)]
DP61D	18 (0.71)	12 (0.47)	180 (7.1)	80 (3.1)	130 (5.1)	48 (1.9)	10 (0.39)	27 (1.1)	40 (1.6)
DP62D	35 (1.4)	25 (0.98)	227 (8.9)	127 (5.0)	148 (5.8)	68 (2.7)	15 (0.59)	45 (1.8)	65 (2.6)
DP63D	47 (1.9)	42 (1.7)		150 (5.9)	168 (6.6)	60 (2.4)	15 (0.59)	58 (2.3)	60 (2.4)

Weight

	DP61	DP62	DP63
Basic weight			
Remote version Process connection: Cutting ring	0,54 kg (1.19 lbs)	1,24 kg (2.74 lbs)	2,46 kg (5.43 lbs)
Compact version Process connection: Cutting ring Diff. pressure conn.: IEC61518	1,25 kg (2.76 lbs)	1,95 kg (4.30 lbs)	3,17 kg (7,00 lbs)
Remote version Process connection: Flange	3,43 kg (7.57 lbs)	5,41 (11.94)	9,08 kg(20.04 lbs)
Comopact version Process connection: Flange Diff. pressure conn.:IEC61518	3,85 kg (8.50 lbs)	6,07 kg (13.40 lbs)	9,79 kg (21,61 lbs)
Additional weight			
Probe profile	0,3 g/mm (0.017 lbs/inch)	1,7 g/mm (0.095 lbs/inch)	5,7 g/mm (0.296 lbs/inch)
End support	0,122 kg (0.269 lbs)	0,59 kg (1.30 lbs)	0,944 kg (2.08 lbs)

Dimensions of the remote version with Flowtap



A: *Threaded connection with safety chain;* **B:** *threaded connection with spindle;* **C:** *flange connection with spindle*

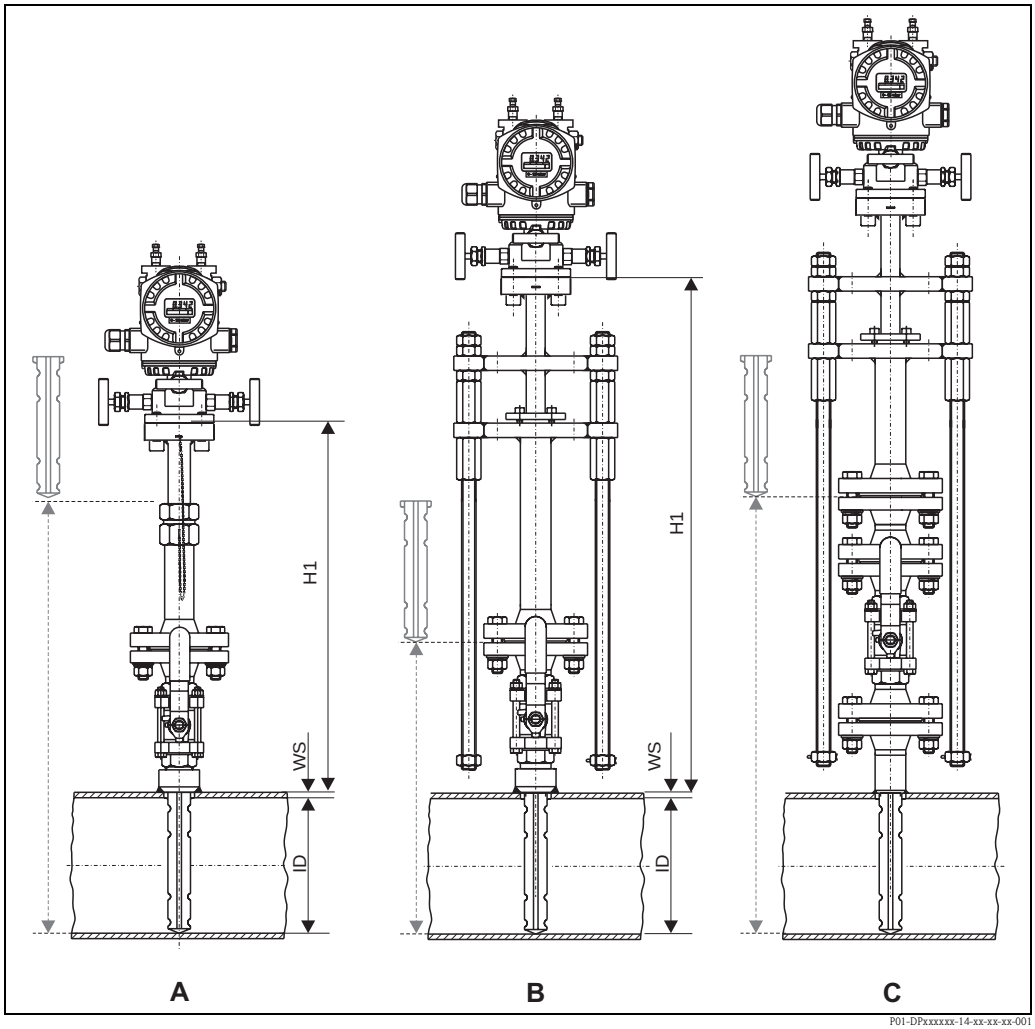
- Probe inserted: H1 = ID + WS + 2 x ISO + H4
- Probe retracted, safety chain: H1 = 3 x (ID + WS) + 4 x ISO + H5
- Probe retracted; spindle: H1 = 2 x (ID + WS) + 3 x ISO + H5

with
- ID: inner pipe diameter
- WS: wall thickness
- ISO: mounting nozzle extension due to isolation (see page 28)
- H4, H5: lengths according to the following table

Probe	End support	threaded connection with safety chain (A)		threaded connection with spindle (B)		flange connection with spindle (C)	
		H4 [mm (inch)]	H5 [mm (inch)]	H4 [mm (inch)]	H5 [mm (inch)]	H4 [mm (inch)]	H5 [mm (inch)]
DP61D	no	450 (18)	400 (15)	480 (19)	430 (17)	760 (30)	570 (22)
	yes	500 (20)	500 (20)	530 (21)	530 (21)	810 (32)	670 (26)
DP62D	no	480 (19)	430 (17)	530 (21)	460 (18)	820 (32)	600 (24)
	yes	560 (22)	560 (22)	610 (24)	620 (24)	900 (35)	760 (30)

Note!
The values given here provide a basis for the estimation of the required space.
The exact values depend on the medium, material, pressure rating, application (gas, steam, liquid) and mounting position and can deviate from the given values by up to ±150 mm (6").

Dimensions of the compact version with Flowtap



A: *Threaded connection with safety chain;* **B:** *threaded connection with spindle;* **C:** *flange connection with spindle*

- Probe inserted: H1 = ID + WS + 2 x ISO + H4
- Probe retracted, safety chain: H1 = 3 x (ID + WS) + 4 x ISO + H5
- Probe retracted; spindle: H1 = 2 x (ID + WS) + 3 x ISO + H5

with
- ID: inner pipe diameter
- WS: wall thickness
- ISO: mounting nozzle extension due to isolation (see page 28)
- H4, H5: lengths according to the following table

Probe	End support	threaded connection with safety chain (A)		threaded connection with spindle (B)		flange connection with spindle (C)	
		H4 [mm (inch)]	H5 [mm (inch)]	H4 [mm (inch)]	H5 [mm (inch)]	H4 [mm (inch)]	H5 [mm (inch)]
DP61D	no	450 (18)	400 (15)	480 (19)	430 (17)	760 (30)	570 (22)
	yes	500 (20)	500 (20)	530 (21)	530 (21)	810 (32)	670 (26)
DP62D	no	480 (19)	430 (17)	530 (21)	460 (18)	820 (32)	600 (24)
	yes	560 (22)	560 (22)	610 (24)	620 (24)	900 (35)	760 (30)

Note!
The values given here provide a basis for the estimation of the required space.
The exact values depend on the medium, material, pressure rating, application (gas, steam, liquid) and mounting position and can deviate from the given values by up to ±150 mm (6").

Process connection, Mounting nozzle

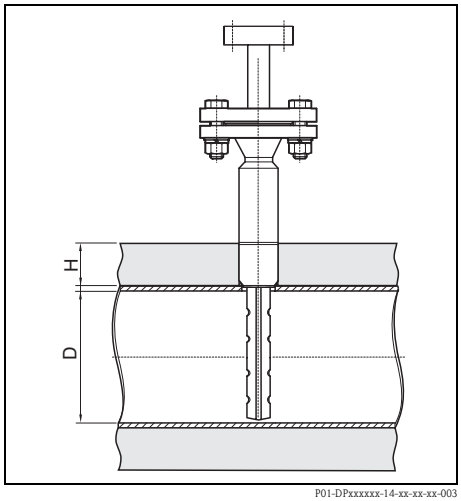
The features 40 ("Process connection") and 70 ("Mounting nozzle) of the product structure must always be selected in a suitable combination:

Process connection Mounting nozzle	Pressure rating	feature 40 "Process Connection"	feature 70 "Mounting nozzle"
Standard versions			
A: Cutting ring	PN40	A**	A**
B: Flange connection	PN40 ... PN250 (EN)	C**	C**
	Cl.300 ... Cl. 1500 (ANSI)	G**	G**
Flowtap versions for exchange of the Pitot tube during the ongoing process			
C: Flowtap with safety chain	PN6	QA*	QA*
D: Flowtap with spindle	PN16	QD*	QD*
	PN40	QE*	QE*
E: Flowtap with flange and spindle	PN63	QL*	QL*

Mounting nozzle extension

With insulated pipes, the length of the mounting nozzle must be increased by the thickness H of the insulating layer. Therefore, this thickness must be specified on the Sizing sheet – Data sheet (page 67). The material of the the mounting nozzle extension must be specified in the product structure (feature 080).
The following lengths are available for the extension of the mounting nozzle:

- 50 mm (2")
- 100 mm (4")
- 110 mm (4.3")
- 120 mm (4.7")
- 130 mm (5.1 ")
- ...



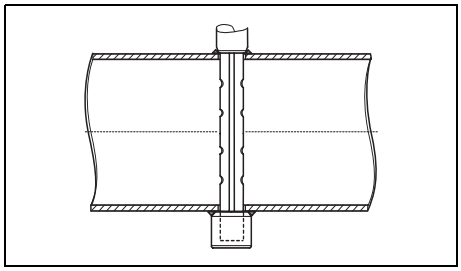
P01-DPxxxxxx-14-xx-xx-xx-003

D: *inner pipe diamter;*
H: *thickness of the insulating layer*

End support

For Pitot tubes from DN 750 an end support (feature 090 of the product structure) has always to be applied. For shorter Pitot tubes an end support can optionally be applied (e.g. for large flow velocities).

✎ Note!
The probe length to be specified is always the inner pipe diameter plus the wall thickness. The additional length required for the end support is taken into account by Endress+Hauser

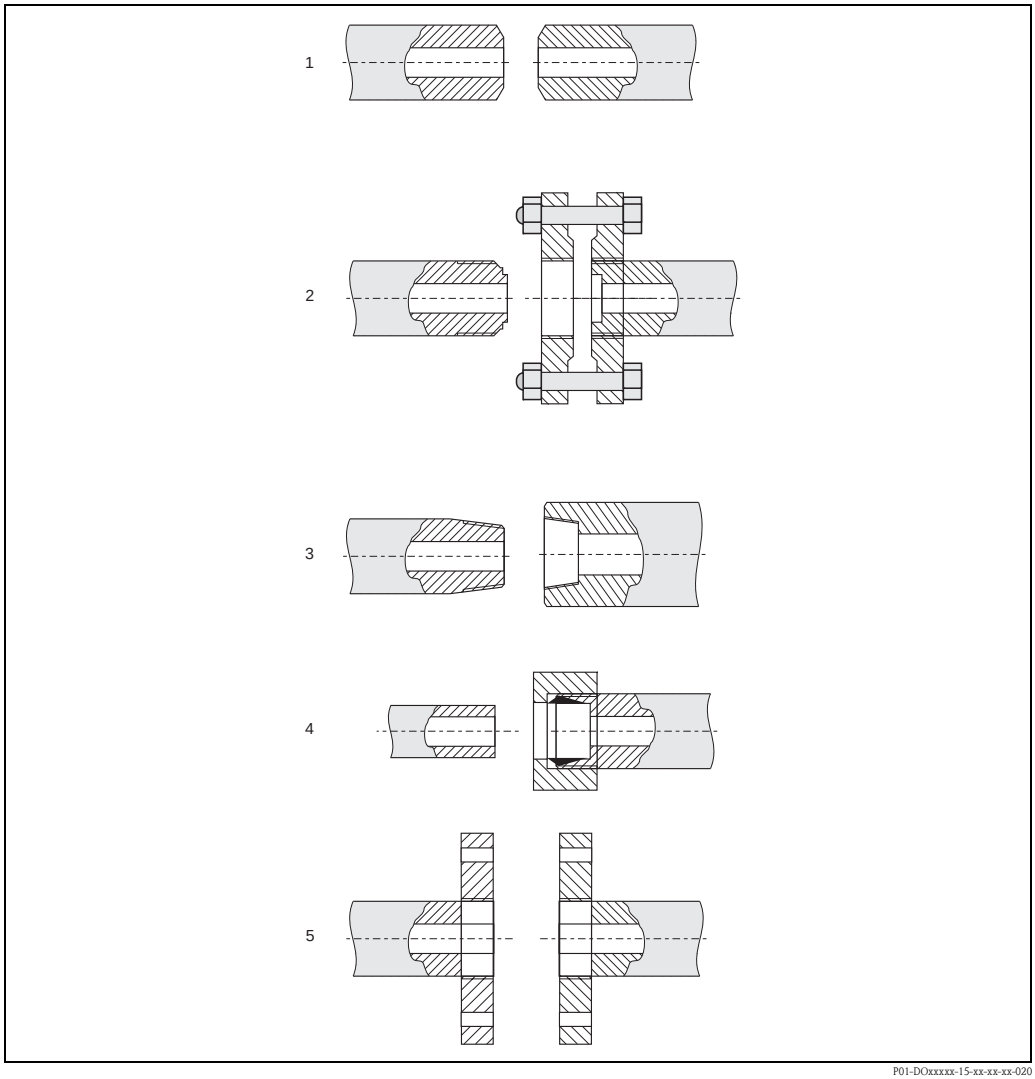


P01-DPxxxxxx-14-xx-xx-xx-004

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:



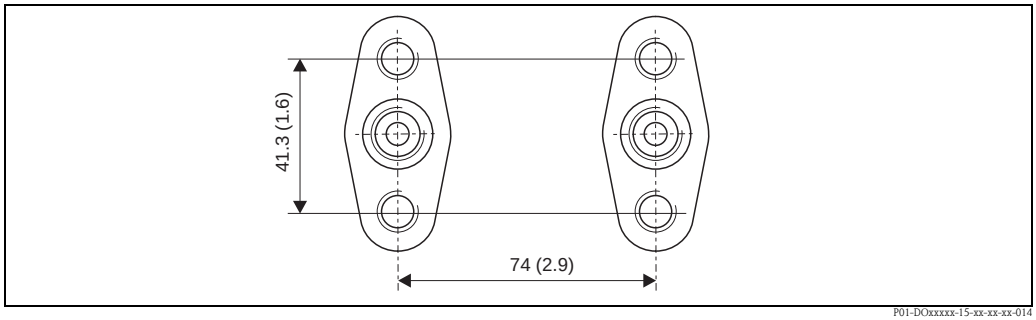
P01-DOxxxxx-15-xx-xx-xx-020

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)]	detachable; 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
5	flange DN15	flange DN15	disconnectable joint; especially suited for steam

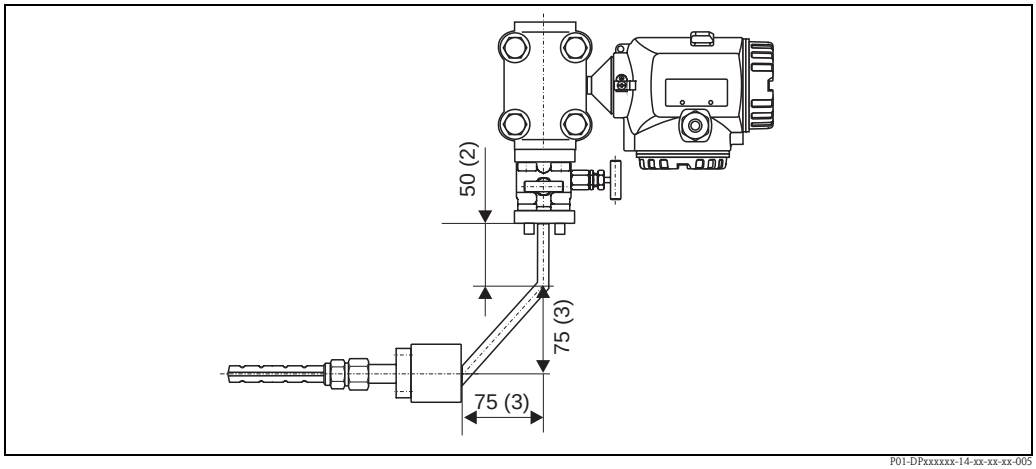
1) The flanges are included in the scope of delivery of the accessory.

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

Differential pressure connection for the compact version (IEC61518)

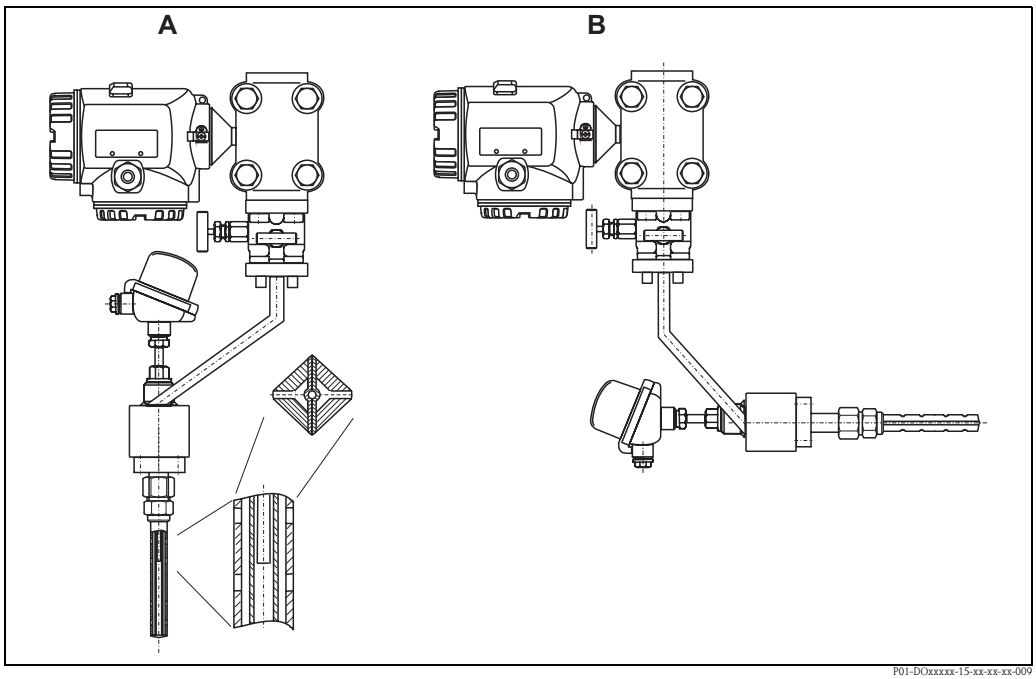


Standard connection for differential pressure transmitter (oval flanges or flange plate); dimensions in mm (inch)



Cranked version (for humid gas); dimensions in mm (inch)

Integrated temperature sensor



A: *for horizontal pipes;* **B:** *for vertical pipes*

- for the Pitot tubes:
  – DP62D
  – DP63D
- The resistance thermometer Pt100 is fixed within the probe profile. The protective tube which is formed by the two partition walls between the probe chambers protects it against damage. It has no contact with the medium.
- material of the sensor: 1.4571 (SS316TI)
  robust and resistant to vibrations
- Rapid installation and removal possible under operating pressure
- Measuring range: -200 °C ... +600 °C
  (-328 °F ... +1112 °F)
- Probe head made of aluminum
- output signal:
  – 4...20mA
  – 4...20mA HART
  – PROFIBUS PA
  – Pt100, 4-wire connection
- for additional information see:
  Technical Information TI269T

Note!
The integrated temperature sensor can be applied for pressure ratings up to PN40/Class 300.

Overview of the product structures

Feature	Name	Description	valid for		
			DP61D	DP62D	DP63D
Primary element					
10	Application; Version	■ Application: "Gas", "Liquid" oder "Steam" ■ Version: "remote" oder "compact" See chapter "Mounting positions" (page 11).	x	x	x
20	Pipe; Orientation	■ Pipe: "Horizontal", "Vertical" ■ Orientation: – "left", "right", "top/bottom" for horizontal pipes – "upwards", "downwards", "upwards/downwards" for vertical pipes See chapter mounting positions (page 11).	x	x	x
40	Process Connection	Defines the size, type and material of the process connection: ■ cutting ring (see page 24) ■ flange (see page 24) ■ flowtap (see pages 26/27) For the temperature limits of the materials see page 16.	x	x	x
60	Probe Length	Defines the length of the prob in mm. The probe length is the sum of the inner pipe diameter plus the wall thickness of the pipe. For Flowtap versions it must also be specified if the pressure rating is above PN 6	x	x	x
70	Mounting Nozzle	Defines the type, size, pressure rating and material of the mounting nozzle. The selection must match the selected process connection (feature 40). For the temperature limits of the materials see page 16.	x	x	x
80	Extension Mounting Nozzle	Defines the length and material of the mounting nozzle extension. The extension of the mounting nozzle is required for insulated pipes (see page 28). Possible lengths: 50 mm, 100 mm, 110 mm, 120 mm, 130 mm, ... ✎ Note! The selected material must match the selection in feature 70 "mounting nozzle". ✎ Note! "Not selected" means that no mounting nozzle extension is required (= 0 mm).	x	x	x
90	End Support	Defines the material of the end support (see page 28). ✎ Note! "Not selected" means that the order does not contain an end support.	x	x	x
100	Diff Pressure Connection; Seal	Defines: ■ the type of differential pressure connection (see page 29). ■ the material of the seal at the differential pressure connection	x	x	x
110	Temperature sensor Pt100	Defines the type and communication interface of the integrated Pt 100 temperature sensor (4-wire connection, 4-20 mA analog signal, HART, PROFIBUS PA). For details see page 31. ✎ Note! "Not selected" means that no temperature sensor is integrated.		x	x

Feature	Name	Description	valid for		
			DP61D	DP62D	DP63D
Accessory: Condensate Chambers					
200	2x Condens. Chamber Mat.; Volume; PN	Defines: ■ the material of the condensate chambers ■ the volume of the condensate chambers ■ the pressure rating of the condensate chambers For details see page 52. ✎ Note! If "not selected" is chosen, no condensate chambers are included in the order. In this case "not needed" has to be selected in the features 210 to 230.	x	x	x
210	Filling Cap Condens. Chamber	Defines the type of filling cap (see page 52).	x	x	x
220	Inlet	Defines the inlet (from the process) of the condensate chamber (see page 29).	x	x	x
230	Outlet	Defines the outlet of the condensate chamber (see page 29).	x	x	x
Accessory: Shut-off valve					
250	2 x Shut-Off Valve; Gasket	Defines: ■ the type of shut-off valve ■ the material of the gasket For details see page 48. ✎ Note! If "not selected" is chosen, no shut-off valves are included in the order. In this case "not needed" has to be selected in the features 260 to 280.	x	x	x
260	Material Shut-Off Valve	Defines the material of the shut-off valve. For the temperature limits of the materials see page 16.	x	x	x
270	Inlet Shut-Off Valve	Defines the inlet (from the process) of the shut-off valve (see page 29).	x	x	x
280	Outlet Shut-Off Valve	Defines the outlet of the shut-off valve (see page 29).	x	x	x
Accessory: Manifold					
300	Manifold Version	Defines the manifold version (see page 54 ff.) ✎ Note! If "not selected" is chosen, no manifold is included in the order. In this case "not needed" has to be selected in the features 310 to 330.	x	x	x
310	Gasket Manifold	Defines the material of the gasket of the manifold. For the temperature limits of the materials see page 16.	x	x	x
320	Process Connection Manifold	Defines the process connection of the manifold (see page 29).	x	x	x
330	Seal Manifold, Screws	Defines: ■ The material of the seal between the manifold and the transmitter ■ The size of the manifold screws For the temperature limits of the materials see page 16. ☝ Caution! The manifold screws must be selected in accordance with the Deltabar differential pressure transmitter.	x	x	x
Differential pressure transmitter					
450	DP-Transmitter Deltabar	Defines if a Deltabar differentail pressure transmitter is included in the order.	x	x	x
Additional options					
500	Add. Option Orifice	These features are used to define additional characteristics of the respective components (e.g. material inspection certificates). The features are optional, which means: ■ It is not necessary to select an option in these features. ■ Multiple options can be selected in these features.	x	x	x
520	Add. Option Condens. Chamber		x	x	x
530	Add. Option Shut-Off Valve		x	x	x
540	Add. Option Manifold		x	x	x
550	Add. Option General		x	x	x

Ordering information

Product structure
Deltatop DP61D

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
D	Horizontal; top/bottom
V	Vertical; upwards
U	Vertical; downwards
W	Vertical; upwards/downwards
Y	special version, to be specified

40	Process connection
	Cutting ring
ABB	pipe > cutting ring, PN40, 316Ti
	EN flanges
CEB	DN25 PN40 B1, 316Ti
CGB	DN25 PN100 B2, 316Ti
CHB	DN25 PN160 E, 316Ti
CJB	DN25 PN250 E, 316Tii
	ANSI flanges
GBB	1" Cl.300 RF, 316Ti
GCB	1" Cl.600 RF, 316Ti
GEB	1" Cl.1500 RF, 316Ti
GJB	1" Cl.600 RTJ, 316Ti
GLB	1" Cl.1500 RTJ, 316Ti
	Flowtap
QAB	Flowtap PN6, 316Ti + safety chain
QDB	Flowtap PN16, 316Ti + spindle
QEB	Flowtap PN40, 316Ti + spindle
QLB	Flowtap PN63, 316Ti + flange + spindle
Y99	special version, to be specified

60	Probe length (Pipe ID + Wall thickness)
A2	mm 316Ti
D2	mm 316Ti, Flowtap PN6
G2	mm 316Ti, Flowtap >PN6
Y9	special version, to be specified

70	Mounting Nozzle
	Cutting ring
AAA	cutting ring, PN40, steel
AAB	cutting ring, PN40, 316Ti
	EN flanges
CEA	DN25 PN40 B1, steel
CEB	DN25 PN40 B1, 316Ti
CGA	DN25 PN100 B2, steel
CGB	DN25 PN100 B2, 316Ti
CGF	DN25 PN100 B2, 16Mo3
CHA	DN25 PN160 E, steel
CHB	DN25 PN160 E, 316Ti
CHF	DN25 PN160 E, 16Mo3
CJA	DN25 PN250 E, steel
CJB	DN25 PN250 E, 316Ti
CJF	DN25 PN250 E, 16Mo3
	ANSI flanges
GBA	1" Cl.300 RF, steel
GBB	1" Cl.300 RF, 316Ti
GBF	1" Cl.300 RF, 16Mo3
GCA	1" Cl.600 RF, steel
GCB	1" Cl.600 RF, 316Ti
GCF	1" Cl.600 RF, 16Mo3

70	Mounting Nozzle
GEA	1" Cl.1500 RF, steel
GEB	1" Cl.1500 RF, 316Ti
GEF	1" Cl.1500 RF, 16Mo3
GJA	1" Cl.600 RTJ, steel
GJB	1" Cl.600 RTJ, 316Ti
GJF	1" Cl.600 RTJ, 16Mo3
GLA	1" Cl.1500 RTJ, steel
GLB	1" Cl.1500 RTJ, 316Ti
GLF	1" Cl.1500 RTJ, 16Mo3
	Flowtap
QAA	Flowtap PN6, steel + safety chain
QAB	Flowtap PN6, 316Ti + safety chain
QDA	Flowtap PN16, steel + spindle
QDB	Flowtap PN16, 316Ti + spindle
QEA	Flowtap PN40, steel + spindle
QEB	Flowtap PN40, 316Ti + spindle
QLA	Flowtap PN63, steel + flange + spindle
QLB	Flowtap PN63, 316Ti + flange + spindle
	Miscellaneous
XAX	not selected
Y99	special version, to be specified

80	Extension Mounting Nozzle
A	mm, carbon steel
B	mm, 316Ti
C	mm, 16Mo3
1	not selected
9	special version, to be specified

90	End Support
A	Carbon steel
B	316Ti
C	16Mo3
1	not selected
2	Prepared for end support
9	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
H	Tap, MNPT1/2; w/o
K	Tap, pipe 12mm; w/o
N	Tap, welding conn. 21,3mm; w/o
T	Tap, G1/2 DIN19207; w/o
U	Flange DN15; 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
4	316Ti; 300cm^3; PN100
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
D	Flange DN15
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

230	Output Condens. Chamber
A	not needed
E	Welding conn. 21,3mm

230	Output Condens. Chamber
N	Tap, G1/2 DIN19207
T	MNPT1/2
Y	special version, to be specified

250	2x Shut-Off Valve
1	not selected
5	Ball valve
6	Valve
7	Gate valve
9	special version, to be specified

260	Material Shut-Off Valve
A	not needed
B	Steel
D	316Ti
E	316
F	316L
Y	special version, to be specified

270	Input Shut-Off Valve
A	not needed
B	Cutting ring (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
DA2	5 valve HT, 316Ti, forging, purge valve
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
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
1	Provided, sep. item
2	not provided

500	Add. Option Pitot Tube (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
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

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
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
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
FF	Wet calibration <300mm, 3-point

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

Product structure
Deltatop DP62D

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
D	Horizontal; top/bottom
V	Vertical; upwards
U	Vertical; downwards
W	Vertical; upwards/downwards
Y	special version, to be specified

40	Process Connection
	Cutting ring
ABB	Pipe > cutting ring, PN40, 316Ti
	EN flanges
CPB	DN32 PN40 B1, 316Ti
DGB	DN40 PN100 B2, 316Ti
DGF	DN40 PN100 B2, 16Mo3
DHB	DN40 PN160 E, 316Ti
DHF	DN40 PN160 E, 16Mo3
DJB	DN40 PN250 E, 316Ti
DJF	DN40 PN250 E, 16Mo3
	ANSI flanges
GPB	1-1/2" Cl.300 RF, 316Ti
GQB	1-1/2" Cl.600 RF, 316Ti
GQF	1-1/2" Cl.600 RF, 16Mo3
GSB	1-1/2" Cl.1500 RF, 316Ti
GSF	1-1/2" Cl.1500 RF, 16Mo3
GWB	1-1/2" Cl.600 RTJ, 316Ti
GWF	1-1/2" Cl.600 RTJ, 16Mo3
G0B	1-1/2" Cl.1500 RTJ, 316Ti
G0F	1-1/2" Cl.1500 RTJ, 16Mo3
	Flowtap
QAB	Flowtap PN6, 316Ti + safety chain
QDB	Flowtap PN16, 316Ti + spindle
QEB	Flowtap PN40, 316Ti + spindle
QLB	Flowtap PN63, 316Ti + flange + spindle
Y99	special version, to be specified

60	Probe Length (Pipe ID + Wall Thickness)
B2	mm, 316Ti, w/o end support
C2	mm, 316Ti, end support
C3	mm, 16Mo3, end support
E2	mm 316Ti, Flowtap PN6 w/o end support
F2	mm 316Ti, Flowtap PN6 + end support
H2	mm 316Ti, Flowtap >PN6 w/o end support
K2	mm 316Ti, Flowtap >PN6 + end support
Y9	special version, to be specified

70	Mounting Nozzle
	Cutting ring
AAA	cutting ring, PN40, steel
AAB	cutting ring, PN40, 316Ti
	EN flanges
CPA	DN32 PN40 B1, steel
CPB	DN32 PN40 B1, 316Ti
CPF	DN32 PN40 B1, 16Mo3
DGA	DN40 PN100 B2, steel
DGB	DN40 PN100 B2, 316Ti
DGF	DN40 PN100 B2, 16Mo3
DHA	DN40 PN160 E, steel
DHB	DN40 PN160 E, 316Ti
DHF	DN40 PN160 E, 16Mo3

70	Mounting Nozzle
DJA	DN40 PN250 E, steel
DJB	DN40 PN250 E, 316Ti
DJF	DN40 PN250 E, 16Mo3
	ANSI flanges
GPA	1-1/2" Cl.300 RF, steel
GPB	1-1/2" Cl.300 RF, 316Ti
GPF	1-1/2" Cl.300 RF, 16Mo3
GQA	1-1/2" Cl.600 RF, steel
GQB	1-1/2" Cl.600 RF, 316Ti
GQF	1-1/2" Cl.600 RF, 16Mo3
GSA	1-1/2" Cl.1500 RF, steel
GSB	1-1/2" Cl.1500 RF, 316Ti
GSF	1-1/2" Cl.1500 RF, 16Mo3
GWA	1-1/2" Cl.600 RTJ, steel
GWB	1-1/2" Cl.600 RTJ, 316Ti
GWF	1-1/2" Cl.600 RTJ, 16Mo3
G0A	1-1/2" Cl.1500 RTJ, steel
G0B	1-1/2" Cl.1500 RTJ, 316Ti
G0F	1-1/2" Cl.1500 RTJ, 16Mo3
	Flowtap
QAA	Flowtap PN6, steel + safety chain
QAB	Flowtap PN6, 316Ti + safety chain
QDA	Flowtap PN16, steel + spindle
QDB	Flowtap PN16, 316Ti + spindle
QEA	Flowtap PN40, steel + spindle
QEB	Flowtap PN40, 316Ti + spindle
QLA	Flowtap PN63, steel + flange + spindle
QLB	Flowtap PN63, 316Ti + flange + spindle
	Miscellaneous
XAX	not selected
Y99	special version, to be specified

80	Extension Mounting Nozzle
A	mm, carbon steel
B	mm, 316Ti
C	mm, 16Mo3
1	not selected
9	special version, to be specified

90	End Support
A	carbon steel
B	316Ti
C	16Mo3
1	not selected
2	prepared for end support
9	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
H	tap, MNPT1/2; w/o
K	tap, pipe 12mm; w/o
N	tap, welding conn. 21,3mm; w/o
P	tap, welding conn. 24mm; w/o
T	tap, G1/2 DIN19207; w/o
U	flange DN15; w/o
Y	special version, to be specified

110	Temperature Sensor Pt100
A	not selected
B	4-20mA, max 600°C
C	4-20mA HART, max 600°C
D	PROFIBUS PA, max 600°C
E	Terminal Block 4-wire, max 600°C
Y	special version, to be specified

200	2 xCondens. Chamber Mat.; Volume; PN
1	not selected

200	2 xCondens. Chamber Mat.; Volume; PN
2	HII (265 GH); 300cm^3; PN100
4	316Ti; 300cm^3; PN100
6	16Mo3; 300cm^3; PN100
7	16Mo3; 20cm^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
D	Flange DN15
E	Wwelding conn. 21,3mm
G	Welding conn. 24mm
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
G	Welding conn. 24mm
N	Tap, G1/2 DIN19207
T	MNPT1/2
Y	special version, to be specified

250	2x Shut-Off Valve
1	not selected
5	Ball valve
6	Valve
7	Gate valve
9	special version, to be specified

260	Material Shut-Off Valve
A	not needed
B	Steel
D	316Ti
G	16Mo3
E	316
F	316L
Y	special version, to be specified

270	Input Shut-Off Valve
A	not needed
B	Cutting ring (Ermeto 12S)
C	FNPT 1/2
E	Welding conn. 21,3mm
G	Welding conn. 24mm
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

300	manifold version
DA1	5 valve HT, steel, 16Mo3, forging, purge valve
DA2	5 valve HT, 316Ti, forging, purge valve
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 Pitot Tube (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
A5	Cleaned from oil+grease
A6	Oxygen service
A7	Cleaned for silicone-free service

510	Add. option temperature sensor (optional; multiple options can be selected)
B1	ATEX II 1GD EEx ia IIC
B2	M12 PA plug

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

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
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
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
FF	Wet calibration <300mm, 3-point

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

Product structure
Deltatop DP63D

10	Application; Version
B	Gas; remote
C	Gas; compact
D	Liquid; remote
E	Liquid; compact
Y	special version, to be specified

20	Pipe; Orientation
B	Horizontal; left
C	Horizontal; right
D	Horizontal; top/bottom
V	Vertical; upwards
U	Vertical; downwards
W	Vertical; upwards/downwards
Y	special version, to be specified

40	Process Connection
	Cutting ring
AAB	cutting ring, PN40, 316Ti
	EN flanges
DPB	DN50 PN40 B1, 316Ti
DRB	DN50 PN100 B2, 316Ti
	ANSI flanges
HBB	2" Cl.300 RF, 316Ti
HCB	2" Cl.600 RF, 316Ti
Y99	special version, to be specified

60	Probe Length (Pipe ID + Wall Thickness)
B2	mm, 316Ti, w/o end support
C2	mm, 316Ti, end support
Y9	special version, to be specified

70	Mounting Nozzle
	Cutting ring
AAA	Cutting ring, PN40, steel
AAB	Cutting ring, PN40, 316Ti
	EN flanges
DPA	DN50 PN40 B1, steel
DPB	DN50 PN40 B1, 316Ti
DRA	DN50 PN100 B2, steel
DRB	DN50 PN100 B2, 316Ti
	ANSI flanges
HBA	2" Cl.300 RF, steel
HBB	2" Cl.300 RF, 316Ti
HCA	2" Cl.600 RF, steel
HCB	2" Cl.600 RF, 316Ti
	Miscellaneous
XAX	not selected
Y99	special version, to be specified

80	Extension Mounting Nozzle
A	mm, carbon steel
B	mm, 316Ti
1	not selected
9	special version, to be specified

90	End Support
A	Carbon steel
B	316Ti
1	not selected
2	Prepared for end support
9	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
H	Tap, MNPT1/2; w/o
K	Tap, pipe 12mm; w/o
N	Tap, welding conn. 21,3mm; w/o

100	Diff. Pressure Connection; Seal
T	Tap, G1/2 DIN19207; w/o
U	Flange DN15; w/o
Y	special version, to be specified

110	Temperature Sensor Pt100
A	not selected
B	4-20mA, max 600°C
C	4-20mA HART, max 600°C
D	PROFIBUS PA, max 600°C
E	Terminal Block 4-wire, max 600°C
Y	special version, to be specified

200	Condens. Chamber Mat.; Volume; PN
1	not selected
2	HII (265 GH); 300cm^3; PN100
4	316Ti; 300cm^3; PN100
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
D	Flange DN15
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

230	Output Condens. Chamber
A	not needed
E	Welding conn. 21,3mm
N	Tap, G1/2 DIN19207
T	MNPT1/2
Y	special version, to be specified

250	2x Shut-Off Valve
1	not selected
5	Ball valve
6	Valve
7	Gate valve
9	special version, to be specified

260	Material Shut-Off Valve
A	not needed
B	Steel
D	316Ti
E	316
F	316L
Y	special version, to be specified

270	Input Shut-Off Valve
A	not needed
B	Cutting ring (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

300	Manifold Version
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
DA2	5 valve HT, 316Ti, forging, purge valve
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
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 Pitot Tube (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
A5	Cleaned from oil+grease
A6	Oxygen service
A7	Cleaned for silicone-free service

510	Add. Option Temperature Sensor (optional; multiple options can be selected)
B1	ATEX II 1GD EEx ia IIC
B2	M12 PA plug

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

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
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
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.

Accessories

Overview

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

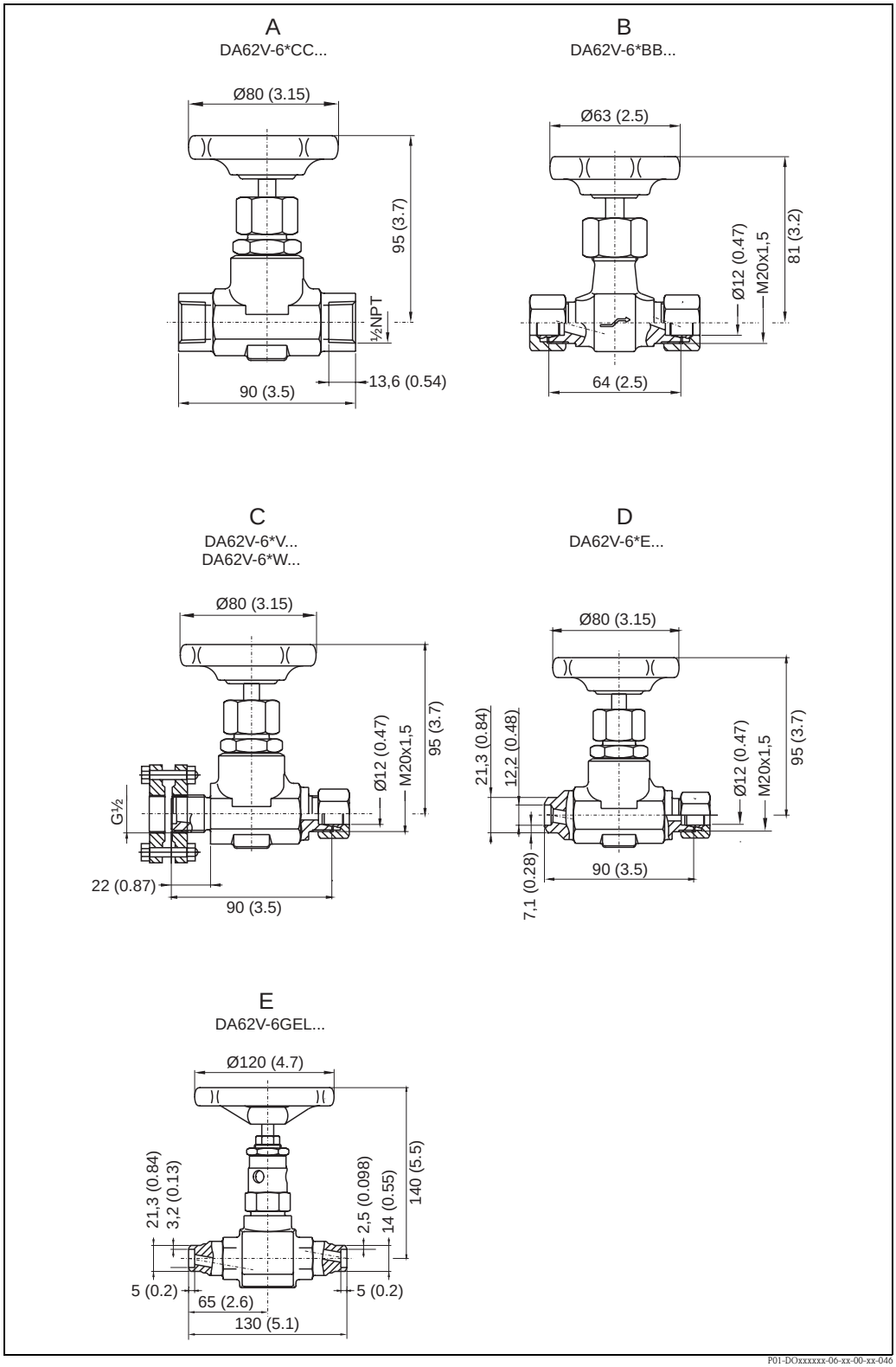
- DA62V: Shut-off valves (see page 48)
- DA62C: Condensate pots (see page 52)
- DA63M: Manifold (see page 54)
- DA62P: Purge unit (see page 63)

Condensate pots, shut-off valves and the manifold can be ordered together with the Pitot tube. They are contained in the product structures DP61D, DP62D and DP63D.
Alternatively, they can be ordered via their own product sturctures. The product structures are listed in the following chapters.
The purge unit can only be ordered through its own product structure.

Deltatop DA62V: Shut-Off Valve (accessory)

Version: Valve (DA62V-6...)

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	DA62V-6*CC*	approx. 0,8 kg (1.8 lbs)
B	DA62V-6*BB*	approx. 0,47 kg (1.0 lbs)
C	DA62V-6*V** DA62V-6*W**	approx. 1,45 kg (3.2 lbs)
D	DA62V-6*E**	approx. 0,73 kg (1.6 lbs)
E	DA62V-6GEL*	approx. 1,6 kg (3.5 lbs)

1) see figure on page 48

Usage

Universal valve; not suited for humid gases;
DA62V-6*V... and DA62V-6*W...: for pressure ratings up to PN160

Design

- Body: die-pressed part
- Surface: steel, phospahtized
- stem thread:
  - external for DA62V-6GEL...
  - internal for all other versions
- replaceable valve seat
- stem with cold rolled surface, back seat and non-rotating cone tip

Materials

	Feature 260 "Material"		
	Steel	**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	Pure graphite	Pure graphite	Pure graphite

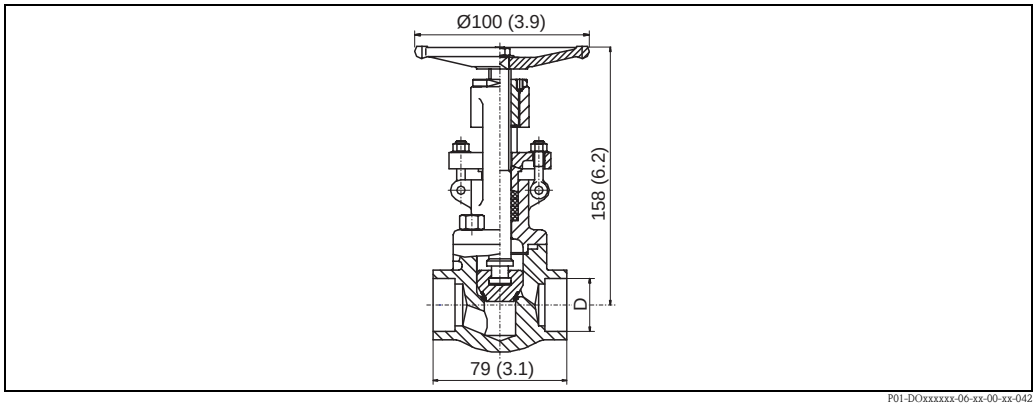
Note!
The options "316" and "316L" are not available for the version "valve".

Version: Gate valve (DA62V-7...)

Usage

Especially suited for steam apllications;
for pressure ratings up to PN100

Dimensions



Dimensions in mm (inch)

Weight

approx. 2,1 kg (4.6 lbs)

Materials

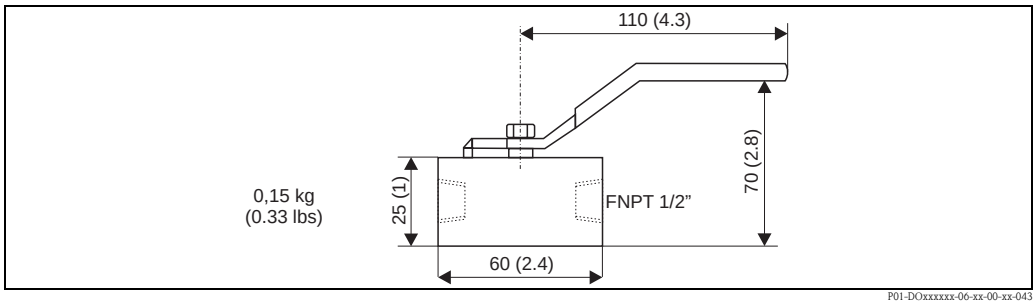
- Body: A105(steel) or 316L
- Valve stem: A182 F304
- Disc: A182-F6
- Gasket: graphite

Version: Ball valve (DA62V-5...)

Usage

Cost-effective solution for low-pressure applications with gases and liquids;
not suited for safety-relevant applications;
for pressure ratings up to PN40

Dimensions



Dimensions in mm (inch)

Weight

0,15 kg (0.33 lbs)

Material

1.4401/316 or C22.8

Gasket

PTFE

Product structure DA62V

250	Version
5	Ball valve; PN40
6	Valve
7	Gate valve; PN100 (800 lbs)
9	special version, to be specified

260	Material
B	Steel
D	316Ti
G	16Mo3
E	316
F	316L
Y	special version, to be specified

270	Input
B	Cutting ring (Ermeto 12S)
C	FNPT1/2
E	Welding conn. 21,3mm
G	Welding conn. 24mm
V	G1/2 DIN19207 Stahl + 2x Flansch; PN160
W	G1/2 DIN19207 rostfr. Stahl + 2x Flansch; PN160
Y	special version, to be specified

280	Output
B	Cutting ring (Ermeto 12S)
C	FNPT1/2
L	Welding conn. 14mm
Y	special version, to be specified

530	Additional Option
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
D5	Cleaned from oil+grease
D6	Oxygen Service
D7	Cleaned for silicone-free service

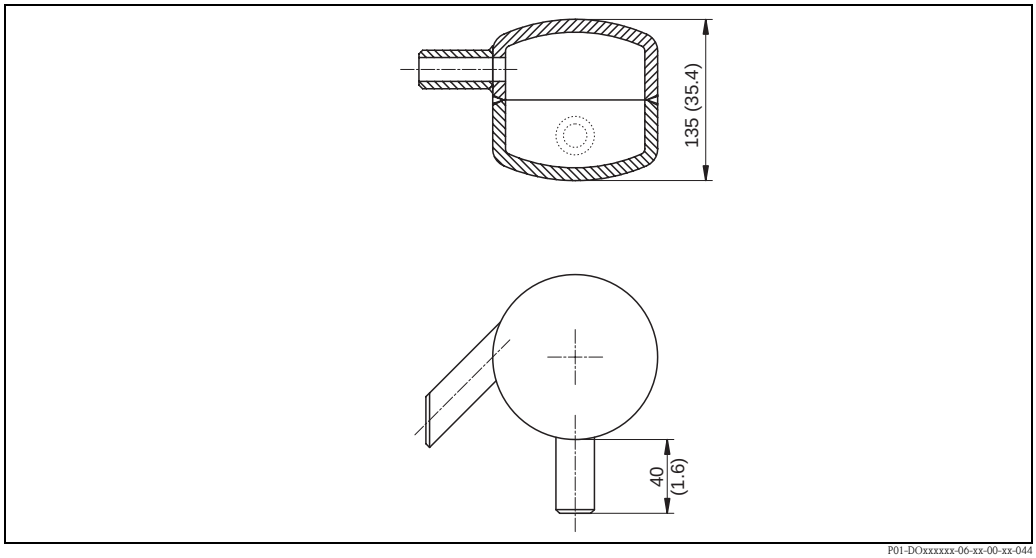
895	Marking
Z1	Tagging (TAG), see additional spec.

Note!
If ordering via this structure, the scope of delivery contains one valve. The weights also refer to one valve.
If ordering via the structures of the Pitot tubes (features 250 ... 280 of the product structures DP6xD), the scope of delivery always contains two valves.

Deltatop DA62C: Condensate Pot (accessory)

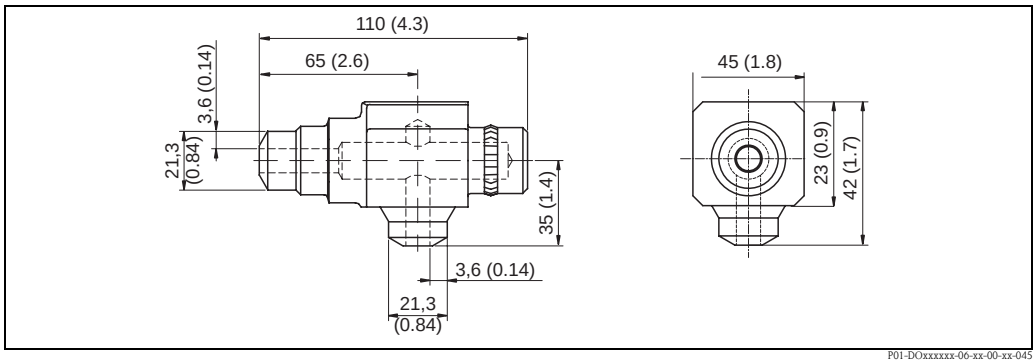
Dimensions

Volume: 300 cm³



Dimensions in mm (inch)

Volume: 20 cm³



Dimensions in mm (inch)

Weight

Volume	Weight
300 cm³	approx. 1,4 kg (3.1 lbs)
20 cm³	approx. 1,4 kg (3.1 lbs)

Product structure

200	Material; Volume; PN
B	HII (265 GH); 300cm3; PN100
D	316Ti; 300cm3; PN100
L	16Mo3; 300cm3; PN100
M	16Mo3; 20cm3; PN250
Y	special version, to be specified

210	Filling Cap
1	not selected
2	NPT1/2
9	special version, to be specified

220	Input
D	Flange DN15
E	Welding conn. 21,3mm
V	G1/2 DIN19207 steel + 2x flange; PN160
W	G1/2 DIN19207 stainl. steel + 2x flange; PN160
Y	special version, to be specified

230	output
E	Welding conn. 21,3mm
G	Welding conn. 24mm
N	Tap, G1/2 DIN19207
T	MNPT1/2
Y	special version, to be specified

520	Additional Option (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

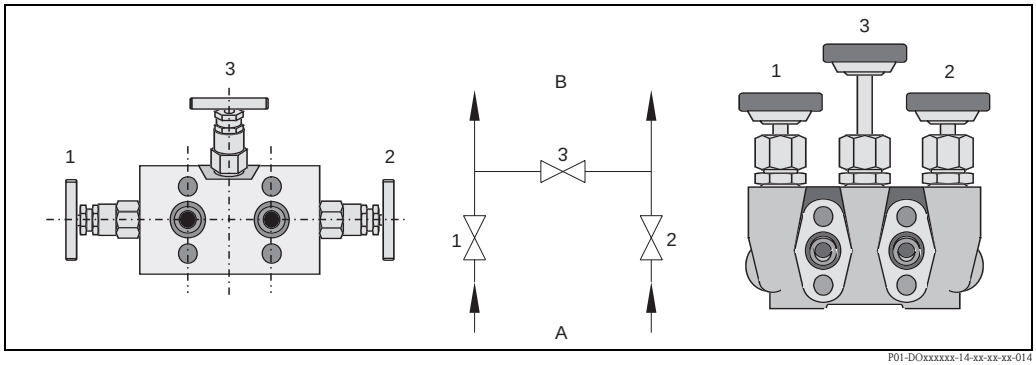
895	Marking
Z1	Tagging (TAG), see additional spec.

Deltatop DA63M: Manifold (accessory)

Usage

3-valve manifold

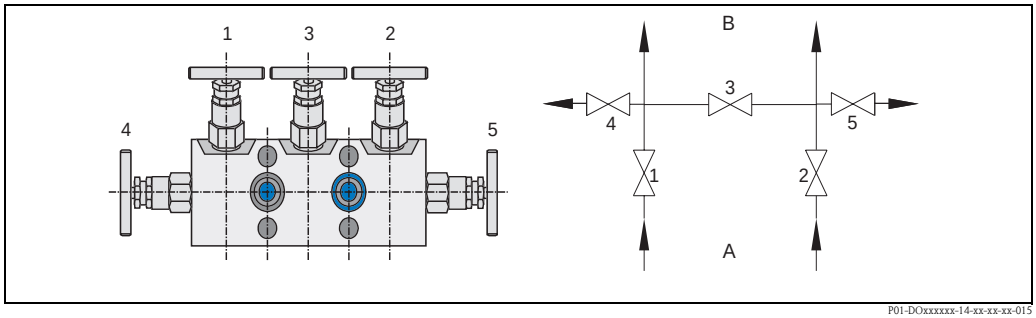
The manifold is used to connect the impulse pipes to the differential pressure transmitter. Valves 1 and 2 can be used to separate the transmitter from the impulse pipes.
Valve 3 is used for a zero point adjustment between the impulse pipes.



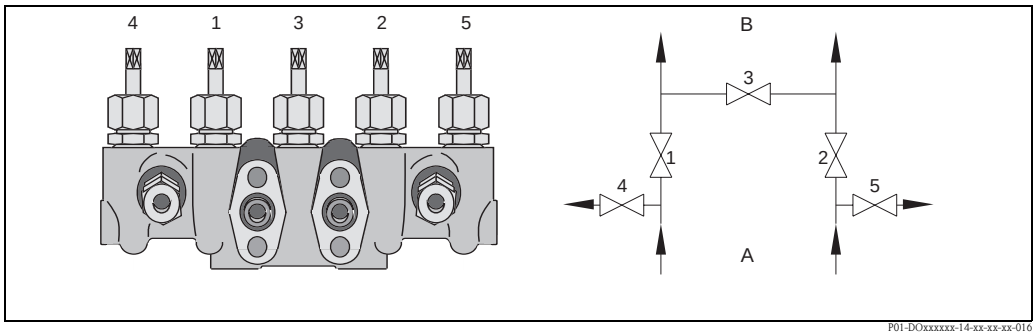
left: milled version (for gases and liquids); right: forged version (for steam);
A: process side; B: transmitter side

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.

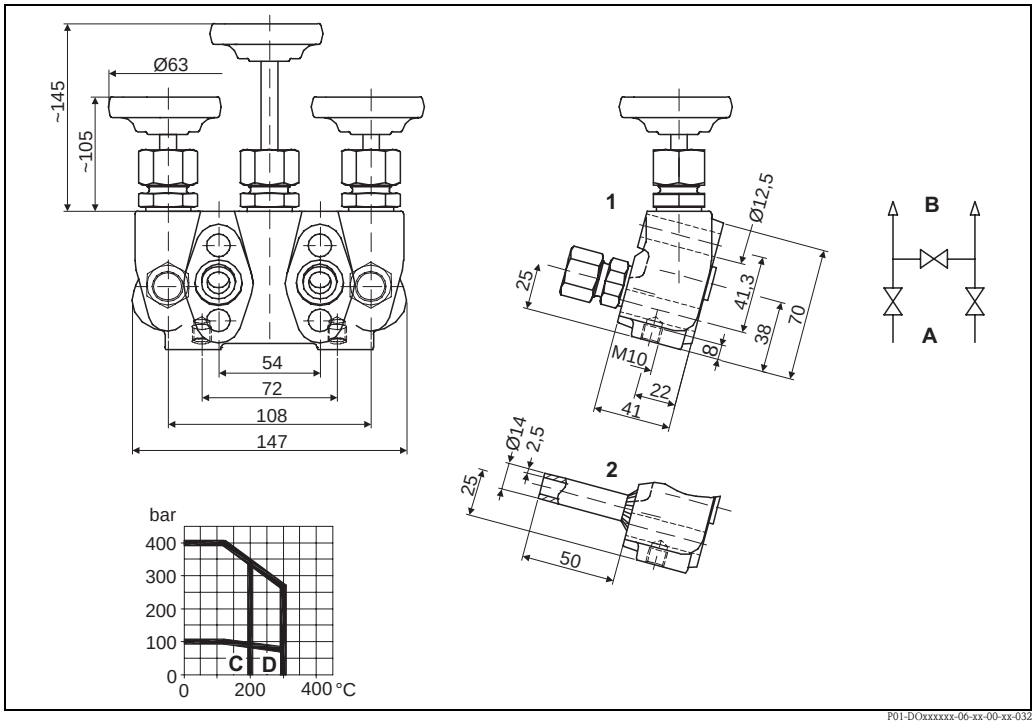


5-valve manifold with venting valve, milled version (for gases and liquids);
A: process side; B: transmitter side



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*

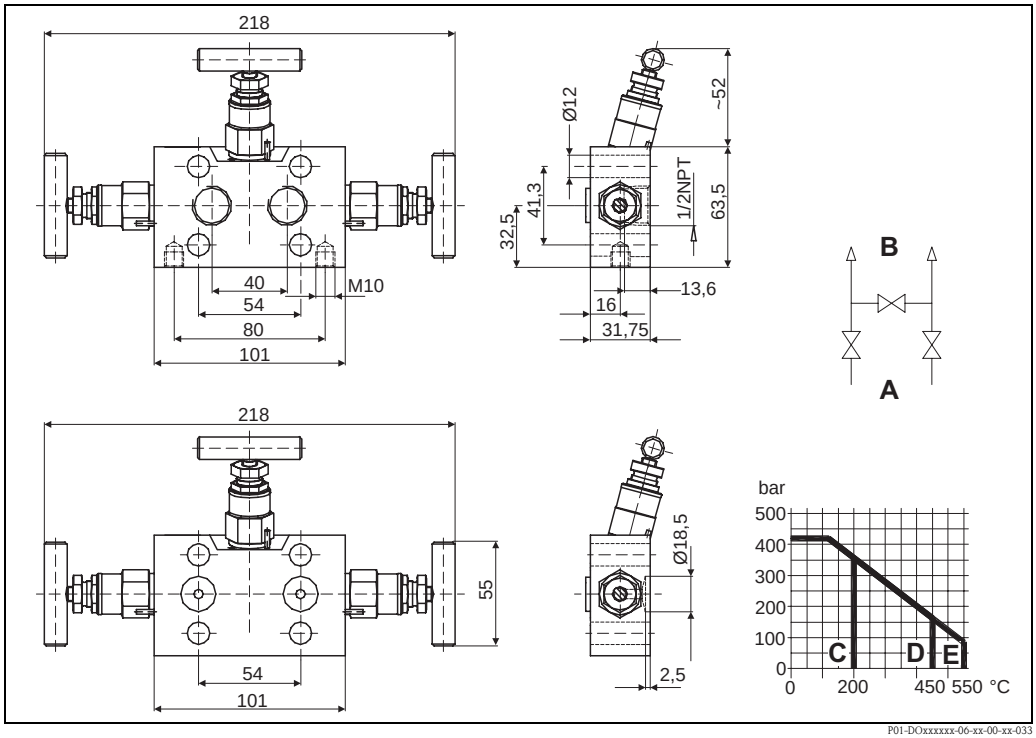
Design

- 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) ■ pure graphite (up to 300 °C)	■ PTFE (up to 200 °C) ■ pure graphite (up to 300 °C)
Union nut	steel	1.4571
Weld ends	1.4515	1.4571

Version: 3-valve, milled



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

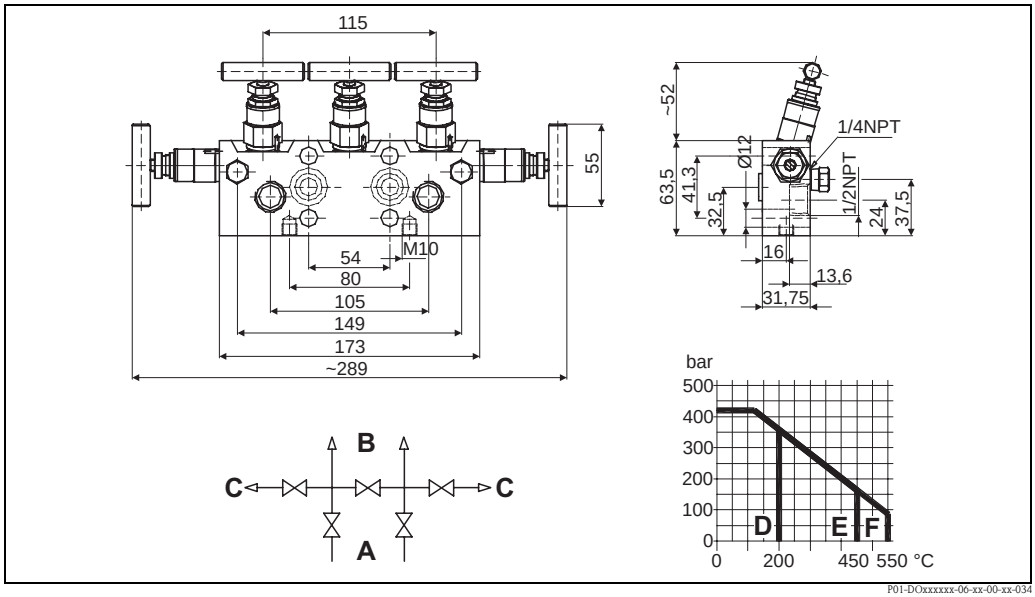
Design

- Surface: steel 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) ■ pure graphite (up to 550 °C)	■ PTFE (up to 200 °C) ■ pure graphite (up to 550 °C)
Gland nut	1.4301	1.4301
T-handle	stainless steel	stainless steel

Version: 5-valve, milled, vent



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

Usage

Gas and liquid applications

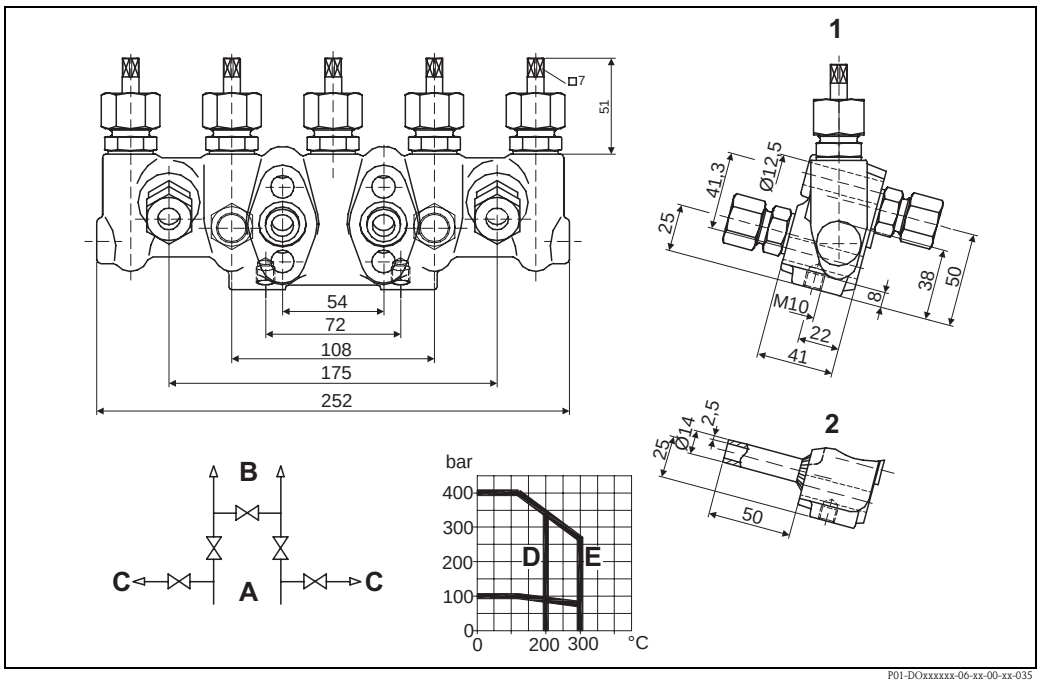
Design

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

Materials

Component	"steel" version	"316L" version
Body	1.0460	1.4404 / 316L
Bonnet	1.4401 / 316	1.4401 / 316
Valve stem	1.4404	1.4404
Needle tip	1.4122	1.4571
Packing	■ PTFE (up to 200 °C) ■ pure graphite (up to 550 °C)	■ PTFE (up to 200 °C) ■ pure graphite (up to 550 °C)
Gland nut	1.4301	1.4301
T-handle	stainless steel	stainless steel
Screw plug	1.0501	1.4404

Version: 5-valve, forged, purge valve



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

Usage

Steam applications

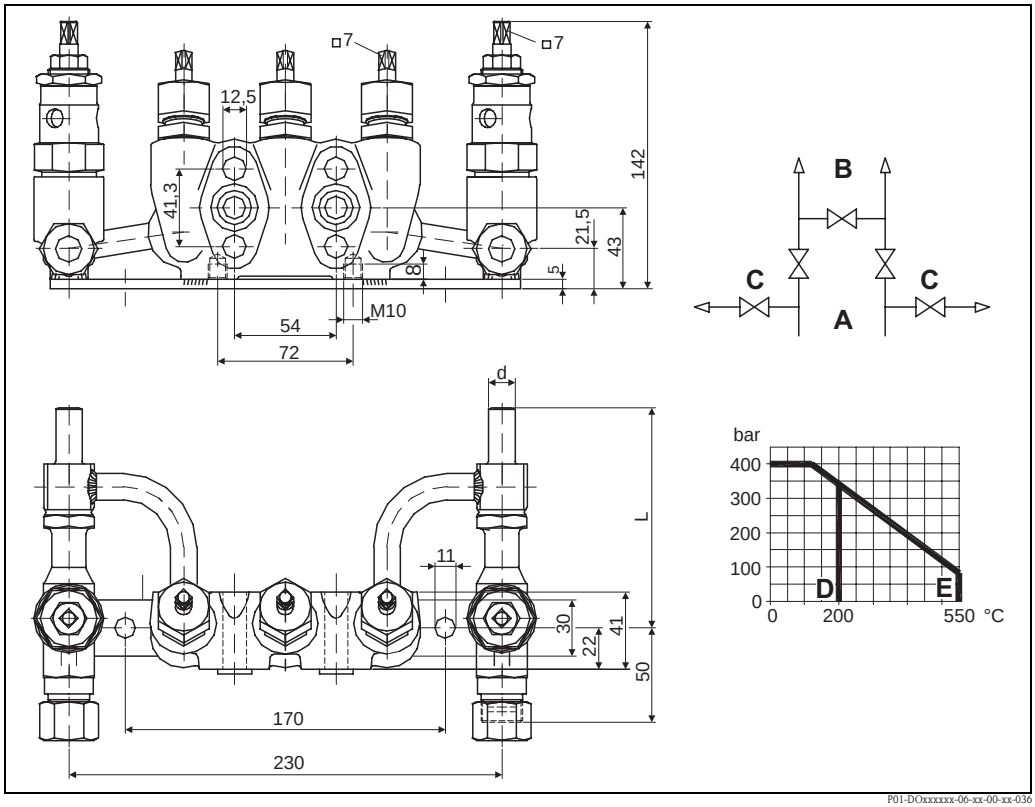
Design

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

Materials

Component	"steel" version	"316L" version
Body	1.0460	1.4571
Bonnet	1.0501	1.4571
Valve seat	1.4571	1.4571
Valve stem	1.4104	1.4571
Needle tip	1.4122	1.4571
Packing	■ PTFE (up to 200 °C) ■ pure graphite (up to 300 °C)	■ PTFE (up to 200 °C) ■ 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

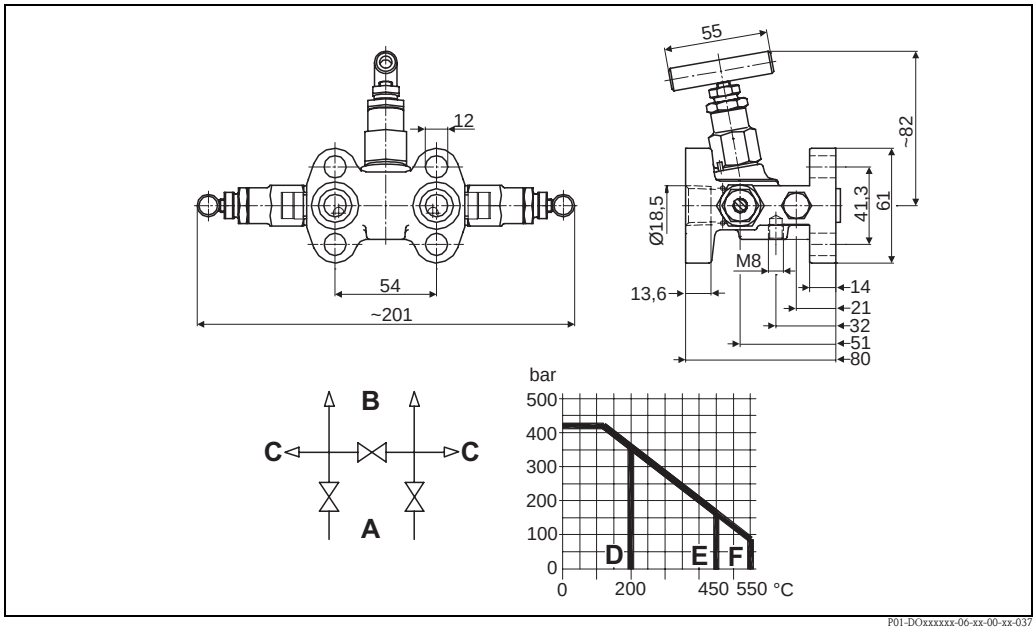
Design

- 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	pure graphite	PTFE	pure 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

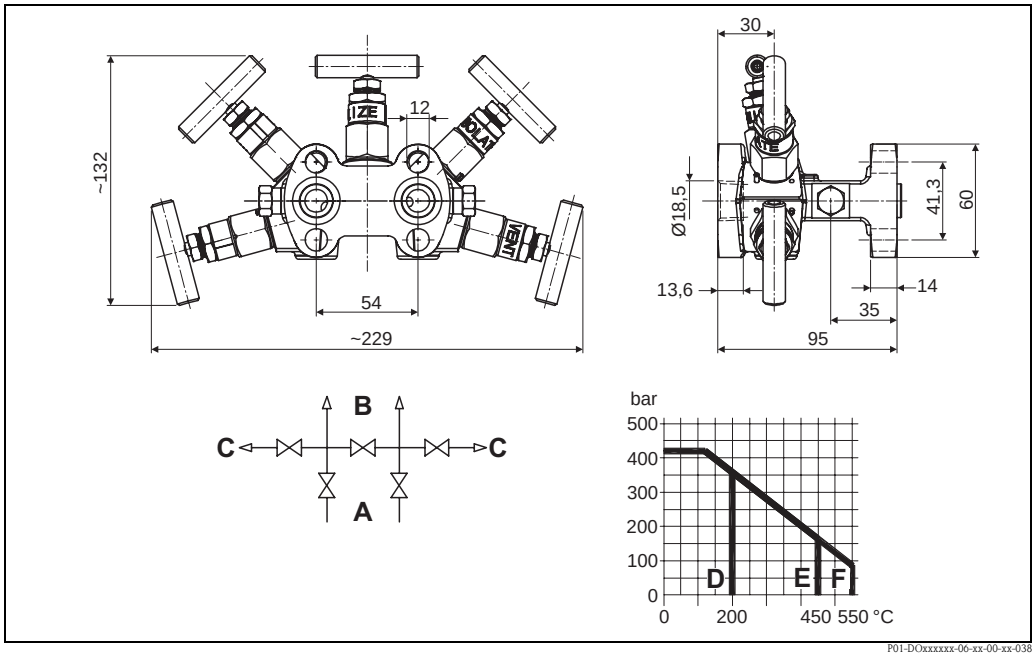
Design:

- 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) ■ pure graphite (up to 550 °C)	■ PTFE (up to 300 °C) ■ pure graphite (up to 550 °C)
Gland nut	1.4301	1.4301
T-handle	stainless steel	stainless steel

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



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) ■ pure graphite (up to 550 °C)
Gland nut	1.4301
T-handle	stainless steel
Screw plug	1.4404

Product structure DA63M

300	Version
AA1	3 valve, steel, forging
AA2	3 valve, 316Ti, forging
AB1	3 valve, steel, milled
AB2	3 valve, 316L, milled
BB1	5 valve, steel, milled, vent
BB2	5 valve, 316L, milled, vent
CA1	5 valve, steel, forging, purge valve
CA2	5 valve, 316Ti, forging, purge valve
DA1	5 valve HT, steel, 16Mo3, forging, purge valve
DA2	5 valve HT, 316Ti, forging, purge valve
KA1	3 valve, steel, forging, IEC61518, both side
KA2	3 valve, 316Ti, forging, IEC61518, both side
LA2	5 valve, 316Ti, forging, IEC61518 both side, vent
YY9	special version, to be specified

310	Gasket
B	PTFE, 200°C/392°F
C	PTFE/pure graphite, HT
Y	special version, to be specified

320	Process Connection
B	FNPT1/2
C	Cutting ring (Ermeto 12S)
D	Welding conn. 14mm
E	IEC61518
Y	special version, to be specified

330	Seals; Screws
B	PTFE; UNF7/16, max PN420
C	PTFE; M10, max PN160
D	Viton; UNF7/16, max PN420
E	Viton; M10, max PN160
F	Viton; M12, max PN420
Y	special version, to be specified

540	Additional Option (optional, multiple options can be selected)
E1	EN10204-3.1 material (wetted parts) inspection certificate
E2	EN10204-3.1 material, NACE MR0175 (wetted parts) inspection certificate
E3	EN10204-3.2 material (wetted parts) inspection certificate
E5	Cleaned from oil+grease
E6	Oxygen service
E7	Cleaned for silicone-free service

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

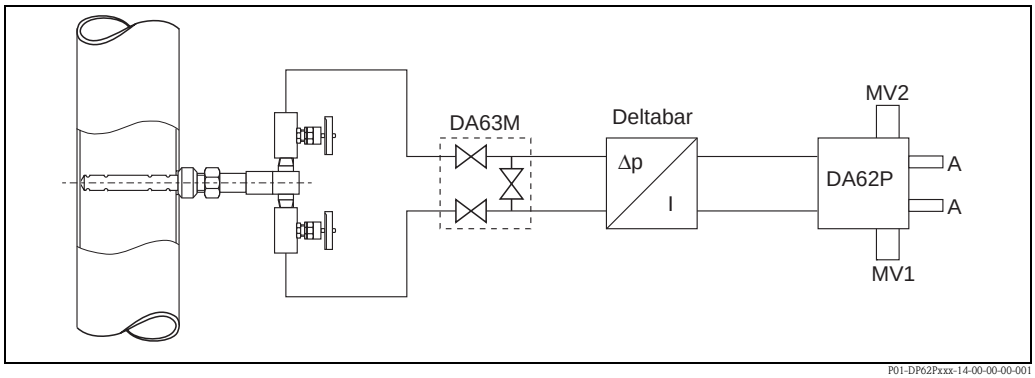
Deltatop DA62P: Purge Unit

Usage

With flow measurements of waste gases or soiled air, solid particles often settle at the profile of the Pitot tube and, depending on the degree of soiling, reduce the measuring accuracy or even interfere the functionality of the Pitot tube.
In many applications, recurrent manual cleaning of the Pitot tube is no feasible solution. Demounting of the probe, thourough cleaning and remounting often are too cost-intensive and time-consuming. Furthermore no measuring data are available during the cleaning procedure.
The purge unit DA62P helps to perform a fully automatic and effortless cleaning.
Application of a purge unit is recommended for a particle concentration of more than 100 mg/m^3. The usability of the purge unit is restricted for humid or adhesive solid particles. The maximum allowable solid content depends on abrasiveness and size of the particles and has to be checked in each case separately.

Systemaufbau

The purge unit consists mainly of a purging block with a 2-way valve which can be directly triggered. A customer-provided relay or a PLC can be used to trigger the two solenoid valves.



MV1, MV2: solenoid valves; A: air purge connection

Mounting

1. The purge unit is directly mounted to the differential pressure transmitter with the supplied screws and seals (material: PTFE).
2. The vent valves (¼" NPT) supplied together with the differential pressure transmitter are screwed into the purge unit. The impulse pipes are mounted on the opposite side of the transmitter. This ensures that not only the Pitot tube but also the measuring chambers of the differential pressure transmitter are purged and cleared from any deposit.
3. The connections for the purging air are located at the bottom of the purge unit. By default the size of the connections is ¼" FNPT (other connections on demand).

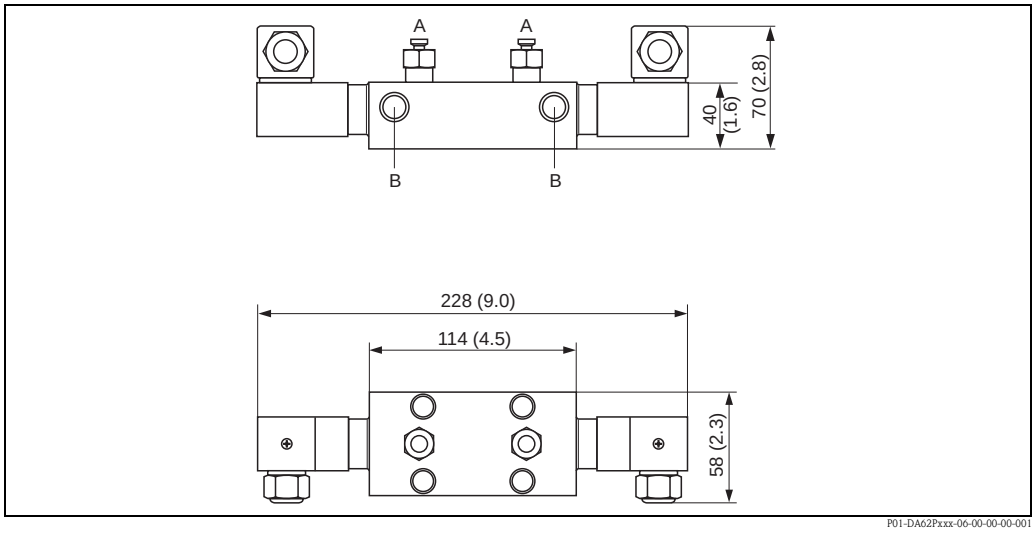
Triggering

The voltage required for triggering the magnetic valves MV1 and MV2 is indicated on the nameplate of the DA62P.
The purge unit can be triggered by manuals switches, switching elements, relays or by a PLC.

Technical data

Type of valve	2-way valve, directly triggered
Medium	air
Operating mode	normally closed
Pipe connection	¼" NPT
Mounting position	arbitrary
Nominal diameter	■ Non-Ex area: 3 mm (0.12") ■ ATEX: 2 mm (0.08 ")
flow coefficient Kv	approx. 0,23 m^3/h
Difference of operating pressure	■ Non-Ex area: max. 6 bar (87 psi) ■ ATEX: max. 5 bar (72 psi)
Overall height of lift	1 mm (0.04")
Leak rate	bubble tight
Temperature of medium	■ Non-Ex area: -10 ... +90 °C (14 ... +194 °F) ■ ATEX: -10 ... +100 °C (14 ... 212 °F) for temperature class T6
Ambient temperature	■ Non-Ex area: max 55 °C (131 °F) ■ ATEX: -30 ... +60 °C (-22 ... +140 °F) for single mounting
Material of valve chamber	■ anodically oxidized aluminium ■ stainless steel
Material of inner parts	stainless steel
Material of seals	FPM
Nominal voltage	■ 230 VAC, 50 Hz ■ 115 V AC, 50 Hz ■ 24 VDC
Protection class	for the ATEX version : EEx M II 2G/Dn T4; EEx EM II 2G/D T4 (PTB 00 ATEX 2129X)
On-time	100 %
Type of protection	IP65
Electrical connection	■ Non-Ex area: according to DIN 43650 ■ ATEX: expansion-fit cable (3000 mm)
Power consumption	■ Non-Ex area: 21 VA AC (pick up); 12 VA / 8W (operation) ■ ATEX: 7 W
Weight	approx. 2,7 kg

Dimensions



A: *Vent valves ¼"NPT;* **B:** *Purge air connections ¼"FNPT (max. 3,5 bar [50 psi])*

Product structure DA62P

400	Approval
A	non-hazardous area
B	ATEX II 2G EEx m II T4
Y	special version, to be specified

410	Power Supply
1	230V 50Hz
2	115V 50Hz
3	24VDC
9	special version, to be specified

420	Material Body Material
1	Aluminium
2	316Ti
9	special version, to be specified

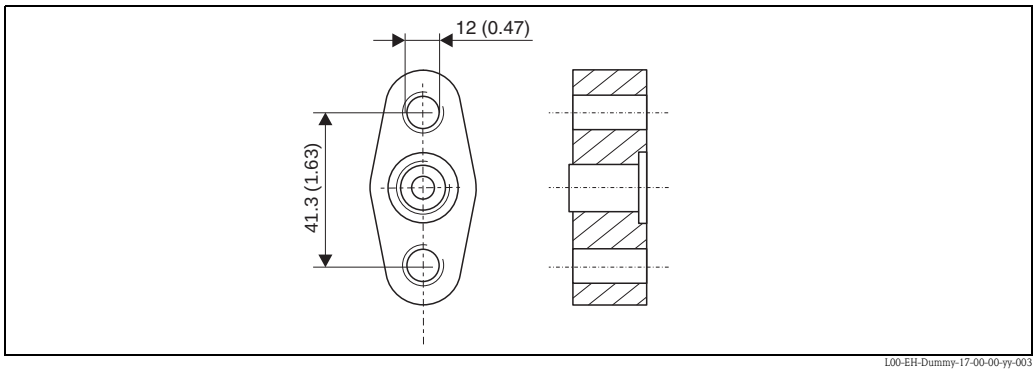
430	Seals; Screws
B	PTFE; UNF7/16
C	PTFE; M10
D	Viton; UNF7/16
E	Viton; M10
F	Viton; M12
Y	special version, to be specified

550	Additional Option (optional; several options can be selected)
FG	Varistor, spark quenching
FH	Varistor + LED, spark quenching
F1	EN10204-3.1 material (wetted parts) inspection certificate
F5	oil+grease free
F7	Cleaned for silicone-free service
F6	Oxygen service
F8	Pressure test + certificate

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

Oval flange adapter PZO for Deltabar S

Dimensions



L00-EH-Dummy-17-00-00-yy-003

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 / Pitot Tube

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.

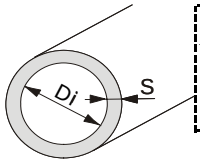
Flowmeter

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

Pipe dimensions *

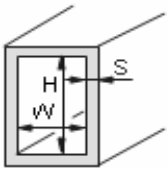
Mounting position s. sheet 2

☐ **Pipe (round) ***



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

☐ **Rectangular duct**



		unit
Duct height (H) :		
Duct width (W) :		
Wall thickness (S):		
Isolation thickness:		
Pipe material:		

The exact specification of the internal dimensions and wall thickness 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

Temperature transmitter not applicable for DP61D

☐ without temperature sensor

☐ PT100 sensor without transmitter

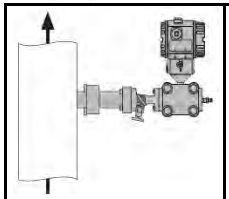
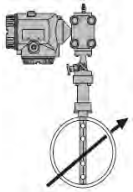
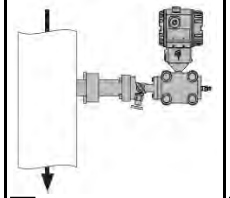
☐ PT100 sensor with 4…20mA transmitter

	unit
Lower range value	
Upper range value	

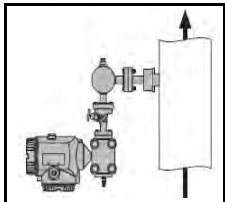
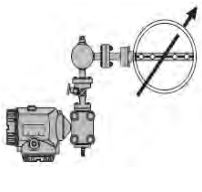
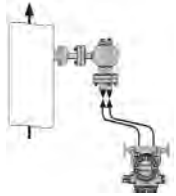
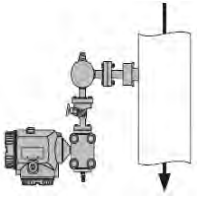
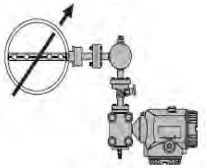
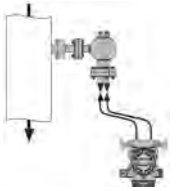
FLOWDATA3-EN

Sizing Sheet - Mounting Position / Pitot Tube

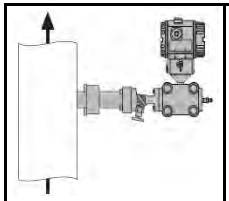
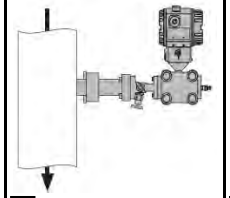
Gas:

compact, vertical	compact, horizontal	remote, vertical	remote, horizontal
 ☐ upwards	 ☐ mounted left	 ☐ upwards/downwards	 ☐ above / on top
 ☐ downwards	 ☐ mounted right		

Steam:

compact, vertical	compact, horizontal	remote, vertical	remote, horizontal
 ☐ upwards	 ☐ mounted left	 ☐ upwards	 ☐ mounted left
 ☐ downwards	 ☐ mounted right	 ☐ downwards	 ☐ mounted right

Liquid:

compact, vertical	compact, horizontal	remote, vertical	remote, horizontal
 ☐ upwards	 ☐ mounted left	 ☐ upwards/downwards	 ☐ below / at bottom
 ☐ downwards	 ☐ mounted right		

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 Customer Project no.	Order specific customer data			
Order code					
Primary element	Order code	Order code of the selected primary element			
	Order no.* Positions*	Order position, to be assigned to this data sheet.			yes
Transmitter	Order code	Order code of the associated differential pressure transmitter.			
	Order no. * Positions*	Order position of the dp transmitter, to be assigned to the primary element.			yes
Tag					
	Tag	Tag no. for clear assignment of primary element and dp-transmitter.			
Main parameter					
	Medium* Status*	Exact designation of the fluid with name (e.g. water) or chemical formula (e.g. CH_4). Type of fluid or state of aggregation of the medium at the given operating conditions - gas, liquid or steam. Depending on this, entry further information will be required.	yes		
Operating conditions					
Process		The differential pressure calculation is based on the correct information about the process conditions. Generally, the layout point for the primary element is maximum requested flow rate at nominal pressure and nominal temperature.			
	Pressure* (absolute or gauge)	Clearly state whether the static pressure is given as absolute or gauge pressure.	yes	yes	
	Ambient pressure	The primary element calculation is always based on absolute static pressure in the pipe. If the static pressure is given as gauge pressure, additionally the average ambient pressure (if different from sea level) or alternatively the height of the location above sea level has to be specified.	yes		
	Flow rate* Density* (at operating / normal / standard conditions)	For gases only: Values of flow rate and/or density can be related to the actual operating conditions (nominal pressure and temperature) or to normal or standard conditions. The resulting difference may be huge depending on pressure and temperature. Please check carefully. Additionally specify the units of flow rate and density clearly (e.g. flow rate in Nm^3/h and not m^3/h for flow at normal conditions).	yes		
	Operating conditions	For gases only: The values of flow rate or density are related to the nominal process conditions (pressure and temperature).	yes		

Section	Field / Parameter	Explanation of the entry	mandatory		
			A[1)]	B[1)]	C[1)]
	Normal conditions	For gases only: The values of flow rate or density are related to normal conditions (pressure and temperature).: Pressure: 101,325 kPa abs. Temperature: 0°C (273,15 K)	yes		
	Standard conditions (acc. to reference conditions)	For gases only: The values of flow rate or density are related to standard conditions (pressure and temperature): Pressure: 101,325 kPa abs. (14,696psi abs.) Temperature: 0°C (59 °F) If there are other reference conditions to be considered, the values for those conditions have to be clearly specified.	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 8). 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 fo the measurement expecially with highly viscous liquids.	yes		
	Z-Factor	For gases only: The compressibility factor Z does have an influence on the density especially at higher pressure and/or higher temperature. If the density is given at normal or standard conditions this may have a quite big impact on the calculation result. If this value is not available, the calculation will be done with the factor set to 1 or, in case of clear defined mixtures, with a factor calculated or estimated from the ingredients.	yes		
	Isentropic index	For gases only: The isentropic index (or specific heat ratio) is required for the calculation of the expansion factor. If the value is not available, the calculation will be done with standard values: 1,65 for monoatomic gases (e.g. Helium He) 1,4 for diatomic gases (e.g. nitrogen N_2) 1,28 for triatomic gases (e.g. carbon dioxide CO_2)	yes		
Flowmeter					
	Nominal width*	Nominal width of the pipe according to the relevant standards, e.g. DN200 (DIN) or 8" (ASME)		yes	
	Pressure rating*	Pressure rating of the selected connection (e.g. flange) according to the relevant standard, e.g. PN40 (DIN) or Cl.600lbs (ASME).		yes	
Pipe dimensions					
	Pipe (round) / Rectangular duct	Selection fo the type of the duct. Only one option can be selected		yes	

Section	Field / Parameter	Explanation of the entry	mandatory		
			A[1)]	B[1)]	C[1)]
	Inner diameter (DI)	Mean inner diameter of the pipe. The precise inner diameter of the pipe is the basis of the differential pressure calulation and determines the length of the probe in the pipe. Incorrect specifications when ordering nresult in corresponding measuring errors or may cause that the probe can not be mounted properly or can not be mounted at all. The inner diameter of the pipe is equal to the length of the probe in the pipe. However, the inner diameter is NOT equal to the nominal diameter. A pipe of the nominal diamter DN200 according to ISO may have inner diameters between 194 mm and 215 mm depending on the pressure rating. For pipes according to ASME, specification of the nominal diameter and the schedule No. is sufficient.	yes	yes	
	Duct height (H) / Duct width (W)	With rectangular ducts the inner pipe diameter is replaced by the inner dimensions of the duct (height and width). From these dimensions the cross-sectional area is calulated, which is needed for the differential pressure calculation. The Pitot tube is usually mounted parallel to the longer side of the rectangular duct. Therefore, this dimension determines the length of the Pitot tube in the pipe. Incorrect specifications in the order result in corresponding measuring errors or may cause that the probe can not be mounted properly or can not be mounted at all.			
	Wall thickness (S)	The wall thickness fo the duct is added to the total length of the Pitot tube. Precise specification is essential.		yes	
	Isolation thickness	Thickness of a possible thermal isolation of the pipe or of other covering shells. The isolation thickness is added to the length of the neck of the probe. A missing specification may cause that the Pitot tube can not be mounted properly (see page 28).			
	Pipe material	Specification of the correct pipe material. The selected material of the mounting components should match the pipe material in order to ensure weldability.		yes	
Additional Data					
Temperature tranmsitter*		Temperature sensors can only be integrated into the device types DP62D and DP63D and for pressure ratings up to PN40 (300lbs).			
	without temperature sensor	An integrated temperature sensor is not required.	yes		
	PT100 sensor without transmitter	A PT100 temperature sensor is required, however without transmitter	yes		
	PT100 sensor with 4...20mA transmitter	When selecting a PT100 sensor with 4...20mA transmitter, it is essential to specify the desired measuring range.	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 the order code. Endress+Hauser will check if there are any order code exclusions.		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)

Instruments International

Endress+Hauser
Instruments International AG
Kaegenstrasse 2
4153 Reinach
Switzerland

Tel. +41 61 715 81 00
Fax +41 61 715 25 00
www.endress.com
info@ii.endress.com

Endress+Hauser

People for Process Automation

TI425P/00/en/10.07
FM+SGML 6.0 ProMoDo