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

Technical Information

Deltapilot S FMB70

Hydrostatic Level Measurement
Pressure sensor with the CONTITE™ measuring cell, condensate proofed and long-term stable; Communication via HART, PROFIBUS PA or FOUNDATION Fieldbus

Application

The hydrostatic pressure sensor is used for the following measuring tasks:
- Hydrostatic pressure measurement in liquids and paste media in all areas of process engineering, process measuring technology, pharmaceuticals and the food industries
- Level, volume or mass measurements in liquids

Your benefits

- Very good reproducibility and long-term stability
- Hermetically sealed CONTITE™ measuring cell:
  - Condensate and climatic proofed
  - High reference accuracy: ±0.1%
  - Minimum temperature effects
- Used for process pressure monitoring up to SIL3, certified according to IEC 61508 by TÜV SÜD
- HistoROM®/M-DAT memory module
- Function-monitored from the measuring cell to the electronics
- Continuous modularity for differential pressure, hydrostatic and pressure (Deltabar S – Deltapilot S – Cerabar S), e.g.
  - replaceable display
  - universal electronic
- Quick commissioning thanks to quick setup menus
- Easy and safe menu-guided operation on-site, via 4 to 20 mA with HART, PROFIBUS PA or via FOUNDATION Fieldbus
- Extensive diagnostic functions

TI416P/00/EN/06.09
No. 71095412

Endress+Hauser
People for Process Automation

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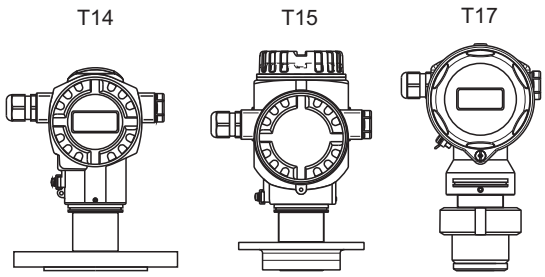
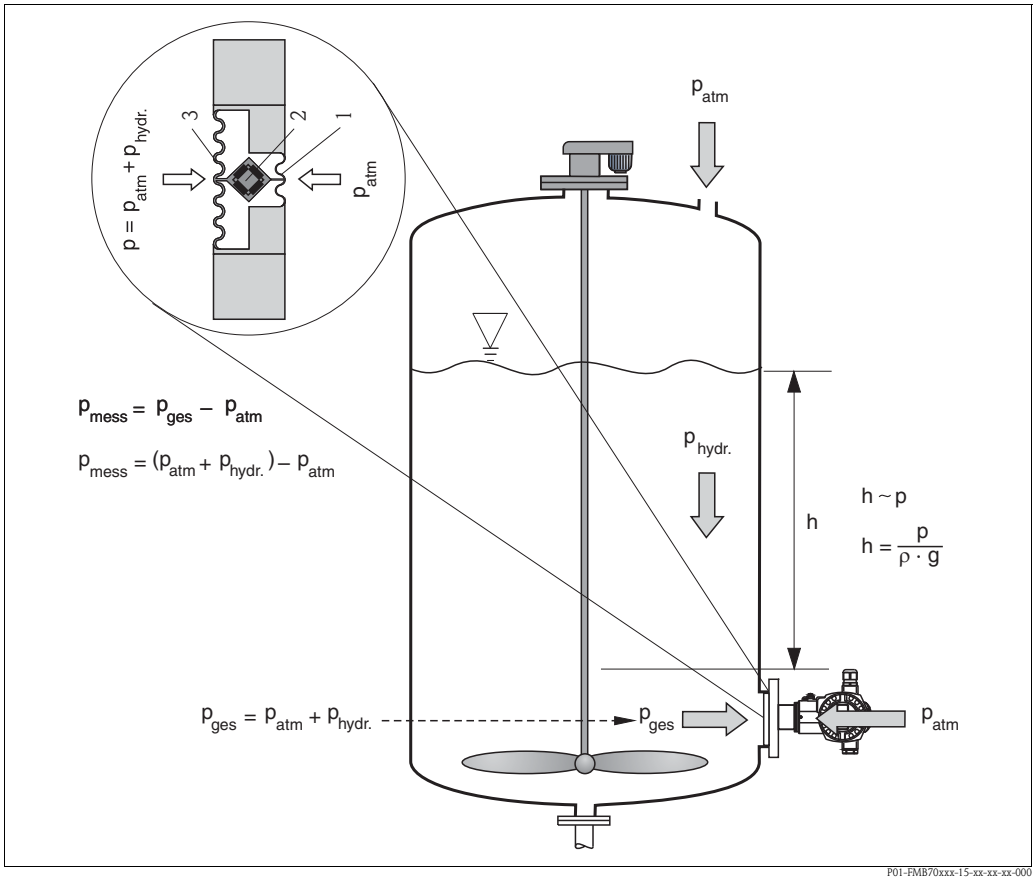
Function and system design

Device selection

Deltapilot S	**FMB70**  P01-FMB70xxx-14-xx-xx-xx-000
Field of application	– Level measurement – Pressure measurement
Industries	Food, pharmaceutical, environment (fresh water and wastewater), chemical
Process connections	– Thread – Flanges – Flush-mounted hygienic connections
Process connection material	– AISI 316L/1.4435 or 1.4404 (see chapter "Material") – Alloy C276/2.4819
Measuring ranges	from –100 to +100 mbar to –900 to +10000 mbar
OPL [1]	max. 40 bar
Process temperature range	–10 to +100°C/+14 to +212°F (+135°C/+275°F for 30 minutes)
Ambient temperature range	■ –40 to +85°C (–40 to +185°F) ■ Separate housing: –40 to +60°C (–40 to +140°F)
Reference accuracy	±0.1% of the set span
Supply voltage	– 4 to20 mA HART: 10.5 to 45 V DC, Ex ia: 10.5 to 30 V DC – PROFIBUS PA: 9 to 32 V DC – FOUNDATION Fieldbus: 9 to 32 V DC
Output	4 to 20 mA with overlaid HART protocol, PROFIBUS PA or FOUNDATION Fieldbus
Options	– Gold-rhodium coated process isolating diaphragm – 3.1 Inspection certificate – 3A and EHEDG approval – HistoROM®/M-DAT memory module – Separate housing
Specialties	– Absolutely resistant to condensate thanks to hermetically sealed CONTITE™ cell – Maximum flexibility thanks to modular design – Cleaning of the transmitter for the use in paint shops

1) OPL: Over Pressure Limit; depends on the weakest link in terms of pressure of the selected components

Measuring principle



Deltapilot S hydrostatic level measurement and measuring principle

1 *Rear isolating membrane of the CONTITE™ measuring cell*
2 *Measuring element*
3 *Process isolating diaphragm*

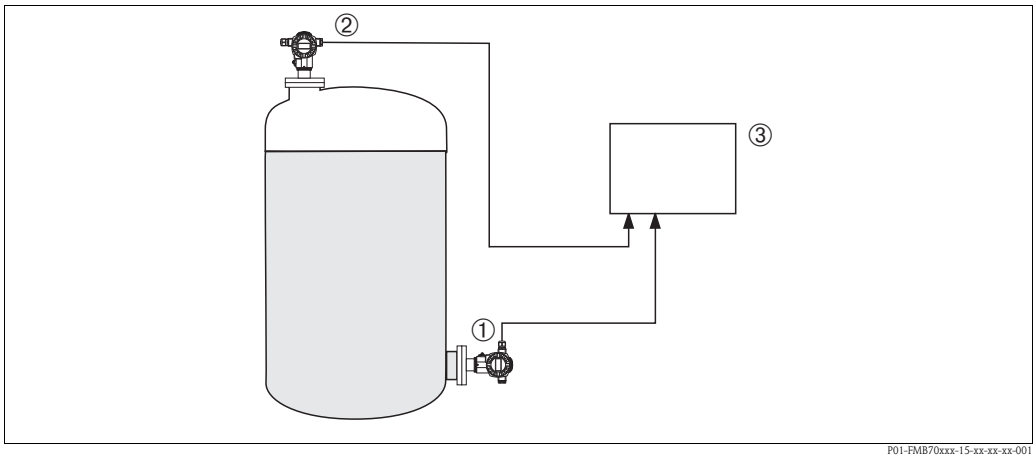
g *Gravitational acceleration*
h *Level height*
p_{tot} *Total pressure = hydrostatic pressure + atmospheric pressure*
p_{atm} *Atmospheric pressure*
$p_{hydr.}$ *Hydrostatic pressure*
p_{meas} *Measured pressure in the measuring cell = hydrostatic pressure*
ρ *Density of fluid*

Due to its weight, a liquid column creates hydrostatic pressure. If the density is constant, the hydrostatic pressure depends solely on the height h of the liquid column.
The CONTITE™ measuring cell which works on the principle of the gauge pressure sensor constitutes the core of Deltapilot S. In contrast to conventional gauge pressure sensors, the precision measuring element (2) in the CONTITE™ measuring cell is absolutely protected between the process isolating diaphragm (3) and the rear isolating membrane (1). Thanks to this hermetic sealing of the measuring element, the CONTITE™ measuring cell is absolutely insensitive to condensate, condensation and aggressive gases. The pressure applied is transferred from the process isolating diaphragm to the measuring element by means of an oil without any loss in pressure.
Two temperature sensors are arranged between the process isolating diaphragm and measuring element which measure the distribution of temperature in the cell. The electronics can compensate any measuring errors resulting from fluctuations in temperature with these measured temperature values.

A linearization with max. 32 points, based on a table entered either manually or semi-automatically, can be activated locally or remotely. This function provides a measurement in engineering units and a linear output signal for spheres, horizontal cylindrical tanks and vessels with conical outlet.

Level measurement in closed tanks with pressure overlay

You can determine the differential pressure in tanks with pressure overlay using two Deltapilot S probes. The measured pressure values of the two probes are sent to a signal processing unit such as Endress+Hauser RMA or a PLC. The signal processing unit or PLC determines the difference in pressure and uses this to calculate the level and the density where necessary.



Level measurement in a closed tank with pressure overlay

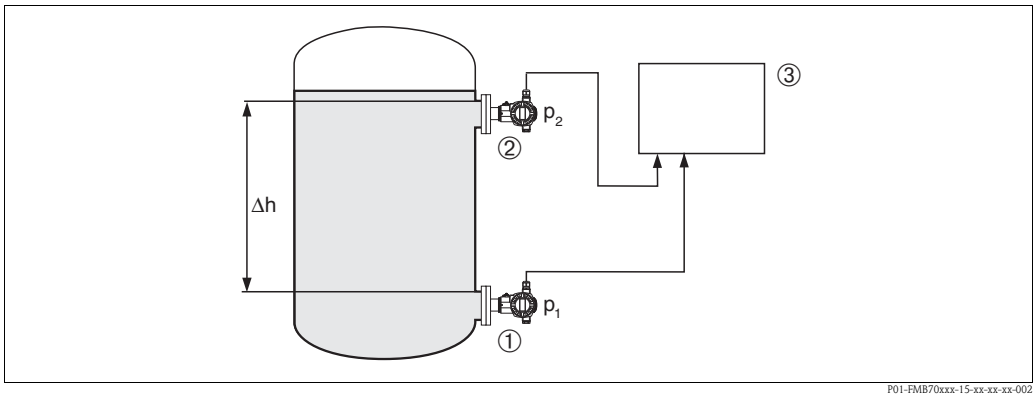
1 Probe 1 measures the total pressure (hydrostatic pressure and top pressure)
2 Probe 2 measures the top pressure
3 The signal processing unit determines the difference in pressure and uses this to calculate the level

Note
- When selecting the Deltapilot S probes, make sure you select large enough measuring ranges (→ see example).
- The process isolating diaphragm of probe 2 must not be flooded. This generates additional hydrostatic pressure which distorts the measurement.
- The ratio of hydrostatic pressure to top pressure should be no more than 1:6.

Example:
- Max. hydrostatic pressure = 600 mbar
- Max. top pressure (probe 2) = 300 mbar
- Max. total pressure, measured with probe 1 = 300 mbar + 600 mbar = 900 mbar
  ⇒ Measuring cell to be selected: 0 to 1200 mbar
- Max. pressure, measured with probe 2: 300 mbar
  ⇒ Measuring cell to be selected: 0 to 400 mbar

Density measurement

You can measure the density in tanks with pressure overlay using two Deltapilot S probes and a signal processing unit or a PLC. The signal processing unit or the PLC calculates the density from the known distance Δh between the two probes and the two measured values p_1 and p_2.



Level measurement in a closed tank with pressure overlay

1 Deltapilot S determines pressure measured value p_1
2 Deltapilot S determines pressure measured value p_2
3 Signal processing unit determines the density from the two measured values p_1 and p_2 and the distance Δh.

Communication protocol

- 4 to 20 mA with HART communication protocol
- PROFIBUS PA
  - The Endress+Hauser devices meet the FISCO model requirements.
  - Due to the low current consumption of 13 mA ± 1 mA, the following can be operated at one bus segment with installation as per FISCO:
    - Up to 7 Deltapilot S for Ex ia, CSA IS and FM IS applications
    - Up to 27 Deltapilot S for all other applications, e.g. in non-hazardous areas, Ex nA, etc.

  Further information on PROFIBUS PA can be found in Operating instructions BA034S "PROFIBUS DP/PA: Guidelines for planning and commissioning" and in the PNO guideline.
- FOUNDATION Fieldbus
  - The Endress+Hauser devices meet the FISCO model requirements.
  - Due to the low current consumption of 15 mA ± 1 mA, the following can be operated at one bus segment with installation as per FISCO:
    - Up to 6 Deltapilot S for Ex ia, CSA IS and FM IS applications
    - Up to 24 Deltapilot S for all other applications, e.g. in non-hazardous areas, Ex nA, etc.

  Further information on FOUNDATION Fieldbus such as bus system component requirements are provided in Operating instructions BA013S "FOUNDATION Fieldbus Overview".

Input

Measured variable

Hydrostatic pressure

Measuring range

Nominal value	Measurement limit		Smallest calibratable Span	MWP [1]	OPL [2]	Vacuum resistance [3]	Version in the order code [4]
	lower (LRL) [5]	upper (URL)				Synthetic oil/ inert oil	
	[bar]	[bar]	[bar]	[bar]	[bar]	[bar_{abs}]	
100 mbar	–0.1	+0.1	0.025	2.7	4	0.01/0.04	1C
400 mbar	–0.4	+0.4	0.04	5.3	8	0.01/0.04	1F
1.2 bar	–1.0	+1.2	0.1	16	24	0.01/0.04	1H
4 bar	–1.0	+4	0.1	16	24	0.01/0.04	1M
10 bar	–1.0	+10	0.1	27	40	0.01/0.04	1P

1) The MWP (maximum working pressure) for the measuring device depends on the weakest element of the components selected with regard to pressure, i.e. the process connection (→ 🖹 25 ff) has to taken into consideration in addition to the sensor (→ see Table above). Pay attention to the pressure-temperature dependence also. For the appropriate standards and further information, → 🖹 24, "Pressure specification".

2) OPL: Over Pressure Limit; depends on the weakest link in terms of pressure of the selected components.

3) The vacuum resistance applies for the measuring cell under reference operating conditions.

4) → 🖹 41 ff, "Ordering information" chapter, feature 40 "Measuring range"

5) By default, the device is set to a low sensor limit of 0 bar. Please specify in the order if the low sensor limit is to be set to a different default value.

Explanation of terms

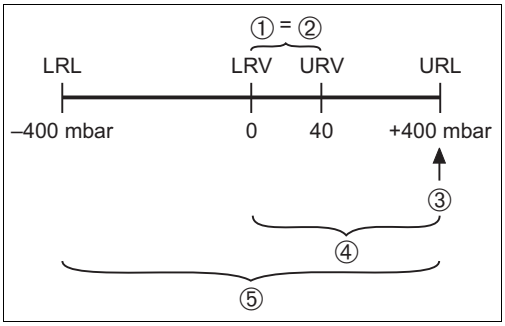
Explanation of terms: Turn down (TD), set span and span based on zero point

Case 1:
- |Lower range value| ≤ |Upper range value|

Example:
- Lower range value (LRV) = 0 mbar
- Upper range value (URV) = 40 mbar
- Nominal value (URL) = 400 mbar

Turn down:
- TD = URL / |URV| = 10:1

Set span:
- URV – LRV = 40 mbar
  This span is based on the zero point.



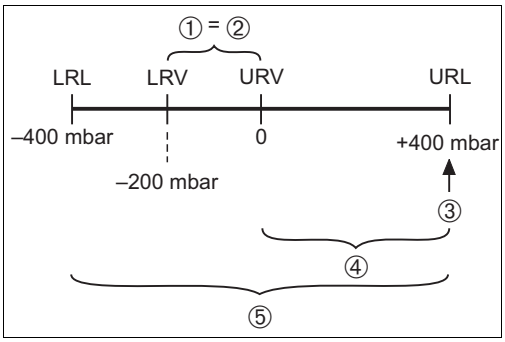
Example: 400 mbar measuring cell

Case 2:
- |Lower range value (LRV)| ≥ |Upper range value (URV)|

Example:
- Lower range value (LRV) = –200 mbar
- Upper range value (URV) = 0 bar
- Nominal value (URL) = 400 mbar

Turn down:
- TD = URL / |(LRV)| = 2:1

Set span:
- URV – LRV = 200 mbar
  This span is based on the zero point.



Example: 400 mbar measuring cell

1 Set span
2 Zero based span
3 Nominal value ≙ upper range limit (URL)
4 Nominal measuring range
5 Sensor measuring range
LRL Lower range limit
URL Upper range limit
LRV Lower range value
URV Upper range value

Output

Output signal

- 4...20 mA with superimposed digital communication protocol HART 5.0, 2-wire
- Digital communication signal PROFIBUS PA (Profile 3.0)
  - signal coding: Manchester Bus Powered (MBP); Manchester II
  - data transmission rate: 31.25 KBit/s, voltage mode
- Digital communication signal FOUNDATION Fieldbus
  - signal coding: Manchester Bus Powered (MBP); Manchester II
  - data transmission rate: 31.25 KBit/s, voltage mode

Signal range – 4 to 20 mA HART

3.8 to 20.5 mA

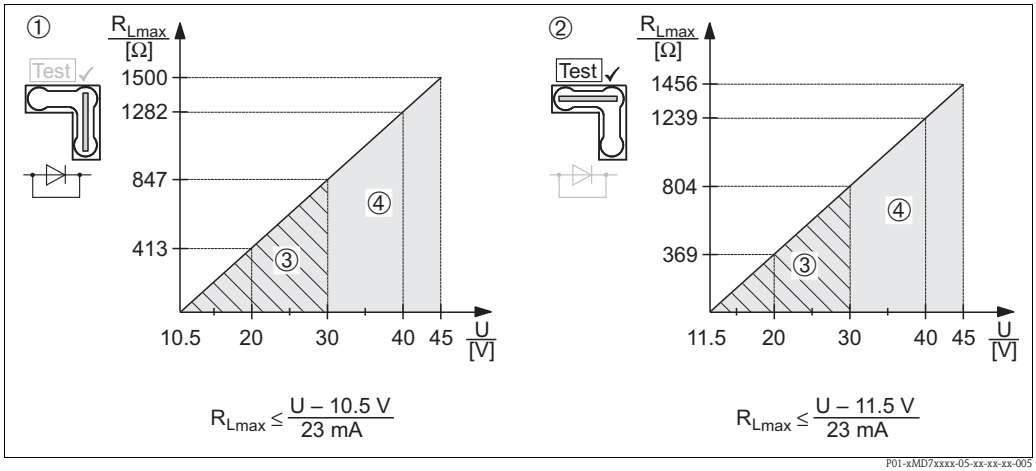
Signal on alarm

As per NAMUR NE 43

- 4...20 mA HART
  Options:
  - Max. alarm*: can be set from 21...23 mA
  - Keep measured value: last measured value is kept
  - Min. alarm: 3.6 mA

  * Factory setting: 22 mA
- PROFIBUS PA: can be set in the Analog Input block,
  options: Last Valid Out Value, Fsafe Value (factory setting), Status bad
- FOUNDATION Fieldbus: can be set,
  options: Last good Value, Fail Safe Value (factory setting), Wrong Value

Load – 4 to 20 mA HART



Load diagram, observe the position of the jumper and the explosion protection. (→ 🖹 17, section "Taking 4...20 mA test signal" .)

1 Jumper for the 4...20 mA test signal inserted in "Non-test" position
2 Jumper for the 4...20 mA test signal inserted in "Test" position
3 Supply voltage 10.5 (11.5) to 30 V DC for 1/2 G, 1 GD, 1/2 GD, FM IS, CSA IS, NEPSI Ex ia and IEC Ex ia
4 Supply voltage10.5 (11.5) to 45 V DC for devices for non-hazardous areas, 1/2 D, 1/3 D, 3 G Ex nA, FM DIP, FM NI, CSA Dust-Ex
R_{Lmax} Maximum load resistance
U Supply voltage

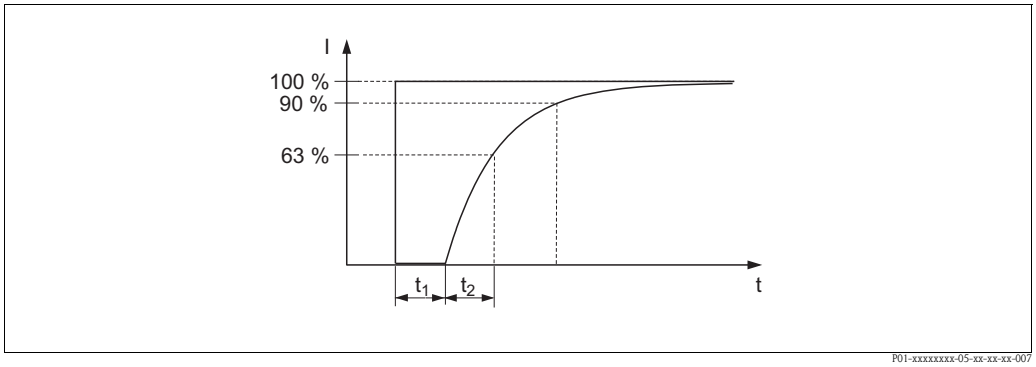
Note!
When operating via a handheld terminal or via PC with an operating program, a minimum communication resistance of 250 Ω must exist within the loop.

Resolution

- Current output: 1 μA
- Display: can be set (factory setting: presentation of the maximum accuracy of the transmitter)

Dynamic behavior current output

Dead time, Time constant (T63)



Presentation of the dead time and the time constant

Type	Dead time t_1	Time constant (T63), t_2
FMB70	40 ms	30 ms

Dynamic behavior HART

Dead time, Time constant (T63)

A typical parametrization for the PLC of 3 to 4 values per second results in the following total dead time:

Type	Dead time t_1	Time constant (T63), t_2
FMB70	290 ms	30 ms

Reading cycle

- HART commands: on average 3 to 4 per second on average.
  The Deltapilot S commands the BURST MODE function for cyclic value transmission via the HART communication protocol.

Response time

≤ 250 ms

Cycle time (Update time)

On average 250...330 ms.

Dynamic behavior PROFIBUS PA

Dead time, Time constant (T63)

A typical cyclic parametrization for the PLC of 20 values per second results in the following total dead time:

Type	Dead time t_1	Time constant (T63), t_2
FMB70	290 ms	30 ms

Response time

- Cyclic: approx. 10 ms per request
- Acyclic: < 50 ms

All values are typical values.

Cycle time (update time)

The cycle time in a bus segment in cyclic data communication depends on the number of devices, the segment coupler used and the internal PLC cycle time.

Dynamic behavior FOUNDATION Fieldbus

Dead time, Time constant (T63)

If the macro cycle time (Hostsystem) is set to a typical value of 250 ms, the following total dead time results:

Type	Dead time t_1	Time constant (T63), t_2
FMB70	290 ms	30 ms

Reading cycle

- Cyclic: up to 5/s, dependent on the number and nature of the function blocks used in a closed-control loop
- Acyclic: 10/s

Response time

- Cyclic: < 80 ms
- Acyclic: < 40 ms

All values are typical values.

Cycle time (update time)

250 ms

Damping

A damping affects all outputs (output signal, display).

- Via on-site display, handheld terminal or PC with operating program, continuous from 0...999 s
- Additionally for HART and PROFIBUS PA: via DIP-switch on the electronic insert, switch position "on" = set value and "off"
- Factory setting: 2 s

Data of the FOUNDATION Fieldbus interface

Basic Data

Device Type	100B (hex)
Device Revision	06 (hex)
DD Revision	01 (hex)
CFF Revision	01 (hex)
ITK Version	5.0
ITK-Certification Driver-No.	IT054800
Link-Master (LAS) cabable	yes
Link Master / Basic Device selectable	yes; Default: Basic Device
Number VCRs	44
Number of Link-Objects in VFD	50

Virtual communication references (VCRs)

Permanent Entries	44
Client VCRs	0
Server VCRs	5
Source VCRs	8
Sink VCRs	0
Subscriber VCRs	12
Publisher VCRs	19

Link Settings

Slot time	4
Min. Inter PDU delay	12
Max. response delay	10

Transducer Blocks

Block	Content	Output values
TRD1 Block	contains all parameters related to the measurement	■ Pressure or level (channel 1) ■ Process temperature (channel 2)
Service Block	contains service information	■ Pressure after damping (channel 3) ■ Pressure drag indicator (channel 4) ■ Counter for max. pressure transgression (channel 5)
Diagnsotic Block	contains diagnostic information	Error code via DI channels (channel 0 to 16)
Display Block	contains parameters to configure the local display	no output values

Function Blocks

Block	Content	Number of Function Blocks	Execution time	Functionality
Resource Block	The Resource Block contains all the data that uniquely identifies the field device. It is an electronic version of a nameplate of the device.			enhanced
Analog Input Block 1 Analog Input Block 2	The AI block takes the manufacturer's input data, selected by channel number, and makes it available to other function blocks at its output. Enhancement: digital outputs for process alarms, fail safe mode		45 ms	enhanced
Digital Input Block	This block contains the discrete data of the diagnose block (selectable via a channel number 0 to 16) and provides them for the blocks at the output.		40 ms	standard
Digital Output Block	This block converts the discrete input and thus initiates an action (selectable via a channel number) in the dp flow block or in the service block. Channel 1 resets the counter for max. pressure transgressions..		60 ms	standard
PID Block	The PID block serves as proportional-integral-derivative controller and is used almost universally to do closed-loop-control in the field including cascade and feedforward. Input IN can be indicated on the display. The selection is performed in the display block (DISPLAY_MAIN_LINE_CONTENT).		120 ms	standard
Arithmetic Block	This block is designed to permit simple use of popular measurement math functions. The user does not have to know how to write equations. The math algorithm is selected by name, chosen by the user for the function to be done.		50 ms	standard
Input Selector Block	The input selector block provides selection of up to four inputs and generates an output based on the configured action. This block normally receives its inputs from AI blocks. The block performs maximum, minimum, middle, average and 'first good' signal selection. INPUT IN1 to IN4 can be indicated on the display. The selection is performed in the display block (DISPLAY_MAIN_LINE_CONTENT).		35 ms	standard
Signal Characterizer Block	The signal characterizer block has two sections, each with an output that is a non-linear function of the respective input. The non-linear function is determined by a single look-up table with 21 arbitrary x-y pairs.		30 ms	standard
Integrator Block	The Integrator Function Block integrates a variable as a function of the time or accumulates the counts from a Pulse Input block. The block may be used as a totalizer that counts up until reset or as a batch totalizer that has a setpoint, where the integrated or accumulated value is compared to pre-trip and trip settings, generating discrete signals when these settings are reached.		35 ms	standard
Analog Alarm Block	This block contains all process alarm conditions (working like a comparator) and represents them at the output.		35 ms	standard

Additional Function Block informations:

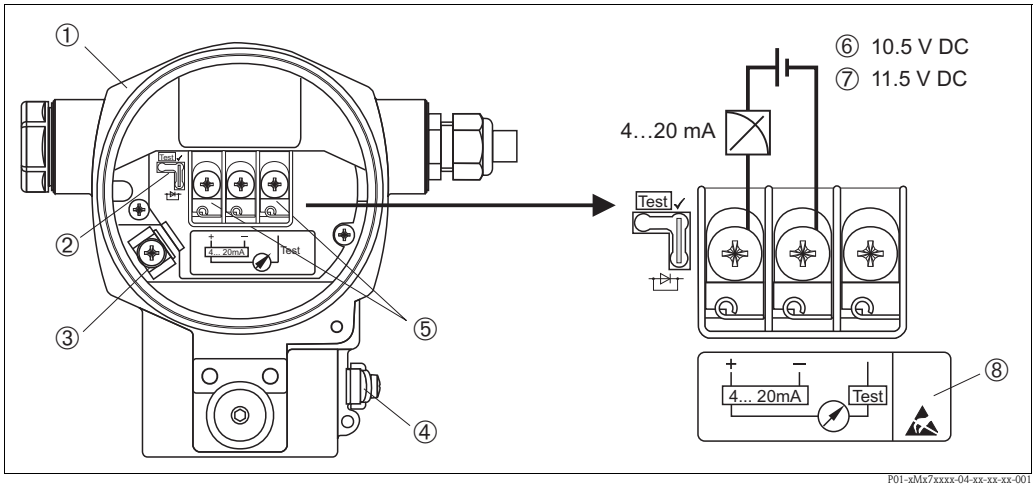
Instantiate Function Block	YES
Number of instantiate blocks	15

Power supply

Electrical connection

Note!
- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings. → 🖹 46 ff, "Safety instructions" and "Installation/Control Drawings" sections.
- Devices with integrated overvoltage protection must be grounded. → 🖹 23.
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.

4 to 20 mA HART



Electrical connection 4 to 20 mA HART, here shown with aluminum housing (T14)

1 Housing
2 Jumper for 4 to 20 mA test signal → 🖹 17, "Taking 4 to 20 mA test signal".
3 Internal ground terminal
4 External ground terminal
5 4 to 20 mA test signal between positive and test terminal
6 Minimum supply voltage 10.5 V DC, if the jumper is inserted in accordance with the illustration.
7 Minimum supply voltage 11.5 V DC, if the jumper is inserted in "Test" position.
8 Devices with integrated overvoltage protection are labelled OVP (overvoltage protection) here (→ 🖹 23).

PROFIBUS PA

The digital communication signal is transmitted to the bus via a 2-wire connection. The bus also provides the auxiliary energy. For further information on the network structure and grounding and for further bus system components such as bus cables, see the relevant documentation, e.g. Operating Instructions BA034S "Guidelines for planning and commissioning PROFIBUS DP/PA" and the PNO Guideline.

Cable specifications:
- Use a twisted, shielded two-wire cable, preferably cable type A

Note!
For further information on the cable specifications, see Operating Instructions BA034S Guidelines for planning and commissioning PROFIBUS DP/PA", PNO Guideline 2.092 " PROFIBUS PA User and Installation Guideline" and IEC 61158-2 (MBP).

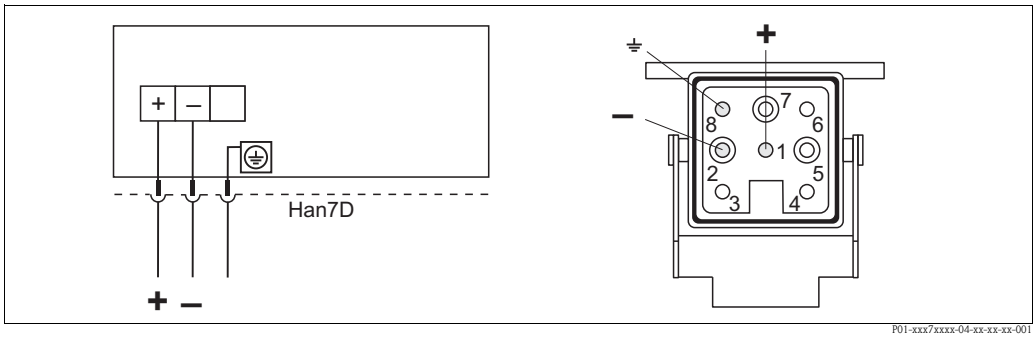
FOUNDATION Fieldbus

The digital communication signal is transmitted to the bus via a 2-wire connection. The bus also provides the auxiliary energy. For further information on the network structure and grounding and for further bus system components such as bus cables, see the relevant documentation, e.g. Operating Instructions BA013S "FOUNDATION Fieldbus Overview" and the FOUNDATION Fieldbus Guideline.

Cable specifications:
- Use a twisted, shielded two-wire cable, preferably cable type A

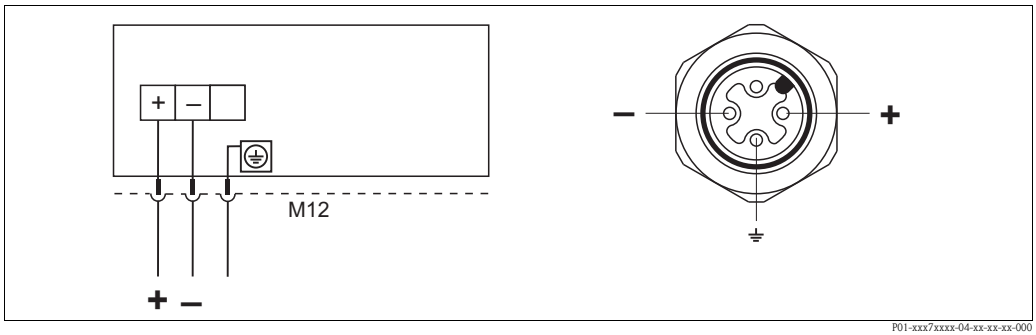
Note!
For further information on the cable specifications, see Operating Instructions BA013S "FOUNDATION Fieldbus Overview", FOUNDATION Fieldbus Guideline and IEC 61158-2 (MBP).

Devices with Harting connector Han7D



Left: electrical connection for devices with a Harting connector Han7D
Right: view of the connection at the device

Devices with M12 connector



Left: electrical connection for devices with an M12 connector
Right: view of the connector at the device

Endress+Hauser offers the following accessories for devices with an M12 connector:

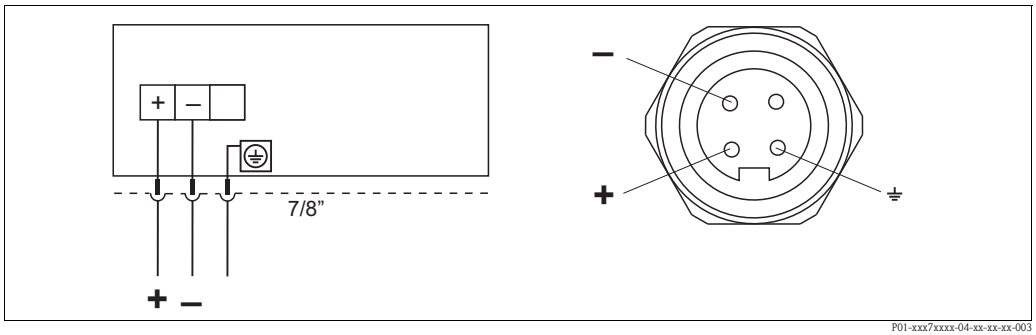
Plug-in jack M 12x1, straight
- Material: body PA; coupling nut CuZn, nickel-plated
- Degree of protection (fully locked): IP67
- Order number: 52006263 or through device order, see also → 41 ff "Ordering information" section

Plug-in jack M 12x1, elbowed
- Material: body PBT; coupling nut CuZn, nickel-plated
- Degree of protection (in screwed situation): IP67
- Order number: 71091284 or through device order, see also → 41 ff "Ordering information" section

Cable 4x0.34 mm^2 with M12 socket, elbowed, screw plug, 5 m length
- Material: body PUR; coupling nut CuSn/Ni; cable PVC

- Degree of protection (fully locked): IP67
- Order number: 52010285 or through device order, see also → 📄 41 ff "Ordering information" section

Devices with 7/8" connector



Left: electrical connection for devices with a 7/8" connector
Right: view of the connector at the device

Kabel gland

Approval	Typ	Clamping range
Standard, II1/2G Exia, IS	Plastic M20x1.5	5...10 mm
ATEX II1/2D, II1/3D, II1/2GD Exia, II1GD Exia II3G Ex nA	Metal M20x1.5 (Ex e)	7...10.5 mm

Terminals

for wire cross-sections of 0.5 to 2.5 mm^2

Taking 4...20 mA test signal

A 4...20 mA signal may be measured via the positive and test terminal without interrupting the measurement. The minimum supply voltage of the device can be reduced by simply changing the position of the jumper. As a result, operation is also possible with lower voltage sources. Observe the position of the jumper in accordance with the following table.

Jumper position for test signal	Description
	– Taking 4...20 mA test signal via plus and test terminal: possible. (Thus, the output current can be measured without interruption via the diode.) – Delivery status – minimum supply voltage: 11.5 V DC
	– Taking 4...20 mA test signal via plus and test terminal: not possible. – minimum supply voltage: 10.5 V DC

Supply voltage

Note
- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas. → 46 ff, "Safety instructions" and "Installation/Control Drawings" sections.

4 to 20 mA HART

- Version for non-hazardous areas, jumper for 4 to 20 mA test signal in "Test" position (delivery status condition): 11.5 to 45 V DC
- Version for non-hazardous areas, jumper for 4 to 20 mA test signal in "Non-test" position 10.5 to 45 V DC

PROFIBUS PA

- Version for non-hazardous areas: 9 to 32 V DC

FOUNDATION Fieldbus

- Version for non-hazardous areas: 9 to 32 V DC

Current consumption

- PROFIBUS PA: 13 mA ± 1 mA, switch-on current corresponds to IEC 61158-2, Clause 21
- FOUNDATION Fieldbus: 15 mA ± 1 mA, switch-on current corresponds to IEC 61158-2, Clause 21

Cable entry

→ 41, feature 30 "Housing; Cable entry; Degree of protection".

Cable specification

- Endress+Hauser recommends using shielded, shielded twisted-pair two-wire cables.
- Terminals for wire cross-sections 0.5 to 2.5 mm^2
- Cable external diameter: 5 to 9 mm

Residual ripple

Without influence on 4 to 20 mA signal up to ± 5% residual ripple within the permitted voltage range [according to HART hardware specification HCF_SPEC-54 (DIN IEC 60381-1)]

Influence of power supply

≤ 0.0006 % of URL/1 V

Accuracy

Reference operating conditions

- As per IEC 60770
- Ambient temperature range T_A = constant, in the range of: +21 to +33°C (+69.8 to +91.4°F)
- Humidity φ = constant, in the range of: 5 to 80 % RH
- Ambient pressure p_A = constant, in the range of: 860 to 1060 mbar
- Position of measuring cell = constant, in the range of: horizontal ±1°
- Input of LOW SENSOR TRIM and HIGH SENSOR TRIM for lower range value and upper range value
- Zero based span
- Membrane material: Alloy C276 (2.4819)
- Filling oil: synthetic oil (polyalphaolefin)/inert oil
- Supply voltage: 24 V DC ± 3 V DC
- Load with HART: 250 Ω

Long-term stability

- 100 mbar measuring cell: ±0.18% of URL/year / ±0.45 % of URL/5 years
- 400 mbar, 1200 mbar measuring cell: ±0.1% of URL/year / ±0.25 % of URL/5 years
- 4000 mbar, 10000 mbar measuring cell: ±0.05% of URL/year / ±0.125 % of URL/5 years

Influence of the installation position

- Maximum: ±2.3 mbar. This value is doubled for devices with inert oil.

Note
Position-dependent zero shift can be corrected. → 20, "General installation instructions" section.

Reference accuracy

The reference accuracy comprises the non-linearity according to limit point setting, hysteresis and non-reproducibility as per IEC 60770. The data refer to the calibrated span

Measuring cell	% of the set span
100 mbar	■ TD 1:1 to TD 2:1 = ±0.15 ■ TD > 2:1 to TD 4:1 = ±0.075 x TD
400 mbar	■ TD 1:1 to TD 4:1 = ±0.15 ■ TD > 4:1 to TD 10:1 = ±0.0375 x TD
1200 mbar	■ TD 1:1 to TD 2:1 = ±0.1 ■ TD > 2:1 to TD 12:1 = ±0.05 x TD
4000 mbar	■ TD 1:1 to TD 4:1 = ±0.1 ■ TD > 4:1 to TD 40:1 = ±0.025 x TD
10000 mbar	■ TD 1:1 to TD 2.5:1 = ±0.1 ■ TD > 2.5:1 = ±0.04 x TD

Total performance

The total performance comprises the non-linearity including hysteresis, non-reproducibility as well as the thermal change of the zero point.

Measuring cell	% of URL
100 mbar, 400 mbar	■ ±0.35
1200 mbar, 4000 mbar, 10000 mbar	■ ±0.15
All specifications apply for the temperature range –10 to +60°C (+14 to +140°F).	

Total Error

The total error comprises the long-term stability and the total performance:

Measuring cell	% of URL/year
100 mbar	■ ±0.53
400 mbar	■ ±0.45
1200 mbar	■ ±0.25
4000 mbar, 10000 mbar	■ ±0.20

Warm-up period

- 4 to 20 mA HART: 10 s
- PROFIBUS PA: 6 s
- FOUNDATION Fieldbus: 50 s

Thermal change of the zero output and the output span

Measuring cell	–10...+60 °C (+14 to +140°F)	+60...+85 °C (+140 to +185°F)
	% of the set span	
100 mbar	±(0.3 x TD + 0.02)	±(0.4 x TD + 0.04)
400 mbar	±(0.25 x TD + 0.01)	±(0.3 x TD + 0.02)
1200 mbar, 4000 mbar, 10000 mbar	±(0.1 x TD + 0.01)	±(0.15 x TD + 0.02)

These values specify the thermal change for the most unfavorable case that the process temperature and the ambient temperature change independently of each other.

Operating conditions (installation)

General installation instructions

- The orientation dependent zero point shift can be corrected directly on the device using an operating key, and even in a hazardous area on devices with external controls.
- The Deltapilot S housing can be rotated through up to 380°. → 22, "Rotating the housing" section.
- The on-site display can be rotated in 90° stages.
- Endress+Hauser offers a mounting bracket for installing the device on pipes or on walls. → 20, "Wall and pipe mounting" section.

Level measurement

- Always install the device under the lowest measuring point.
- Do not install the device at the following positions:
  - in the filling curtain
  - in the tank outflow
  - or at a point in the tank that can be reached by pressure pulses from the agitator.
- The calibration and functional test can be carried out more easily if you mount the device downstream of a shut-off device.
- Deltapilot S must be included in the insulation for media that can harden when cold.

Pressure measurement in gases

- Mount Deltapilot S with shut-off device above the tapping point so that condensate can flow into the process.

Pressure measurement in steams

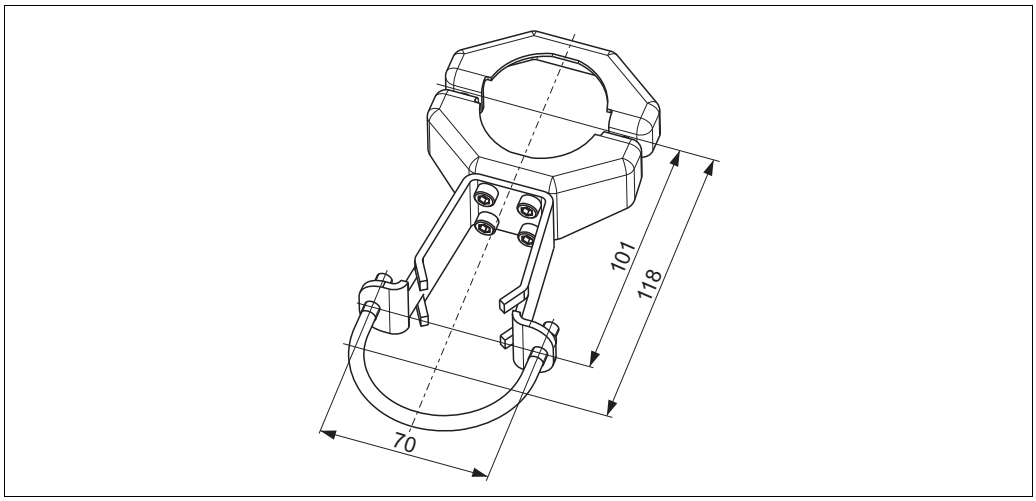
- Mount Deltapilot S with siphon below the tapping point.
  The siphon reduces the temperature to almost ambient temperature.
- Fill the siphon with fluid before commissioning.

Pressure measurement in liquids

- Mount Deltapilot S with shut-off device below or at the same level as the tapping point.

Wall and pipe mounting

Endress+Hauser offers a mounting bracket for installing the device on pipes or on walls.
→ 43 ff, feature 110, "Additional options 2".



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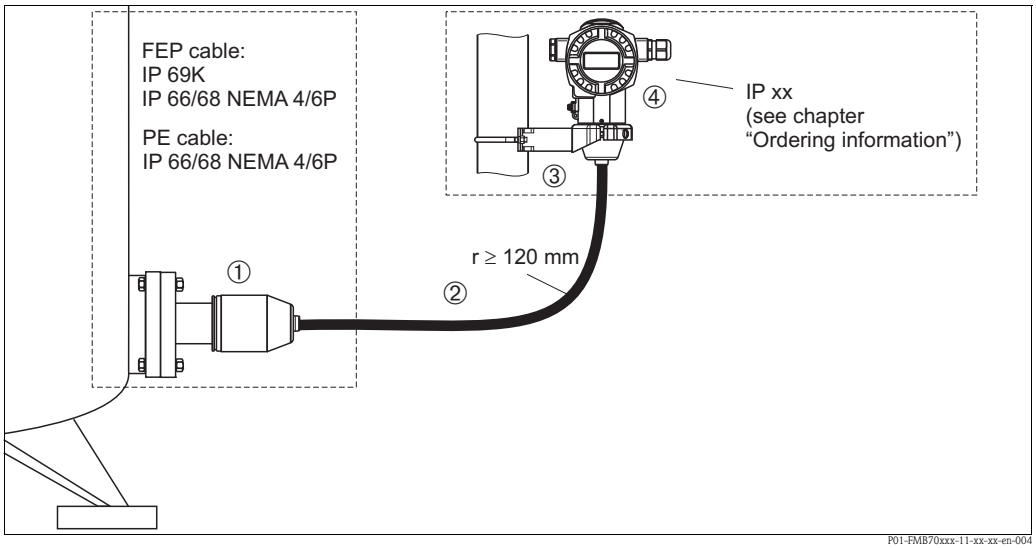
"Separate housing" version

With the "separate housing" version, you are able to mount the housing with the electronics insert at a distance from the measuring point. This facilitates trouble-free measurement:
- Under particularly difficult measuring conditions (at installation locations that are cramped or difficult to access)
- If rapid cleaning of the measuring point is required
- If the measuring point is exposed to vibrations.

You can choose between different cable versions:
- PE (2 m, 5 m and 10 m)
- FEP (5 m).

→ 📄 43 ff, Feature 110, "Additional options 2", Version "G".

For the dimensions, see → 📄 32.



In the case of the "separate housing" version, the sensor is delivered with the process connection and cable ready mounted. The housing and a mounting bracket are enclosed as separate units. The cable is provided with a socket at both ends. These sockets are simply connected to the housing and the sensor.

1 Process connection with sensor
2 Cable, both ends are fitted with a socket
3 Mounting bracket provided, suitable for pipe and wall mounting
4 Housing with electronic insert

Degree of protection for the process connection with sensor with the use of
- FEP cable:
  - IP 69K
  - IP 66 NEMA 4/6P
  - IP 68 (1.83 mH_2O for 24 h) NEMA 4/6P
- PE cable:
  - IP 66 NEMA 4/6P
  - IP 68 (1.83 mH_2O for 24 h) NEMA 4/6P

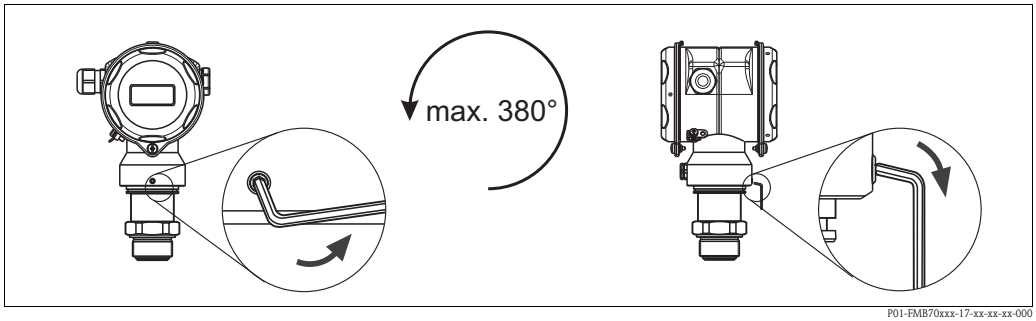
Technical data of the PE and FEP cable:
- Minimum bending radius: 120 mm (4.72 inch)
- Cable extraction force: max. 450 N
- Resistance to UV light

Use in hazardous area:
- Intrinsically safe installations (Ex ia/IS)
- FM/CSA IS: for Div.1 installatin only

Rotating the housing

The housing can be rotated through up to 380° by loosening the Allen screw.

Your benefits
- Simple mounting by optimally aligning the housing
- Good, accessible device operation
- Optimum readability of the on-site display (optional).



Align the housing by loosening the Allen screw.
Aluminum housing (T14 and T15): 2 mm Allen key; Stainless steel housing (T17): 3 mm Allen key

Oxygen applications

Oxygen and other gases can react explosively to oils, grease and plastics, such that, among other things, the following precautions must be taken:
– All components of the system, such as measuring devices, must be cleaned in accordance with the BAM (DIN 19247) requirements.
– Dependent on the materials used, a certain maximum temperature and a maximum pressure for oxygen applications must not be exceeded. The maximum temperature T_{max} for oxygen applications is 60°C (140°F).

The devices suitable for gaseous oxygen applications are listed in the following table with the specification p_{max}.

Order code for devices cleaned for oxygen applications	**p_{max} for oxygen applications**
FMB70 – * * * ** * *** F * *	Depends on the weakest link in terms of pressure of the selected components: over pressure limit (OPL) of the selected sensor or process connection (1.5 x PN)[1]

1) → 🖹 8, "Measuring range" and → 🖹 25 ff, "Mechanical construction" section

Silicone-free applications

Cleaning of the transmitter for the use e.g. in paint shops → 🖹 42 "Filling" version "L".

Diaphragm seals for materials with hydrogen build-up (Gold-rhodium coating)

With regard to materials in which hydrogen build-up takes place, hydrogen atoms can diffuse through the metal diaphragms. This can result in incorrect measurement results.
Endress+Hauser offers process isolating diaphragm with Gold-Rhodium coating for this application.

→ 🖹 42 "FMB70 ordering information", feature 60 "Material of the process isolating diaphragm" version "6".

Operating conditions (environment)

Ambient temperature limits

- FMB70: –40 to +85°C (–40 to +185°F)
  lower temperatures on request
- On-site display: –20 to +70°C (–4 to +158°F)
  Extended operating temperature range with restrictions in the optical properties such as display speed and contrast: –40 to +85°C (–40 to +185°F)
- Separate housing: –40 to +60°C (–40 to +140°F)

For devices for use in hazardous areas, see Safety Instructions, Installation or Control Drawing.
(→ 🖹 46, "Safety instructions" and "Installation/Control Drawings" sections).

The device can be used in this temperature range. The values in the specification, such as thermal changes, may be exceeded in this case.

Storage temperature range

- –40 to + 90°C (–40 to + 194°F)
- On-site display: –40 to +85°C (–40 to +185°F)
- Separate housing: –40 to +60°C (–40 to +140°F)

Degree of protection

- → 🖹 41 ff, feature 30 "Housing; Cable entry; Degree of protection".
- Degree of protection IP 68 for T17 housing: 1.83 mH_2O for 24 hours
- Seperate housing → 🖹 21

Climate class

Class 4K4H (air temperature: –20 to 55°C (–4 to +131°F), relative humidity: 4 to 100 %)
fulfilled as per DIN EN 60721-3-4 (condensation possible)

Vibration resistance

Device/Additional option	Test standard	Vibration resistance
FMB70	GL	guaranteed for: 3...25 Hz: ±1.6 mm; 25...100 Hz: 4 g in all 3 planes
FMB70 with mounting bracket	IEC 61298-3	guaranteed for: 10...60 Hz: ±0.15 mm; 60...500 Hz: 2 g in all 3 planes

Electromagnetic compatibility

- Electromagnetic compatibility to EN 61326 and NAMUR recommendation EMC (NE21). For details refer to the declaration of conformity.
- Maximum deviation: < 0.5 % of span
- All measurements were performed with a turn down (TD) = 2:1.

Overvoltage protection (optional)

- Overvoltage protection:
  – Nominal functioning DC voltage: 600 V
  – Nominal discharge current: 10 kA
- Surge current check $\hat{i}$ = 20 kA as per DIN EN 60079-14: 8/20 µs satisfied
- Arrester AC current check I = 10 A satisfied

→ 🖹 42 ff, feature 100 "Additional options 1" and feature 110 "Additional options 2", version "M Overvoltage protection".

Note!
Devices with integrated overvoltage protection must be grounded.

Operating conditions (process)

Process temperature limits

- –10 to +100°C (+14 to +212°F)
- Up to +135°C (+275°F) short-term (for 30 minutes) for cleaning purposes

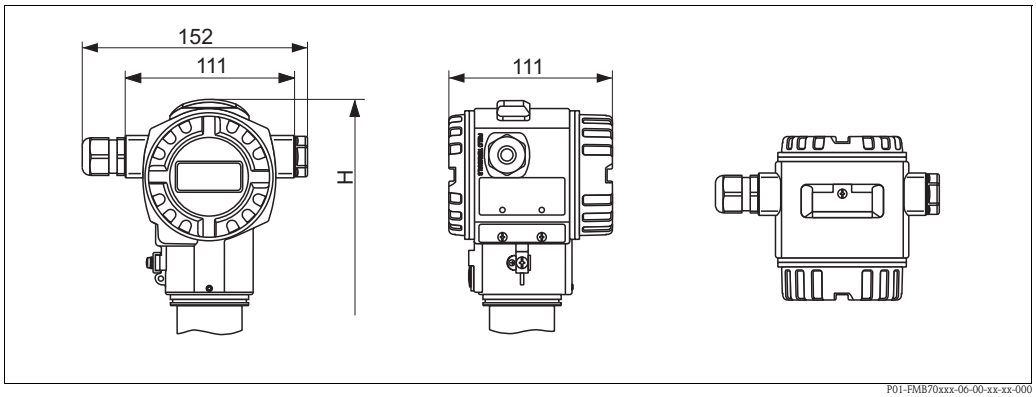
Pressure specifications

- The maximum pressure for the measuring device is dependent on the lowest-rated element with regard to pressure, see the following sections for this:
  – → 📄 8 ff, section "Measuring range"
  – Chapter "Mechanical construction".
  The MWP (maximum working pressure) is specified on the nameplate. This value refers to a reference temperature of 20°C (68°F) or 100°F for ANSI flanges and may be applied to the device for an unlimited time. Observe pressure-temperature dependency.
- The pressure values permitted at higher temperatures can be found in the following standards:
  – EN 1092-1: 2001 Tab. 18 [1]
  – ASME B 16.5a – 1998 Tab. 2-2.2 F316
  – ASME B 16.5a – 1998 Tab. 2.3.8 N10276
  – JIS B 2220
- The test pressure corresponds to the over pressure limit of the measuring instrument (Over pressure limits OPL = 1.5 x MWP) and may fit only temporally limited, so that no permanent damage develops.
- The Pressure Equipment Directive (EC Directive 97/23/EC) uses the abbreviation "PS". The abbreviation "PS" corresponds to the MWP (maximum working pressure) of the measuring device.
- In the case of sensor range and process connections where the OPL (Over Pressure Limit) of the pressure connection is smaller than the nominal value of the sensor, the device is set at the factory, at the very maximum, to the OPL value of the process connection. If you want to use the entire sensor range, select a process connection with a higher OPL value (1.5 x PN; PN = MWP).
- In oxygen applications, the values for "p_{max} and T_{max} for oxygen applications" as per → 📄 22, "Oxygen applications" may not be exceeded.

1) With regard to their stability-temperature property, the materials 1.4435 and 1.4404 are grouped together under 13EO in EN 1092-1 Tab. 18. The chemical composition of the two materials can be identical.

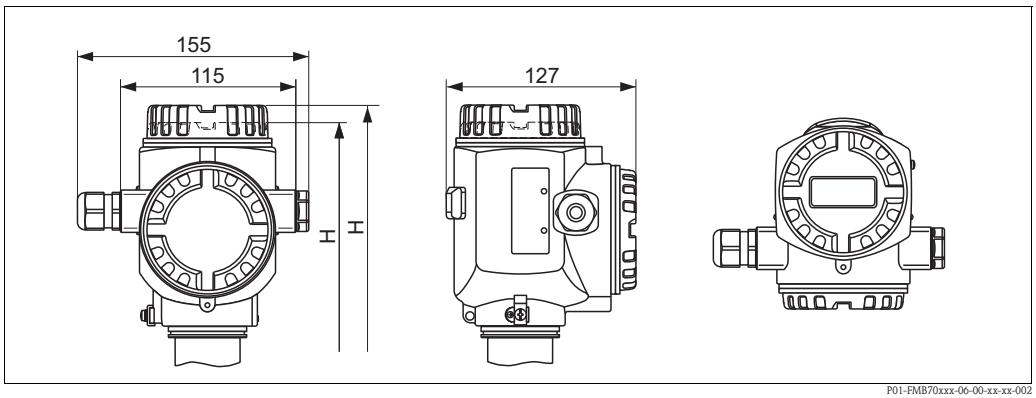
Mechanical construction

Dimensions of T14 housing



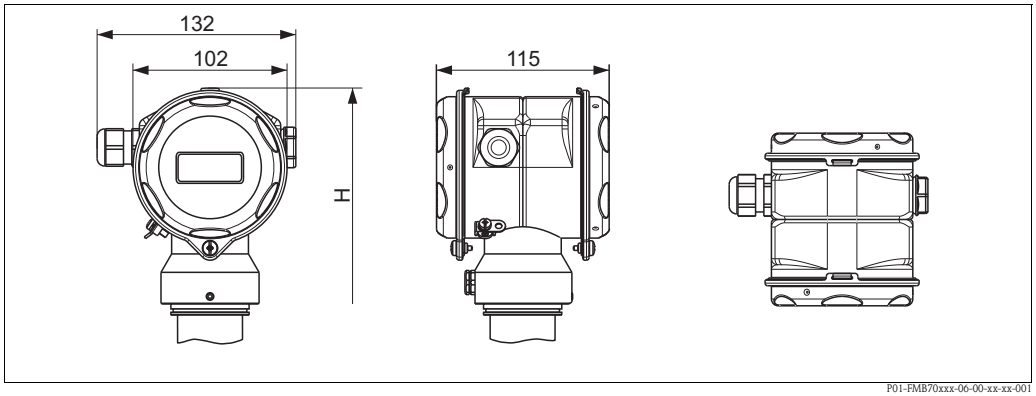
Front view, left-hand side view, top view.
→ See appropriate process connection for installation height H. For housing weight see → 33.

Dimensions of T15 housing



Front view, left-hand side view, top view.
→ See appropriate process connection for installation height H. For housing weight see → 33.

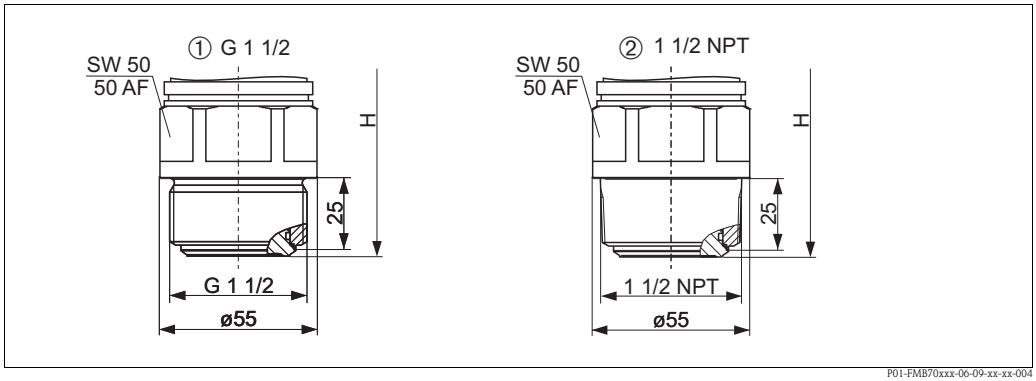
Dimensions of T17 housing



Front view, left-hand side view, top view.
→ See appropriate process connection for installation height H. For housing weight see → 33.

Process connections

Threaded connection ISO 228 and NPT



FMB70 with thread,
→ See following table for installation height. For weight see → 🖹 33.

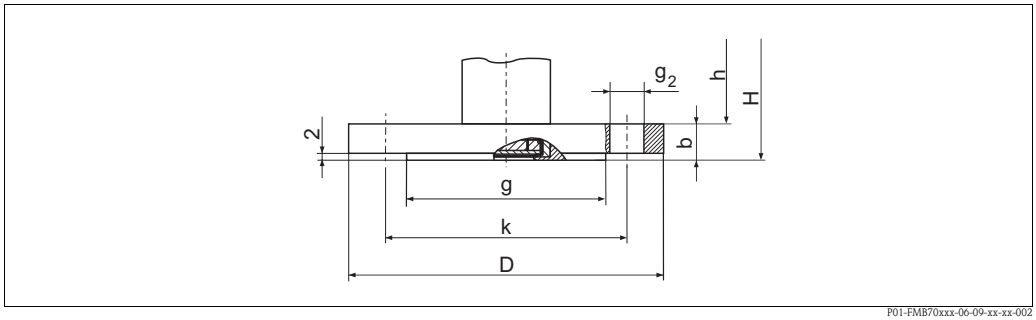
1 Thread ISO 228 G 1 1/2 A;
Material version 1G: AISI 316L/1.4435, version 1H: Alloy C276/2.4819
2 Thread ANSI 1 1/2 MNPT;
Material version 2D: AISI 316L/1.4435

Installation height H for devices with threaded connection

Description	Device height H
T14 housing, optional display on the side	185 mm
T15 housing without display, flat cover	191 mm
T15 housing with display, high cover	203.5 mm
T17 housing, optional display on the side	201 mm

Note!
Some device versions have CRN approval. For a CRN-approved device, a CRN-approved process connection (→ 🖹 41 ff, feature 70 "Process connection") has to be ordered with a CSA approval (→ 🖹 41, feature 10 "Approval"). These devices are fitted with a separate plate bearing the registration number CRN OF1987.7C.

EN/DIN flanges, connection dimensions as per EN 1092-1/DIN 2527



FMB70, flange with raised face

H: Device height = Height of the device without flange h + flange thickness b
Height h see → 🖹 28.

	Flange [1]								Boltholes			
Version	**Material [2]**	**Nominal diameter**	**Nominal pressure**	**Shape [3]**	**Diameter D** [mm]	**Thickness b** [mm]	**Raised face diameter g** [mm]	**Raised face height f** [mm]	**Quantity**	**Diameter g_2** [mm]	**Hole circle k** [mm]	**Flange weight [4]** [kg]
CE	AISI 316L	DN 40	PN 10/16	B1 (C)	150	18	88	2	4	18	110	2.6
CF	AISI 316L	DN 50	PN 10/16	B1 (C)	165	18	102	2	4	18	125	3.3
CG	AISI 316L	DN 80	PN 10/16	B1 (C)	200	20	138	2	8	18	160	5.1
CH	AISI 316L	DN 100	PN 10/16	B1 (C)	220	20	158	2	8	18	180	6.3

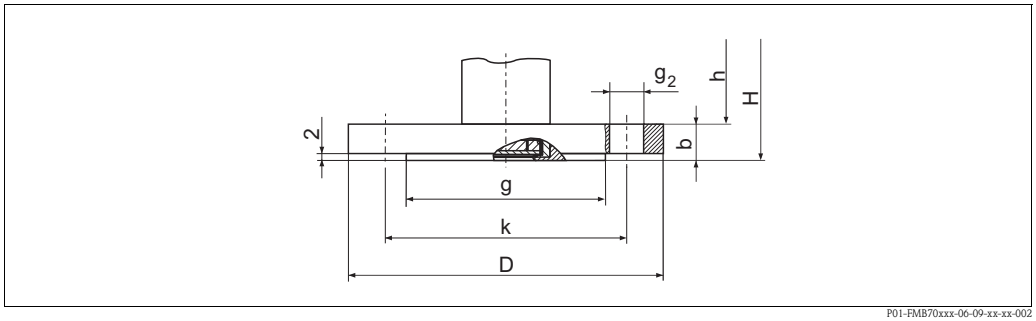
1) The roughness of the surface in contact with the medium, including the sealing surface of the flanges (all standards) is Ra 0.8 µm. Lower surface roughness on request.

2) AISI 316L

3) Designation as per DIN 2526 in brackets

4) Weight incl. pipe and measuring cell, housing weight, see → 🖹 33

ANSI flanges, connection dimensions as per ANSI B 16.5, raised face RF



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FMB70, flange with raised face

H: Device height = Height of the device without flange h + flange thickness b
Height h see → 🖹 28.

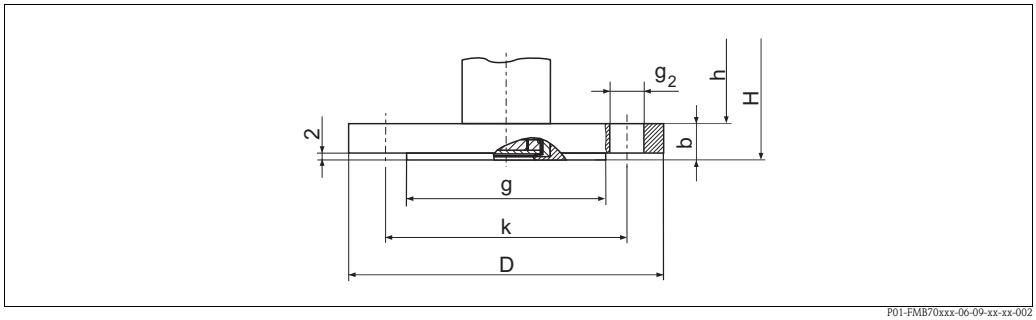
	Flange [1]							Boltholes			
Version	**Material [2]**	**Nominal diameter** [in]	**Class** [lb./sq in]	**Diameter D** [in] *[mm]*	**Thickness b** [in] *[mm]*	**Raised face diameter g** [in] *[mm]*	**Raised face height f** [in] *[mm]*	**Quantity**	**Diameter g_2** [in] *[mm]*	**Hole circle k** [in] *[mm]*	**Flange weight [3]** [kg]
AE	AISI 316/ 316L	1 1/2	150	5 *127*	0.69 *17.5*	2.88 *73.2*	0.06 *1.6*	4	0.62 *15.7*	3.88 *98.6*	2.1
AF	AISI 316/ 316L	2	150	6 *152.4*	0.75 *19.1*	3.62 *91.9*	0.06 *1.6*	4	0.75 *19.1*	4.75 *120.7*	3.0
AG	AISI 316/ 316L	3	150	7.5 *190.5*	0.94 *23.9*	5 *127*	0.06 *1.6*	4	0.75 *19.1*	6 *152.4*	5.7
AH	AISI 316/ 316L	4	150	9 *228.6*	0.94 *23.9*	6.19 *157.2*	0.06 *1.6*	8	0.75 *19.1*	7.5 *190.5*	7.8

1) The roughness of the surface in contact with the medium, including the sealing surface of the flanges (all standards) is Ra 0.8 µm. Lower surface roughness on request.

2) Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)

3) Weight incl. pipe and measuring cell, housing weight, see → 🖹 33

JIS flanges, connection dimensions as per JIS B 2220 BI, raised face RF



FMB70, flange with raised face

H: Device height = Height of the device without flange + flange thickness b
Height h see → 🖹 28.

	Flange [1]							Boltholes			
Version	**Material**	**Nominal diameter**	**Nominal pressure**	**Diameter** **D** [mm]	**Thickness** **b** [mm]	**Raised face diameter** **g** [mm]	**Raised face height** **f** [mm]	**Quantity**	**Diameter** **g_2** [mm]	**Hole circle** **k** [mm]	**Flange weight [2]** [kg]
KE	AISI 316L	40 A	10 K	140	16	81	2	4	19	105	2.1
KF	AISI 316L	50 A	10 K	155	16	96	2	4	19	120	2.5
KL	AISI 316L	80 A	10 K	185	18	126	2	8	19	150	3.8
KH	AISI 316L	100 A	10 K	210	18	151	2	8	19	175	4.9

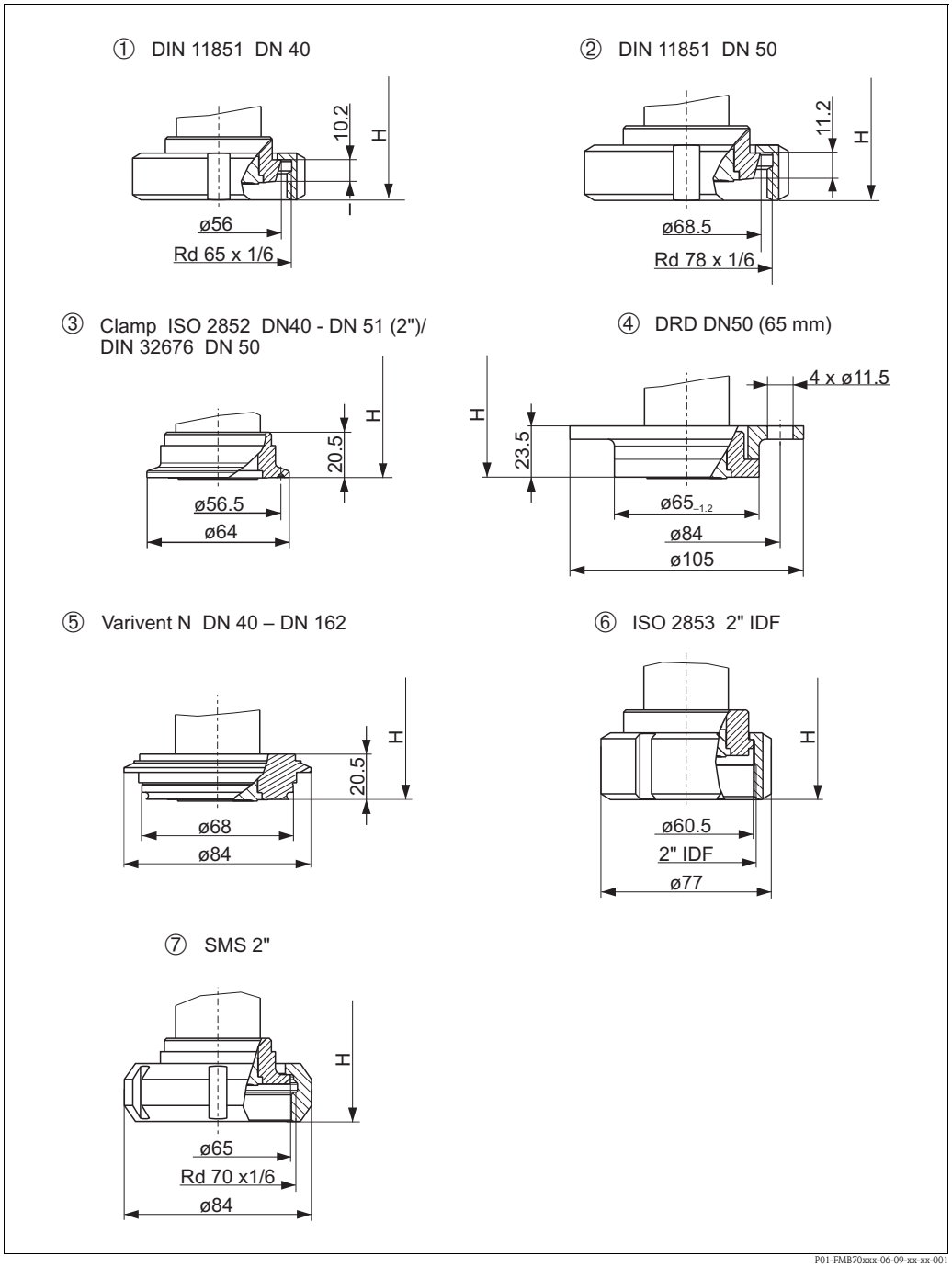
1) The roughness of the surface in contact with the medium, including the sealing surface of the flanges (all standards) is Ra 0.8 µm. Lower surface roughness on request.

2) Weight incl. pipe and measuring cell, housing weight, see → 🖹 33

Installation height H for devices with flange

Description	Device height H
T14 housing, optional display on the side	190 mm
T15 housing without display, flat cover	196 mm
T15 housing with display, high cover	208.5 mm
T17 housing, optional display on the side	206 mm

Hygienic connections



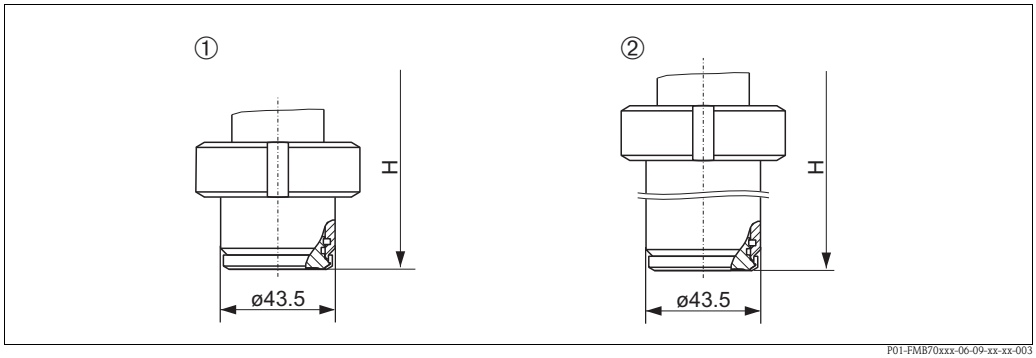
FMB70 process connections, hygienic connections, material AISI 316L/1.4435
surface roughness of the surfaces in contact with the medium ≤ 0.8 µm as standard. Lower surface roughness on request.
For weight see → 33.

1 Version M2: DIN 11851 DN 40 PN 25, EHEDG
2 Version M3: DIN 11851 DN 50 PN 25, EHEDG
3 Version TD: Tri-Clamp ISO 2852 DN 40 – DN 51 (2"), DN 32675 DN 50, EHEDG, 3A
4 Version TK: DRD DN50 (65 mm) PN 25
5 Version TR: Varivent type N for pipes 40 – 162, PN 40, EHEDG, 3A
6 Version 56: ISO 2853 2" IDF, EHEDG
7 Version UE: SMS 2", PN25, EHEDG

Installation height H for devices with hygienic connection

Description	Device height H
T14 housing, optional display on the side	188 mm
T15 housing without display, flat cover	194 mm
T15 housing with display, high cover	206.5 mm
T17 housing, optional display on the side	204 mm

Universal process adapter



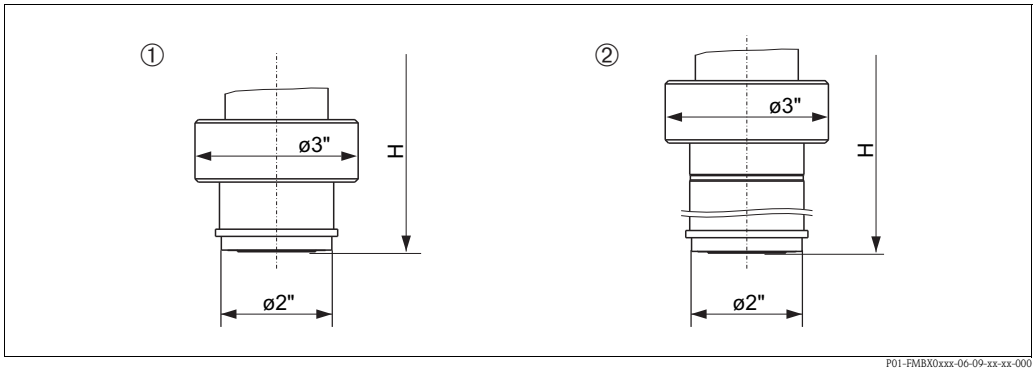
FMB70 process connection, material: AISI 316L/1.4435;
Surface roughness of the surfaces in contact with the medium $R_a \leq 0.8$ µm as standard. Lower surface roughness on request.

1 Version 00: universal process adapter incl. silicone molded seal, 3A, EHEDG
2 Version 57: universal process adapter, extension 6 inch including silicone molded seal, 3A, EHEDG

Installation height H for devices with universal process adapter

Description	Device height H, universal process adapter	Device height H, universal process adapter, 6 inch extension
T14 housing, optional display on the side	197 mm	308 mm
T15 housing without display, flat cover	203 mm	314 mm
T15 housing with display, high cover	215.5 mm	326.5 mm
T17 housing, optional display on the side	213 mm	324 mm

Anderson process adapter



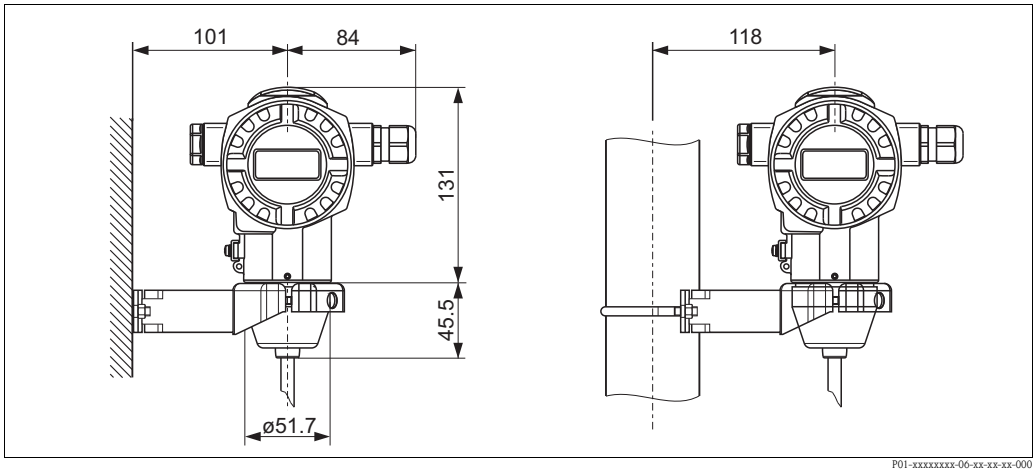
FMB70 process connection, material: AISI 316L/1.4435;
Surface roughness of the surfaces in contact with the medium $R_a \leq 0.8$ µm as standard. Lower surface roughness on request.

1 Version 60: Anderson process adapter short 2-3/16", incl. silicone molded seal, 3A
2 Version 62: Anderson process adapter long 6-1/2", incl. silicone molded seal, 3A

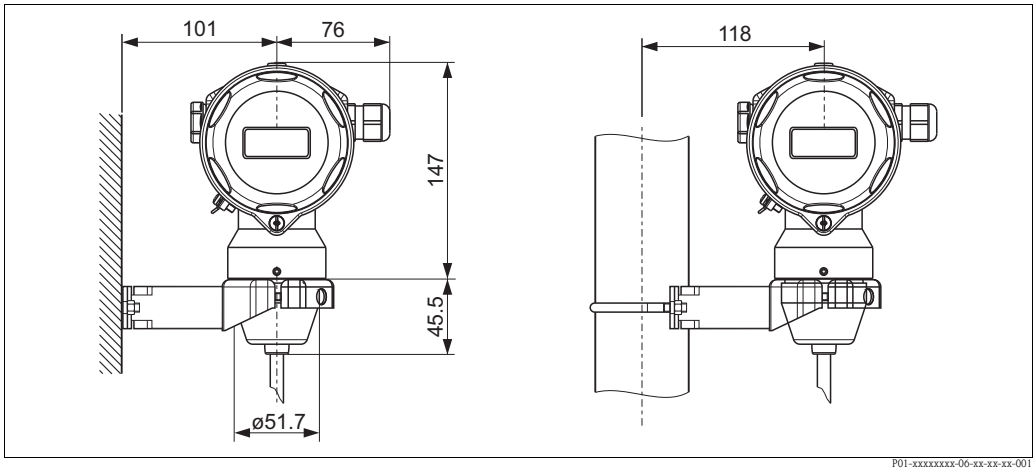
Installation height H for devices with Anderson process adapter

Description	Device height H, Anderson short	Device height H, Anderson long
T14 housing, optional display on the side	206 mm	316 mm
T15 housing without display, flat cover	216 mm	326 mm
T15 housing with display, high cover	227 mm	337 mm
T17 housing, optional display on the side	221 mm	331 mm

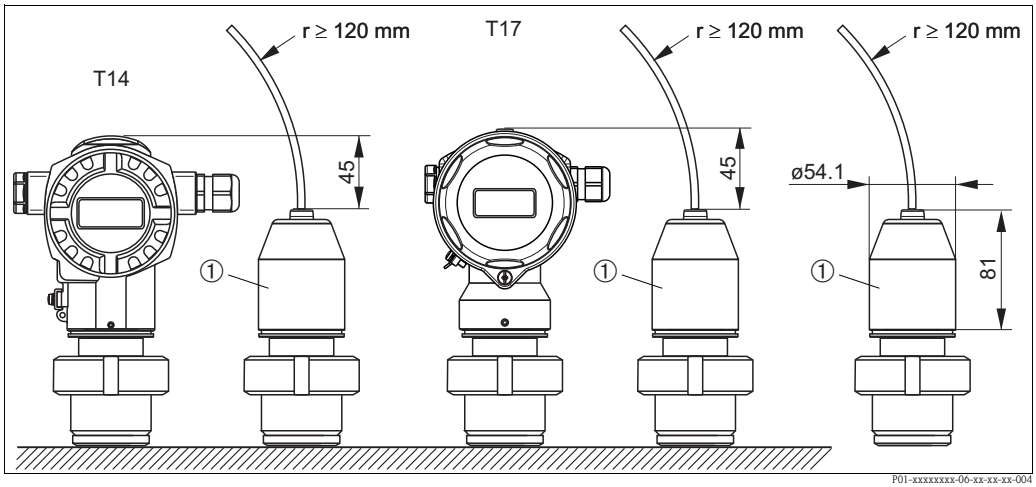
"Separate housing" version



Dimensions T14 housing, optional display on the side. Housing weight see → 33.



Dimensions T17 housing, optional display on the side. Housing weight see → 33.



Reduction of the mounting height of the process connection, for application of the separate housing.
1 Process connection adapter.

If the separate housing is used, the mounting height of the process connection is reduced by approx. 45 mm as compared to the dimensions of the standard version.
The minimum bending radius (r) for the cable is 120 mm (4.7").

Weight

Housing

	T14	T15	T17	Separate housing
with electronics insert and on-site display	1.2 kg	1.8 kg	1.2 kg	Weight of housing T14 or T17 + 0.5 kg. Weight of sensor + 0.5 kg.
with electronics insert, without on-site display	1.1 kg	1.7 kg	1.1 kg	

Process connections

- Version 1G, thread ISO 228 G 1 1/2 A, AISI 316L/1.4435: 0.8 kg
- Version 1H, thread ISO 228 G 1 1/2 A, Alloy C276/2.4819: 0.8 kg
- Version 2D, thread ANSI 1 1/2 MNPT, AISI 316L/1.4435: 0.8 kg
- Version M2: DIN 11851 DN 40 PN 25, AISI 316L: 0.7 kg
- Version M3: DIN 11851 DN 50 PN 25, AISI 316L: 0.9 kg
- Version TD: Tri-Clamp ISO 2852 DN 40 – DN 51 (2"), DN 32675 DN 50, AISI 316L/1.4435: 0.7 kg
- Version TK: DRD DN50 (65 mm) PN 25, , AISI 316L/1.4435: 1.1 kg
- Version TR: Varivent type N for pipes 40 – 162, PN 40, AISI 316L/1.4435: 1.0 kg
- Version UE: SMS 2", PN25, AISI 316L/1.4435: 0.7 kg
- Version 56: ISO 2853 2" IDF, AISI 316L/1.4435: 0.8 kg
- Version 00: Universal process adapter, AISI 316L/1.4435: 0.8 kg
- Version 57: Universal process adapter with 6 inch extension, AISI 316L/1.4435: 1.7 kg
- Flanges, → 26 ff.

Material

T14/T15 housing:

- Housing: Die-cast aluminium with protective powder-coating on polyester basis: RAL 5012 (blue), cover: RAL 7035 (grey)
- External operation (keys and key covering): Polycarbonate PC-FR, RAL 7035 (grey)
- Sight glass: Mineral glass
- Cable gland: Polyamide (PA)
- Pressure compensation filter: PA6 GF10
- Blind plug: PBT-GF30 FR, Dust Ex: AISI 316L (1.4435)
- Seals:
  - Cable and blind plug seal: Silicone (VMQ)
  - Pressure compensation filter o-ring: Silicone (VMQ)
  - Cover: EPDM
  - Sight glass: Silicone (VMQ)
- Nameplate: AISI 304 (1.4301)

T17 housing:

- Housing: Stainless steel AISI 316L (1.4404)
- Sight glass:
  - Version for non-hazardous area, ATEX Ex ia, NEPSI Zone 0/1 Ex ia, IECEx Zone 0/1 Ex ia, FM NI, FM IS, CSA IS: Polycarbonate (PC)
  - ATEX 1/2 D, ATEX 1/3 D, ATEX 1 GD, ATEX 1/2 GD, ATEX 3 G, FM DIP, CSA Dust Ex: Mineral glass
- Cable gland: Polyamid (PA), for Dust Ex: CuZn nickel-plated
- Blind plug: PBT-GF30 FR, for Dust Ex: AISI 316L (1.4435)
- Pressure compensation filter: PA6 GF10
- Seals:
  - Cable and blind plug seal: Silicone (VMQ)
  - Pressure compensation filter o-ring: Silicone (VMQ)
  - Cover: EPDM
  - Sight glass: EPDM
- Nameplates: lasered

DIN/EN flanges

Endress+Hauser supplies DIN/EN flanges made of stainless steel AISI 316L as per material numbers 1.4435 or 1.4404. With regard to their stability-temperature property, the materials 1.4435 and 1.4404 are grouped together under 13EO in EN 1092-1 Tab. 18. The chemical composition of the two materials can be identical.

Seals:

- For Universal process adapter 44mm: silicon molded seal FDA 21CFR177.2600/USP Class VI-70C.

Cable for separate housing:

- PE cable:
  Slip-resistant cable with strain-relief members made of Dynemo; shielded using aluminium-coated film; insulated with polyethylene (PE-LD), black; copper wires, twisted, UV resistant
- FEP cable:
  Slip-resistant cable; shielded using galvanized steel wire netting; insulated with fluorinated ethylene propylene (FEP), black; copper wires, twisted, UV resistant

TSE Certificate of Suitability

The following applies to all process wetted device components:
- They do not contain any materials derived from animals.
- No auxiliaries or operating materials derived from animals are used in production or processing.

Note!
Process wetted device components are listed in the "Mechanical construction" (→ 25) and "Ordering information" (→ 41) sections.

Miscellaneous:

- Mounting accessories: mounting bracket with screws AISI 304 (1.4301)
- Process isolating diaphragm: Alloy C276 (2.4819), Ø 35.8 mm
- Filling oil
  – Synthetic oil FDA 21 CFR 172.882
  – Inert oil

→ For process connections and filling oils, see ordering information, → 41.

Human interface

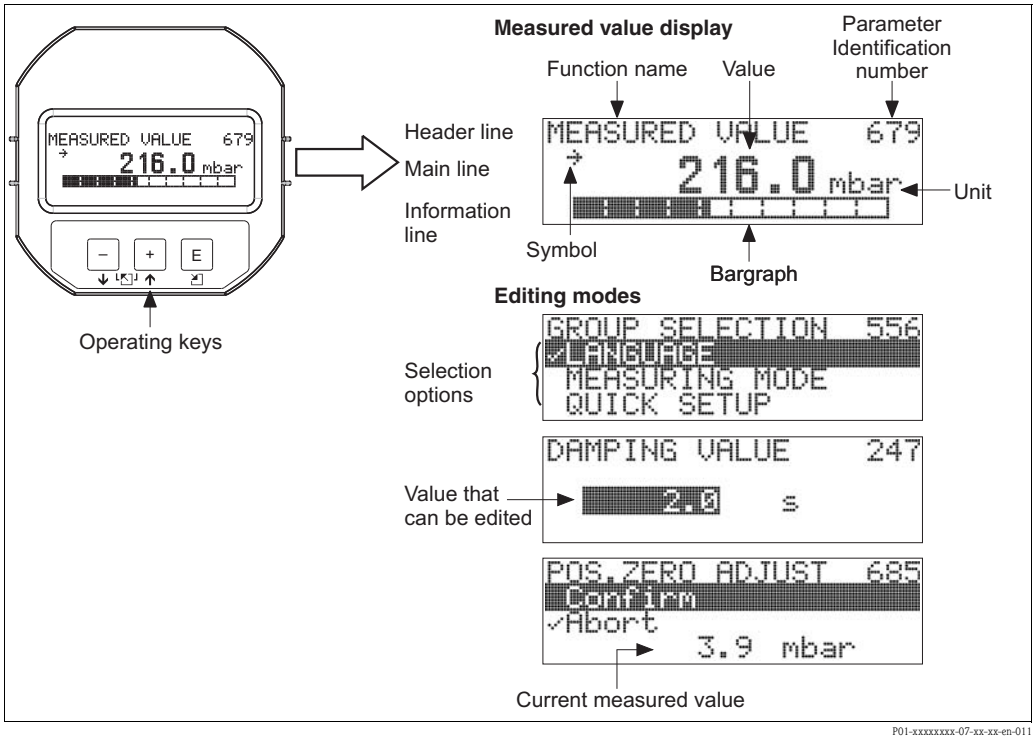
Operating elements

On-site display (optional)

A 4-line liquid crystal display (LCD) is used for display and operation. The on-site display shows measured values, dialog text as well as fault and notice messages in plain text, thereby supporting the user in every stage of operation. The liquid crystal display of the device can be turned in 90° steps.
Depending on the installation position of the device, this makes it easy to operate the device and read the measured value.

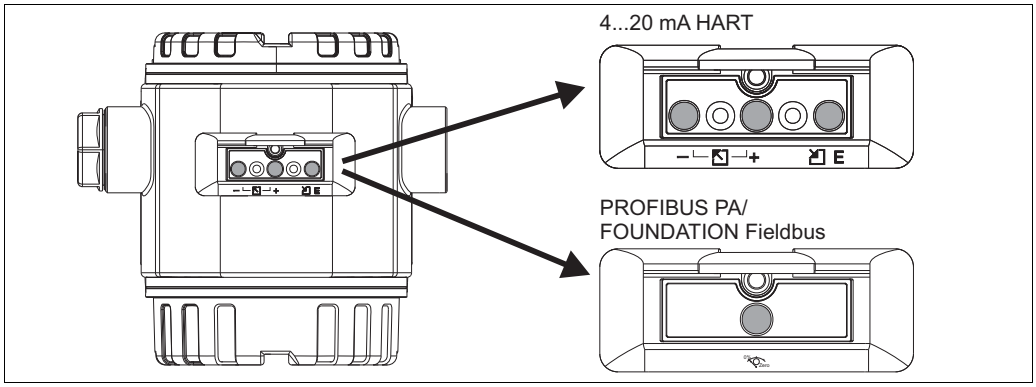
Functions:

- 8-digit measured value display including sign and decimal point, bar graph for 4 to 20 mA HART as current display or for PROFIBUS PA as graphical display of the scaled value of the AI Block, for FOUNDATION Fieldbus as graphic display of the transducer output.
- Simple and complete menu guidance thanks to seperation of the parameters into three levels
- Ech parameter is given as 3-digit ID number for easy navigation
- Option for configuring the display according to individual requirements and desires, such as language, alternating display, display of other measured values such as sensor temperature, contrast setting
- Comprehensive diagnostic functions (fault and warning message, peak-hold indicators, etc.)
- Rapid and safe commissioning with the Quick Setup menus



Operating keys on the exterior of the device

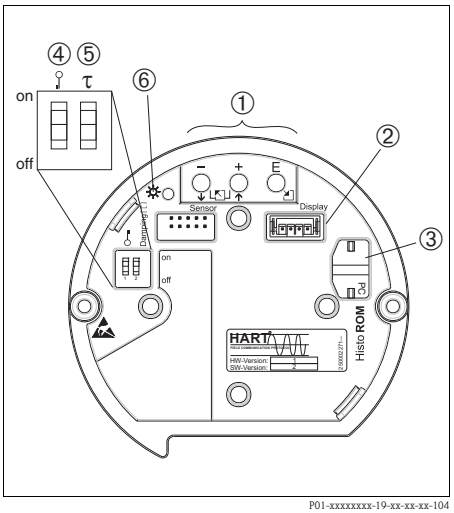
At the aluminium housing (T14/T15), the operating keys are located either outside the device under the protection cap or inside the electronic insert. At the stainless steel housing (T17), the operating keys are always located inside on the electronic insert..



P01-PMx7xxxx-19-xx-xx-xx-038

The operating keys located externally on the device work on the Hall sensor principle. As a result, no additional openings are required in the device. This guarantees:
- Complete protection against environmental influences such as moisture and contamination
- Simple operation without any tools
- No wear.

Operating keys and elements located internally on the electronic insert



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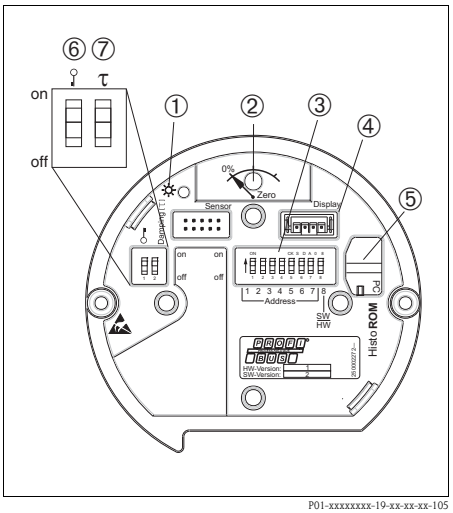
Electronic insert HART

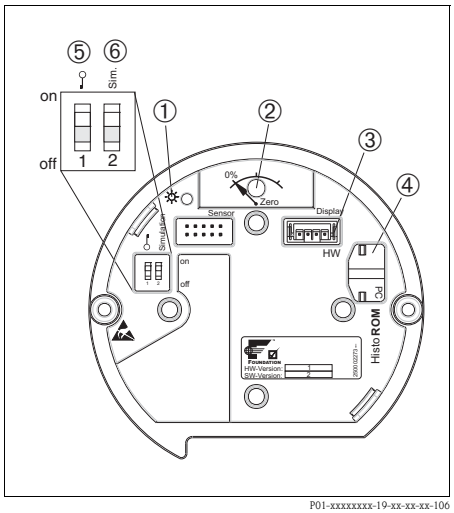
1 Operating keys
2 Slot for optional display
3 Slot for optional HistoROM®/M-DAT
4 DIP-switch for locking/unlocking measured-value-relevant parameters
5 DIP-switch for damping on/off
6 Green LED to indicate value being accepted



P01-xxxxxxxx-19-xx-xx-xx-105

Elektronikeinsatz PROFIBUS PA

1 Green LED to indicate value being accepted
2 Key for position calibration and device reset
3 DIP-switch for bus address
4 Slot for optional display
5 Slot for optional HistoROM®/M-DAT
6 DIP-switch for locking/unlocking measured-value-relevant parameters
7 DIP-switch for damping on/off



P01-xxxxxxxx-19-xx-xx-xx-106

Elektronikeinsatz FOUNDATION Fieldbus

1 Green LED to indicate value being accepted
2 Key for position calibration and device reset
3 Slot for optional display
4 Slot for optional HistoROM®/M-DAT
5 DIP-switch for locking/unlocking measured-value-relevant parameters
6 DIP-switch for simulation mode on/off

Local operation

Function	External operation (operation keys, optional, not T17 housing)	Internal operation (electronic insert)	Display (optional)
Position calibration (zero point correction)	X	X	X
Setting lower-range value and upper-range value – reference pressure present at the device	X (HART only)	X (HART only)	X
Device Reset	X	X	X
Locking and unlocking measured-value-relevant parameters	—	X	X
Value acceptance indicated by green LED	X	X	X
Switching damping on and off	—	X (HART and PA only)	X
Setting bus address (PA)	—	X	X
Switching simulation mode on and off (FOUNDATION Fieldbus)	—	X	X

Remote operation

Depending on the position of the write protection switch at the device, all software parameters are accessible.

HART

Remote operation via:
- Handheld terminal Field Communicator 375 (see Chapter "Hard- und Software for on-site and remote operation" → 38)
- FieldCare (see Chapter "Hard- und Software for on-site and remote operation" → 38 ff) mit
  – Commubox FXA191 (see Chapter "Hard- und Software for on-site and remote operation" → 38 ff)
  – Commubox FXA195 (see Chapter "Hard- und Software for on-site and remote operation" → 38 ff)
- Field Xpert:
  Field Xpert is an industrial PDA with integrated 3.5" touchscreen from Endress+Hauser based on Windows Mobile. It communicates via wireless with the optional VIATOR Bluetooth modem connected to a HART device point-to-point or wireless via WiFi and Endress+Hauser's Fieldgate FXA520. Field Xpert also works as a stand-alone device for asset management applications. For details refer to BA060S/00/en.

PROFIBUS PA

Remote operation via:
- FieldCare (see Chapter "Hard- und Software for on-site and remote operation" → 38 ff)
  – Profiboard: For the Connection of a Personal Computer to PROFIBUS
  – Proficard: For the Connection of a Laptop to PROFIBUS

FOUNDATION Fieldbus

Remote operation via:
- Handheld terminal Field Communicator 375 (see Chapter "Hard- und Software for on-site and remote operation" → 38 ff)
- Use an FF-configuration program for e.g. NI-FBUS configurator, to
  – connect devices with "FOUNDATION Fieldbus signal" into an FF-network
  – set FF-specific parameter
  Operation with NI-FBUS Configurator:
  The NI-FBUS Configurator is an easy-to-use graphical environment for creating linkages, loops and a schedule based on the fieldbus concept.
  You can use the NI-FBUS Configurator to configure a fieldbus network as follows:
  – Set block and device tags
  – Set device addresses
  – Create and edit function block control strategies (function block applications)
  – Configure vendor -defined function and transducer blocks
  – Create and edit schedules
  – Read and write to function block control strategies (function block applications)
  – Invoke Device Description (DD) methods

– Display DD menus
– Download a configuration
– Verify a configuration and compare it to a saved configuration
– Monitor a downloaded configuration
– Replace a virtual device by a real device
– Save and print a configuration

Note!
For further information please contact your local Endress+Hauser Sales Center.

Hard- und Software for on-site and remote operation

Commubox FXA191

For intrinsically safe communication with FieldCare via the RS232C interface. For details refer to TI237F700/en.

Commubox FXA195

For intrinsically safe communication with FieldCare via the USB interface. For details refer to TI404F/00/en.

Commubox FXA291

The Commubox FXA291 connects Endress+Hauser field instruent with CDI interface (=Endress+Hauser Common Data Interface) to the USB interface of a personal computer or a notebook. For details refer to TI405C/07/en.

Note!
For the following Endress+Hauser instruments you need the "ToF Adapter FXA291" as an additional accessory:

- Cerabar S PMC71, PMP7x
- Deltabar S PMD7x, FMD7x
- Deltapilot S FMB70

ToF Adapter FXA291

The ToF Adapter FXA291 connects the Commubox FXA291 with instruments of the ToF platform, pressure instruments and the Gammapilot via the USB interface of a personal computer or a notebook. For details refer to KA271F.

Field Communicator 375

With a handheld terminal, all the parameters can be configured anywhere along the 4 to 20 mA line via menu operation.

HistoROM®/M-DAT (optional)

HistoROM®/M-DAT is a memory module, which is attached to the electronic insert. The HistoROM®/M-DAT can be retrofitted at any stage (Order number: 52027785).

Your benefits

- Quick and safe commissioning of the same measuring points by copying the configuration data of one transmitter to another transmitter
- Reliable process monitoring thanks to cyclical recording of pressure and sensor temperature measured values
- Simple dagnosis by recording diverse events such as alarms, configuration changes, counters for measuring range undershoot and overshoot for pressure and temperature as well as user limit overshoot and undershoot for pressure and temperature etc.
- Analysis and graphic evaluation of the events and process parameters via software (contained in scope of supply).

HistoROM®/M-DAT can be ordered via feature 100 "Additional options 1" or feature 110 "Additional options 2" or as spare parts. → 🖹 42 ff. A CD with Endress+Hauser operating program is also included in the scope of delivery.
You can copy data from one transmitter to another transmitter when operating a FOUNDATION Fieldbus device via an FF configuration program. You need the Endress+Hauser FieldCare operating program and the Commubox FXA291 service interface and the ToF Adapter FXA291 to be able to access the data and events saved in the HistoROM®/M-DAT.

FieldCare

FieldCare is an Endress+Hauser asset management tool based on FDT technology. With FieldCare, you can configure all Endress+Hauser devices as wella s devices from other manufacturers that support the FDT standard.

FieldCare supports the following functions:
- Configuration of transmitter in offline and online operation
- Loading and saving device data (upload/download)
- HistoROM®/M-DAT analysis
- Documentation of the measuring point

Connection options:
- HART via Commubox FXA191 and the RS232C serial interface of a computer
- HART via Commubox FXA195 and the USB port on a computer
- PROFIBUS PA via segment coupler and PROFIBUS interface card
- FOUNDATION Fieldbus via Commubox FXA193 and the RS232C serial interface of a computer
- Service interface with adapter Commubox FXA291 and ToF Adapter FXA291 (USB).

For further information see → www.endress.com

Certificates and approvals

CE mark

The device meets the legal requirements of the relevant EC directive.
Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

Ex approvals

- ATEX
- FM
- CSA
- NEPSI
- IECEx
- GOST on request

All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas.
→ 46 ff, "Safety instructions" and "Installation/Control Drawings" sections.

Suitability for hygenic processes

The Deltapilot S is suitable for the employment in hygenic processes.
Overview of permitted process connections from → 25.
Many versions meet the requirements of 3A-Sanitary Standard No. 74 and are certified by the EHEDG.

Note!
The gap-free connections can be cleaned without residue using the usual cleaning methods.

Functional Safety SIL 2 / IEC 61508 Declaration of conformity (optional)

The Deltapilot S hydrostatic pressure sensor with a 4 to 20 mA output signal have been developed to IEC 61508 standard. These devices can be used for process pressure monitoring up to SIL 2.
→ For a detailed description of the safety functions with Deltapilot S, settings and characteristic quantities for functional safety, please refer to the "Manual for Functional Safety - Deltapilot S" SD213P.
→ For devices with SIL 2 / IEC 61508 declaration of conformity, see → 41 ff, Feature 100 "Additional option 1" and Feature 110 "Additional option 2", version E "SIL 2 / IEC 61508, Declaration of Conformity".

Overfill protection

WHG (German Water Resources Act). See "Ordering information" → 41 (see also ZE266P).

CRN approval

Some device versions have CRN approval. For a CRN-approved device, a CRN-approved process connection (→ 41, feature 70 "Process connection") has to be ordered with a CSA approval (→ 41, feature 10 "Approval"). These devices are fitted with a separate plate bearing the registration number CRN OF1987.7C.

Standards and guidelines

DIN EN 60770 (IEC 60770):
Transmitters for use in industrial-process control systems
Part 1: Methods for inspection and routine testing

DIN 16086:
Electrical pressure measuring instruments, pressure sensors, pressure transmitters, pressure measuring instruments, concepts, specifications in data sheets

EN 61326-X:
EMC product family standard for electrical equipment for measurement, control and laboratory use.

Pressure Equipment Directive (PED)

The Deltapilot S correspond to Article 3 (3) of the EC directive 97/23/EC (Pressure Equipment Directive) and has been designed and manufactured according to good engineering practice.

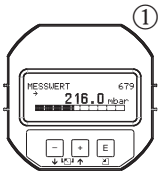
Marine approval

GL (Germanischer Lloyd)

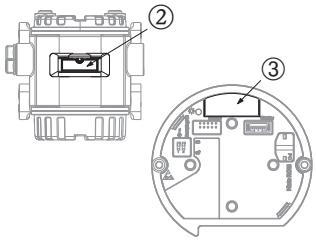
Ordering information

FMB70

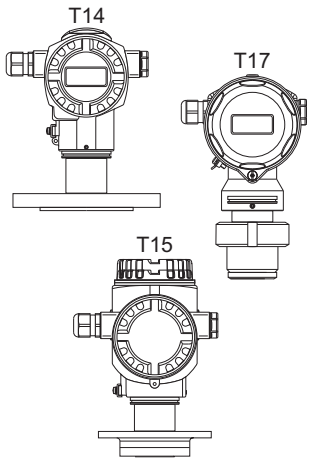
This overview does not mark options which are mutually exclusive.



10	Approval:
A	Version for non-hazardous areas
F	Version for non-hazardous areas, WHG overfill protection
E	Combined certificates: ATEX II Ex ia + FM IS + CSA IS ATEX II 1/2G Ex ia IIC T6+ FM/CSA IS CL.I,II,III Div.1 Gr. A-G
1	ATEX II 1/2 G Ex ia IIC T6
6	ATEX II 1/2 G Ex ia IIC T6, WHG overfill protection
2	ATEX II 1/2 D
4	ATEX II 1/3 D
8	ATEX II 1 GD Ex ia IIC T6
3	ATEX II 1/2 GD Ex ia IIC T6
7	ATEX II 3 G Ex nA II T6
S	FM IS, Class I, II, III Division 1, Groups A – G; NI Class I Division 2, Groups A – D; AEx ia
Q	FM DIP, Class II, III Division 1, Groups E – G
R	FM NI, Class I, Division 2, Groups A – D
U	CSA IS, Class I, II, III Division 1, Groups A - G
W	CSA Class II, III Division 1, Groups E – G (Dust Ex)
H	NEPSI Ex ia IIC T6
I	IECEx Zone 0/1 Ex ia IIC T6



20	Output; Operation:
A	4...20 mA HART, operation outside, LCD (→ see Fig. ①, ②)
B	4...20 mA HART, operation inside, LCD (→ see Fig. ①, ③)
C	4...20 mA HART, operation inside (→ see Fig. ③)
M	PROFIBUS PA, operation outside, LCD (→ see Fig. ①, ②)
N	PROFIBUS PA, operation inside, LCD (→ see Fig. ①, ③)
O	PROFIBUS PA, operation inside (→ see Fig. ③)
P	FOUNDATION Fieldbus, operation outside, LCD (→ see Fig. ①, ②)
Q	FOUNDATION Fieldbus, operation inside, LCD (→ see Fig. ①, ③)
R	FOUNDATION Fieldbus, operation inside (→ see Fig. ③)



30	Housing; Cable entry; Protection:
A	Aluminum T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, Gland M 20x1.5
B	Aluminum T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, Thread G 1/2
C	Aluminum T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, Thread 1/2 NPT
D	Aluminum T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, M 12x1 PA plug
E	Aluminum T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, 7/8" FF plug
F	Aluminum T14 housing, optional display on the side, IP 65/NEMA 4X, Han7D connector, 90°
J	Aluminum T15 housing, optional display on the top, IP 66/67/NEMA 4X/ 6P, Gland M 20x1.5
K	Aluminum T15 housing, optional display on the top, IP 66/67/NEMA 4X/ 6P, Thread G 1/2
L	Aluminum T15 housing, optional display on the top, IP 66/67/NEMA 4X/ 6P, Thread 1/2 NPT
M	Aluminum T15 housing, optional display on the top, IP 66/67/NEMA 4X/ 6P, M 12x1 PA plug
N	Aluminum T15 housing, optional display on the top, IP 66/67/NEMA 4X/ 6P, 7/8" FF plug
P	Aluminum T15 housing, optional display on the top, IP 65/NEMA 4X, Han7D connector, 90°
R	T17 316L Hygiene IP66/68 NEMA6P; M20 gland, T17 = side cover
S	T17 316L Hygiene IP66/68 NEMA6P; G1/2 thread, T17 = side cover
T	T17 316L Hygiene IP66/68 NEMA6P; NPT1/2 thread, T17 = side cover
U	T17 316L Hygiene IP66/68 NEMA6P; M12 plug, T17 = side cover
V	T17 316L Hygiene IP66/68 NEMA6P; 7/8" plug, T17 = side cover

40	Sensor range; Sensor overload limit (= OPL):	
	Sensors for gauge pressure	
	Measuring limits [1]:	
	Sensor rated value (URL)	**OPL (over pressure limit)**
1C	100 mbar/10 kPa/1.5 psi/1 mH_2O/40 inH_2O [1]	4 bar/400 kPa/60psi/40 mH_2O/160 inH_2O
1F	400 mbar/40 kPa/6psi/4 mH_2O/160 inH_2O [1]	8 bar/800 kPa/120 psi/80 mH_2O/3200 inH_2O
1H	1.2 bar/120 kPa/18 psi/12 mH_2O/480 inH_2O [2]	24 bar/2.4 MPa/350 psi/240 mH_2O/ 10000 inH_2O
1M	4 bar/400 kPa/60 psi/40 mH_2O/1600 inH_2O [2]	24 bar/2.4 MPa/350 psi/240 mH_2O/ 10000 inH_2O
1P	10 bar/1 MPa/150 psi/100 mH_2O/4000 inH_2O [2]	40 bar/4 MPa/600 psi/400 mH_2O/16000 inH_2O

1) –100 %...+100 % of sensor rated value

2) –1.0 bar...+100 % of sensor rated value

FMB70 (continued)

50	**Calibration; Unit:**
A	Sensor range; %
1	Sensor range; mbar/bar
2	Sensor range; kPa/MPa
3	Sensor range; mmH_2O/mH_2O
4	Sensor range; inH_2O/ftH_2O
6	Sensor range; psi
B	Customised; see additional specification
C	Factory calibration certificate, 5-point; see additional specification
D	DKD certificate; see additional specification

60	**Material of the process isolating diaphragm; Seal:**
2	Alloy C276; welded
6	Alloy C276 with gold-rhodium coating; welded

70	**Process connection; Material:**
	Threaded connection
1G	Thread ISO 228 G 1 1/2, AISI 316L
1H	Thread ISO 228 G 1 2/2, Alloy C
2D	Thread ANSI MNPT 1 1/2, AISI 316L (CRN)
	EN/DIN flanges
CE	DN 40 PN 10/16 B1, AISI 316L (CRN)
CF	DN 50 PN 10/16 B1, AISI 316L (CRN)
CG	DN 80 PN 10/16 B1, AISI 316L (CRN)
CH	DN 100 PN 10/16 B1, AISI 316L (CRN)
	ANSI flanges
AE	1 1/2" 150 lbs RF, AISI 316/316L
AF	2" 150 lbs RF, AISI 316/316L
AG	3" 150 lbs RF, AISI 316/316L
AH	4" 150 lbs RF, AISI 316/316L
	JIS flanges
KE	10 K 40 A RF, AISI 316L
KF	10K 50A RF, AISI 316L
KL	10K 80A RF, AISI 316L
KH	10K 100A RF, AISI 316L
	Hygienic connections
M2	DIN 11851 DN 40 PN 25, AISI 316L (CRN), EHEDG
M3	DIN 11851 DN 50 PN25, AISI 316L (CRN), EHEDG
TD	Tri-Clamp ISO 2852 DN 40 – DN 51 (2"), DIN 32676 DN 50, AISI 316L, EHEDG, 3A (CRN)
TK	DRD DN50 (65 mm) PN 25, AISI 316L
TR	Varivent type N for DN 40 – DN 162 pipes, EHEDG, 3A (CRN)
UE	SMS 2" PN 25, AISI 316L, EHEDG
56	ISO 2853 2" IDF, AISI 316L, EHEDG
00	Universal process adapter 44 mm including silicon molded seal, EHEDG, 3A (CRN)
57	Universal process adapter 44 mm, 6" extension including silicon molded seal, EHEDG, 3A (CRN)
60	Anderson short 2-3/16", 316L, 3A, incl. silicone seal
62	Anderson long 6-1/2", 316L, 3A, incl. silicone seal

90	**Filling:**
C	Synthetic oil (FDA)
F	Inert oil
L	Inert oil, cleaned for silicone-free service

100	**Additional option 1:**
A	not selected
E	SIL2/IEC61508 Declaration of conformity
B	Material test certificate for wetted parts, inspection certificate as per EN 10204 3.1 acc. to specification 52005759
M	Overvoltage protection
J	Software adjustment, see additional spec.
N	HistoROM/M-DAT
S	GL (German Lloyd) marine certificate
2	Test report acc. to EN 10204-2.2
3	Individual test with certificate, inspection certificate as per EN 10204-3.1
4	Overpressure test with certificate, inspection certificate as per EN 10204-3.1

FMB70 (continued)

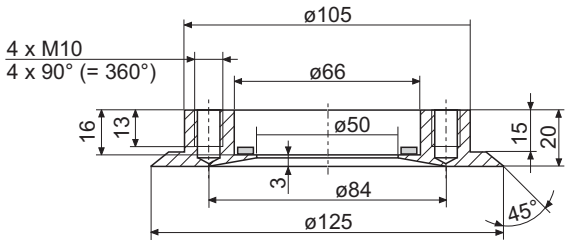
110	**Additional option 2:**	
	A	not selected
	E	SIL2/IEC61508 Declaration of conformity
	G	Separate housing, cable length see additional spec. + mounting bracket, wall/pipe, 316L (FM/CSA IS: only for Div.1 Installation)
	M	Overvoltage protection
	J	Software adjustment, see additional spec.
	N	HistoROM/M-DAT
	S	GL (German Lloyd) marine certificate
	U	Mounting bracket, pipe/wall mounting, AISI 304
	2	Test report acc. to EN 10204-2.2
	3	Individual test with certificate, inspection certificate as per EN10204-3.1
	4	Overpressure test with certificate, inspection certificate as per EN 10204-3.1

995	**Identification:**	
	Z1	Measuring point (TAG)
	Z2	Bus address

FMB70	Order code

Accessories

Welding flanges



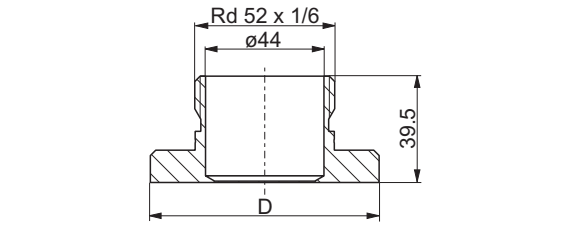
P01-DB5xxxx-06-xx-xx-xx-032

Welding flange for flush-mounted installation for devices with a DRD flange.

Version	Order number
DRD DN50 (65 mm), AISI 316L (1.4435)	52002041
DRD DN50 (65 mm), AISI 316L (1.4435) with inspection certificate EN 10204 3.1 material	52011899
DRD DN50 (65 mm), AISI 304 (1.4301)	916743-0000

Note!
- Order number for a replacement PTFE flat seal (5 pieces): 52024228

Welding neck for universal process adapter

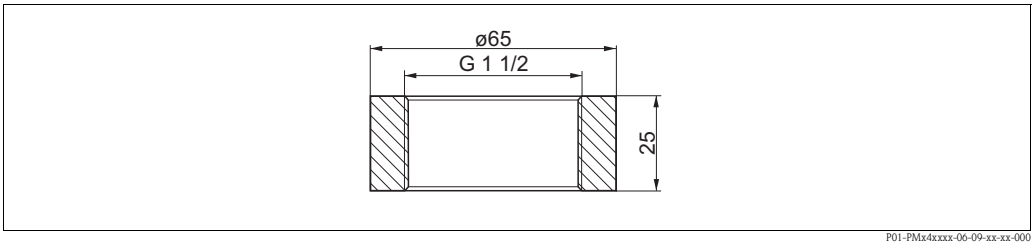


P01-PMC45xxx-06-xx-xx-xx-000

Welding neck for flush mounting a Deltapilot S with a universal process adapter

Diameter D	Material	Order number
65 mm	AISI 316L (1.4435)	214880-0002
65 mm	AISI 316L (1.4435) with inspection certificate EN 10204 3.1 material	52010174
85 mm	AISI 316L (1.4435)	52006262
85 mm	AISI 316L (1.4435) with inspection certificate EN 10204 3.1 material	52010173

Welding neck for ISO G 1 1/2 thread



Welding neck for flush mounting a Deltapilot S with ISO 228 G 1 1/2 A thread, AISI 316L/1.4435
Order number: 52024469, order number with 3.1 inspection certificate: 52024470

Note!
- Endress+Hauser offers a pressure sensor dummy for the welding necks with order numbers 52024469 and 52024470. Order number for pressure sensor dummy: 52024471

Adapter

You can use the following adapters to mount an FMB70 with a universal process connection in a DRD, dairy fitting or clamp connection:

Version	Order number
DRD DN50 (65 mm), AISI 304 (1.4301)	917656-0001
Dairy fitting DIN 11851 DN 40, AISI 304 (1.4301)	917656-0002
Dairy fitting DIN 11851 DN 50, AISI 304 (1.4301)	917656-0000
Tri-Clamp ISO 2852 DN 40-51 (2")/DIN 32676 DN 50, AISI 304 (1.4301)	917650-0002

HistoROM®/M-DAT

HistoROM®/M-DAT is a memory module, which is attached to the electronic insert. The HistoROM®/M-DAT can be retrofitted at any stage. The HistoROM®/M-DAT can be retrofitted at any time → For further information see → 📄 38.
- Order number: 52027785

Mounting bracket

Endress+Hauser offers a mounting bracket for installing the device on pipes or on walls.
→ See also Page 20, "Wall and pipe mounting".
- Material: AISI 304 (1.4301)
- Order number: 52024612

Additional documentation

Field of activities

- Pressure measurement, Powerful instruments for process pressure, differential pressure, level and flow: FA004P

Technical information

- EMC test procedures TI241F
- Technical Information for Deltabar S: TI382P
- Technical Information for Cerabar S: TI383P

Operating instructions

4 to 20 mA HART:
- Deltapilot S: BA332P
- Description of device functions Cerabar S/Deltabar S/Deltapilot S: BA274P

PROFIBUS PA:
- Deltapilot S: BA356P//en
- Description of device functions Cerabar S/Deltabar S/Deltapilot S: BA296P

FOUNDATION Fieldbus:
- Deltapilot S: BA372P
- Description of Instrument Functions Cerabar S/Deltabar S/Deltapilot S: BA303P

Brief operating instructions

- 4...20 mA HART, Deltapilot S: KA1020P
- PROFIBUS PA, Deltapilot S: KA1023P
- FOUNDATION Fieldbus, Deltapilot S: KA1026P

Functional safety manual (SIL)

- Deltapilot S (4 to 20 mA): SD213P

Safety instructions

Certificate/explosion protection	Electronics	Documentation	Version in the order code
ATEX II 1/2 G Ex ia IIC T6	– 4...20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA283P	1
ATEX II 1/2 D	– 4...20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA284P	2
ATEX II 1/3 D	– 4...20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA285P	4
ATEX II 1 GD Ex ia IIC T6	– 4...20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA287P	8
ATEX II 1/2 GD Ex ia IIC T6	– 4...20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA286P	3
ATEX II 3 G Ex nA II T6	– 4...20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA288P	7
ATEX II Ex ia + FM IS + CSA IS ATEX II 1/2G Ex ia IIC T6 + FM/CSA IS CL.I,II,III Div.1 Gr.A-G	– 4...20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA252P	E

Certificate/explosion protection	Electronics	Documentation	Version in the order code
IECEx Zone 0/1 Ex ia IIC T6	– 4...20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XB010P	I

Certificate/explosion protection	Electronics	Documentation	Version in the order code
NEPSI Ex ia IIC T4/T6	– 4...20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA435P	H

Installation/Control Drawings

Certificate/explosion protection	Electronics	Documentation	Version in the order code
FM IS Class I, II, III, Division 1, Groups A – G; NI, Class I Division 2, Groups A – D; AEx ia	– 4 to 20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– ZD214P – ZD216P	S
CSA IS Class I, II, III, Division 1, Groups A – G; Class I Division 2, Groups A – G	– 4 to 20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– ZD215P – ZD217P	U

Overfill protection

- WHG: ZE266P

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CCS/FM+SGML 6.0

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