



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Technical Information

Deltapilot S DB50/50L/51/52/53

Hydrostatic Level Measurement

Pressure sensor with CONTITE™ measuring cell;
waterproof, climatic-proofed, long-term stability; for food, fresh
water and wastewater, chemical and pharmaceutical products



Application

The devices in the Deltapilot S product family are used for continuous level measurement in all liquid and paste-like media. They are used in both the chemical, pharmaceutical and food industry as well as in the water and wastewater sector.

Switching units perfectly in line with the application:

- Determine the level, volume, differential pressure, density and product weight
- Control limit contacts
- Integrate the measuring point in various automation systems.

Your benefits

- Hermetically sealed CONTITE™ measuring cell:
 - Climatic-proofed and with high long-term stability
 - Maximum linearity (better than 0.1 % of the set measuring range)
 - Minimum temperature effects (better than 0.1%/10 K).
- Compact, rod or cable versions available
- Separate mounting of housing and electronic insert (IP 68 protection at the measuring point)
- Easy and comfortable operation:
 - Onsite with display and operating module
 - Operation via communication
- Replaceable electronic inserts:
 - 4 to 20 mA HART
 - PROFIBUS PA
 - FOUNDATION Fieldbus
 - Analog output
 - PFM

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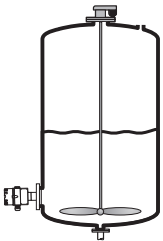
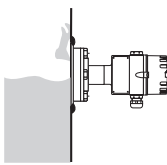
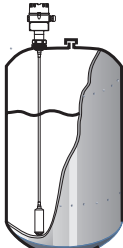

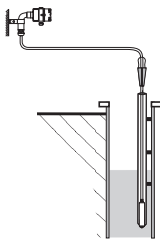
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Function and system design

Device selection

Deltapilot S – product family	DB50/DB50A  P01-DB5xxxxx-14-xx-xx-xx-001 Compact version	DB50L/DB50S  P01-DB5xxxxx-14-xx-xx-xx-002 Compact version as hygienic version	DB51/DB51A  P01-DB5xxxxx-14-xx-xx-xx-003 Rod version	DB52/DB52A  P01-DB5xxxxx-14-xx-xx-xx-004 Cable version	DB53/DB53A  P01-DB5xxxxx-14-xx-xx-xx-005 Cable version with suspension clamp
Field of application	– Level measurement – Differential pressure measurement (derived from level via switching unit)				
Industries	Food, pharmaceutical, environment (fresh water and wastewater), chemical				
Process connections	– Thread – Flanges	– Flush-mounted hygienic connections	– Thread – Flanges	– Thread – Flanges	– Suspension clamp
Process connection material	– AISI 316L – Alloy C4	– AISI 316L	– AISI 316L – Alloy C4	– AISI 316L – Alloy C4	– AISI 316L with plastic
Rod (pipe)/rope	—	—	– AISI 316L – Alloy C4	– FEP – PE	– FEP – PE
Pipe/rope	—	—	400 to 4000 mm (16 to 160 inch)	0.5 to 200 m (20 to 7874 inch) ¹⁾	0.5 to 200 m (20 to 7874 inch) ¹⁾
Measuring ranges	– from –100 to +100 mbar to –900 to +10000 mbar – US version: from –1.5 to +1.5 psi to –13 to 150 psi – Max. turn down: 10:1				
Process temperature	–10 to +100°C (+14 to +212°F)	–10 to +100°C (+14 to +212°F), +135°C (+275°F) for 30 minutes	–10 to +80°C (+14 to +176°F)	–10 to +80°C (+14 to +176°F)	–10 to +80°C (+14 to 176°F)
Supply voltage	– Analog 0.2 to 1.2 mA; 15 to 20 V DC – PFM: 14 to 16 V DC; EEx ia: 14 to 19.2 V DC – 4 to 20 mA HART: 11.5 to 30 V DC; EEx ia: 11.5 to 30 V DC – PROFIBUS PA, version without overvoltage protection: 9 to 32 V DC, EEx ia: 9 to 24 V DC Version with overvoltage protection: 9.6 to 32 V DC; EEx ia: 9 to 24 V DC – FOUNDATION Fieldbus: 9 to 32 V DC; EEx ia: 9 to 24 V DC				
Output	0.2 to 1.2 mA, analog, PFM, 4 to 20 mA with superimposed HART protocol, PROFIBUS PA or FOUNDATION Fieldbus				
Options	– 3.1 Inspection certificate – Separate housing	– 3.1 Inspection certificate – Separate housing	– Separate housing	– Separate housing	—
Specialties	– Absolutely resistant to condensate thanks to hermetically sealed CONTITE™ cell – Stainless steel version (AISI 316L) for hygienic requirements as well as aluminum and polyester housing versions – 3A and EHEDG approval – Maximum flexibility thanks to modular design				

1) EExia, FM IS, CSA IS: 0.5 to 100 m (20 to 3937 inch)

DB50(A), DB51(A), DB52(A) universal usage

- Modular probe program for optimum process adaptation
- DB50(A) compact version: installation in the tank from below or from the side
- DB51(A)/DB52(A) rod and cable extension: installation from above, i.e. easy to equip and retrofit buried tanks, no additional opening in the tank floor

DB50L/DB50S optimized for the food and pharmaceutical industry

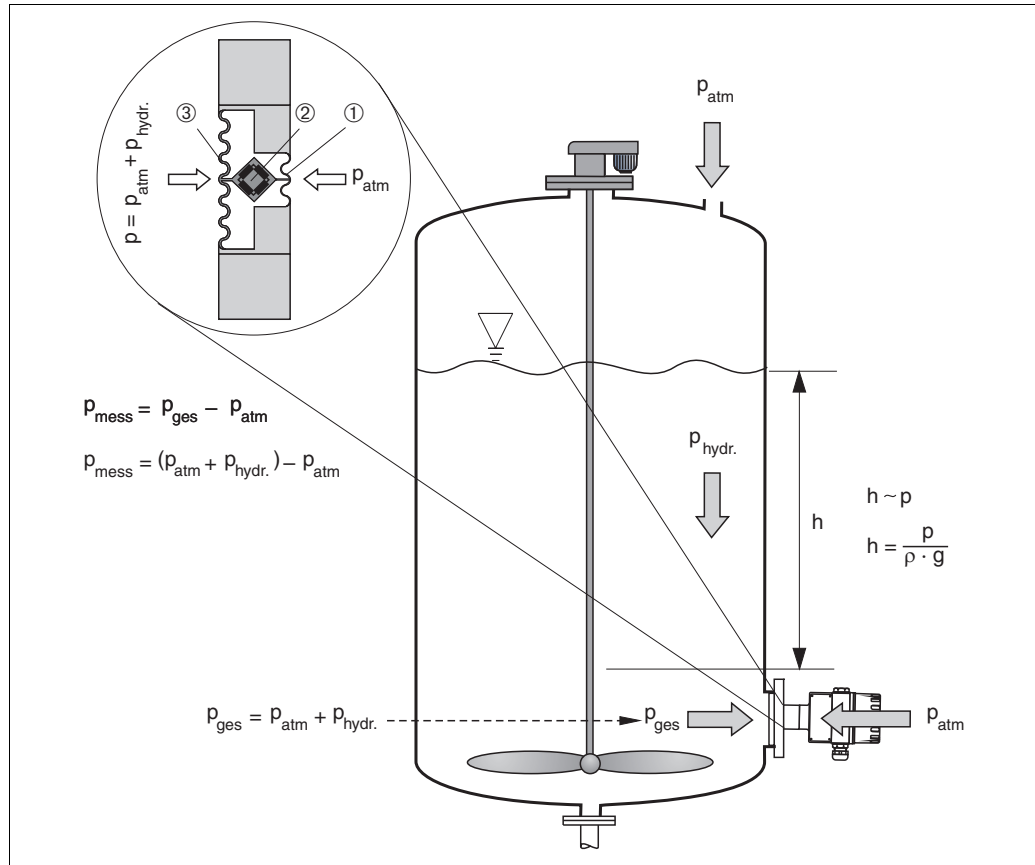
- All typical flush-mounted process connections can be supplied
- Welding flanges
- Stainless steel housing
- All food process connections are gap-free and can be cleaned without any residue left, e.g. CIP cleaning
- USDA/H1 approved transfer liquid as per FDA guidelines
- 3A or EHEDG approvals



DB53(A) for the water and wastewater industry

- The housing with the electronic insert is mounted outside shafts and tanks in such a way that it is protected from flooding. The rope is secured with a suspension clamp.
- Electronic inserts with an integrated surge arrester provide protection against overvoltage if lightning strikes.
- The stainless steel measuring cell tube (AISI 316L) and the Alloy measuring diaphragm allow use in aggressive media such as wastewater for example.
- Rope up to 200 m in length (up to 100 m in Ex-areas) without strain relief.
- Special measuring cell with gold-rhodium coating for applications in which severe hydrogen formation can occur (e.g. digested sludge); see also Page 19.
- Special measuring cell with gold-platinum coating for acids, alkalis or sea water; see also Page 19.

Measuring principle



Deltapilot S hydrostatic level measurement and measuring principle

- 1 Measuring diaphragm
- 2 Measuring element
- 3 Process diaphragm (separating diaphragm)
- g Gravitational acceleration
- h Level height
- p_{tot} Total pressure = hydrostatic pressure + atmospheric pressure
- p_{atm} Atmospheric pressure
- $p_{\text{hydr.}}$ Hydrostatic pressure
- p_{meas} Measured pressure in the measuring cell = hydrostatic pressure
- ρ Density of fluid

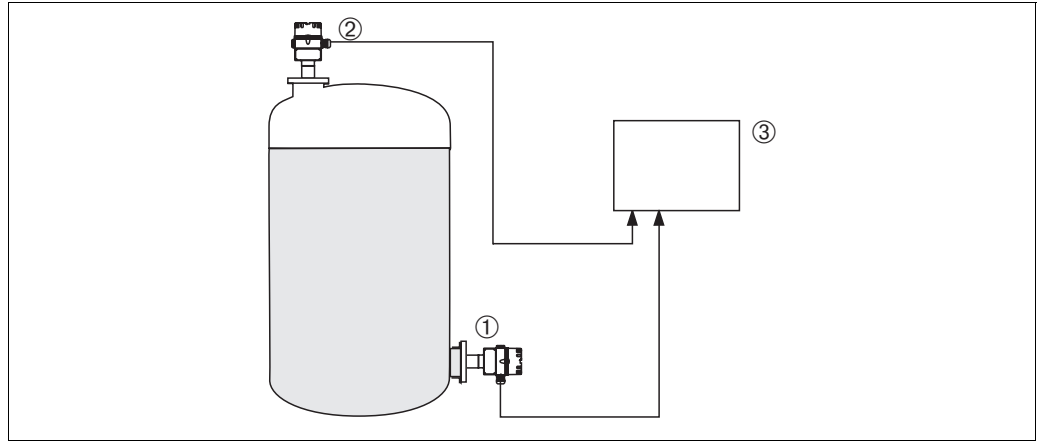
Due to its weight, a liquid column creates hydrostatic pressure. If the density is constant, the hydrostatic pressure depends solely on the height h of the liquid column.

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 diaphragm (3) and the measuring diaphragm (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 diaphragm to the measuring element by means of an oil without any loss in pressure.

Two temperature sensors are arranged between the process 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 temperature measured values.

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 pressure measured 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.



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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!

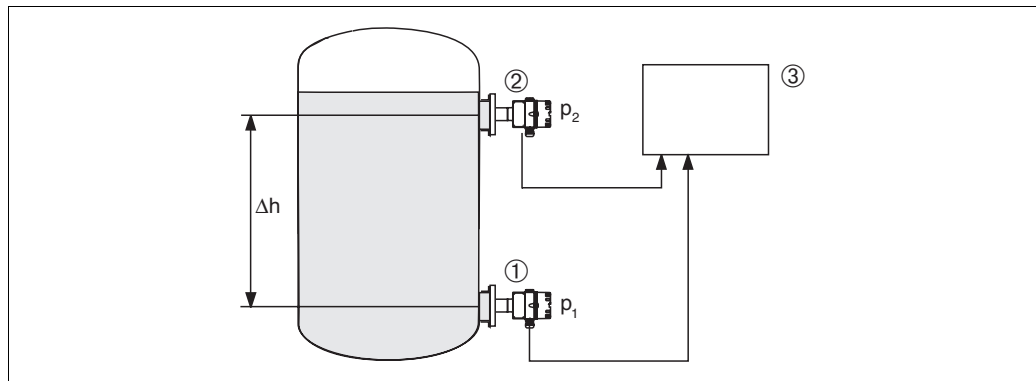
- When selecting the Deltapilot S probes, make sure you select large enough measuring ranges (→ see example).
- The measuring diaphragm of probe 2 must not be flooded. This generates additional hydrostatic pressure which distorts the measurement.
- The ratio of hydrostatic pressure to top pressure should be max. 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 .



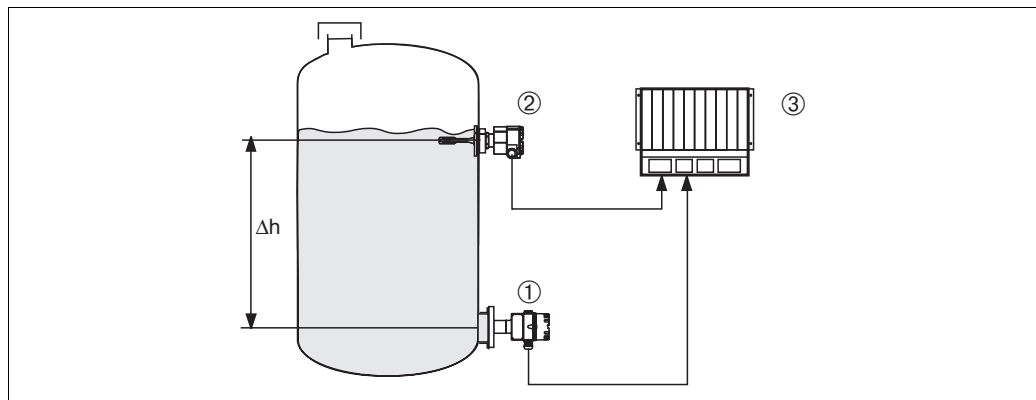
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Level measurement in a closed tank with pressure overlay

- 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 .

Level measurement with automatic density correction (with changing media in the tank)

Level measurement with automatic density correction is possible in conjunction with a limit switch such as Liquiphant and a PLC. The limit switch always switches at the same level. In the switch point, the signal processing unit determines the corrected density from the pressure of the Deltapilot S probe currently measured and the known distance between Deltapilot S and the limit switch. The signal processing unit then calculates the level from the new density and the measured pressure from the Deltapilot S probe.



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Level measurement with automatic density correction

- 1 Deltapilot S
- 2 Liquiphant
- 3 PLC

Communication protocol

- 4 to 20 mA with HART communication protocol
- PROFIBUS PA
 - The Endress+Hauser Deltapilot S devices meet the FISCO model requirements.
 - Due to the low current consumption of 10 ± 1 mA, the following can be operated at one bus segment with installation as per FISCO:
 - Up to 9 Deltapilot S for EEx ia, CSA IS and FM IS applications
 - Up to 32 Deltapilot S for all other applications, e.g. in non-hazardous areas, EEx 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 Deltapilot S devices meet the FISCO model requirements.
 - Due to the low current consumption of 11 ± 1 mA, the following can be operated at one bus segment with installation as per FISCO:
 - Up to 9 Deltapilot S for EEx ia, CSA IS and FM IS applications
 - Up to 32 Deltapilot S for all other applications, e.g. in non-hazardous areas, EEx nA, etc.

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

Measuring system**Measuring system with 0.2 to 1.2 mA analog – FEB11(P)**

The electronic insert returns a current signal of 0.2 to 1.2 mA that is in proportion to the pressure. The FMC420 silometer provides voltage to the electronic insert and evaluates the current signal that is in proportion to the level. The standardized signals of 0 to 10 V and 4 to 20 mA (0 to 20 mA) are then available at the output of the silometer. → See also Technical Information TI077F and Operating Instructions BA179F.

Measuring system with PFM – FEB17(P)

The electronic insert returns a pulse-frequency-modulated signal of 200 to 1200 Hz. The evaluation and operating unit Prolevel FMB662 provides power to the electronic insert and converts the PFM signal of the probe to a standardized current or voltage signal. → See also Technical Information TI234F and Operating Instructions BA144F.

Measuring system with 4 to 20 mA HART – FEB22(P)

HART is a field-tested industry standard accepted worldwide. In HART technology, the 4 to 20 mA analog transmission and the digital communication take place simultaneously via the same wire pair. The 4 to 20 mA analog signal is used for rapid measured value transmission. The digital HART signal allows device data to be read and written, e.g. for diagnosis and maintenance information.

Measuring system with PROFIBUS PA – FEB24(P)

PROFIBUS PA is an open fieldbus standard. It allows multiple sensors and actuators to be connected, even in Ex-areas. By means of PROFIBUS PA, energy is supplied to the devices with two-wire technology and the process information is transmitted digitally from the sensor.

Further information on PROFIBUS PA, such as bus system component requirements, can be found in Operating Instructions BA034S "PROFIBUS DP/PA: Guidelines for planning and commissioning" and in the PNO guideline.

Measuring system with FOUNDATION Fieldbus – FEB26

FOUNDATION Fieldbus is an open fieldbus standard. It allows multiple sensors and actuators to be connected, even in Ex-areas. By means of FOUNDATION Fieldbus, energy is supplied to the devices with two-wire technology and the process information is transmitted digitally from the sensor.

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

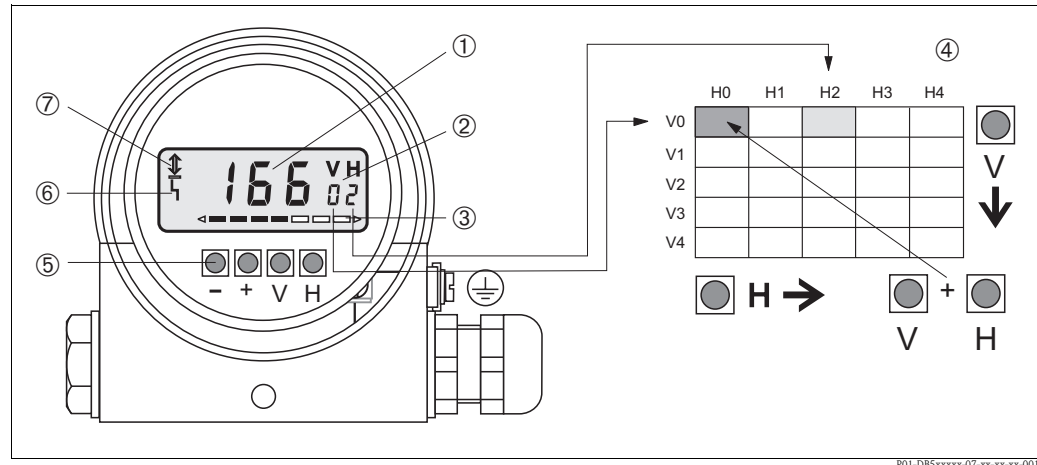
Human interface

Onsite display (optional)

The FHB20 display and operating module is available as an option for the following electronic inserts. → See also Page 37, feature 70 "Electronic insert":

- 4 to 20 mA HART – FEB22(P)
- PROFIBUS PA – FEB24(P)
- FOUNDATION Fieldbus – FEB26

The parameters are illustrated in a 10 x 10 matrix (→ see Figure, No. ④). With the display module, you can access every parameter directly at the place of measurement. Dry calibration, linearization and operation enabling and disabling are possible without any further tools.



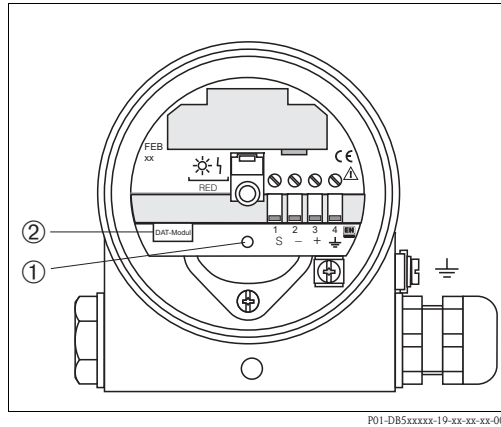
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User interface of the electronic insert with the FHB20 display and operating module

- 1 4 1/2-digit display of measured values and parameters
- 2 Current matrix position
- 3 Bar graph of the measured value
- 4 Operating matrix
- 5 Operating keys
- 6 Signal for reporting an error
- 7 Communication signal, lights up when operating using the handheld terminal or via remote operation

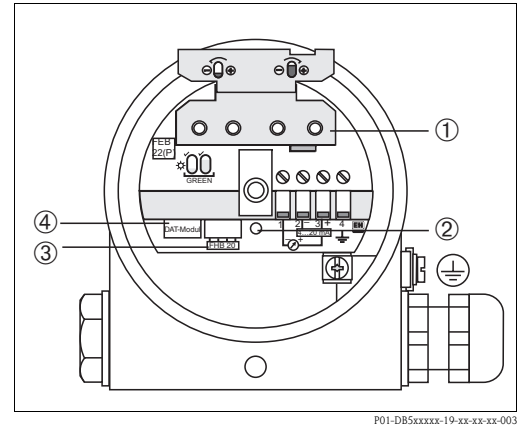
Operating elements

Operating keys and elements on the electronic insert



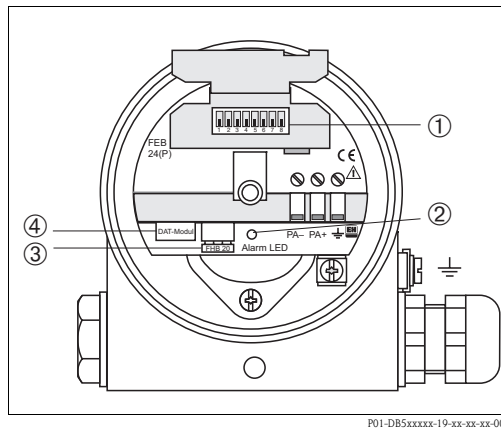
Electronic insert FEB11(P) – 0.2 to 1.2 mA and electronic insert FEB17(P) – PFM

- 1 Red LED to indicate a fault
- 2 Slot for the DAT module



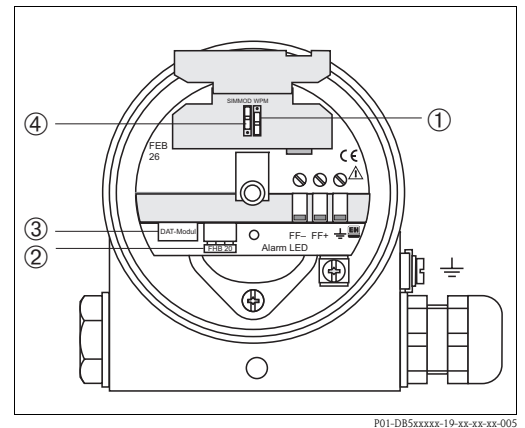
Electronic insert FEB22(P) – 4 to 20 mA HART

- 1 Operating keys for empty and full calibration, calibration with partially full tanks, lock/unlock operation and reset
- 2 Green LED flashes when accepting the value for empty and full calibration, during a reset and if operation is locked or unlocked
- 3 Slot for optional FHB20 display and operating module
- 4 Slot for the DAT module



Electronic insert FEB24(P) – PROFIBUS PA

- 1 DIP switches for bus address
- 2 Red LED to indicate a warning or a fault
- 3 Slot for optional FHB20 display and operating module
- 4 Slot for the DAT module



Electronic insert FEB26 – FOUNDATION Fieldbus

- 1 DIP switch to lock/unlock operation
- 2 Slot for optional FHB20 display and operating module
- 3 Slot for the DAT module
- 4 DIP switch for switching simulation mode on/off

DAT module

All the specific data of the measuring cell are saved in the DAT module. When the device is switched on, these data are read out of the DAT module and into the electronic insert memory.

The DAT module can be ordered as a spare part (order number: 542585-0000). However, the measuring cell number must be stated when ordering.

Handheld terminals – HART

With the handheld terminal Universal-HART-Communicator DXR275 or DXR375, all the parameters can be configured anywhere along the 4 to 20 mA line via menu operation.

**FieldCare –
HART, PROFIBUS PA**

FieldCare is an Endress+Hauser asset management tool based on FDT technology. With FieldCare, you can configure all Endress+Hauser devices as well as devices from other manufacturers that support the FDT standard. The following operating systems are supported: WinNT4.0, Win2000 and Windows XP.

FieldCare supports the following functions:

- Configuration of transmitters in offline and online operation
- Loading and saving device data (upload/download)
- Documentation of the measuring point

**Commuwin II –
HART, PROFIBUS PA**

Commuwin II is a graphically supported operating program for intelligent measuring devices with the communication protocols HART and PROFIBUS PA. The following operating systems are supported: Win 3.1/3.11, Win 95, Win 98, WinNT4.0 and Win2000.

Commuwin II supports the following functions:

- Configuration of measuring devices in online operation via matrix operation
- Loading and saving device data (upload/download)
- Visualization of measured values and limit values
- Presentation and recording of measured values with a line recorder.

Connection option:

- HART via Commubox FXA191 with the serial interface RS 232 C of a computer or via Commubox FXA195 with the USB interface of a computer
- PROFIBUS PA via segment coupler and PROFIBUS interface card

**Remote operation –
FOUNDATION Fieldbus**

An FF configuration program is required to integrate a device with "FOUNDATION Fieldbus signal" into an FF network or to set the FF-specific parameters. Please contact your local Endress+Hauser Sales Center for more information.

Input (measured variable)

Measured variable Hydrostatic pressure

Measuring range

Measuring range	Measuring limit		Recommended span min./max. [bar]	Overload bar_{abs}	Vacuum resistance bar	Version in the order code ¹⁾
	lower (LRL) [bar]	upper (URL) [bar]				
0 to +100 mbar	0	+0.1	0.025/0.1	8	–0.1	BA
0 to +400 mbar	0	+0.4	0.04/0.4	8	–0.4	BB
0 to +1200 mbar	0	+1.2	0.12/1.2	24	–0.9	BC
0 to +4 bar	0	+4	0.4/4	24	–0.9	BD
0 to +10 bar	0	+10	1/10	40	–0.9	BE
–100 to +100 mbar	–0.1	+0.1	0.025/0.1	8	–0.1	DA
–400 to +400 mbar	–0.4	+0.4	0.04/0.4	8	–0.4	DB
–900 to +1200 mbar	–0.9	+1.2	0.12/1.2	24	–0.9	DC
–900 to +4000 mbar	–0.9	+4	0.4/4	24	–0.9	DD
–0.9 to +10 bar	–0.9	+10	1/10	40	–0.9	DE

1) See also Page 36 ff, "Ordering information" chapter, feature 40 "Measuring range"

Explanation of terms

- A turn down of TD = 10:1 is possible with the following electronic inserts:
 - 4 to 20 mA HART – FEB22(P)
 - PROFIBUS PA – FEB24(P)
 - FOUNDATION Fieldbus – FEB26

Turn down is possible via the signal processing units for electronic inserts 0.2 to 1.2 mA analog – FEB11(P) and PFM – FEB17(P). → See "Function and system design" chapter, "Measuring device" section.

**Explanation of terms: turn down (TD),
set span and span based on zero point**
Case 1:

- $|\text{Lower range value (LRV)}| \leq |\text{Upper range value (URV)}|$

Example:

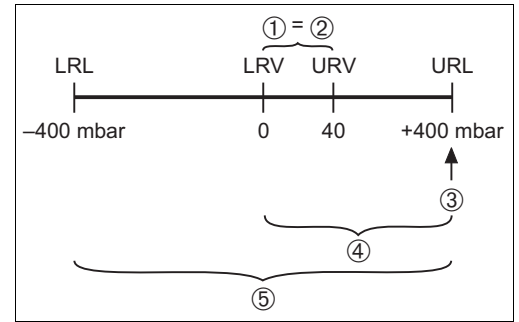
- Lower range value (LRV) = 0 mbar
- Upper range value (URV) = 40 mbar
- Nominal value (URL) = 400 mbar

Turn down:

- $\text{Nominal value} / |\text{upper range value (URV)}| = 400 \text{ mbar} / 40 \text{ mbar}$
TD = 10:1

Set span:

- $\text{Upper range value (URV)} - \text{lower range value (LRV)} = 40 \text{ mbar} - 0 \text{ mbar}$
Set span = 40 mbar
This span is based on the zero point.



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*Example: 400 mbar measuring cell**Case 2:*

- $|\text{Lower range value (LRV)}| \geq |\text{Upper range value (URV)}|$

Example:

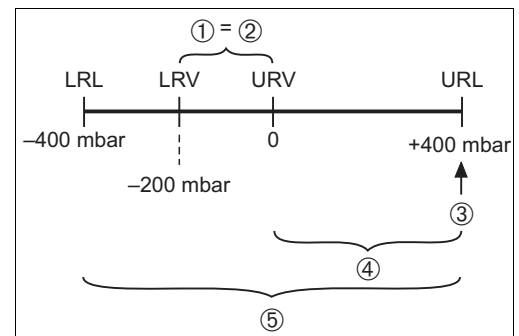
- Lower range value (LRV) = -200 mbar
- Upper range value (URV) = 0 mbar
- Nominal value (URL) = 400 mbar

Turn down:

- $\text{Nominal value} / |\text{lower range value (LRV)}| = 400 \text{ mbar} / 200 \text{ mbar}$
TD 2:1

Set span:

- $\text{Upper range value (URV)} - \text{lower range value (LRV)} = 0 \text{ mbar} - (-200 \text{ mbar})$
Set span = 200 mbar
This span is based on the zero point.



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Example: 400 mbar measuring cell

- 1 Set span
 - 2 Span based on zero point
 - 3 Nominal value $\hat{=}$ 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

- 0.2 to 1.2 mA analog signal, 3-wire
- 200 to 1200 Hz PFM signal, 2-wire
 - $f_0 = 200 \text{ Hz} \pm 5 \text{ Hz}$
 - 100 mbar measuring range: $f_0 = 200 \text{ Hz} \pm 10 \text{ Hz}$
- 4 to 20 mA with superimposed communication protocol HART, 2-wire
- Digital communication signal PROFIBUS PA (Profile 3.0), 2-wire
- Digital communication signal FOUNDATION Fieldbus, 2-wire

Signal on alarm

- 0.2 to 1.2 mA analog: $\geq 1.5 \text{ mA}$
- PFM $\leq 20 \text{ Hz}$
- 4 to 20 mA HART
 - Options:
 - Min. = 3.6 mA; onsite display: 0
 - Max. = 22 mA (factory setting); onsite display: 1
 - Hold: last measured value is held; onsite display: 2
- PROFIBUS PA:
 - Options configurable in the Analog Input Block for the output signal: Last Valid Out Value, FSafe Value (factory setting), Status bad
 - Options configurable in the Transducer Block for the "Measured value" parameter and the onsite display: Min. (onsite display: -19999), Max. (onsite display: +19999), Hold: last measured value is held
- FOUNDATION Fieldbus:
 - Output signal: last measured value is held; status change from "Uncertain" or "Bad"
 - Options configurable in the Transducer Block for the "Measured value" parameter and the onsite display: Min. (onsite display: -19999), Max. (onsite display: +19999), Hold: last measured value is held

Load

0.1 to 1.2 mA analog	PFM	4 to 20 mA HART
Max. 25 Ω /core	Max. 25 Ω /core	<p style="text-align: right; font-size: small;">P01-DB5xxxxx-05-xx-xx-xx-002</p>

Sensitivity, PFM –FEB17(P)

Measuring range	Resolution	Measuring range	Resolution
0 to 100 mbar	10 Hz/mbar	-100 to 100 mbar	5 Hz/mbar
0 to 400 mbar	2.5 Hz/mbar	-400 to 400 mbar	1.25 Hz/mbar
0 to 1200 mbar	0.833 Hz/mbar	-900 to 1200 mbar	0.476 Hz/mbar
0 to 4000 mbar	0.25 Hz/mbar	-900 to 4000 mbar	0.204 Hz/mbar
0 to 10000 mbar	0.1 Hz/mbar	-900 to 10000 mbar	0.092 Hz/mbar

Damping

- 0 to 99 s configurable via the FHB20 display and operating module, PC with operating program or handheld terminal
- Factory setting: 0 s

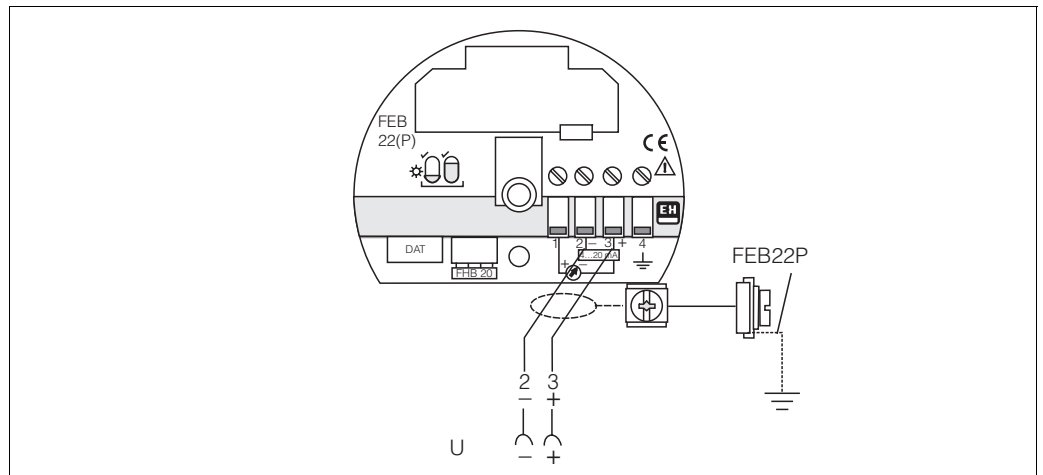
Power supply

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 (XAs) or Installation or Control Drawings (ZDs). → See also Page 59 ff, "Safety Instructions" and "Installation/Control Drawings" sections.
- Protective circuits against reverse polarity and HF influences are integrated.
- The housing must be grounded for electronic inserts with an integrated overvoltage protection.
- The system is optimally shielded against interference influences if the shielding is connected on both sides. If you have to reckon with potential equalization currents in the system, only ground the shielding at one end, preferably at the Deltapilot S probe.

4 to 20 mA HART electronics – FEB22(P)



P01-DB5xxxxx-04-xx-xx-xx-005

0.2 to 1.2 mA analog electronics – FEB11(P)

The twin-core cable must be connected to terminals 2 (–) and 3 (+).

PFM electronics – FEB17(P)

The twin-core cable must be connected to terminals 2 (–) and 3 (+).

PROFIBUS PA electronics – FEB24(P)

The twin-core cable must be connected to the "PA+" and "PA–" terminal.

More information on laying out and grounding the network is provided in Operating Instructions BA034S "PROFIBUS DP/PA: Guidelines for planning and commissioning".

FOUNDATION Fieldbus electronics – FEB26

The twin-core cable must be connected to the "FF+" and "FF–" terminal.

More information on laying out and grounding the network is provided in Operating Instructions BA013S "FOUNDATION Fieldbus Overview".

Supply voltage	<p>Note!</p> <ul style="list-style-type: none"> ■ When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions (XAs) or Installation or Control Drawings (ZDs). ■ 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. → See also Page 59 ff, "Safety Instructions" and "Installation/Control Drawings" sections. <p>0.2 to 1.2 mA analog</p> <p>15 to 20 V DC</p> <p>PFM</p> <p>Version for non-hazardous areas: 14 to 16 V DC</p> <p>4 to 20 mA HART</p> <p>Version for non-hazardous areas: 11.5 to 30 V DC</p> <p>PROFIBUS PA</p> <ul style="list-style-type: none"> ■ Version for non-hazardous areas and electronics without overvoltage protection: 9 to 32 V DC ■ Version for non-hazardous areas and electronics with overvoltage protection: 9.6 to 32 V DC <p>FOUNDATION Fieldbus</p> <p>Version for non-hazardous areas: 9 to 32 V DC</p>
Current consumption	<p>PROFIBUS PA</p> <p>10 mA ± 1 mA</p> <p>FOUNDATION Fieldbus</p> <p>11 mA ± 1 mA</p>
Switch-on current	<p>0.1 to 1.2 mA analog, PFM and 4 to 20 mA HART</p> <p>100 mA for 30 V, pulse width half-life 20 ms</p> <p>PROFIBUS PA and FOUNDATION Fieldbus</p> <p>Switch-on current corresponds to Table 4, IEC 61158-2, Clause 2</p>
Cable entry	<p>→ See also Page 37 ff, feature 80 "Housing; Cable entry".</p>
Cable specification	<p>0.1 to 1.2 mA analog</p> <ul style="list-style-type: none"> ■ Endress+Hauser recommends using a shielded, three-core instrument cable with max. 25 Ω per core. ■ Terminals for wire cross-section: 0.08 to 2.5 mm² <p>PFM</p> <ul style="list-style-type: none"> ■ Endress+Hauser recommends using a shielded, twin-core instrument cable with max. 25 Ω per core. ■ Terminals for wire cross-section: 0.08 to 2.5 mm² <p>4 to 20 mA HART, PROFIBUS PA and FOUNDATION Fieldbus</p> <ul style="list-style-type: none"> ■ Endress+Hauser recommends using a twisted, shielded twin-core cable. ■ Terminals for wire cross-section: 0.08 to 2.5 mm²

Residual ripple**4 to 20 mA HART**

- Max. ripple (measured at 500 Ω) 47 to 125 kHz: $U_{ss} \leq 200$ mV
- Max. noise (measured at 500 Ω) 500 Hz to 10 kHz: $U_{eff} \leq 2.2$ mV

0.1 to 1.2 mA analog

In the range 1 Hz to 100 kHz: max. failsafe value $U_{ss} \leq 1$ V

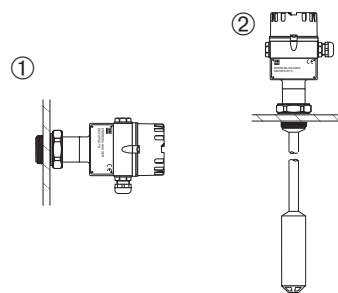
Performance characteristics

Reference operating conditions

- As per DIN 16086
- Calibration temperature: +25°C (+77°F)

Position during calibration

- ① DB50(A), DB50L, DB50S
 ② DB51(A), DB 52(A), DB53(A)



P01-DB5xxxxx-11-xx-xx-xx-009

Zero-point increase

90% of measuring range

Long-term stability

$\pm 0.1\%$ of URL¹⁾ per 6 months

Linearity

Linearity as per the limit point method:
 – $\pm 0.2\%$ of the set span¹⁾
 – Optional: $\pm 0.1\%$ of the set span¹⁾

Hysteresis

$\pm 0.1\%$ of URL¹⁾

Influence of ambient temperature

$\pm 0.01\%/10$ K of URL¹⁾

Influence of medium temperature

$\pm 0.1\%/10$ K of URL¹⁾

1) For an explanation of terms, see Page 13

Operating conditions (installation)

Installation instructions for compact version DB50, DB50A, DB50L, DB50S

- 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 outlet 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 after a shut-off device.
- Deltapilot S must be included in the insulation for media that can harden when cold. The use of rod or cable versions is also possible.

Installation instructions for rod and cable versions DB51(A), DB52(A) and DB53(A)

- When mounting the rod and cable versions, make sure that the probe head is located at a point as free as possible from flow. To protect the probe from impact from lateral movement, mount the probe in a guide tube (preferably made of plastic) or secure it with a clamping fixture. For devices for Ex-areas, see Safety Instructions (XAs).
- The length of the rope or the probe rod is based on the planned level zero point. The top of the probe should be at least 5 cm under this.

Supplementary installation instructions

Process diaphragm

- Do not use sharp or hard objects to handle or clean the process diaphragm. Build-up has no effect on the measurement result as long it is porous and does not present a mechanical load on the diaphragm of the pressure measuring cell.
- The process diaphragm on all Deltapilot S rod and cable extension is protected against mechanical damage by means of a plastic cover.

Seal

- Deltapilot S with G 1 1/2 thread:
When screwing the device into the tank, the flat seal supplied must be placed on the sealing surface of the process connection.
- Deltapilot S with NPT thread:
 - Wrap and seal the thread with Teflon tape.
 - Tighten the device at the hexagon head only. Do not turn the device by the housing.
 - Do not screw in the thread too tightly. Max. torque: 20...30 Nm

Sealing the probe housing

It is important that no moisture enters the housing while mounting the probe, connecting the electronic insert and operating the measuring system.

- Always screw the housing cover and the cables entries tight.
- The O-Ring seal in the housing cover and the thread of the aluminum cover are lubricated. If this lubrication has been removed, replace it with silicone grease or graphite paste, for example, so that the cover seals tight. Do not use mineral-oil based greases. These can destroy the O-ring.

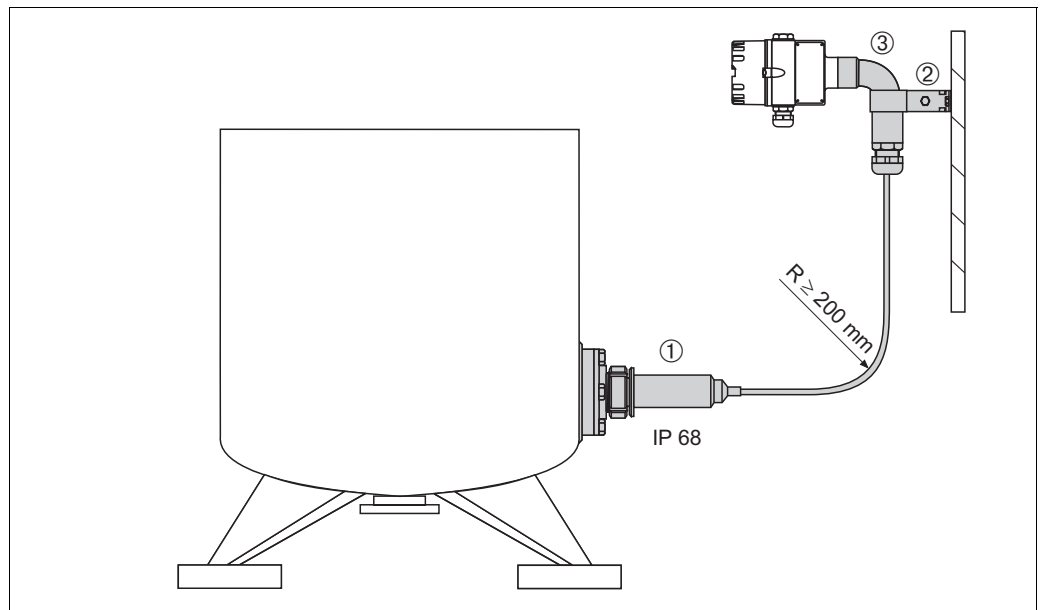
Housing adapter with mounting bracket for humid, damp and difficult-to-access mounting locations

With the housing adapter and mounting bracket, you have the option of mounting the housing with the electronic insert away from the measuring point. This allows problem-free measurement

- under particularly difficult measuring conditions (in confined or difficult-to-access mounting locations)
- in the event of extreme fluctuations in temperature at the tank wall.

You can operate and control the device quickly and comfortably away from the measuring point by means of the FHB20 display and operating module or via remote operation. IP 68 ingress protection applies for the housing adapter.

The mounting bracket is suitable for pipe and wall mounting.



P01-DB5xxxxx-11-xx-xx-xx-006

Measuring point with housing adapter and mounting bracket

- 1 Housing adapter
- 2 Mounting bracket for pipe and wall mounting
- 3 Pipe bend

Note!

- When mounting, observe a bending radius of at least 200 mm.

Special measuring cells for substances with hydrogen formation

In the case of materials in which hydrogen formation occurs (e.g. digested sludge), hydrogen atoms can diffuse through the metal diaphragm. This can result in incorrect measurement results.

For such instances, Endress+Hauser offers diaphragms with a gold-rhodium coating.

→ Order through 50 "Measuring cell version", type Z "Additional specification". In addition, for version "Z", quote the order number 52009331.

Note!

- To reduce the formation of hydrogen, you should refrain from using galvanized assemblies.

Special measuring cell for acids, alkalis or sea water

For acids, alkalis or sea water, Endress+Hauser offers diaphragms with a gold-platinum coating.

→ Order through 50 "Measuring cell version", type Z "Additional specification". In addition, indicate the order number 52009332 for Version 'Z'.

Operating conditions (environment)

Ambient temperature range	<ul style="list-style-type: none">■ -20 to +60°C (-4 to +140°F)■ With separate electronics: -20 to +85°C (-4 to +185°F) <p>For devices for use in hazardous areas, see Safety Instructions (XAs), Installation or Control Drawing (ZDs).</p>
Ambient temperature limits	<p>-40 to +85°C (-40 to +185°F)</p> <p>The device can be operated in this temperature range. When commissioning the device, the temperature cannot go below -20°C (-4°F). The values of the specification such as accuracy can be overshoot here.</p>
Storage temperature range	<p>-40 to +85°C (-40 to +185°F)</p>
Vibration resistance	<p>10 to 55 Hz, 2 g, as per DIN EN 60068-2-6</p>
Degree of protection	<ul style="list-style-type: none">■ → See Page 37 ff, feature 80 "Housing; Cable entry".■ Housing: IP 66/NEMA 4X■ Housing adapter: IP 68 (1 mH₂O for 24 h)
Electromagnetic compatibility (EMC)	<p>Interference emission as per EN 61326, electrical device B; interference immunity as per EN 61326 appendix A (industrial use) and NAMUR EMC recommendation (NE21).</p>
Overvoltage protection	<p>The following electronic inserts are equipped with an surge arrester:</p> <ul style="list-style-type: none">- 0.2 to 1.2 mA analog – FEB11P- PFM – FEB17P- 4 to 20 mA HART – FEB22P- PROFIBUS PA – FEB24P <p>Protective diodes: gas tube surge arrester 230 V, nominal discharge current 10 kA</p>

Operating conditions (process)

Process temperature range	Device	Process temperature range
	– DB50(A) – DB50L, DB50S	–10 to +100°C (+14 to +212°F)
	– DB51(A) – DB52(A) with FEP rope – DB53(A) with FEP rope	–10 to +80°C (+14 to +176°F)
	– DB52(A) with PE rope – DB53(A) with PE rope	–10 to +70°C (+14 to +158°F)

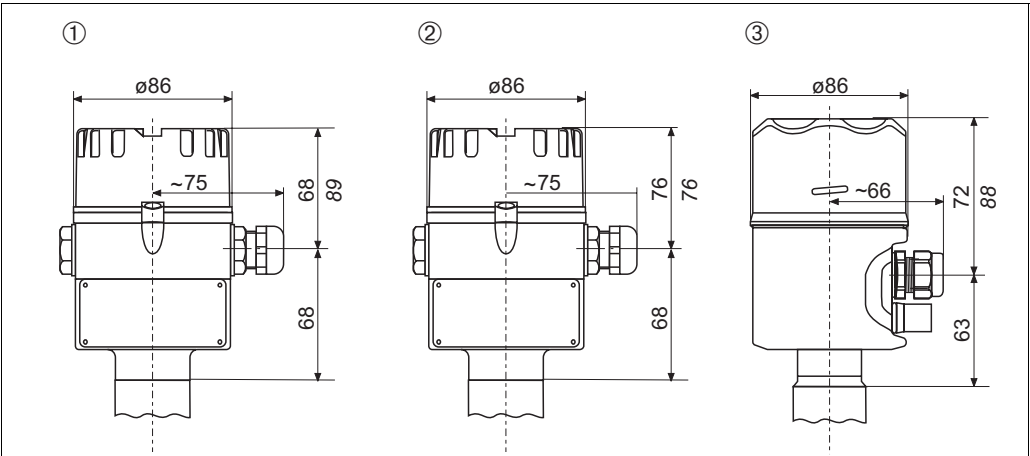
For devices for use in hazardous areas, see Safety Instructions (XAs), Installation or Control Drawing (ZDs).

Process temperature limits	<ul style="list-style-type: none">■ DB51(A), DB52(A) and DB53(A): –40 to +85°C (–40 to +185°F)■ The DB50L and DB50S versions can be exposed to +135°C (+275°F) for a brief period (maximum 30 minutes) for cleaning purposes.
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Process pressure limits	→ For overload and vacuum resistance see Page 12, "Measuring range" section.
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Mechanical construction

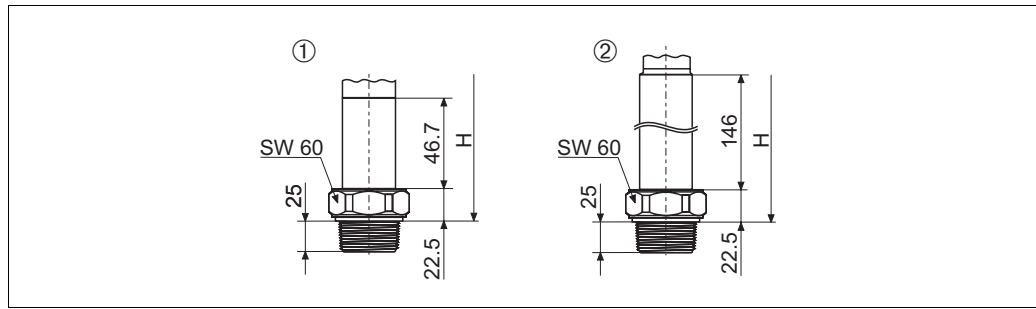
Dimensions of housing



Deltapilot S housing versions

- 1 Aluminum housing
- 2 Polyester housing
- 3 Stainless steel housing

Dimensions written in *italics* apply to devices with a cover including a sight glass. Devices with the FHB20 onsite display are always supplied with a cover with a sight glass.

**Process connections DB50 and
DB50A (compact version)**
Threaded connection ISO 228 and NPT


P01-DB5xxxxx-06-xx-xx-xx-023

DB50(A) with thread

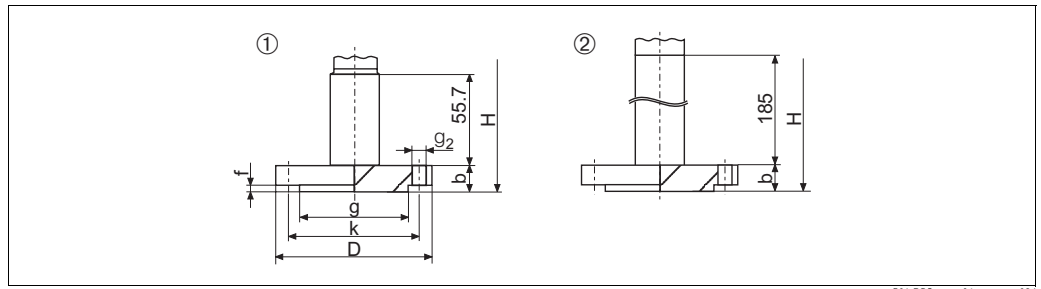
- 1 DB50(A) with thread G 1 1/2 or 1 1/2 NPT without flame barrier
 2 DB50(A) with thread G 1 1/2 or 1 1/1 NPT with flame barrier
 (flame barrier for use in hazardous areas, Zone 0)

Installation height H, devices with a thread

	Cover	Aluminum housing [mm]	Polyester housing [mm]	Stainless steel housing [mm]
Without a flame barrier	Flat	205.2	213.2	204.2
	High (with sight glass) ¹⁾	226.2	213.2	220.2
With a flame barrier	Flat	304.5	312.5	204.2
	High (with sight glass) ¹⁾	325.5	312.5	231.5

- 1) Devices with the FHB20 display and operating module are always supplied with a high cover or with a cover with a sight glass.

EN/DIN, ANSI and JIS flanges



DB50(A) with flange; surface roughness of the surfaces in contact with the medium EN/DIN: $R_a = 10$ to $12.5 \mu\text{m}$,
ANSI: $R_a = 3.2$ to $6.3 \mu\text{m}$, JIS: $R_a = 3.2$ to $6.3 \mu\text{m}$

1 DB50(A), flange without flame barrier

2 DB50(A), flange with flame barrier (flame barrier for use in hazardous areas, Zone 0)

H For installation height H, see Page 24

EN/DIN flanges, connection dimensions as per EN 1092-1 (old DIN 2526 Form C)

Flange									Screwholes			Flange weight ³⁾
Version	Material ¹⁾	Nominal diameter	Nominal pressure	Shape ²⁾	Diameter	Thick-ness	Raised face diameter	Raised face height	Quan-tity	Diameter	Hole circle	
					D [mm]	b [mm]	g [mm]	f [mm]		g ₂ [mm]	k [mm]	
20	AISI 316L	DN 40	PN 10/16	B1 (C)	150	16	88	3	4	18	110	2.3
21	AISI 316L	DN 50	PN 10/16	B1 (C)	165	18	102	3	4	18	125	3.0
22	AISI 316L	DN 80	PN 10/16	B1 (C)	200	24	138	3	8	18	160	4.8
23	AISI 316L	DN 100	PN 10/16	B1 (C)	220	20	158	3	8	18	180	6.0

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.

2) Designation as per DIN 2526 in brackets

3) Housing weight, see Page 32

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

Flange								Screwholes			Flange weight ²⁾
Version	Material ¹⁾	Nominal diameter	Class	Diameter	Thickness	Raised face diameter	Raised face height	Quantity	Diameter	Hole circle	
		[in]	[lb./sq in]	D [in] [mm]	b [in] [mm]	g [in] [mm]	f [in] [mm]		g ₂ [in] [mm]	k [in] [mm]	
30	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	1.8
31	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	2.7
32	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	5.4
33	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	7.5

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

2) Weight incl. pipe, housing weight, see Page 32

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

Flange								Screwholes			
Version	Material ¹⁾	Nominal diameter	Nominal pressure	Diameter D [mm]	Thickness b [mm]	Raised face diameter g [mm]	Raised face height f [mm]	Quantity	Diameter g₂ [mm]	Hole circle k [mm]	Flange weight ²⁾ [kg]
7B	AISI 316L	40 A	10 K	144	16	81	2	4	19	105	1.8
7C	AISI 316L	50 A	10 K	155	16	96	2	4	19	120	2.2
7D	AISI 316L	80 A	10 K	185	18	127	2	8	19	150	3.5
7L	AISI 316L	100 A	10 K	210	18	151	2	8	19	175	4.6

1) AISI 316L/1.4435

2) Weight incl. pipe, housing weight, see Page 32

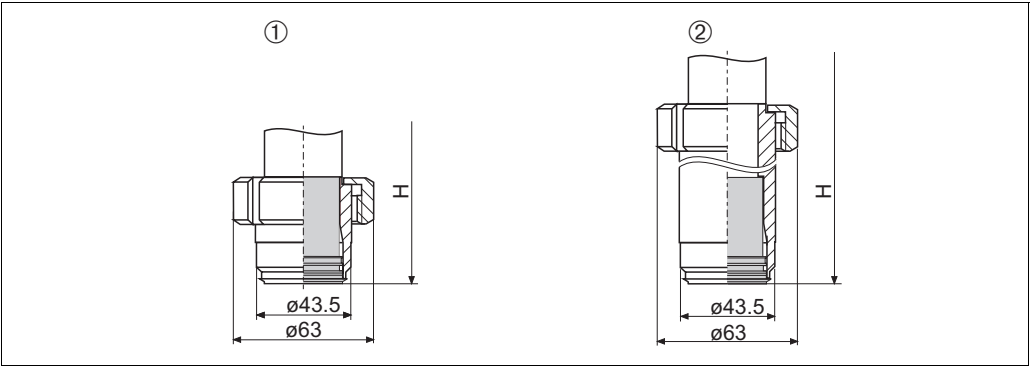
Installation height H, devices with a flange

	Cover	Aluminum housing [mm]	Polyester housing [mm]	Stainless steel housing [mm]
Without a flame barrier	Flat	201 + flange thickness b	201 + flange thickness b	189 + flange thickness b
	High (with sight glass) ¹⁾	212 + flange thickness b	201 + flange thickness b	205 + flange thickness b
With a flame barrier	Flat	312 + flange thickness b	322 + flange thickness b	310 + flange thickness b
	High (with sight glass)	333 + flange thickness b	322 + flange thickness b	326 + flange thickness b

1) Devices with the FHB20 display and operating module are always supplied with a high cover or with a cover with a sight glass.

Process connection DB50L and DB50S (food version)

Universal process adapter



P01-DB5xxxxx-06-xx-xx-xx-021

Process connection DB50L/DB50S, material: AISI 316L/1.4435;
Surface roughness of the surfaces in contact with the medium $R_a \leq 0.8 \mu\text{m}$ as standard. Lower surface roughness on request.

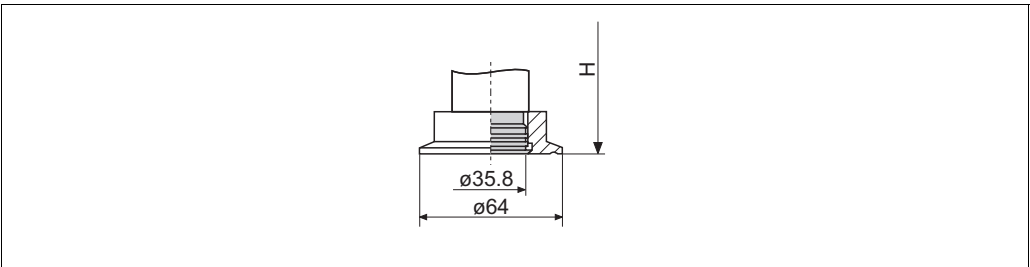
- 1 Version 00: universal process adapter incl. silicone molded seal, 3A
- 2 Version 57: universal process adapter, extension 6 inch incl. silicone molded seal, 3A

Installation height H, devices with universal process adapter

	Cover	Aluminum housing [mm]	Polyester housing [mm]	Stainless steel housing [mm]
Universal process adapter	Flat	221	221	209
	High (with sight glass) ¹⁾	232	221	225
Universal process adapter with 6 inch extension	Flat	318	318	306
	High (with sight glass)	329	318	322

- 1) Devices with the FHB20 display and operating module are always supplied with a high cover or with a cover with a sight glass.

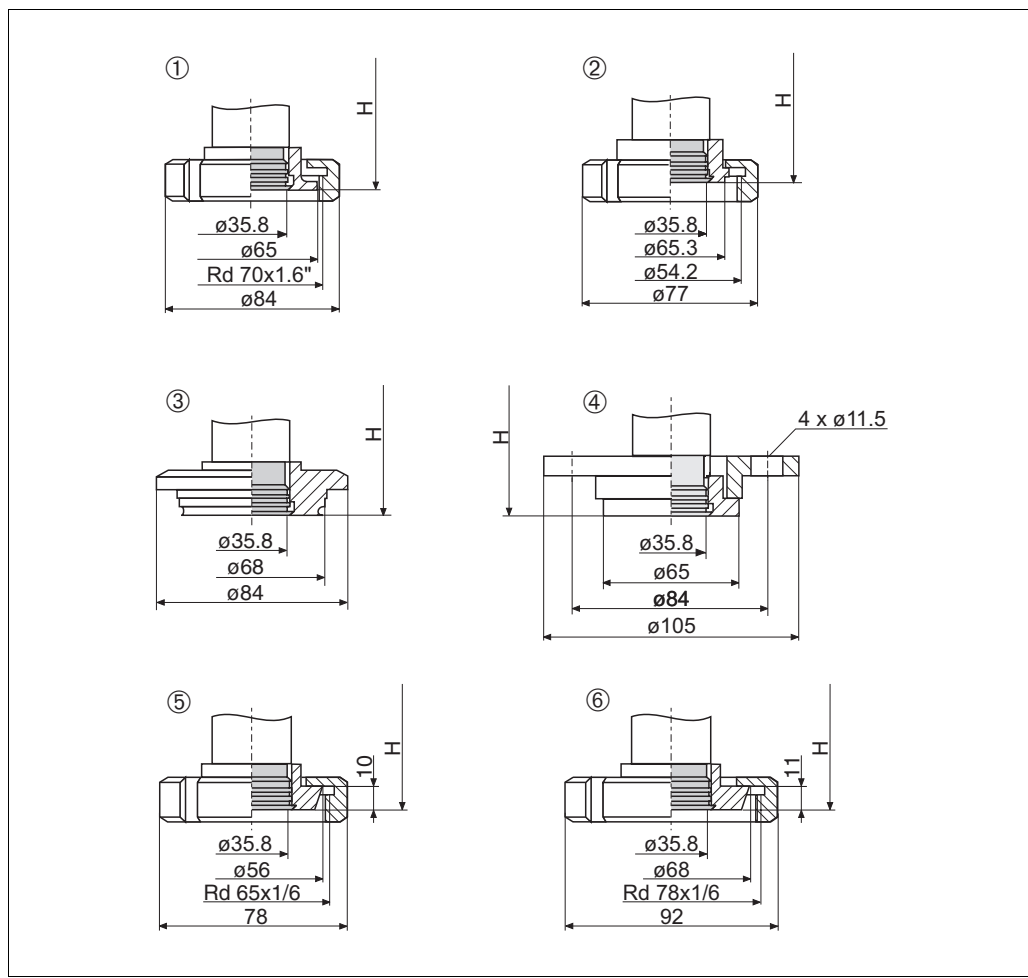
Tri-Clamp ISO 2852



P01-DB5xxxxx-06-xx-xx-xx-015

Process connection DB50L/DB50S, version 50: Tri-Clamp ISO 2852 DN 40 – DN 51 (2")/DIN 32676 DN 50, EHEDG, 3A;
Material: AISI 316L/1.4435; surface roughness of surfaces in contact with the medium $R_a \leq 0.8 \mu\text{m}$ as standard. Lower surface roughness on request.

Hygienic connections



P01-DB5xxxxx-06-xx-xx-xx-010

Hygienic connections DB50L: DIN 11851 with coupling nut, material: AISI 316L/1.4435, surface roughness of surfaces in contact with the medium $R_a \leq 0.8 \mu\text{m}$ as standard. Lower surface roughness on request.

- 1 Version 53: SMS 2" PN 25, EHEDG, 3A
- 2 Version 56: ISO 2385 IDF 2", EHEDG, 3A
- 3 Version 55: Varivent type N for pipes DN 40 – DN 162 PN 40, EHEDG
- 4 Version 44: DRD 65 mm PN 25, EHEDG, 3A
- 5 Version 40: DIN 11851 DN 40 PN 40
- 6 Version 41: DIN 11851 DN 50 PN 40

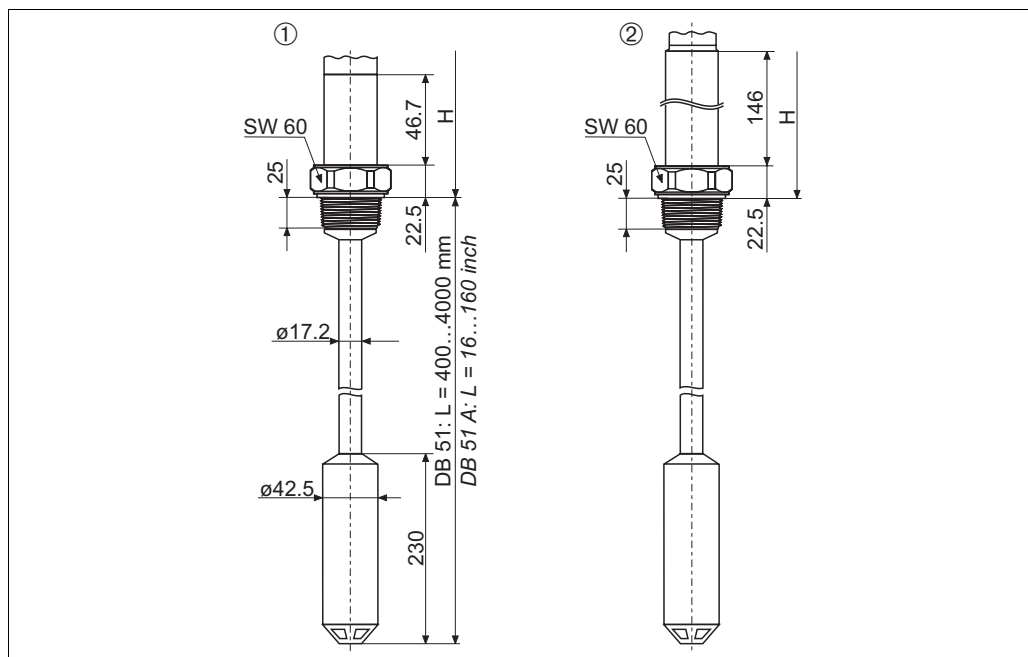
Installation height H, devices with universal process adapter, Tri-Clamp or hygienic connection

	Cover	Aluminum housing [mm]	Polyester housing [mm]	Stainless steel housing [mm]
Without a flame barrier	Flat	221	221	209
	High (with sight glass) ¹⁾	232	221	225

- 1) Devices with the FHB20 display and operating module are always supplied with a high cover or with a cover with a sight glass.

Process connections DB51 and DB51A (rod/pipe version)

Threaded connection ISO 228 and NPT

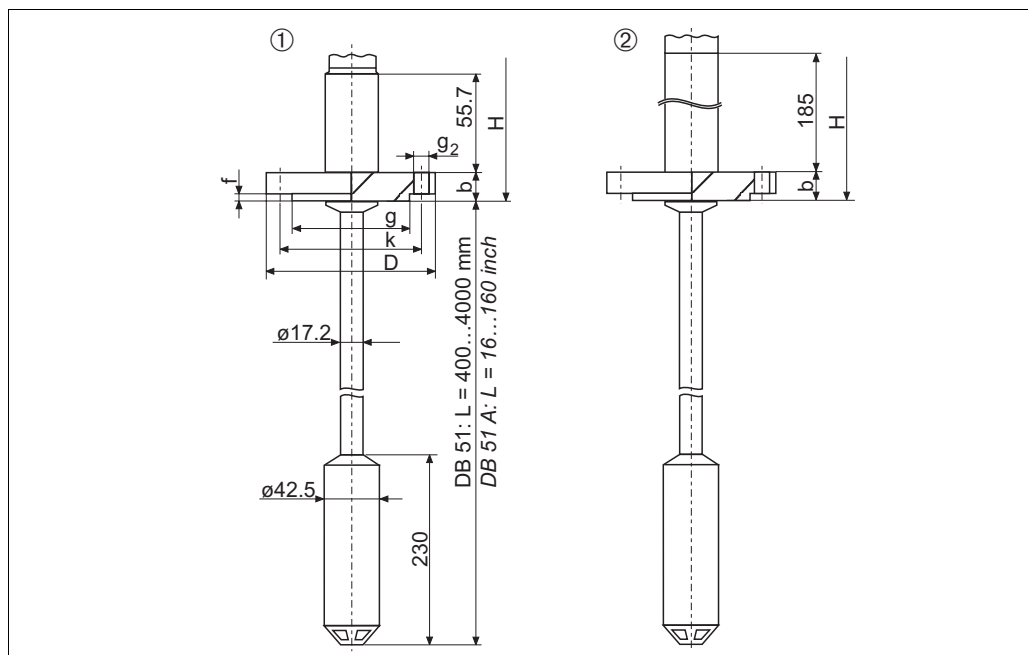


P01-DB5xxxxx-06-xx-xx-xx-026

DB51(A), rod version with thread

- 1 DB51(A), thread G 1 1/2 or 1 1/2 NPT without flame barrier
 2 DB51 (A), thread G 1 1/2 or 1 1/2 NPT with flame barrier
 (flame barrier for use in hazardous areas, Zone 0)
 H For installation height H, see Page 22

EN/DIN, ANSI and JIS flanges



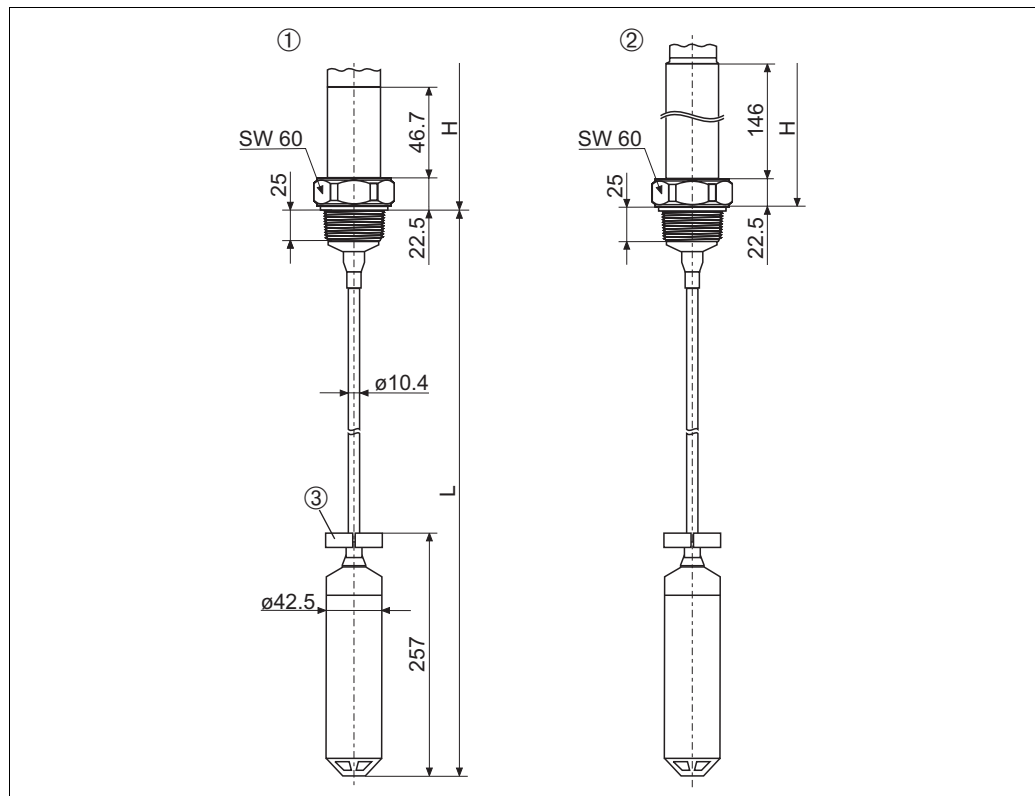
P01-DB5xxxxx-06-xx-xx-xx-027

DB51(A), rod version with flange

- 1 DB51(A), flange without flame barrier
 2 DB51(A), flange with flame barrier
 (flame barrier for use in hazardous areas, Zone 0)
 H For installation height H, see Page 24
 → For process connection dimensions, see Page 23 ff.

**Dimensions of Deltapilot S
DB52 and DB52A (cable
version)**

Threaded connection ISO 228 and NPT

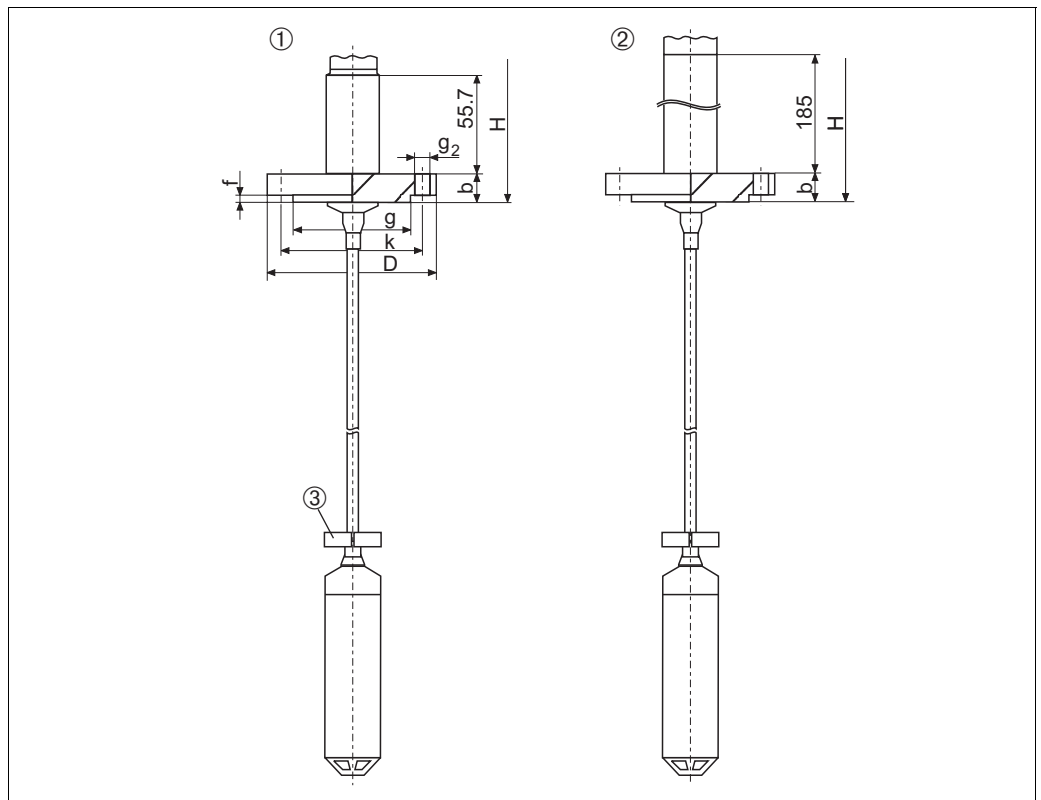


P01-DB5xxxxx-06-xx-xx-xx-028

DB52(A), cable version with thread

- 1 DB52(A), thread G 1 1/2 and 1 1/2 NPT without flame barrier
- 2 DB52(A), thread G 1 1/2 and 1 1/2 NPT with flame barrier
(flame barrier for use in hazardous areas, Zone 0)
- 3 Clamp for clamping fixture
- H For installation height H, see Page 22
- L Probe length:
Without approval, EEx nA II T6: 0.5 to 200 m (20 to 7874 inch)
EEx ia IIC T6, FM IS, CSA IS: 0.5 to 100 m (20 to 3937 inch)

EN/DIN, ANSI and JIS flanges

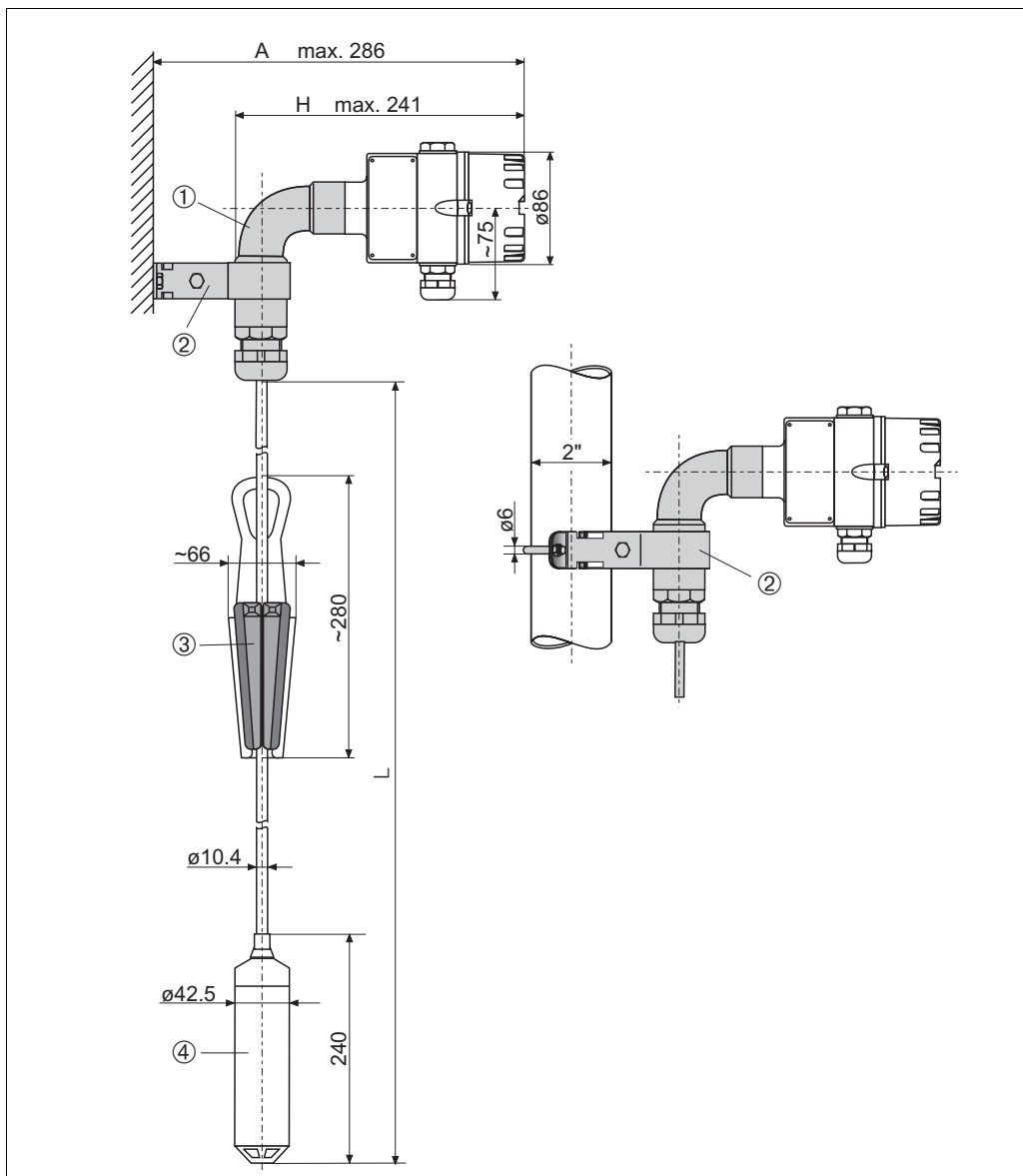


P01-DB5xxxxx-06-xx-xx-xx-029

DB52(A), cable version with flange

- 1 DB52(A), flange without flame barrier
 - 2 DB52(A), flange with flame barrier
(flame barrier for use in hazardous areas, Zone 0)
 - 3 Clamp for clamping fixture
 - H For installation height H, see Page 24
 - L Probe length:
Without approval, EEx nA II T6: 0.5 to 200 m (20 to 7874 inch)
EEx ia IIC T6, FM IS, CSA IS: 0.5 to 100 m (20 to 3937 inch)
- For process connection dimensions, see Page 23 ff.

Dimensions of Deltapilot S DB53 and DB53A (suspension clamp and mounting bracket)



P01-DB5xxxxx-06-xx-xx-xx-007

DB53 with suspension clamp and mounting bracket

- 1 Pipe bend
- 2 Mounting bracket for pipe and wall mounting
- 3 Suspension clamp
- 4 Measuring cell tube
- L Probe length:
Without approval, EEx nA II T6: 0.5 to 200 m (20 to 7874 inch)
EEx ia IIC T6, FM IS, CSA IS: 0.5 to 100 m (20 to 3937 inch)

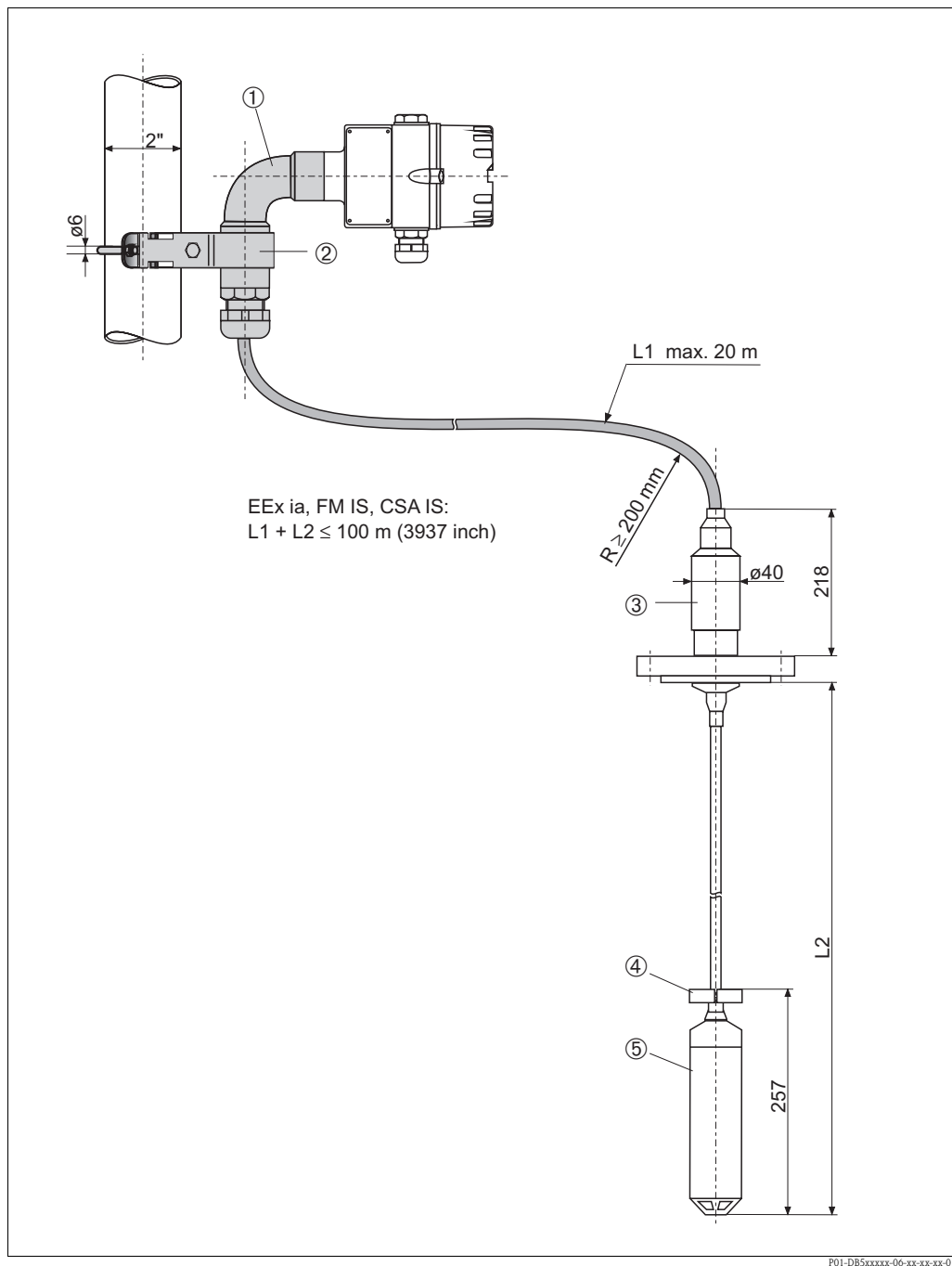
Dimension A

Cover	Aluminum housing	Polyester housing	Stainless steel housing
Flat	265 mm	273 mm	264 mm
High (with sight glass)	286 mm	273 mm	280 mm

Dimension H

Cover	Aluminum housing	Polyester housing	Stainless steel housing
Flat	219 mm	227 mm	218 mm
High (with sight glass)	240 mm	227 mm	234 mm

Dimensions of connecting cable with housing adapter and mounting bracket



Connecting cable with housing adapter and mounting bracket, here shown with a DB52

- 1 Pipe bend
- 2 Mounting bracket for pipe and wall mounting
- 3 Housing adapter
- 4 Clamp for clamping fixture
- 5 Measuring cell tube
- L Probe length

Note!

- For DB50, DB50L, DB51, DB52, order the housing adapter and the mounting bracket via feature 90 "Additional option" or subsequently as an accessory. → See also Page 19 and Page 56, "Housing adapter with mounting bracket" section.
- When using a housing adapter in the EEx ia, FM IS or CSA IS area, the total cable length (connecting cable (L1) + rope (L2)) must not exceed 100 m.

Weight**Housing**

	Aluminum housing	Polyester housing	Stainless steel housing
With flat cover, incl. electronic insert	0.8 kg	0.7 kg	0.9 kg
With high cover, incl. electronic insert	1.15 kg	0.7 kg	1.0 kg

Process connection DB50(A)

Process connection incl. sensor	Weight
Threaded connection without a flame barrier incl. sensor	0.8 kg
Threaded connection with a flame barrier incl. sensor	1.35 kg
Flange connection without a flame barrier incl. sensor, without a flange	0.45 kg
Flange connection with a flame barrier incl. sensor, without a flange	1.0 kg

Note!

- Total weight of device with threaded connection = weight of housing + weight of process connection DB50(A)
- Total weight of device with flange connection = weight of housing + weight of process connection DB50(A) + weight of flange (→ see Page 23 ff)

Deltapilot process connections DB50L and DB50S (food version)

Process connection incl. sensor	Weight
Tri-Clamp ISO 2852 DN 40 – DN 51 (2")/DIN 32676 DN 50	0.6 kg
SMS 2" incl. nut	0.95 kg
ISO 2385 IDF 2" incl. nut	1.0 kg
Varivent type N for pipes DN 40 – DN 162	0.9 kg
DRD 65 mm	1.05 kg
DIN 11851 dairy fitting DN 40 incl. nut	0.8 kg
DIN 11851 dairy fitting DN 50 incl. nut	1.1 kg
Universal process adapter	0.7 kg
Universal process adapter with 6 inch extended diaphragm seal	1.5 kg

Note!

- Total weight of device = weight of housing + weight of process connection DB50L and DB50S

Process connection and pipe DB51(A)

Process connection incl. sensor	Weight
Pipe incl. cable	0.77 kg/m
Threaded connection without a flame barrier incl. measuring cell tube and sensor	1.65 kg
Threaded connection with a flame barrier incl. measuring cell tube and sensor	2.2 kg
Flange connection without a flame barrier incl. measuring cell tube and sensor, without a flange	1.3 kg
Flange connection with a flame barrier incl. measuring cell tube and sensor, without a flange	1.85 kg

Note!

- Total weight of device with threaded connection = weight of housing + weight of pipe incl. cable x length + weight of process connection DB51(A)
- Total weight of device with flange connection = weight of housing + weight of pipe incl. cable x length + weight of process connection DB51(A) + weight of flange (→ see Page 23 ff)

Process connection and cable DB52(A)

Process connection incl. sensor	Weight
PE cable	0.13 kg/m
FEP cable	0.18 kg/m
Threaded connection without a flame barrier incl. measuring cell tube and sensor	1.65 kg
Threaded connection with a flame barrier incl. measuring cell tube and sensor	2.2 kg
Flange connection without a flame barrier incl. measuring cell tube and sensor, without a flange	1.3 kg
Flange connection with a flame barrier incl. measuring cell tube and sensor, without a flange	1.85 kg

Note!

- Total weight of device with threaded connection = weight of housing + weight of cable x length + weight of process connection DB52(A)
- Total weight of device with flange connection = weight of housing + weight of cable x length + weight of process connection DB52(A) + weight of flange (→ see Page 23 ff)

Process connection DB53 (A) – securing with suspension clamp and mounting bracket

Process connection incl. sensor	Weight
PE cable	0.13 kg/m
FEP cable	0.18 kg/m
Mounting bracket	0.2 kg
Pipe bend incl. cable entry	0.65 kg
Suspension clamp	0.4 kg
Measuring cell tube incl. sensor	1.0 kg

Note!

- Total weight of device = weight of housing + weight of cable x length + weight of mounting bracket + weight of pipe bend + weight of suspension clamp + weight of measuring cell tube

Weight of additional options





Accessories	Weight
Mounting bracket	0.2 kg
Pipe bend incl. cable entry	0.65 kg
Housing adapter for DB51(A) and DB 52(A)	0.85 kg
Housing adapter for DB50(A) and DB50L/S	0.7 kg

Material**Housing**

	Aluminum housing	Polyester housing	Stainless steel housing
Housing	EN AC-44300 (GD-AISI12) with synthetic coating, blue/gray	Fiberglass reinforced polyester, blue/gray (PBT-GF)	AISI 316L (1.4404)
Flat cover	EN AC-44300 with synthetic coating, gray	Fiberglass reinforced polyester, gray (PBT-GF)	AISI 316L (1.4404)
High cover with sight glass	EN AC-44300 with synthetic coating, gray	Polycarbonate (PC)	AISI 316L (1.4404)
Sight glass	Glass	Polycarbonate (PC)	Glass
Seal for housing cover	EPDM O-ring	Silicone O-ring (VQM)	Silicone molded seal (VQM, PTFE)

- Electronic insert: plastic ABS housing, cast electronic insert
- Process connections: AISI 316L (1.4435) or Alloy C4 (2.4610)
- Process diaphragm: Alloy C276 (2.4819)
- Measuring cell: AISI 316L (1.4435) or C276 (2.4819)
- Probe tube DB51(A): AISI 316L (1.4435) or Alloy C4 (2.4610)
- Rope DB52(A) and DB53(A): multi-core cable with steel wire braiding, FEP or PE insulation
- Measuring cell tube DB51(A), DB52(A) and DB53(A): AISI 316L (1.4435) or Alloy C4 (2.4610)/C22 (2.4602)
- Suspension clamp: AISI 316L (1.4404) and fiberglass reinforced polyamide (PA)
- Seals
 - For measuring cell sealing, see Ordering information, Page 36
 - Universal process adapter: silicone profile packing, suitable for foodstuffs in accordance with BGA XV FDA 21 CFR 177.2600
 - Process connection DRD: PTFE seal
- Protection cap for diaphragm DB51, DB52, DB53: PFA (perfluoralkoxy) plastic
- Clamp for clamping fixture for DB52(A): PFA (perfluoralkoxy) plastic, AISI 304 (1.4301)
- Housing adapter and pipe bend:
 - Housing adapter: AISI 316L (1.4435) and AISI 316 Ti (1.4571)
 - Multi-core cable with steel braiding, PE insulation
 - Pipe bend:
 - AISI 316 Ti (1.4571) and AISI 321 (1.4541)
 - Cable gland:
 - CuZn nickel-plated
 - O-ring: NBR
 - Sealing insert: TPE-V
 - O-ring: EPDM
- Mounting bracket: AISI 304 (1.4301)

Certificates and approvals

CE mark	The device meets the legal requirements of the EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.
Ex approvals	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. → See also Page 59 ff, "Safety Instructions" and "Installation/Control Drawings" sections.
Suitability for hygienic processes	<p>The Deltapilot S DB50L/DB50S is suitable for the employment in hygienic processes.</p> <p>Overview of permitted process connections from →  4.</p> <p>Many versions meet the requirements of 3A-Sanitary Standard No. 74 and are certified by the EHEDG.</p> <p> Note!</p> <p>The gap-free connections can be cleaned without residue using the usual cleaning methods.</p>  
Overfill protection	WHG (German Water Resources Act)
Seismic test	DB53 with FEB22 electronic insert passed in accordance with IEEE 344-1987.
Marine approval	DB50, DB50L, DB52 and DB53 with FEB17 electronic insert: German Lloyd, certificate No.: 99350 – 97 HH
Standards and guidelines	<p>DIN EN 60770 (IEC 60770): Transmitters for controlling in systems used in industrial process technology Part 1: Methods for evaluating the operating behavior</p> <p>DIN 16086: Electrical pressure measuring devices, pressure sensors, transmitters, pressure measuring devices Terms, specifications in data sheets</p> <p>EN 61326: Electrical equipment for control technology and laboratory application – EMC requirements</p>

Ordering information

DB50 – compact version

10	Approval:				
	A	Version for non-hazardous area			
	E	Version for non-hazardous area, overfill protection WHG			
	G	ATEX II 1/2 G EEx ia IIC T6			
	C	ATEX II 1/2 G EEx ia IIC T6, flame barrier			
	D	ATEX II 1/2 G EEx ia IIC T6, overfill protection WHG			
	B	ATEX II 1/2 G EEx ia IIC T6, flame barrier, overfill protection WHG			
	N	ATEX II 3 G EEx nA II T6			
	S	CSA IS, Class I, Division 1, Groups A – D			
	T	CSA IS, Class I, Division 2, Groups A – D			
20	Probe:				
	B	Compact version + inspection certificate as per EN 10204–3.1 material (AISI 316L wetted)			
	C	Compact version			
30	Process connection:				
					Threaded connections
			10	ISO 228 G 1 1/2, AISI 316L	
			11	ISO 228 G 1 1/2, Alloy C	
			12	ANSI 1 1/2 NPT, AISI 316L	
				EN flanges	
			20	DN 40 PN 10/16 B1, AISI 316L	
			21	DN 50 PN 10/16 B1, AISI 316L	
			22	DN 80 PN 10/16 B1, AISI 316L	
			23	DN 100 PN 10/16 B1, AISI 316L	
				ANSI flanges	
			30	1 1/2" 150 lbs RF, AISI 316/316L	
			31	2" 150 lbs RF, AISI 316/316L	
			32	3" 150 lbs RF, AISI 316/316L	
			33	4" 150 lbs RF, AISI 316/316L	
				JIS flanges	
			7B	10K 40A RF, AISI 316L	
			7C	10K 50A RF, AISI 316L	
			7D	10K 80A RF, AISI 316L	
			7L	10K 100A RF, AISI 316L	
40	Measuring range:				
			BA	0 to 100 mbar/1 mH ₂ O/40 inH ₂ O	
			BB	0 to 400 mbar/4 mH ₂ O/160 inH ₂ O	
			BC	0 to 1200 mbar/12 mH ₂ O/480 inH ₂ O	
			BD	0 to 4000 mbar/40 mH ₂ O/1600 inH ₂ O	
			BE	0 to 10 bar/100 mH ₂ O/4000 inH ₂ O	
			DA	–100 to 100 mbar/1 mH ₂ O/40 inH ₂ O	
			DB	–400 to 400 mbar/4 mH ₂ O/160 inH ₂ O	
			DC	–900 to 1200 mbar/12 mH ₂ O/480 inH ₂ O	
			DD	–900 to 4000 mbar/40 mH ₂ O/1600 inH ₂ O	
			DE	–0.9 to 10 bar/100 mH ₂ O/4000 inH ₂ O	
50	Linearity; Fill fluid:				
			1	< 0.2 % of measuring range; FDA compliant	
			2	< 0.2 % of measuring range; inert oil	
			3	< 0.1 % of measuring range; FDA compliant	
			4	< 0.1 % of measuring range; inert oil	
			Z	Additional specification	
60	Measuring sensor seal:				
			1	Viton	
			2	EPDM	
			5	Kalrez	
			3	Sensor welded	
DB50					Order code

→For continuation of ordering information for DB50, see the following page.

**DB50 – compact version
(continued)**

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DB50L – compact version for hygienic applications


Only in conjunction with an approved process connection

10				Approval:	
				A	Version for non-hazardous area
				E	Version for non-hazardous area, overfill protection WHG
				G	ATEX II 1/2 G EEx ia IIC T6
				D	ATEX II 1/2 G EEx ia IIC T6, overfill protection WHG
				N	ATEX II 3 G EEx nA II T6
				S	CSA IS, Class I, Division 1, Groups A – D
				T	CSA IS, Class I, Division 2, Groups A – D
20				Probe:	
				B	Compact version + inspection certificate as per EN 10204-3.1 material (AISI 316L wetted)
				C	Compact version
30				Process connection:	
					Tri-Clamp connections
			50		ISO 2852 DN 40 – 51 (2"), DIN 32676 DN 50, AISI 316L, EHEDG, 3A
					Hygienic connections
			53		SMS 2" PN 25, AISI 316L, EHEDG, 3A
			56		IDF 2" ISO 2853, AISI 316L, EHEDG, 3A
			55		Varivent type N for pipes DN 40 – DN 162, PN 40, AISI 316L, EHEDG
			44		DRD 65 mm, PN 25, AISI 316L, EHEDG, 3A
			00		Universal process adapter 44 mm incl. silicone molded seal, 3A
			57		Universal process adapter 44 mm, extension 6" incl. silicone molded seal, 3A
			40		DIN 11851 DN 40 PN 40, AISI 316L
			41		DIN 11851 DN 50 PN 40, AISI 316L
40				Measuring range:	
				BA	0 to 100 mbar/1 mH ₂ O/40 inH ₂ O
				BB	0 to 400 mbar/4 mH ₂ O/160 inH ₂ O
				BC	0 to 1200 mbar/12 mH ₂ O/480 inH ₂ O
				BD	0 to 4000 mbar/40 mH ₂ O/1600 inH ₂ O
				BE	0 to 10 bar/100 mH ₂ O/4000 inH ₂ O
				DA	–100 to 100 mbar/1 mH ₂ O/40 inH ₂ O
				DB	–400 to 400 mbar/4 mH ₂ O/160 inH ₂ O
				DC	–900 to 1200 mbar/12 mH ₂ O/480 inH ₂ O
				DD	–900 to 4000 mbar/40 mH ₂ O/1600 inH ₂ O
				DE	–0.9 to 10 bar/100 mH ₂ O/4000 inH ₂ O
50				Linearity; Fill fluid:	
				1	< 0.2 % of measuring range; FDA compliant
				3	< 0.1 % of measuring range; FDA compliant
60				Measuring sensor seal:	
				5	Kalrez
				4	Viton (only with universal process adapter)
				3	Sensor welded
DB50L					Order code

→For continuation of ordering information for DB50L, see the following page.

**DB50L – compact version for
hygienic applications
(continued)**

[illegible]

DB51 – rod version

10	Certificates:				
	A	Version for non-hazardous area			
	E	Version for non-hazardous area, overfill protection WHG			
	G	ATEX II 1/2 G EEx ia IIC T6			
	C	ATEX II 1/2 G EEx ia IIC T6, flame barrier			
	D	ATEX II 1/2 G EEx ia IIC T6, overfill protection WHG			
	B	ATEX II 1/2 G EEx ia IIC T6, flame barrier, overfill protection WHG			
	N	ATEX II 3 G EEx nA II T6			
	S	CSA IS, Class I, Division 1, Groups A – D			
	T	CSA IS, Class I, Division 2, Groups A – D			
20	Probe:				
		Probe length 400 to 4000 mm			
	E	... mm probe tube made of AISI 316L			
	F	... mm probe tube made of Alloy C			
30	Process connection:				
		Threaded connection			
	10	ISO 228 G 1 1/2, AISI 316L			
	11	ISO 228 G 1/2, Alloy C			
	12	ANSI 1 1/2 NPT, AISI 316L			
		EN flanges			
	20	DN 40 PN 10/16 B1, AISI 316L			
	21	DN 50 PN 10/16 B1, AISI 316L			
	22	DN 80 PN 10/16 B1, AISI 316L			
	23	DN 100 PN 10/16 B1, AISI 316L			
		ANSI flanges			
	31	2" 150 lbs RF, AISI 316/316L			
	32	3" 150 lbs RF, AISI 316/316L			
	33	4" 150 lbs RF, AISI 316/316L			
		JIS flanges			
	7B	10K 40A RF, AISI 316L			
	7C	10K 50A RF, AISI 316L			
	7D	10K 80A, RF, AISI 316L			
	7L	10K 100A RF, AISI 316L			
40	Measuring range:				
	BA	0 to 100 mbar/1 mH ₂ O/40 inH ₂ O			
	BB	0 to 400 mbar/4 mH ₂ O/160 inH ₂ O			
	BC	0 to 1200 mbar/12 mH ₂ O/480 inH ₂ O			
	BD	0 to 4000 mbar/40 mH ₂ O/1600 inH ₂ O			
	BE	0 to 10 bar/100 mH ₂ O/4000 inH ₂ O			
	DA	–100 to 100 mbar/1 mH ₂ O/40 inH ₂ O			
	DB	–400 to 400 mbar/4 mH ₂ O/160 inH ₂ O			
	DC	–900 to 1200 mbar/12 mH ₂ O/480 inH ₂ O			
	DD	–900 to 4000 bar/40 mH ₂ O/1600 inH ₂ O			
	DE	–0.9 to 10 bar/100 mH ₂ O/4000 inH ₂ O			
50	Linearity; Fill fluid:				
	1	< 0.2 % of measuring range; FDA compliant			
	2	< 0.2 % of measuring range; inert oil			
	3	< 0.1 % of measuring range; FDA compliant			
	4	< 0.1 % of measuring range; inert oil			
	Z	Additional specification			
60	Measuring sensor seal:				
	1	Viton			
	2	EPDM			
	5	Kalrez			
	3	Welded			
DB51					Order code

→For continuation of ordering information for DB51, see the following page.

[illegible]

DB52 – cable version with
process connection

10	Approval:				
	A	Version for non-hazardous area			
	E	Version for non-hazardous areas, overfill protection WHG			
	G	ATEX II 1/2 G	EEx ia IIC T6		
	3	ATEX II 1/2 G	EEx ia IIB T6		
	C	ATEX II 1/2 G	EEx ia IIC T6, flame barrier		
	1	ATEX II 1/2 G	EEx ia IIB T6, flame barrier		
	D	ATEX II 1/2 G	EEx ia IIC T6, overfill protection WHG		
	4	ATEX II 1/2 G	EEx ia IIB T6, overfill protection WHG		
	B	ATEX II 1/2 G	EEx ia IIC T6, flame barrier, overfill protection WHG		
	2	ATEX II 1/2 G	EEx ia IIB T6, flame barrier, overfill protection WHG		
	N	ATEX II 3 G	EEx nA II T6		
	S	CSA	IS, Class I, Division 1, Groups A – D		
	T	CSA	IS, Class I, Division 2, Groups A – D		
20	Probe:				
	K	... mm FEP rope (probe length: 0.5 to 200 m)			
	M	... mm PE rope (probe length: 0.5 to 200 m)			
	L	... mm FEP rope for EEx ia and CSA IS (probe length: 0.5 to 100 m)			
	N	... mm PE rope for EEx ia and CSA IS (probe length: 0.5 to 100 m)			
30	Process connection:				
			Threaded connection		
	10	ISO 228 G 1 1/2, AISI 316L			
	11	ISO 228 G 1 1/2, Alloy C			
	12	ANSI 1 1/2 NPT, AISI 316L			
		EN flanges			
	20	DN 40 PN 10/16 B1, AISI 316L			
	21	DN 50 PN 10/16 B1, AISI 316L			
	22	DN 80 PN 10/16 B1, AISI 316L			
	23	DN 100 PN 10/16 B1, AISI 316L			
		ANSI flanges			
	31	2" 150 lbs RF, AISI 316/316L			
	32	3" 150 lbs RF, AISI 316/316L			
	33	4" 150 lbs RF, AISI 316/316L			
		JIS flanges			
	7B	10 K 40 A RF, AISI 316L			
	7C	10K 50A RF, AISI 316L			
	7D	10K 80A RF, AISI 316L			
	7L	10 K 100 A RF, AISI 316L			
40	Measuring range:				
	BA	0 to 100 mbar/1 mH ₂ O/40 inH ₂ O			
	BB	0 to 400 mbar/4 mH ₂ O/160 inH ₂ O			
	BC	0 to 1200 mbar/12 mH ₂ O/480 inH ₂ O			
	BD	0 to 4000 mbar/40 mH ₂ O/1600 inH ₂ O			
	BE	0 to 10 bar/100 mH ₂ O/4000 inH ₂ O			
	DA	–100 to 100 mbar/1 mH ₂ O/40 inH ₂ O			
	DB	–400 to 400 mbar/4 mH ₂ O/160 inH ₂ O			
	DC	–900 to 1200 mbar/12 mH ₂ O/480 inH ₂ O			
	DD	–900 to 4000 mbar/40 mH ₂ O/1600 inH ₂ O			
	DE	–0.9 to 10 bar/100 mH ₂ O/4000 inH ₂ O			
50	Linearity; Fill fluid:				
	1	< 0.2 % of measuring range; FDA compliant			
	2	< 0.2 % of measuring range; inert oil			
	3	< 0.1 % of measuring range; FDA compliant			
	4	< 0.1 % of measuring range; inert oil			
	Z	Additional specification			
60	Measuring sensor seal:				
	1	Viton			
	2	EPDM			
	5	Kalrez			
	3	Sensor welded			
DB52					Order code

→For continuation of ordering information for DB52, see the following page.

**DB52 – cable version with
process connection
(continued)**

[illegible]

DB53 – cable version with suspension clamp

10	Approval:				
	A	Version for non-hazardous area			
	H	ATEX II 2 G EEx ia IIC T6			
	N	ATEX II 3 G EEx nA II T6			
	S	CSA IS, Class I, Division 1, Groups A – D			
	T	CSA IS, Class I, Division 2, Groups A – D			
20	Probe:				
	K	... mm FEP rope (probe length: 0.5 to 200 m)			
	M	... mm PE rope (probe length: 0.5 to 200 m)			
	L	... mm FEP rope for EEx ia, CSA IS (probe length: 0.5 to 100 m)			
	N	... mm PE rope for EEx ia, CSA IS (probe length: 0.5 to 100 m)			
30	Process connection:				
	70	Cable probe without suspension clamp			
	71	Suspension clamp AISI 316L			
40	Measuring range:				
	BA	0 to 100 mbar/1 mH ₂ O/40 inH ₂ O			
	BB	0 to 400 mbar/4 mH ₂ O/160 inH ₂ O			
	BC	0 to 1200 mbar/12 mH ₂ O/480 inH ₂ O			
	BD	0 to 4000 mbar/40 mH ₂ O/1600 inH ₂ O			
	BE	0 to 10 bar/100 mH ₂ O/4000 inH ₂ O			
50	Linearity; Fill fluid:				
	1	< 0.2 % of measuring range; FDA compliant			
	2	< 0.2 % of measuring range; inert oil			
	3	< 0.1 % of measuring range; FDA compliant			
	4	< 0.1 % of measuring range; inert oil			
	Z	Additional specification			
60	Measuring sensor seal:				
	1	Viton			
	2	EPDM			
	5	Kalrez			
	3	Sensor welded			
70	Electronics; Output:				
	Electronic inserts without integrated overvoltage protection				
	A	Without integrated electronic insert (e.g. for ordering spare parts)			
	B	FEB11, 3-wire analog signal			
	C	FEB17, 2-wire PFM signal			
	E	FEB22, 4 to 20 mA, HART			
	G	FEB22, 4 to 20 mA, HART, with FHB20 onsite display			
	H	FEB24, PROFIBUS PA			
	K	FEB24, PROFIBUS PA, with FHB20 onsite display			
	1	FEB26, FOUNDATION Fieldbus			
	2	FEB26, FOUNDATION Fieldbus, with FHB20 onsite display			
	Electronic inserts with integrated overvoltage protection				
	M	FEB11P, 3-wire analog signal			
	N	FEB17P, 2-wire PFM signal			
	R	FEB22P, 4 to 20 mA, HART			
	T	FEB22P, 4 to 20 mA, HART, with FHB20 onsite display			
	U	FEB24P, PROFIBUS PA			
	W	FEB24P, PROFIBUS PA, with FHB20 onsite display			
DB53					Order code

→For continuation of ordering information for DB53, see the following page.

**DB53 – cable version with
suspension clamp
(continued)**

80										Housing; Cable entry:	
										A0	Without housing (e.g. for ordering spare parts)
										G1	Polyester housing IP 66, gland M 20x1.5
										G2	Aluminum housing IP 66, gland M 20x1.5
										G3	Stainless steel housing AISI 316L IP 66, gland M 20x1.5
										P2	Aluminum housing IP 66, plug M 12x1
										P3	Stainless steel housing AISI 316L IP 66, plug M 12x1
										T2	Aluminum housing IP 66, plug 7/8"
										T3	Stainless steel housing AISI 316L IP 66, plug 7/8"
										E1	Polyester housing NEMA 4X, thread 1/2 NPT
										E2	Aluminum housing NEMA 4X, thread 1/2 NPT
										E3	Stainless steel housing AISI 316L NEMA 4X, thread 1/2 NPT
										F1	Polyester housing IP 66, thread G 1/2 A
										F2	Aluminum housing IP 66, thread G 1/2 A
										F3	Stainless steel housing IP 66, thread G 1/2 A
90										Additional option:	
										0	Basic version
										A	Basic version, adjusted measuring range
DB53											Complete order code

DB50A – compact version

10	Approval:				
	A	Version for non-hazardous area			
	N	ATEX II 3 G EEx nA II T6			
	O	FM IS, Class I, Division 1, 2, Groups A – D			
	S	CSA IS, Class I, Division 1, Groups A – D			
	T	CSA IS, Class I, Division 2, Groups A – D			
20	Probe:				
	C	Compact version			
30	Process connection:				
				Threaded connection	
	12	ANSI 1 1/2 NPT, AISI 316L			
				ANSI flanges	
	30	1 1/2" 150 lbs RF, AISI 316/316L			
	31	2" 150 lbs RF, AISI 316/316L			
	32	3" 150 lbs RF, AISI 316/316L			
	33	4" 150 lbs RF, AISI 316/316L			
				JIS flange	
	7C	JIS 10 K 50 A RF, AISI 316L			
40	Measuring range:				
	FA	0 to 1.5 psi/1 mH ₂ O/40 inH ₂ O			
	FB	0 to 6 psi/4 mH ₂ O/160 inH ₂ O			
	FC	0 to 15 psi/12 mH ₂ O/480 inH ₂ O			
	FD	0 to 60 psi/40 mH ₂ O/1600 inH ₂ O			
	FE	0 to 150 psi/100 mH ₂ O/4000 inH ₂ O			
	GA	–1.5 to 1.5 psi/1 mH ₂ O/40 inH ₂ O			
	GB	–6 to 6 psi/4 mH ₂ O/160 inH ₂ O			
	GC	–13 to 15 psi/12 mH ₂ O/480 inH ₂ O			
	GD	–13 to 60 psi/40 mH ₂ O/1600 inH ₂ O			
	GE	–13 to 150 psi/100 mH ₂ O/4000 inH ₂ O			
50	Linearity; Fill fluid:				
	1	< 0.2 % of measuring range; FDA compliant			
	2	< 0.2 % of measuring range; inert oil			
	3	< 0.1 % of measuring range; FDA compliant			
	4	< 0.1 % of measuring range; inert oil			
	Z	See additional specification			
60	Measuring sensor seal:				
	1	Viton			
	2	EPDM			
	5	Kalrez			
	3	Sensor welded			
70	Electronics; Output:				
		Electronic inserts without integrated overvoltage protection			
	A	Without integrated electronic insert (e.g. for ordering spare parts)			
	B	FEB11, 3-wire analog signal			
	C	FEB17, 2-wire PFM signal			
	E	FEB22, 4 to 20 mA, HART			
	G	FEB22, 4 to 20 mA, HART, with FHB20 onsite display			
	H	FEB24, PROFIBUS PA			
	K	FEB24, PROFIBUS PA, with FHB20 onsite display			
	1	FEB26, FOUNDATION Fieldbus			
	2	FEB26, FOUNDATION Fieldbus, with FHB20 onsite display			
		Electronic inserts with integrated overvoltage protection			
	M	FEB11P, 3-wire analog signal			
	N	FEB17P, 2-wire PFM signal			
	R	FEB22P, 4 to 20 mA, HART			
	T	FEB22P, 4 to 20 mA, HART, with FHB20 onsite display			
	U	FEB24P, PROFIBUS PA			
	W	FEB24P, PROFIBUS PA, with FHB20 onsite display			
DB50A					Order code

→For continuation of ordering information for DB50A, see the following page.

[illegible]

DB50S – compact version for hygienic applications


Only in conjunction with an approved process connection

10	Approval:				
	A	Version for non-hazardous area			
	N	ATEX II 3 G EEx nA II T6			
	O	FM IS, Class I, Division 1 and 2, Groups A – D			
	S	CSA IS, Class I, Division 1, Groups A – D			
	T	CSA IS, Class I, Division 2, Groups A – D			
20	Probe:				
	C	Compact version			
30	Process connection:				
	00	Universal process adapter 44 mm incl. silicone molded seal, 3A			
	57	Universal process adapter 44 mm, extension 6 inch, incl. silicone molded seal, 3A			
	50	Tri-Clamp ISO 2852 DN 40 – 51 (2") AISI 316L, EHEDG, 3A			
40	Measuring range				
	FA	0 to 1.5 psi/1 mH ₂ O/40 inH ₂ O			
	FB	0 to 6 psi/4 mH ₂ O/160 inH ₂ O			
	FC	0 to 15 psi/12 mH ₂ O/480 inH ₂ O			
	FD	0 to 60 psi/40 mH ₂ O/1600 inH ₂ O			
	FE	0 to 150 psi/100 mH ₂ O/4000 inH ₂ O			
	GA	–1.5 to 1.5 psi/1 mH ₂ O/40 inH ₂ O			
	GB	–6 to 6 psi/4 mH ₂ O/160 inH ₂ O			
	GC	–13 to 15 psi/12 mH ₂ O/480 inH ₂ O			
	GD	–13 to 60 psi/40 mH ₂ O/1600 inH ₂ O			
	GE	–13 to 150 psi/100 mH ₂ O/4000 inH ₂ O			
50	Linearity; Fill fluid:				
	1	< 0.2 % of measuring range; FDA compliant			
	3	< 0.1 % of measuring range; FDA compliant			
60	Measuring sensor seal:				
	5	Kalrez			
	4	Viton (only with universal process adapter)			
	3	Sensor welded			
70	Electronics; Output:				
	Electronic inserts without integrated overvoltage protection				
	A	Without integrated electronic insert (e.g. for ordering spare parts)			
	B	FEB11, 3-wire analog signal			
	C	FEB17, 2-wire PFM signal			
	E	FEB22, 4 to 20 mA, HART			
	G	FEB22, 4 to 20 mA, HART, with FHB20 onsite display			
	H	FEB24, PROFIBUS PA			
	K	FEB24, PROFIBUS PA, with FHB20 onsite display			
	1	FEB26, FOUNDATION Fieldbus			
	2	FEB26, FOUNDATION Fieldbus, with FHB20 onsite display			
	Electronic inserts with integrated overvoltage protection				
	M	FEB11P, 3-wire analog signal			
	N	FEB17P, 2-wire PFM signal			
	R	FEB22P, 4 to 20 mA, HART			
	T	FEB22P, 4 to 20 mA, HART, with FHB20 onsite display			
	U	FEB24P, PROFIBUS PA			
	W	FEB24P, PROFIBUS PA, with FHB20 onsite display			
DB50S					Order code

→For continuation of ordering information for DB50S, see the following page.

[illegible]

DB51A – rod version

10	Approval:									
	A	Version for non-hazardous area								
	N	ATEX II 3 G EEx nA II T6								
	O	FM IS, Class I, Division 1, 2, Groups A – D								
	S	CSA IS, Class I, Division 1, Groups A – D								
	T	CSA IS, Class I, Division 2, Groups A – D								
20	Probe:									
		Probe length 16 to 160 inch								
	G	... inch, AISI 316L								
30	Process connection:									
		Threaded connection								
	12	ANSI 1 1/2 NPT, AISI 316L								
		ANSI flanges								
	31	2" 150 lbs RF, AISI 316/316L								
	32	3" 150 lbs RF, AISI 316/316L								
	33	4" 150 lbs RF, AISI 316/316L								
		JIS flanges								
	7C	JIS 10 K 50 A RF, AISI 316L								
40	Measuring range:									
	FA	0 to 1.5 psi/1 mH ₂ O/40 inH ₂ O								
	FB	0 to 6 psi/4 mH ₂ O/160 inH ₂ O								
	FC	0 to 15 psi/12 mH ₂ O/480 inH ₂ O								
	FD	0 to 60 psi/40 mH ₂ O/1600 inH ₂ O								
	FE	0 to 150 psi/100 mH ₂ O/4000 inH ₂ O								
	GA	–1.5 to 1.5 psi/1 mH ₂ O/40 inH ₂ O								
	GB	–6 to 6 psi/4 mH ₂ O/160 inH ₂ O								
	GC	–13 to 15 psi/12 mH ₂ O/480 inH ₂ O								
	GD	–13 to 60 psi/40 mH ₂ O/1600 inH ₂ O								
	GE	–13 to 150 psi/100 mH ₂ O/4000 inH ₂ O								
50	Linearity; Fill fluid:									
	1	< 0.2 % of measuring range; FDA compliant								
	2	< 0.2 % of measuring range; inert oil								
	3	< 0.1 % of measuring range; FDA compliant								
	4	< 0.1 % of measuring range; inert oil								
	Z	Additional specification								
60	Measuring sensor seal:									
	1	Viton								
	2	EPDM								
	5	Kalrez								
	3	Sensor welded								
70	Electronics; Output:									
		Electronic inserts without integrated overvoltage protection								
	A	Without integrated electronic insert (e.g. for ordering spare parts)								
	B	FEB11, 3-wire analog signal								
	C	FEB17, 2-wire PFM signal								
	E	FEB22, 4 to 20 mA, HART								
	G	FEB22, 4 to 20 mA, HART, with FHB20 onsite display								
	H	FEB24, PROFIBUS PA								
	K	FEB24, PROFIBUS PA, with FHB20 onsite display								
	1	FEB26, FOUNDATION Fieldbus								
	2	FEB26, FOUNDATION Fieldbus, with FHB20 onsite display								
		Electronic inserts with integrated overvoltage protection								
	M	FEB11P, 3-wire analog signal								
	N	FEB17P, 2-wire PFM signal								
	R	FEB22P, 4 to 20 mA, HART								
	T	FEB22P, 4 to 20 mA, HART, with FHB20 onsite display								
	U	FEB24P, PROFIBUS PA								
	W	FEB24P, PROFIBUS PA, with FHB20 onsite display								
DB51A										Order code

→For continuation of ordering information for DB51A, see the following page.

**DB51A – rod version
(continued)**

80										Housing; Cable entry:	
										A0	Without housing (e.g. for ordering spare parts)
										E1	Polyester housing NEMA 4X, thread 1/2 NPT
										E2	Aluminum housing NEMA 4X, thread 1/2 NPT
										E3	AISI 316L housing, NEMA 4X, thread 1/2 NPT
										P2	Aluminum housing, IP 66, plug M12x1
										P3	AISI 316L housing, IP 66, plug M12x1
										T2	Aluminum housing, IP 66, plug 7/8"
										T3	AISI 316L housing, IP 66, plug 7/8"
90										Additional option:	
										0	Basic version
										5	200 inch connecting cable with housing adapter, NEMA 6P, separate electronics
										7	...inch connecting cable with housing adapter, NEMA 6P, separate electronics, max. 800 inch
										A	Basic version, adjusted measuring range
										D	200 inch connecting cable with housing adapter, NEMA 6P, separate electronics, adjusted measuring range
DB51A											Complete order code

→For continuation of ordering information for DB52A, see the following page.

DB53A – cable version with suspension clamp

10	Approval:				
	A	Version for non-hazardous area			
	N	ATEX II 3 G EEx nA II T6			
	O	FM IS, Class I, Division 1, 2, Groups A – D			
	S	CSA IS, Class I, Division 1, Groups A – D			
	T	CSA IS, Class I, Division 2, Groups A – D			
20	Probe:				
	P	... inch FEP rope (probe length: 20 to 7874 inch)			
	R	... inch PE rope (probe length: 20 to 7874 inch)			
	S	... inch FEP rope for EEx ia, CSA IS, FM IS (probe length: 20 to 3937 inch)			
	T	... inch PE rope for EEx ia, CSA IS, FM IS (probe length: 20 to 3937 inch)			
30	Process connection:				
	70	Cable probe without suspension clamp			
	71	Suspension clamp AISI 316L			
	7C	Flange JIS 10 K 50 A RF, AISI 316L			
40	Measuring range:				
	FA	0 to 1.5 psi/1 mH ₂ O/40 inH ₂ O			
	FB	0 to 6 psi/4 mH ₂ O/160 inH ₂ O			
	FC	0 to 15 psi/12 mH ₂ O/480 inH ₂ O			
	FD	0 to 60 psi/40 mH ₂ O/1600 inH ₂ O			
	FE	0 to 150 psi/100 mH ₂ O/4000 inH ₂ O			
50	Linearity; Fill fluid:				
	1	< 0.2 % of measuring range; FDA compliant			
	2	< 0.2 % of measuring range; inert oil			
	3	< 0.1 % of measuring range; FDA compliant			
	4	< 0.1 % of measuring range; inert oil			
	Z	Additional specification			
60	Measuring sensor seal:				
	1	Viton			
	2	EPDM			
	5	Kalrez			
	3	Sensor welded			
70	Electronics; Output:				
	Electronic inserts without integrated overvoltage protection				
	A	Without integrated electronic insert (e.g. for ordering spare parts)			
	B	FEB11, 3-wire analog signal			
	C	FEB17, 2-wire PFM signal			
	E	FEB22, 4 to 20 mA, HART			
	G	FEB22, 4 to 20 mA, HART, with FHB20 onsite display			
	H	FEB24, PROFIBUS PA			
	K	FEB24, PROFIBUS PA, with FHB20 onsite display			
	1	FEB26, FOUNDATION Fieldbus			
	2	FEB26, FOUNDATION Fieldbus, with FHB20 onsite display			
	Electronic inserts with integrated overvoltage protection				
	M	FEB11P, 3-wire analog signal			
	N	FEB17P, 2-wire PFM signal			
	R	FEB22P, 4 to 20 mA, HART			
	T	FEB22P, 4 to 20 mA, HART, with FHB20 onsite display			
	U	FEB24P, PROFIBUS PA			
	W	FEB24P, PROFIBUS PA, with FHB20 onsite display			
DB53A					Order code

→For continuation of ordering information for DB53A, see the following page.

Accessories

Display and operating module FHB20

The FHB20 display and operating module is available for onsite operation for the following electronic inserts.

- HART – FEB22(P)
- PROFIBUS PA – FEB24(P)
- FOUNDATION Fieldbus – FEB26
- Material: POM (polyoxymethylene)
- Order number: 942512-0100

Note!

- The display and operating module only fits under a cover with a sight glass (high cover), see this chapter, "Cover with sight glass" section. If you order the FHB20 onsite display by means of the order structure, the Deltapilot S with a high cover is delivered (→ see Page 37, "Ordering information" chapter, feature 70 "Electronic insert").
- Once you have configured a device with the FHB20 display and operating module, you can remove the display and use it to configure other devices. Only remove the display from an electronic insert, or attach it to an electronic insert, in a deenergized state.
- → See also Page 10, "Human interface" chapter.

Cover with sight glass (high cover)

Cover with sight glass depending on the housing version:

	For aluminum housing	For polyester housing	For stainless steel housing
Material	EN AC-44200 with synthetic coating, gray, sight glass: glass	Cover (transparent): polycarbonate (PC)	AISI 316L (1.4404), sight glass: glass
Order number	942828-0010	942828-0001	942828-0100

Housing adapter with mounting bracket for humid, damp and difficult-to-access mounting locations

With the housing adapter and mounting bracket, you have the option of mounting the housing with the electronic insert away from the measuring point. This allows problem-free measurement

- under particularly difficult measuring conditions (in confined or difficult-to-access mounting locations)
- in the event of extreme fluctuations in temperature at the tank wall

IP 68 protection applies for the housing adapter. The mounting bracket is suitable for pipe and wall mounting. → See also page 19, "Housing adapter with mounting bracket" section and Page 31, "Dimensions" section.

Order code	Version
HDB50-A	5 m PE cable with mounting bracket AISI 304 (1.4301)
HDB50-B	... m PE cable (1 to 30 m) with mounting bracket AISI 304 (1.4301)
HDB50-C	5 m FEP cable with mounting bracket AISI 304 (1.4301)
HDB50-D	... m FEP cable (1 to 30 m) with mounting bracket AISI 304 (1.4301)

Mounting bracket

Mounting bracket for pipe and wall mounting:

- Material: AISI 304 (1.4301)
- Order number: 919806-1000

→ See also Page 19, "Housing adapter with mounting bracket" section and Page 30, "Dimensions of Deltapilot S DB53 and DB53 (A) "Suspension clamp and mounting bracket" section.

Rope shortening kit

Rope shortening kit for cable between housing adapter and mounting bracket:

- Order number: 935666-0020

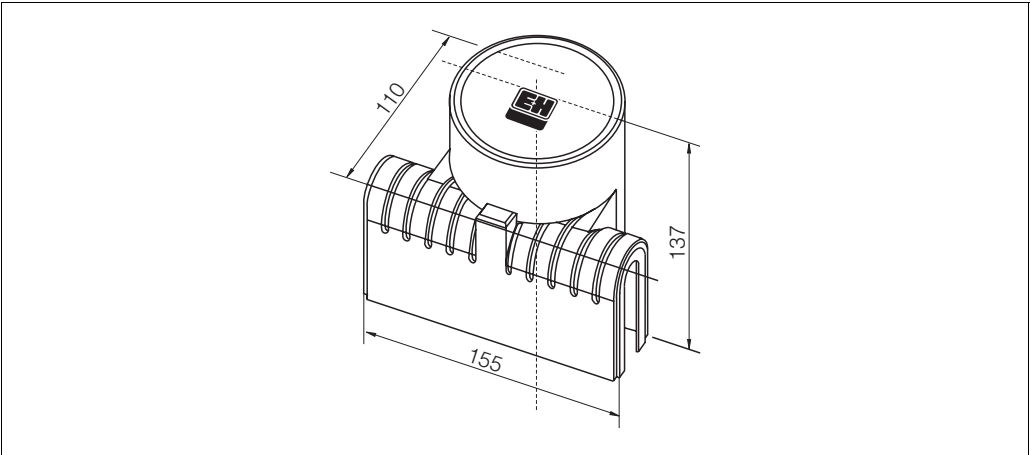
Suspension clamp

Suspension clamp for Deltapilot S DB53:

- Material: stainless steel AISI 316L (1.4435), clamping jaw: fiberglass reinforced PA (polyamide)
- Order number: 52010869

→ See also Page 30, "Dimensions of Deltapilot S DB53 and DB53(A) "Suspension clamp and mounting bracket" section.

Protective cover

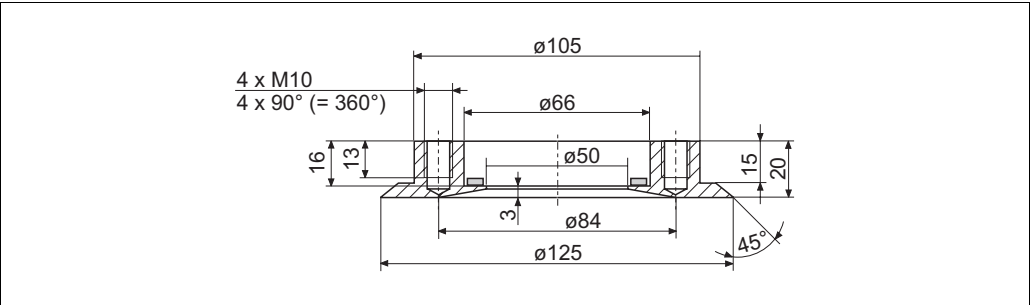


P01-DB5xxxxx-00-xx-xx-xx-001

Protection cover

- For the aluminum and polyester housing, Endress+Hauser offers protective covers with two cable entries.
- Max. ambient temperature: +70°C (+158°F)
 - Material: polyamide (PA)
 - Order number for protection cover for devices with a flat cover: 942262-0000
 - Order number for protection cover for devices with a high cover: 942262-0001

Welding flanges



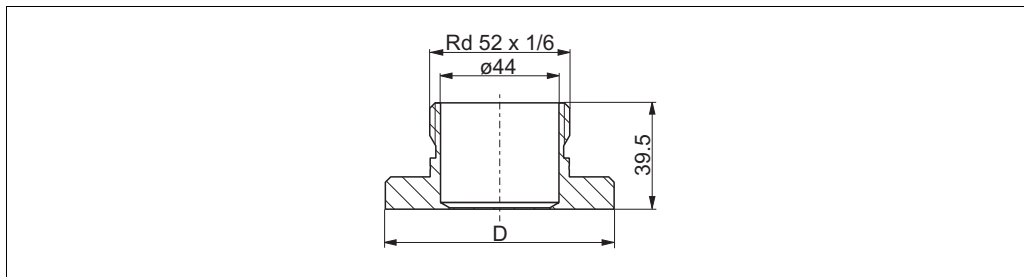
P01-DB5xxxxx-00-xx-xx-xx-032

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

Version	Order number
DRD DN 50, AISI 316L (1.4435)	52002041
DRD DN 50, 3.1, AISI 304 (1.4301)	52011899
DRD DN 50, AISI 304 (1.4301)	916743-0000

Note!

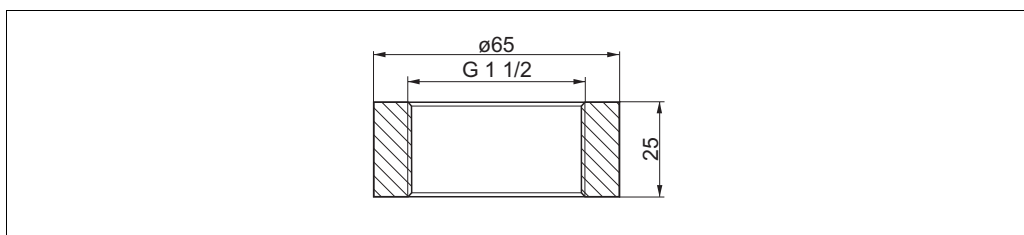
- Order number for a replacement PTFE flat seal (5 pieces): 52024228

**Welding neck adapter for
universal process adapter**


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

Welding neck adapter for flush mounting a Deltapilot S DB50L/DB50S with a universal process adapter

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

**Welding neck adapter thread
ISO G 1 1/2**


P01-PMx4xxxx-06-09-xx-xx-000

Welding neck adapter for flush mounting a Deltapilot S DB50 with thread ISO 228 G 1 1/2 A
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 a DB50L with a universal process connection in a DRD, dairy fitting or Clamp connection:

Version	Order number
DRD 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

Documentation

Field of Activities	<ul style="list-style-type: none"> ■ Pressure measurement, powerful measuring devices for process pressure, differential pressure, level and flow: FA004P/00/en
Technical Information on switching unit	<ul style="list-style-type: none"> ■ Level measurement, silometer FMC4120: TI077F/00/en ■ Level measurement, Prolevel FMB662: TI234F/00/en
Operating Instructions	<ul style="list-style-type: none"> ■ Deltapilot S HART: BA152P/00/en ■ Deltapilot S PROFIBUS PA: BA164F/00/en ■ Deltapilot S FOUNDATION Fieldbus: BA232F/00/en ■ PROFIBUS DP/PA, Guidelines for planning and commissioning: BA034S/04/en ■ FOUNDATION Fieldbus Overview, Installation and Commissioning Guidelines: BA013S/04/en

Safety Instructions

Certificate/explosion protection	Device	Electronics	Documentation
ATEX II 1/2 G EEx ia IIC T6	DB50, DB50L, DB51, DB52	<ul style="list-style-type: none"> – PFM – 4 to 20 mA HART – PROFIBUS PA – FOUNDATION Fieldbus 	<ul style="list-style-type: none"> – XA002F – XA002F – XA007F – XA135F
ATEX II 2 G EEx ia IIC T6	DB53	<ul style="list-style-type: none"> – PFM – 4 to 20 mA HART – PROFIBUS PA – FOUNDATION Fieldbus 	<ul style="list-style-type: none"> – XA002F – XA002F – XA007F – XA135F
ATEX 1/2 G EEx nA II T6	DB50, DB50L, DB51, DB52, DB53	<ul style="list-style-type: none"> – PFM – 4 to 20 mA HART – PROFIBUS PA – FOUNDATION Fieldbus 	<ul style="list-style-type: none"> – XA189F – XA189F – XA189F – XA189F
ATEX II 1/2 G EEx ia IIB T6	DB52	<ul style="list-style-type: none"> – PFM – 4 to 20 mA HART – PROFIBUS PA – FOUNDATION Fieldbus 	<ul style="list-style-type: none"> – XA002F – XA002F – XA007F – XA135F

Installation Drawings/ Control Drawings

Certificate/explosion protection	Device	Electronics	Documentation
CSA IS Class I, Division 1, Groups A-D	DB50(A), DB50L, DB50S, DB51(A), DB 52(A), DB53(A)	<ul style="list-style-type: none"> – PFM – 4 to 20 mA HART – PROFIBUS PA – FOUNDATION Fieldbus 	<ul style="list-style-type: none"> – ZD227P – ZD226P – ZD036F + ZD021F – ZD068F + ZD021F
FM IS Class I, Division 1, 2 Groups A-D	DB50A, DB50S, DB51A, DB52A, DB53A	<ul style="list-style-type: none"> – PFM/4 to 20 mA HART – PROFIBUS PA – FOUNDATION Fieldbus 	<ul style="list-style-type: none"> – ZD228P – ZD024F + ZD021F – ZD067F + ZD021F

Overfill protection	<ul style="list-style-type: none"> ■ WHG: ZE217F/00/en: HART ■ WHG: ZE238F/00/en: PROFIBUS PA
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