

Hydrostatic Level Measurement

deltapilot S DB 50, DB 51, DB 52

deltapilot S DB 50 L

deltapilot S DB 53

Pressure sensors with CONTITE measuring cell
watertight, condensation-free, stable
For foodstuffs, water, wastewater, chemicals
and pharmaceuticals



Application

The Deltapilot S product range is designed for continuous level measurement of liquids and pastes in the chemical, pharmaceutical and foodstuffs industries as well as in water and wastewater treatment. Together with an appropriate transmitter they can be used to:

- determine level, volume, differential pressure, product weight, density,
- control limit contacts and
- integrate the measuring point into various automation systems.

Features and Benefits

- New "CONTITE" measuring cell:
 - watertight, condensation-free, with long-term stability,
 - excellent linearity (better than 0.1% of measuring range),
 - low temperature coefficient (better than 0.1%/10 K).
- Probes in compact, rod or rope versions.
- Separate mounting of housing and electronic insert (protection IP 68 at the measuring point).
- Easy and simple operation with Smart electronic inserts:
 - with FHB 20 display directly on-site,
 - with intelligent data protocols (INTENSOR; HART) or
 - using an interface card to connect to a personal computer via Rackbus or to PROFIBUS-PA.

Endress + Hauser

The Power of Know How

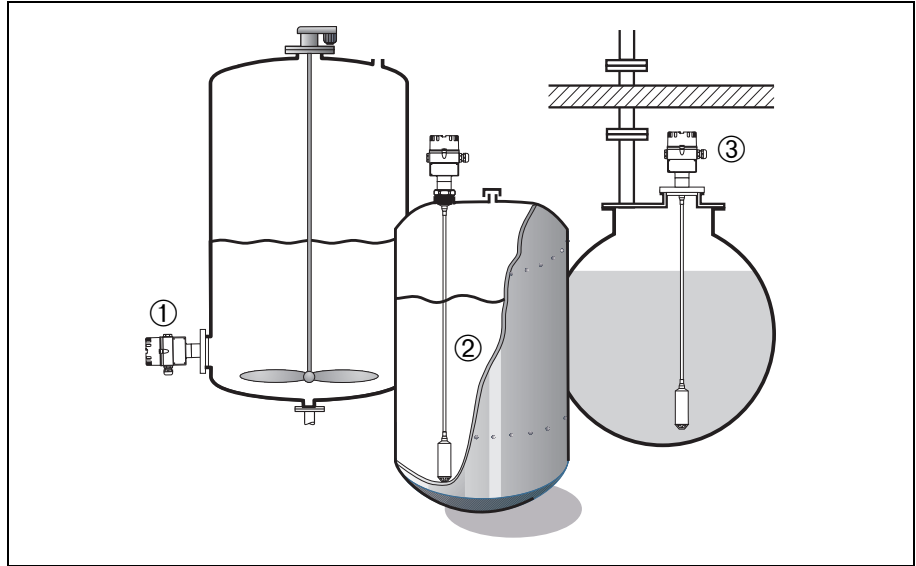


Versions

For Pumped Liquids

- DB 50 compact version,
- DB 51 version with rod extension,
- DB 52 version with rope extension

- ① Deltapilot S DB 50 compact version
- ② Deltapilot S DB 51 with rod extension
- ③ Deltapilot S DB 52 with rope extension



Modular Probes for a Perfect Fit

- Compact version
 - mounted in the tank wall or base.
- Rod or rope version
 - top mounted, i.e. simple equipping and retrofitting of buried tanks,
 - requires no extra openings in the base of the tank.
- Housing adapter
 - for high flood risk – allows separate mounting of housing, electronic insert, and operation remote from the measuring point,
 - IP 68 at the measuring point.

Optimum Process Fit

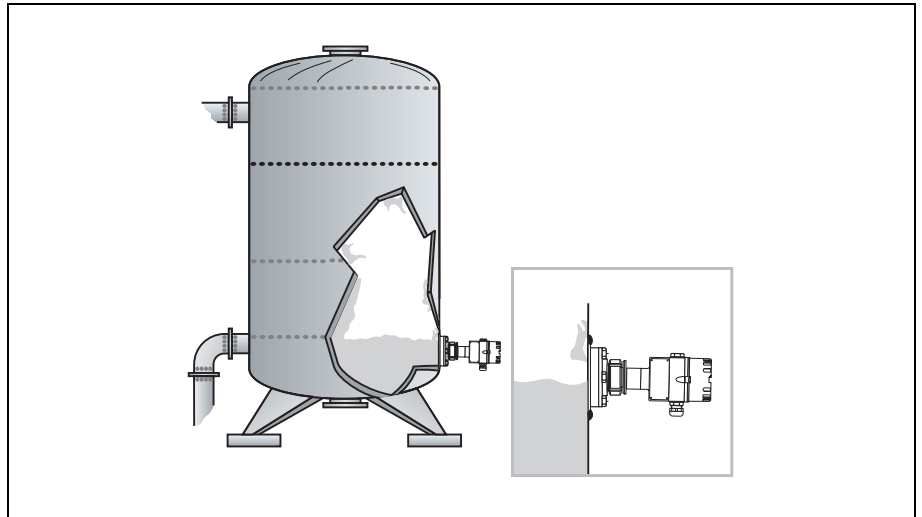
- Hastelloy diaphragm gives high mechanical and chemical resistance.
- Pressure resistant diaphragm
 - overload resistance to 20x nominal pressure max. 25 bar (max. 380 psi), vacuum to -900 mbar (-13 psi).
- Universal explosion protection.

High Accuracy

- Pressure resistant measuring cell
 - overload resistance to 20x nominal pressure max. 25 bar (max. 380 psi), vacuum to -900 mbar (-13 psi).
- Low temperature coefficient (better than 0.1%/10 K).

**Foodstuffs and Pharmaceuticals
DB 50 L**

Deltapilot S DB 50 L with welded flange for flush mounting. All process connections for foodstuffs are gap-free for cleaning without residue.

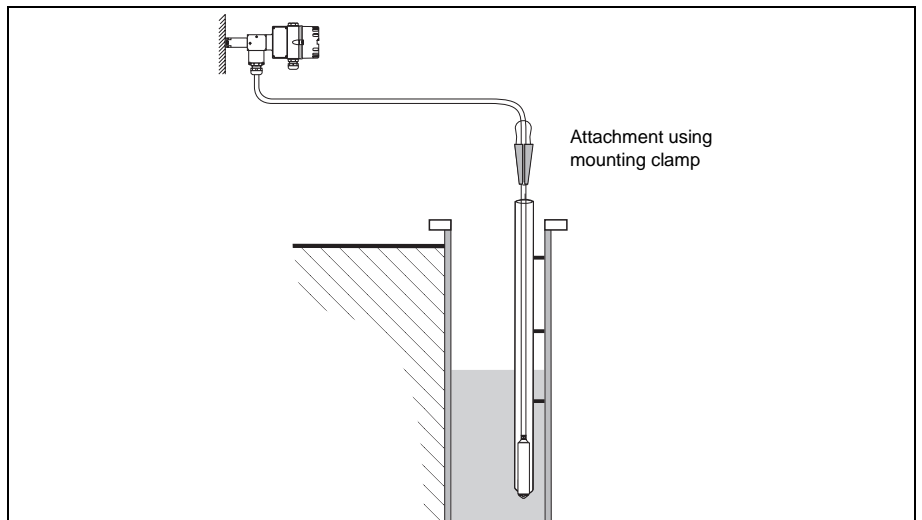


Process Connections for Sanitary Applications

- All common flush-mounted process connections available.
- Sanitary process connections for cleaning without residue (CIP).
- Measuring cell with Hastelloy diaphragm as standard, elastomer-free with welded cell seal.
- Housing adapter – for high flood risk – allows separate mounting of housing, electronic insert, and operation remote from the measuring point – IP 68 at the measuring point.
- 3A or EHEDG approvals
- USDA/H1 approved diaphragm seal to FDA directives

**Water and Wastewater Industries
DB 53**

Deltapilot S DB 53 Attachment using mounting clamp



Rugged and Resistant – Ideal for Water and Wastewater Treatment

- Electronic inserts with integrated overvoltage protection against lightning strikes.
- The stainless steel measuring cell tube and the Hastelloy cell diaphragm allow use in applications with aggressive media.
- Sensor cables up to 200 m (8000 in), in hazardous areas 100 m (4000 in), long require no tension relief.
- Special measuring cell (Rhodium plated) for applications where hydrogen formation can occur (e.g. digested sludge). Do not use galvanised fittings for these applications!

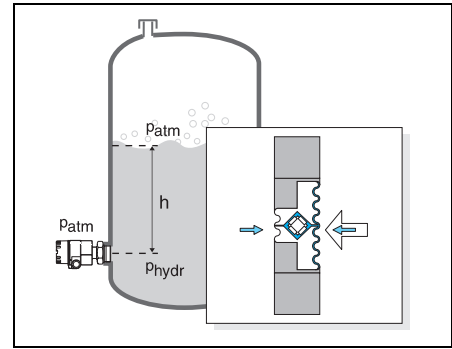
Measuring System

Measurement Principle

The weight of a column of liquid generates a hydrostatic pressure. At constant density, the hydrostatic pressure is a function of the height h of the column of liquid only:

$$P_{hydrostatic} = \rho \cdot g \cdot h$$

ρ = density
 g = gravitational constant
 h = distance between the surface of the liquid and the centre of the process diaphragm



Measuring Cell

The heart of the Deltapilot S is the new "CONTITE" measuring cell – condensation-free, watertight, and with excellent long-term stability. The measuring cell is protected against water hammer up to 20x the nominal pressure max. 25 bar (max. 380 psi) by a special lay-back pad, ensuring accurate measurements at all times.

Pressure compensation

The sealed "CONTITE" measuring cell is designed to measure gauge pressure. The cell is compensated for atmospheric pressure by means of a capillary which leads from a Goretex filter in the housing directly to the measuring element.

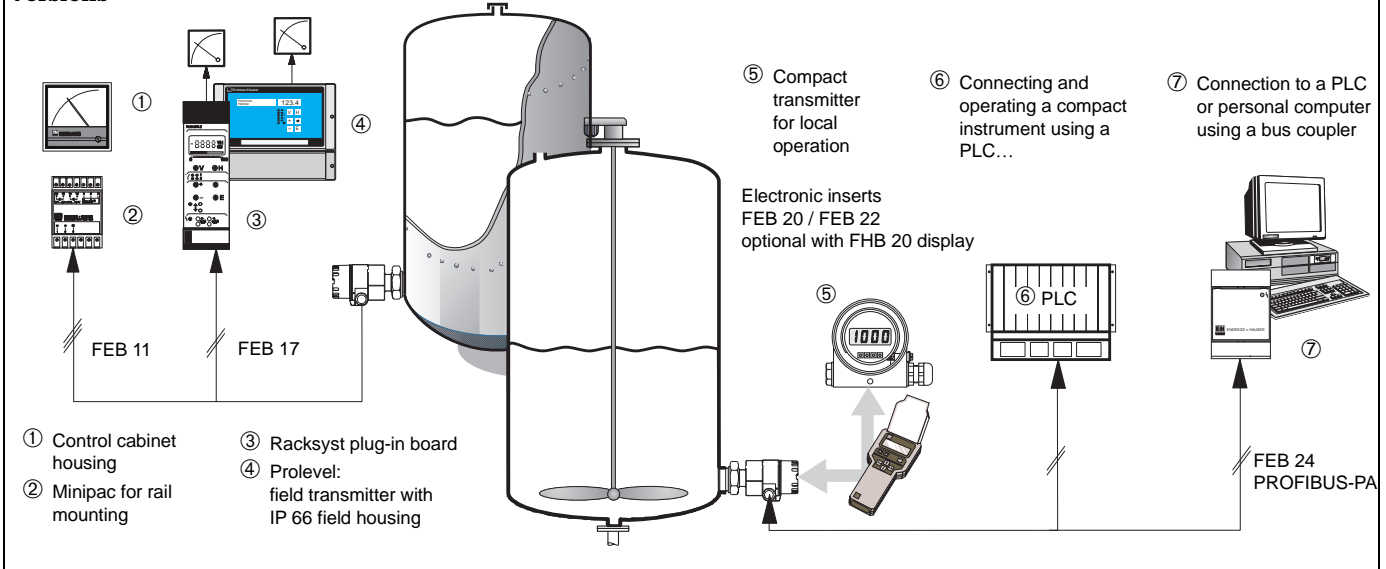
Measuring Point

The measuring point consists of:

- a Deltapilot S sensor with the FEB electronic insert
- and
- a separate transmitter or connection to a data bus (Rackbus or PROFIBUS-PA)

An electronic insert FEB 20 or FEB 22 turns the Deltapilot S into a compact instrument which can be operated locally or remotely using a handheld terminal.

Versions



Electronic insert	FEB 11	FEB 17	FEB 20 (INTENSOR), FEB 22 (HART)	FEB 24 (PROFIBUS-PA)
With integrated overvoltage protection	FEB 11 P	FEB 17 P	FEB 20 P (INTENSOR), FEB 22 P (HART)	FEB 24 P (PROFIBUS-PA)
Signal	0.2...1.2 mA analogue signal along three wires	200...1200 Hz PFM signal along two wires	4...20 mA analogue signal via two wires with superimposed digital communication signal Protocol: – FEB 20: INTENSOR – FEB 22: HART	Digital communication signal along two wires Protocol: PROFIBUS-PA
Operation and evaluation	– Silometer FMC 420 – Silometer FMC 423 – Silometer FMC 425	– Silometer FMC 470 Z* – Silometer FMX 570 – Silometer FMC 671 Z – Silometer FMC 676 Z – Silometer FMB 672 Z – Silometer FMB 677 Z – Prolevel FMB 662 – Prolevel FMC 661	– Local operation with FHB 20 display – Remote operation with handheld terminal Intensor (FEB 20): Commulog VU 260 Z HART (FEB 22): Universal HART Communicator DXR 275 – Connection and operation using a PLC or evaluating units – Silometer FMX 770 – FXN 671 (transmitter power supply unit and interface to Rackbus) – Commubox FXA 191 and PC, e.g. with the Commuwin II operating program	– with FHB 20 display at measuring point or – via bus coupler connection to PLC or PC e.g. with the Commuwin II operating program

* For operation with Silometer FMC 470 switch off pulse width detection.

Operation

FEB 20 (INTENSOR) / FEB 22 (HART)

The Smart electronic insert (FEB 20/ FEB 22) mounted directly in the probe housing makes the Deltapilot S a compact transmitter and allows:

- simple local empty and full calibration by pushbuttons or
- access to the E+H user matrix
 - with the operating module FHB 20,
 - via a handheld terminal,
 - via the Silometer FMX 770 or FXN 671 Rackbus interface card or Commubox FXA 191 and PC, e.g. with the Commuwin II operating program or PLC, PCS...

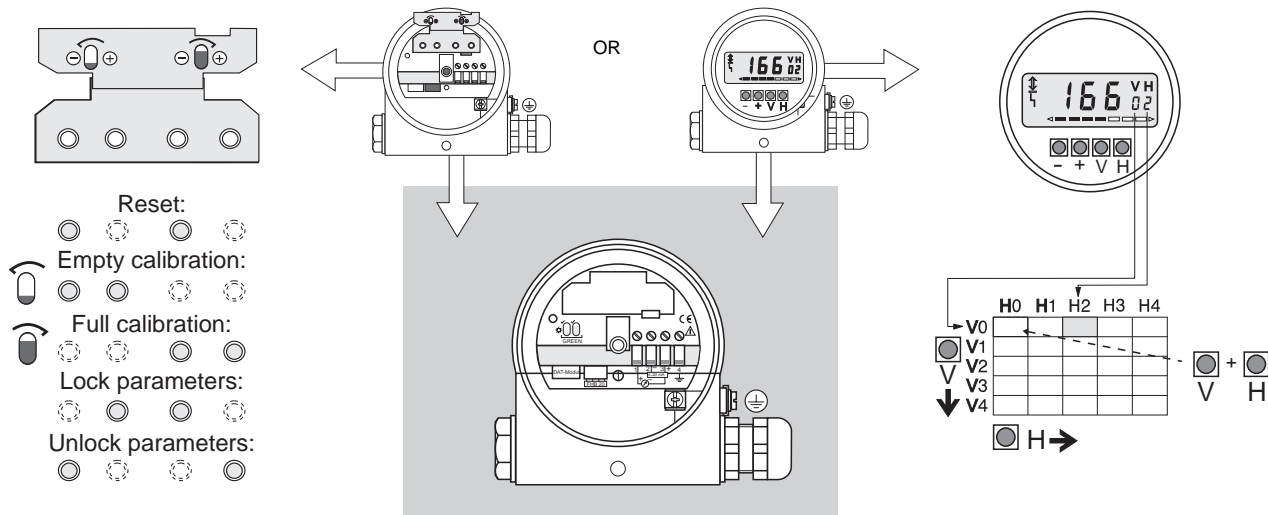
FEB 24 (PROFIBUS-PA)

The FEB electronic insert with the PROFIBUS-PA protocol allows:

- local operation with the FHB 20 operating module or
- matrix operation with a personal computer and the Commuwin II operating program running under MS Windows.

Matrix Operation

The standard Endress+Hauser matrix is a clear and uniform system which is easy to use no matter whether the Deltapilot S is calibrated with the pushbuttons and display, with the handheld terminal, with a Silometer transmitter or via the operating program Commuwin II.



Four pushbuttons call basic functions

Electronic insert FEB 20 / FEB 22

The FHB 20 uses the operating matrix

Pushbutton Operation

The following basic functions can be called up with the four pushbuttons at the local control panel:

- empty and full calibration,
- calibration with a partially filled vessel,
- parameter lock to protect matrix parameters.

Operation with FHB 20 Display

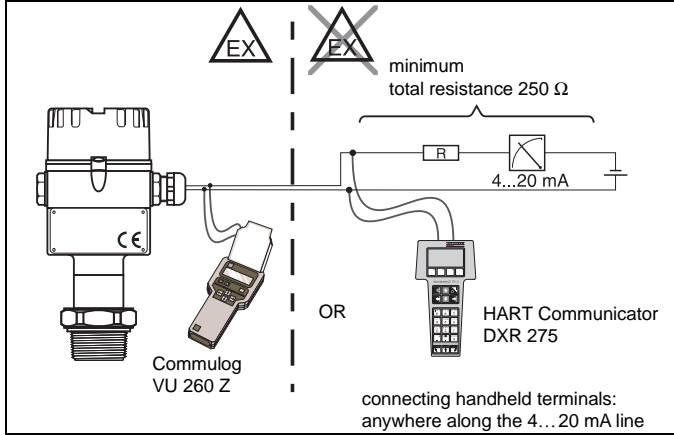
The addition of a display allows the Endress+Hauser operating matrix to be accessed directly. The following additional functions are available:

- dry calibration,
- linearisation,
- setting and simulation of analogue output,
- selection of technical units, etc.

Handheld Terminal

A handheld terminal allows all functions of the Deltapilot S to be accessed at any point in the 4...20 mA signal line.

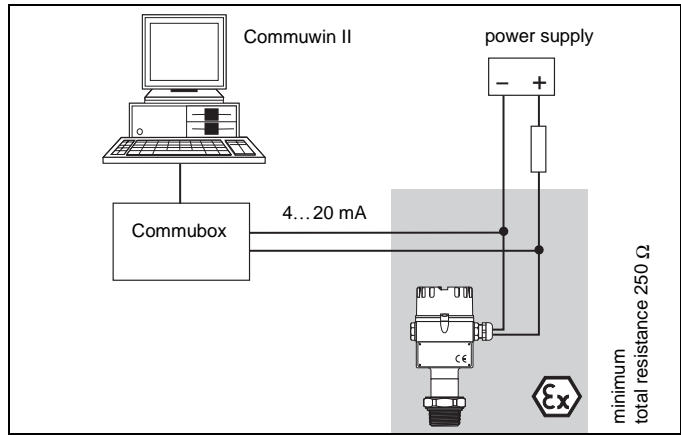
- Two instruments are available:
 - Commulog VU 260 Z: INTENSOR protocol,
 - Universal HART Communicator DXR 275: HART protocol.



Connecting handheld terminals

Operation with Commubox

The Commubox FXA 191 links intrinsically safe Smart transmitters with an INTENSOR or HART protocol to the RS 232 C serial interface of a personal computer. This enables transmitters to be remotely operated using the Endress+Hauser operating program Commuwin II.



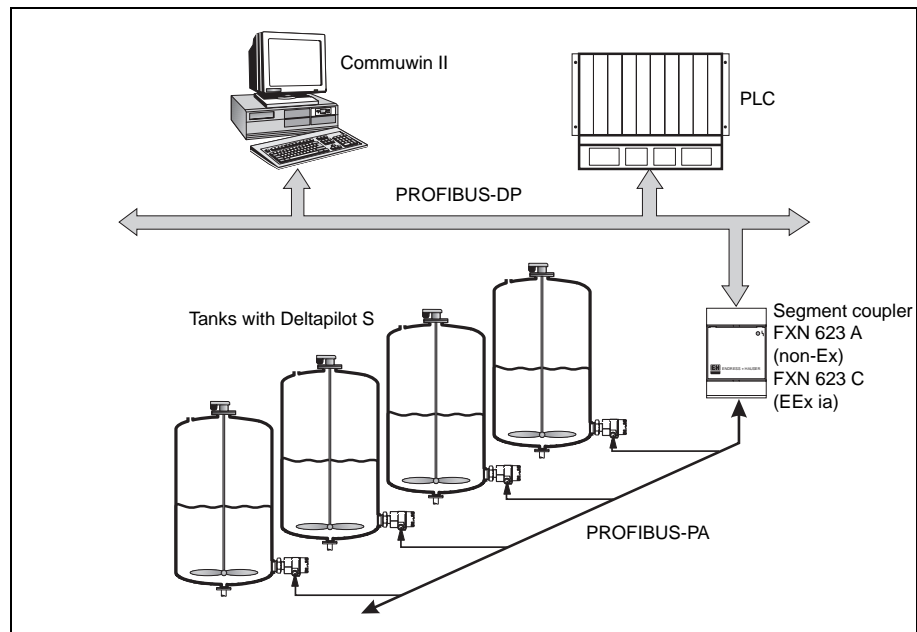
Connecting the Commubox

PROFIBUS-PA

The PROFIBUS-PA is an open fieldbus standard for connecting sensors and actuators, which may also be in explosion hazardous areas, to one bus cable. The two-wire sensors are supplied with power over the PROFIBUS-PA and the process information of the sensor is digitally transmitted.

The number of instruments operated at one bus segment:

- up to 10 for EEx ia applications
- up to 32 for non-Ex applications



The FEB 24 electronic insert with the PROFIBUS-PA protocol allows:

- local operation with the FHB 20 operating module or
- matrix operation with a personal computer and the Commuwin II operating program running under MS Windows 3.11

Installation

Mounting Point

Compact version DB 50 (L)

- The DB 50 must always be installed below the lowest measuring point.
- It should not be mounted in the filling stream, at the tank outlet or at a place in the tank where pressure pulses from an agitator can occur.
- Calibration and function testing can be carried out more easily if the DB 50 is mounted downstream of a cut-off valve.

Rod and rope versions

- The rope version should be mounted at a point free from currents and turbulence, as lateral movement and contact with the vessel wall can affect accuracy. The probe can be built into a stilling well (preferably of plastic) or attached to a mounting clamp.
- The length of the support cable or the probe rod depends on the zero point of the level. The tip of the probe should be at least 5 cm (0.2 in) below it.
- When installed in a domed manhole, the probe should be mounted on a nozzle to prevent the housing from being flooded by moisture or condensation. In very damp conditions, it is recommended that a housing adapter is used to mount the housing and electronic insert away from the measuring point.

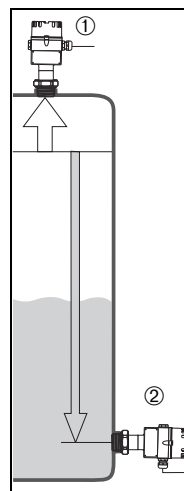
Measurement in Pressurised Tanks (Electronic Differential Pressure Measurement)

Differential pressure in pressurised tanks is measured with a Commutec or Prolevel transmitter and two Deltapilot S probes. Probe ① measures the head pressure, Probe ② measures the total pressure (hydrostatic and head pressure).

Note:

- The measuring diaphragm of Probe ① must not be flooded as it then detects an additional hydrostatic pressure which falsifies the reading.
- The ratio of hydrostatic pressure to head pressure should be a max. 1:6.
- Ensure that the measuring cells of the two Deltapilot S probes are suitable for the application (see example).

Example:
The most suitable measuring cells should be chosen for measurement in a pressurised tank with maximum height 5 m (200 in) and a head pressure of max. 1000 mbar (14.5 psi).



Example water tank:

Data:

Max. head pressure: 1000 mbar (14.5 psi)

Max. hydrostatic pressure (filling height water 5 m (200 in)): 500 mbar (7.3 psi)

Max. pressure at **Probe ①**: 1000 mbar (14.5 psi)

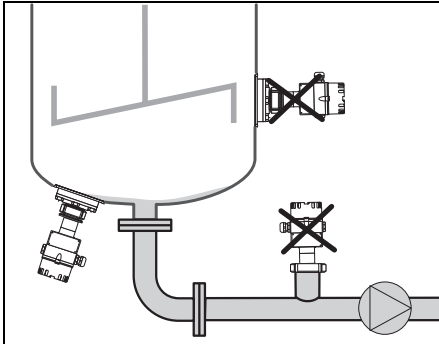
⇒ chosen measuring cell: 0 ... 1200 mbar (0 ... 15 psi)

Max. total pressure at **Probe ②**: 500 mbar + 1000 mbar = 1500 mbar (21.8 psi)

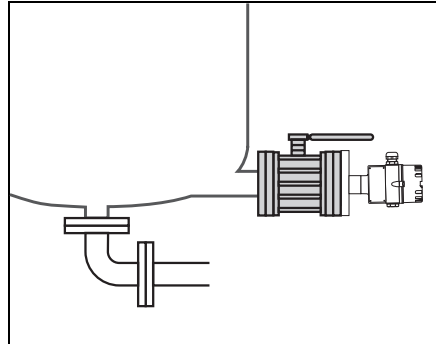
⇒ chosen measuring cell: 0 ... 4000 mbar (0 ... 60 psi)

Process Diaphragm

- The process diaphragm is not to be handled or cleaned with hard or pointed objects. Measurement is unaffected by material build-up, provided this is elastic and can transmit the hydrostatic pressure.
- All Deltapilot S versions with the rod or rope extension are supplied with a plastic cover which protects the process diaphragm from mechanical damage.



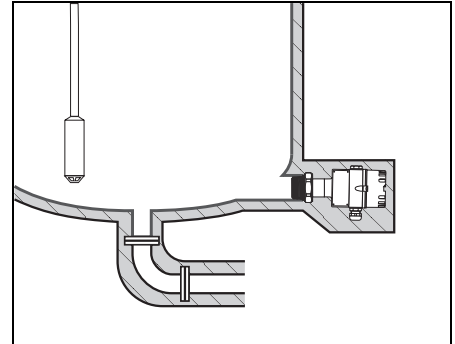
Do not mount in the outlet of the tank or near agitators.



Easy mounting and operation downstream of a cut-off valve.

Temperature Effects

- In applications where the product can harden when cold, the Deltapilot S must also be insulated. Alternatively a rod or rope version can be used.
- If there is a extreme temperature difference between calibration and operation, then the instrument needs approx. 10 to 15 minutes to warm up before it can measure accurately.



In applications where the product can harden, the Deltapilot S must also be covered by the insulation.

Installing the Deltapilot S

- Sealing
Deltapilot S probes with process connection G 1 1/2 thread are supplied with a flat seal. When screwing the instrument into the tank, **this seal only** must be placed on the sealing surface of the process connection. Do not seal using hemp or similar materials.
- For Deltapilot S probes with process connection NPT thread, it is recommended that the thread is sealed by wrapping with PTFE type.
- When tightening, turn the probe by the hexagonal nut only, not by the housing! Do not screw in too tightly. Max. torque: 20...30 Nm.

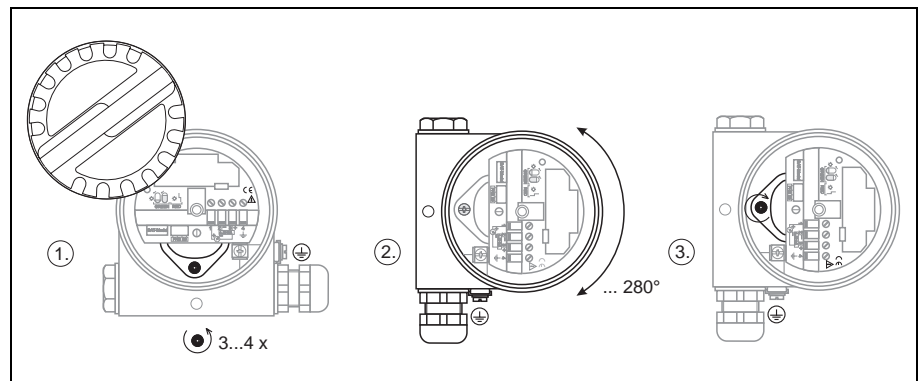
Turning the Housing

The housing can be turned to position the cable entry. In order to prevent moisture entering through the cable gland, the following precautions are recommended, particularly when mounting outdoors:

- The cable entry should point downwards when the Deltapilot S is installed laterally in the tank.
- The cable entry should always be horizontal when the Deltapilot S is fitted with a protective hood.

Turn the housing F 6/F 8/F 10

- ① Unscrew the cover
Loosen the Phillips screw under the housing 3 to 4 turns
- ② Turn the housing (max. 280°)
- ③ Securely tighten the Phillips screw underneath the housing



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. The housing cover and cable glands should therefore always be screwed tight. The O-ring seal in the housing cover and the thread of the aluminium cover are lubricated when delivered. If this lubrication has been removed, then it should be replaced (e.g. silicone fat or graphite paste) so that the cover seals tight. Do not use mineral-oil based lubricants! These will destroy the O-ring.

Pressure Compensation

A Goretex filter mounted behind the nameplate compensates for pressure in the probe housing. During assembly, there is an overpressure in the probe housing which is slowly released through the Goretex filter. Once the housing cover has been screwed on, wait appr. 1 min before starting measurement.

Housing Adapter

The housing and electronic insert can be mounted remotely from the measuring point by using the housing adapter. The adapter also enables problem-free measurement:

- under especially difficult conditions (very damp environment or danger from flooding),
- in narrow or inaccessible mounting areas.

Compact instruments with operating module can be easily and simply operated and remotely monitored from the actual measurement point. The ingress protection at the measuring point is IP 68 with this arrangement.

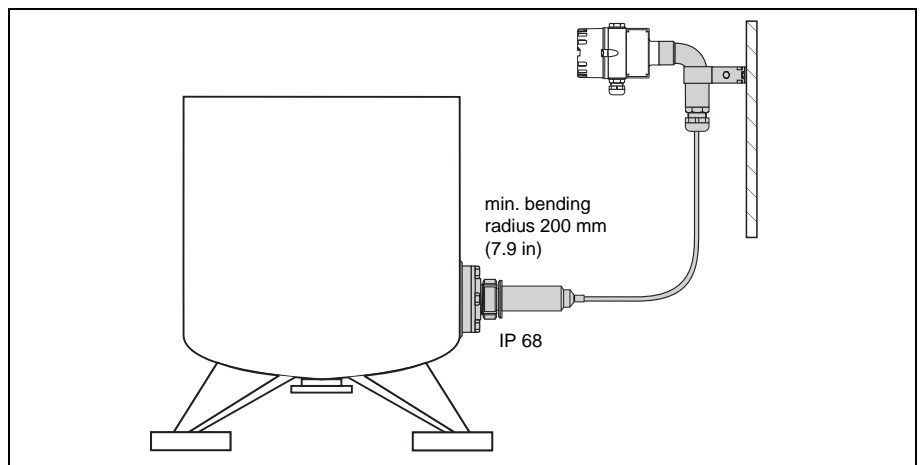
Dimensions

1 in = 25.4 mm
1 mm = 0.039 in

Using the housing adapter under difficult measuring conditions

- very damp,
- inaccessible installation point.

IP 68 applies to installation point.



Housings

Housing Versions

- Plastic housing Type F 10
- or similar aluminium housing Type F 6
- stainless steel housing (1.4301 / AISI 304) Type F 8

For instruments which are operated with an electronic insert and operating module (FHB 20), the housing cover is also available with a transparent cover (see accessories). All housings have ingress protection IP 66.

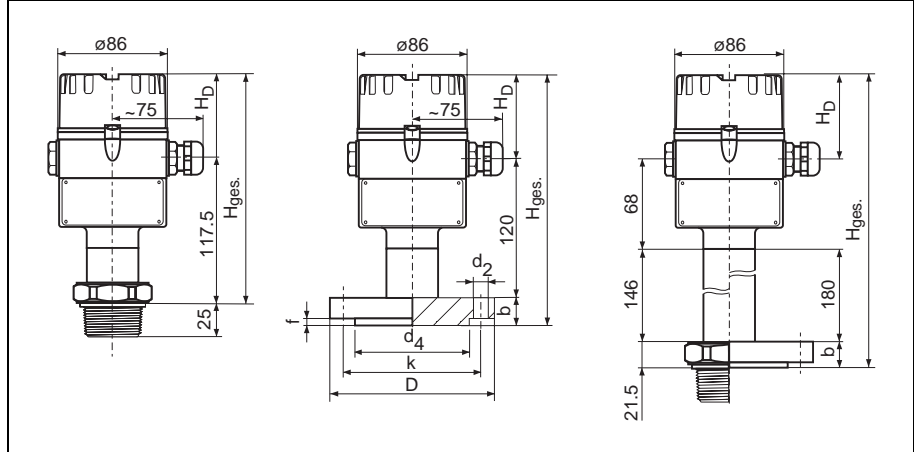
Dimensions of the Deltapilot S DB 50

Deltapilot S DB 50
Dimensions with housings F 6/F 10

Left:
process connection thread
thread G 1 1/2 (BSP) or 1 1/2 NPT
Centre:
process connection flange
(see flange table below for dimensions)

Right:
Deltapilot S with flame barrier
for all versions used in explosion hazardous areas Zone 0

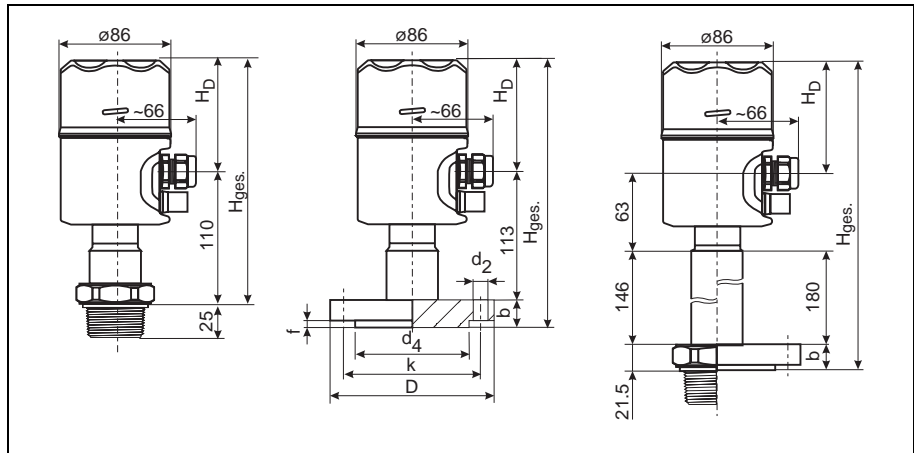
Construction: compact version for mounting from below or from the side



Deltapilot S DB 50
Dimensions with housing F 8

Left:
process connection thread
thread G 1 1/2 (BSP) or 1 1/2 NPT
Centre:
process connection flange
(see flange table below for dimensions)

Right:
Deltapilot S with flame barrier
for all versions used in explosion hazardous areas Zone 0



Dimensions
1 in = 25.4 mm
1 mm = 0.039 in

		Housing F 6 (aluminium)	Housing F 10 (plastic)	Housing F 8 (stainless steel)
height H_D	flat cover	65	67.5	67
	transparent cover	75	86	80
total height H_{Ges.}	process connection thread	117.5+H _D	117.5+H _D	110+H _D
	flange	b+120+H _D	b+120+H _D	113+H _D
with flame barrier	thread	235.5+H _D	235.5+H _D	230.5+H _D
	flange	b+248+H _D	b+248+H _D	b+243+H _D

Flanges

Dimensions to DIN 2526 Form C, material: stainless steel 1.4435 (AISI 316L)

Size	Flange			Raised face		Number of boreholes	
	D	b	k	d ₄	f		d ₂
DN 40 PN 16	150	16	110	88	3	4	18
DN 50 PN 16	165	18	125	102	3	4	18
DN 80 PN 16	200	20	160	138	3	8	18
DN 100 PN 16	220	20	180	158	3	8	18

Dimensions to ANSI B16.5, material: stainless steel 1.4435 (AISI 316L)

Size	Flange			Raised face		Number of boreholes	
	D	b	k	d ₄	f		d ₂
ANSI 1 1/2"	127	17.5	98.6	73.2	1.6	4	15.7
ANSI 2"	152.4	19.1	120.7	91.9	1.6	4	19.1
ANSI 3"	190.5	23.9	152.4	127	1.6	4	19.1
ANSI 4"	228.6	23.9	190.5	157.2	1.6	8	19.1

Deltapilot S DB 51

Construction:
Version with rod extension for mounting from above

Note installation height!

Left: Deltapilot S DB 51 with housing F 6/F 10

Process connection: thread G 1 1/2 (BSP) or 1 1/2 NPT

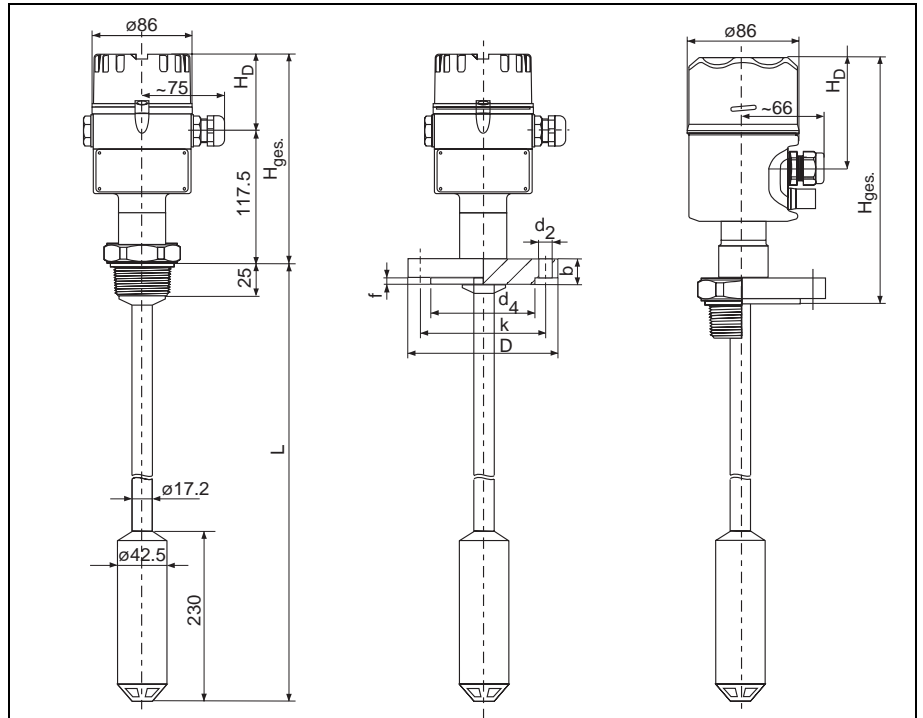
Centre: Deltapilot S DB 51 with housing F 6/F 10

Process connection: flange (see flange table on page 10 for dimensions)

Right: Deltapilot S DB 51 with housing F 8

- Material of extension rod: stainless steel 1.4435 (AISI 316 L) or 2.4610 (Hastelloy C4)
- Material of measuring cell tube: stainless steel 1.4435 (AISI 316 L) or 2.4610 (Hastelloy C4)
- Max. length of rod: 4 m (13.1 ft)

Dimensions with flame barrier similar to DB 50 on page 10



Deltapilot S DB 52

Construction:
Version with rope extension for mounting from above

Left: Deltapilot S DB 52 with housing F 6/F 10

Process connection: thread G 1 1/2 (BSP) or 1 1/2 NPT or flange

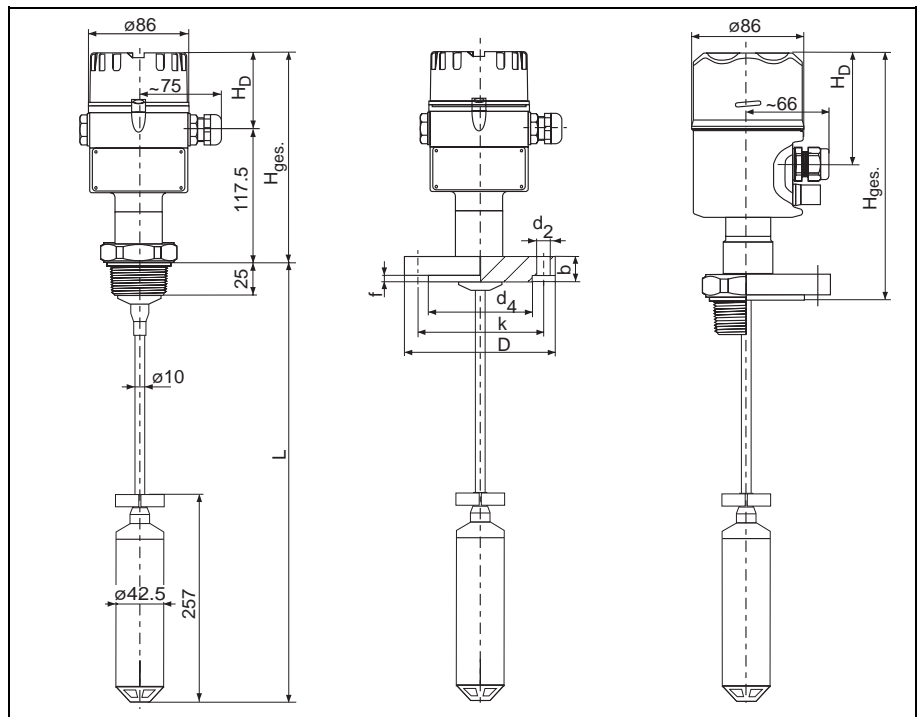
Centre: Deltapilot S DB 52 with housing F 6/F 10

Process connection: flange (see flange table on page 10 for dimensions)

Right: Deltapilot S DB 52 with housing F 8

- Material of support cable: FEP or PE
- Material of measuring cell tube: stainless steel 1.4435 (AISI 316 L) or 2.4610 (Hastelloy C4)
- max. cable length: 200 m (656 ft)
- max. cable length in hazardous areas: 100 m (328 ft)
- min. bending radius: 200 mm (7.9 in)

Dimensions with flame barrier similar to DB 50 on page 10



Dimensions
1 in = 25.4 mm
1 mm = 0.039 in

Caution! When using a housing adapter, the maximum length of the cable is the total length of the support cable plus the connecting cable of the housing adapter.

Dimensions Deltapilot S DB 50 L

Universal Mounting Adapter

The Deltapilot S DB 50 L is also available with a universal mounting adapter, giving a degree of flexibility regarding existing process connections. A profiled silicone seal is provided, which is pushed on the tip of the probe. This seal must **always** be used when screwing into a process connection.

The Deltapilot S DB 50 L with universal mounting adapter can be screwed into:

- an existing process connection or
- into a welding neck from
Endress+Hauser:
 - Core hole diameter: 89 mm (3.504 in)
Material: 1.4435 (AISI 316L)
Order No.: 942521-0101 or
 - Core hole diameter: 89 mm (3.504 in)
Material: 1.4571 (AISI 316Ti)
Order No.: 942521-0102 or
 - Core hole diameter: 65 mm (2.559 in)
Material: 1.4435 (AISI 316L)
Order No.: 214880-0002 or
 - Core hole diameter: 85 mm (3.349 in)
on request

Endress+Hauser offers a DB 50L with a 6" adapter for applications in double-walled tanks.

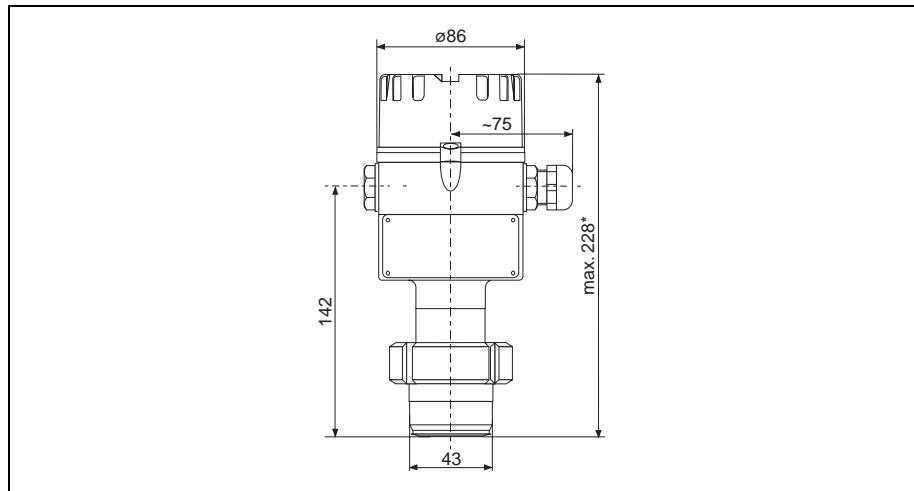
When welding the welding neck in the tank, we recommend the use of a welding dummy (see accessories on page 16).

The height of the housing is dependent upon the cover version:

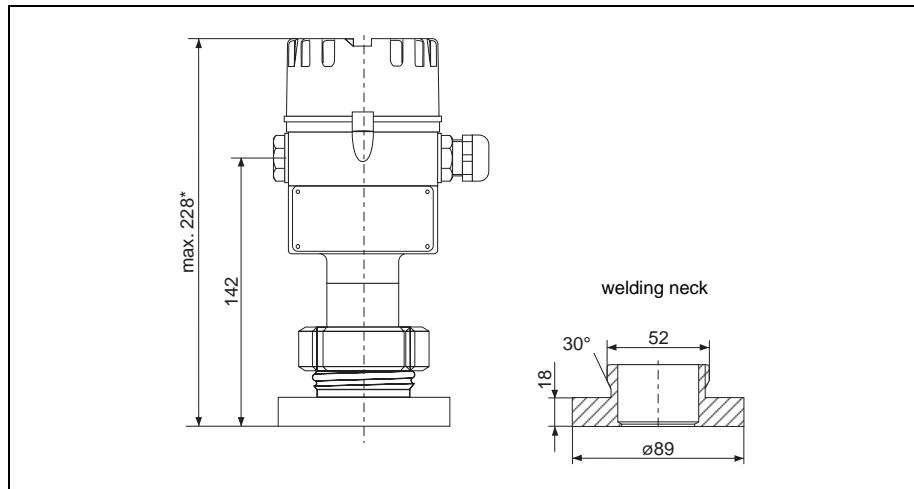
total height	housing F 8	housing F 10	housing F 8
flat cover	207	210	202
transparent cover	217	228	214

Dimensions
1 in = 25.4 mm
1 mm = 0.039 in

Universal mounting adapter
* the height of the housing is dependent upon the cover version (see table above)



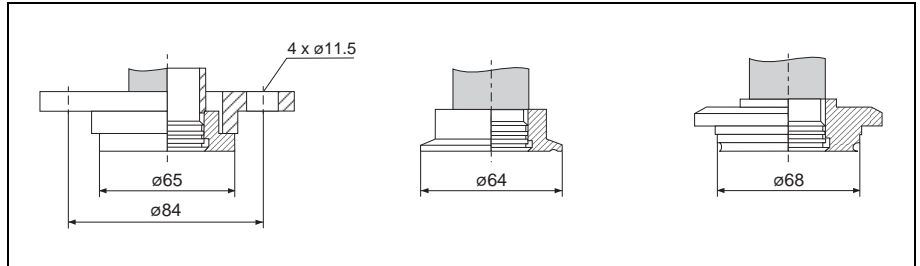
Welding neck diameter: 89 mm
* the height of the housing is dependent upon the cover version (see table above).



Process Connections

All common flush-mounted process connections are available for applications in the foodstuffs industry. These are supplied as standard elastomer-free and with welded measuring cell seal. The gap-free connections leave no residue when industrial cleaning procedures are used.

Dimensions
 1 in = 25.4 mm
 1 mm = 0.039 in



Flange diameter 65 mm (DRD)

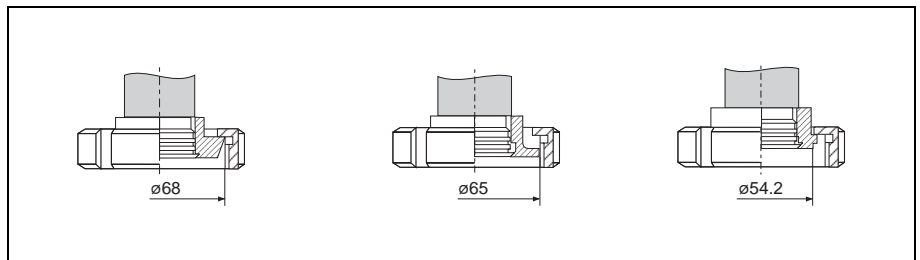
- Material: 1.4435 (AISI 316L)
- Fastening: coupling flange 1.4301 (AISI 304) for connecting to welding flange

Tri-Clamp coupling 2" (ISO 2852)

- Material: 1.4435 (AISI 316L)
- Fastening: clamp

Coupling DN 50 (Varivent)

- Material: 1.4435 (AISI 316L)
- Fastening: clamp



Dairy coupling DN 40, DN 50 DIN 11851

- Material: 1.4435 (AISI 316L)
- Fastening: coupling nut 1.4301 (AISI 304)

SMS coupling 2"

- Material: 1.4435 (AISI 316L)
- Fastening: coupling nut 1.4301 (AISI 304)

IDF coupling (ISO 2853)

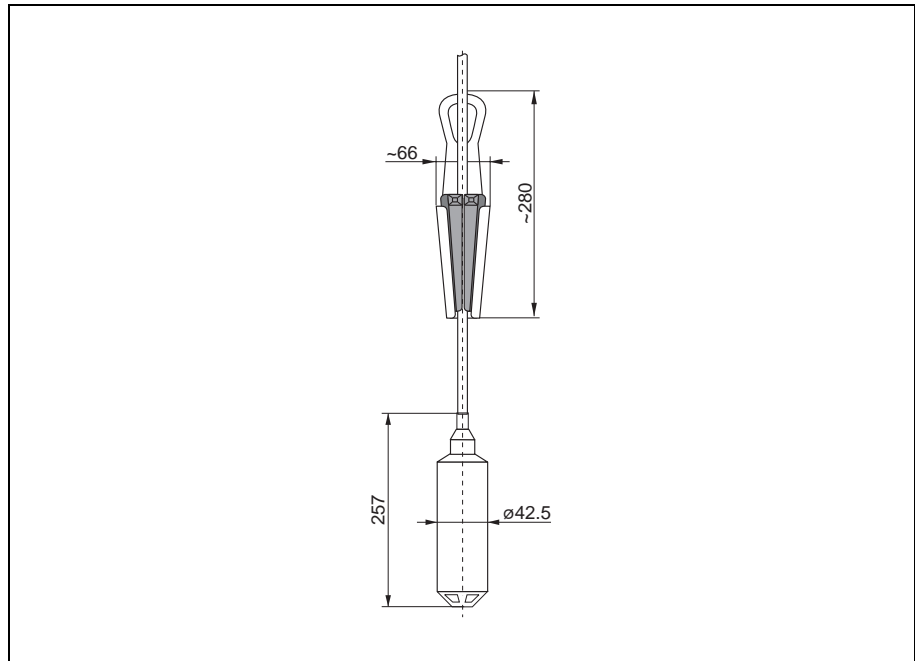
- Material: 1.4435 (AISI 316L)
- Fastening: coupling nut 1.4301 (AISI 304)

Dimensions of the Deltapilot S DB 53

In order to protect it from flooding, the housing, with electronic insert, is mounted outside inspection shafts and vessels. The mounting bracket of the DB 53 is similar to the housing adapter used for separate mounting of housing and electronic insert for the DB 50, DB 50 L, DB 51, DB 52 versions (see page 15). The sensor cable is hung from a mounting clamp which also provides tension relief.

- Material: galvanised steel with plastic clamping jaws
- Order No.: 010527-0000
- Sensor cable
 - min. bending radius 200 mm (7.9 in)
 - max. cable length 200 m (656 ft)
 - max. cable length in hazardous areas 100 m (328 ft)

Deltapilot S DB 53 probe and mounting clamp as attachment accessory
The mounting unit of the DB 53 is identical with the housing adapter.
The dimensions correspond to the diagram on page 15.



Accessories

Housing Adapter

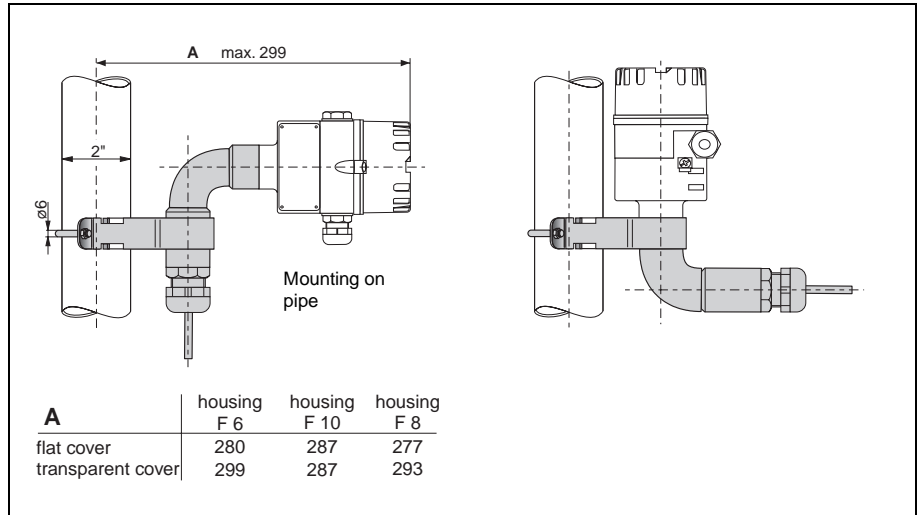
For separate mounting of the housing (F6/F10) and electronic insert

- Material: 1.4301 (AISI 304)
- Order No. for housing adapter with 5 m (16.4 ft) cable: 942579-0051
- Order No. for housing adapter with up to 20 m (65.6 ft) cable: 942579-1001
- Order No. for mounting bracket: 919806-1000
- Order No. for rope shortening kit: 935666-0020
- Sensor cable
 - min. bending radius 200 mm (7.9 in)
 - max. cable length 200 m (656 ft); hazardous areas: 100 m (328 ft)

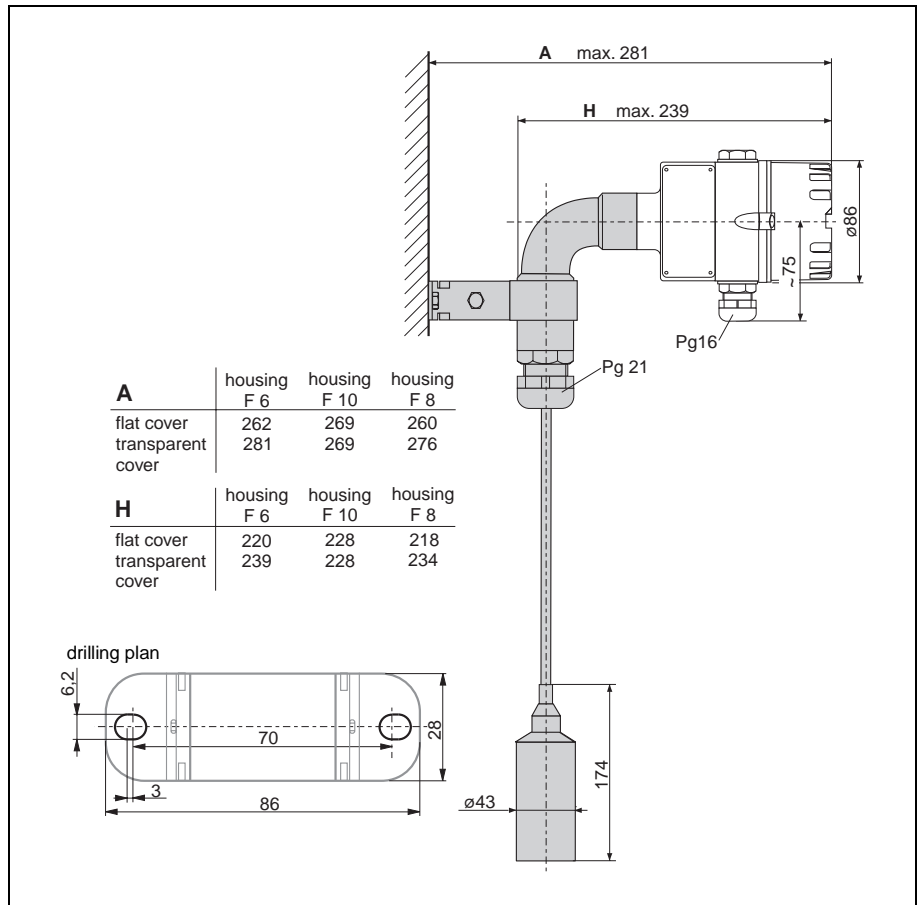
Mounting with housing adapter enables problem-free measurement even under the most difficult measuring conditions

- very damp,
 - inaccessible installation point.
- IP 68 applies to installation point.

Mounting on 2" pipe
Housing adapter with mounting bracket for separate mounting of housing and electronic insert.



Wall mounting
Housing adapter with mounting bracket for separate mounting of housing and electronic insert.



Protective Hood

Protective hoods are available for aluminium or plastic housings (F 6/F 10) with two cable entries.

They protect probes from excessive temperatures caused by direct sunlight and prevent condensation from entering the housing.

- Ambient temperature: max. 70°C
- Material: polyamide
- Transparent cover
Order No.: 942262-0001
- Flat cover
Order No.: 942262-0000

Welding Dummy for Welding Neck TSP 14880

Further information and ordering on request from Endress+Hauser.

Blind Plugs for Welding Neck

Further information and ordering on request from Endress+Hauser.

Operating Modul FHB 20

Plug-in display for the electronic inserts FEB 20, FEB 22 and FEB 24.

- Material: POM
- Order No.: 942512-0100

Transparent Cover

- Material: polycarbonat
Order No.: 942828-0001
- Material: coated aluminium
Order No.: 942828-0010
- Material: stainless steel 1.4301 (AISI 304)
Order No.: 942828-0100

Other Measuring Cells Rhodium plated

Where high levels of hydrogen are present in the material (e.g. digested sludge), hydrogen atoms can diffuse through the metal surfaces of the sensor and give false measurements. A special metallic cell is available from Endress+Hauser for such applications. Note: To reduce hydrogen levels, no galvanised fittings should be used.

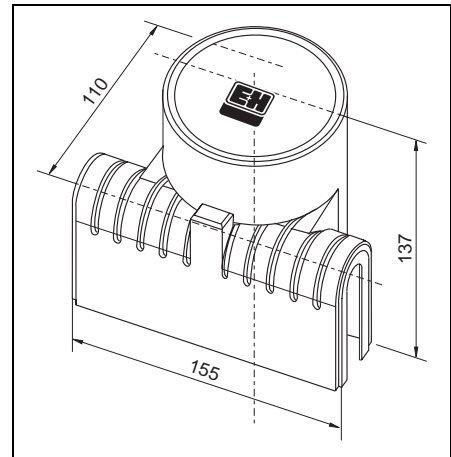
Welding Flange

This can be ordered as an accessory to the Deltapilot S DB 50 L:

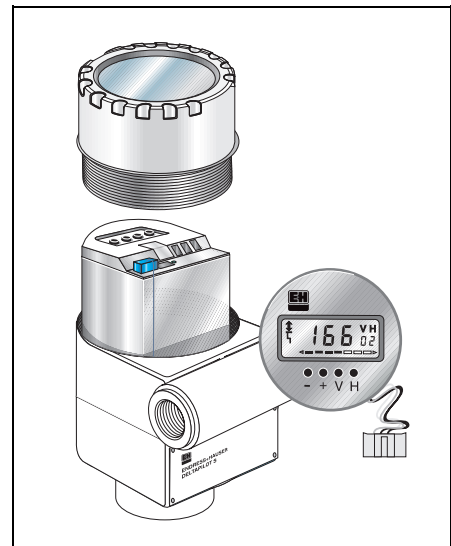
- Welding flange for flush mounting on the tank for a 65 mm flange (DRD flange) as process connection.
 - Material: 1.4301 (AISI 304)
 - Order No.: 916743-0000
- Sealing ring: PTFE flat seal supplied
 - Order No.: 916783-0000

Dimensions
1 in = 25.4 mm
1mm = 0.039 in

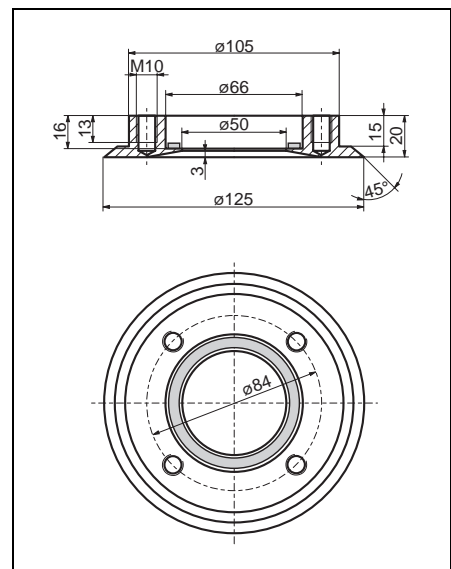
Dimensions of the
DRD welding flange



Protective hood for housing
• F 6 (aluminium) and
• F 10 (plastic)



Deltapilot S with
• display FHB 20
• and transparent cover



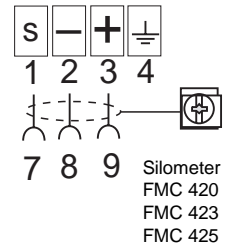
Electrical Connection

① Electronic Insert FEB 11/FEB 11 P

An analogue signal (0.2...1.2 mA) from the FEB 11/FEB 11 P is transmitted along a three-wire cable to the evaluating unit.

- Calibration: at the evaluating unit in the control room or control cabinet.
- Cable resistance max. 25 Ω per wire.
- The housing must be grounded when using the FEB 11 P electronic insert with overvoltage protection.

① FEB 11/FEB 11 P

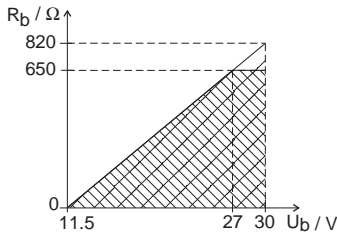
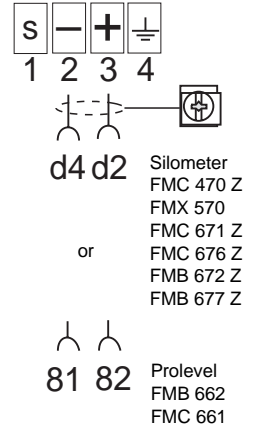


② Electronic Insert FEB 17/FEB 17 P

An interference-free PFM signal (pulse frequency approx. 200 Hz to 1200 Hz) from the FEB 17/FEB 17 P is transmitted to the evaluating unit.

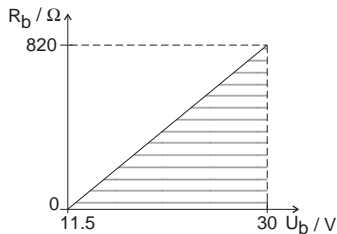
- Calibration: at the evaluating unit. If the density and level of the medium is known, then calibration can be carried out without filling the vessel.
 - The housing must be grounded when using the FEB 17 P electronic insert with overvoltage protection.
- Note: For operation with Silometer FMC 470 switch off pulse width detection.

② FEB 17/FEB 17 P



- ▨ FEB 20
- ▧ FEB 22

Graph showing load of FEB 20/22 with communication; min. $R_b=250 \Omega$



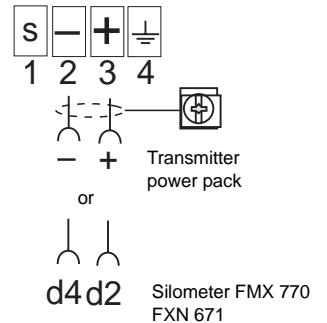
Graph showing load of FEB 20/22 without communication

③ Smart Electronic Inserts FEB 20/FEB 20 P; FEB 22/FEB 22 P

A digital communication signal and a analogue 4...20 mA signal are simultaneously transmitted without any mutual interference.

- Power supply voltage: 11.5 V_{DC} ...30 V_{DC}
- The housing must be grounded when using the FEB 20 P/FEB 22 P electronic insert with overvoltage protection.

③ FEB 20/FEB 20 P FEB 22/FEB 22 P

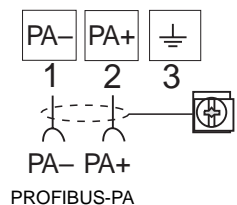


④ PROFIBUS-PA FEB 24/FEB 24 P

The digital communication signal is transmitted along a two-wire cable at the bus. This bus cable also carries the power supply.

- Power supply voltage: non-Ex: 9 V_{DC} ...32 V_{DC} Ex: 9 V_{DC} ...24 V_{DC} (1.2 W)
- Bus cable: When installing for the first time, twisted screened two-wire cable should be used with the following specifications:
 - loop resistance (DC) 15...150 Ω /km
 - inductance per unit length 0.4...1 mH/km
 - capacitance per unit length 80...200 nF/km
- The housing must be grounded when using the FEB 24 P electronic insert with overvoltage protection.

④ FEB 24/FEB 24 P



Screening

- Use industrial screened cabling.
- If unscreened cable is used to connect FEB 20/FEB 22 and FEB 20/FEB 22 P, electromagnetic interference may effect the digital communication signal.
- With non Ex applications the maximum screening effect is assured, when the cable screening is grounded at both ends.
- With Ex applications, only one end of the screening can be directly grounded. Then this should be the sensor end. (Observe local regulations for explosion protection).

Exchanging the Electronic Inserts

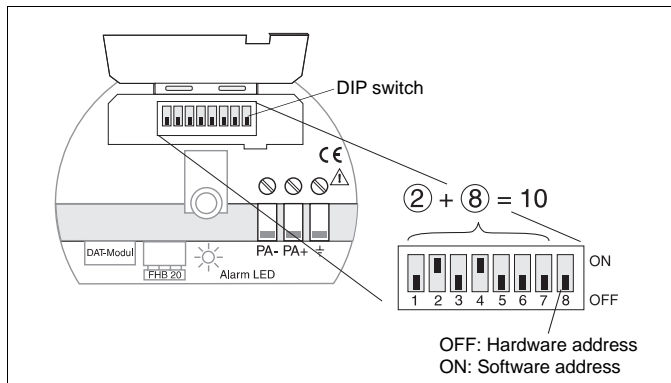
The electronic inserts can be exchanged. For versions with integrated overvoltage protection particularly, check that the ground cable is firmly connected to:

- the internal ground terminal of the housing
- terminal 4.

Also check the resistance between terminal 4 and the external ground terminal. It must always be smaller or equal to 0.1 Ω.

Bus Address

When using an FEB 24/FEB 24 P electronic insert for connecting the Deltapilot S to a Profibus, each instrument is given a unique address. The address can be set by hardware via the DIP switch or by software via the operating program Commuwin II (Switch 8: ON)

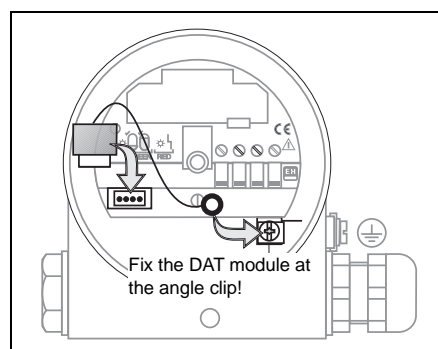


- Setting the bus address
- Lift the protective cover
 - Set the address (1...126) on switches 1...7
 - Set switch 8 to OFF
 - Switch the unit off and on again to activate the new address

Connecting the DAT Module

All data concerning the measuring cell are permanently stored in the DAT module. The DAT module is supplied ready-mounted. It is permanently connected to the Deltapilot S housing and cannot be lost.

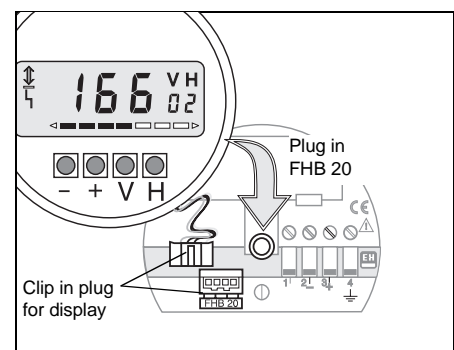
- If the DAT module has to be exchanged, loosen the looped wire and remove it from electronic insert.
- Plug the new DAT onto the electronic insert and secure the looped wire.



- Left:**
Connecting the DAT module (applies to all FEB):
All measuring cell-specific data are stored in the DAT module and then transmitted to the electronic insert.
Right:
Connecting the display FHB 20 to FEB 20, FEB 22 und FEB 24.

Connecting the FHB 20 Operating Module

The FHB 20 operating module can be plugged onto the electronic inserts FEB 20/20 P, FEB 22/22 P and FEB 24/24 P for local operation. The plug of the FHB 20 must be clipped into the appropriate socket. Please note the configuration of plug and socket. The display is plugged into the central hole of the electronic insert.



Technical Data

General Specifications

Application

Operation and System Design

Input Variables

Output Variables

(1) Caution!

When using a housing adapter, the maximum length of the cable is 200 m (656 ft), hazardous areas 100 m (328 ft) and comprises the total length of the support cable plus the connecting cable of the housing adapter.

Measuring Accuracy

Manufacturer	Endress+Hauser
Instrument designation	Deltapilot S
Deltapilot S	The instrument is used for continuous measurement of the level of liquids, pastes and sludges.
Measuring principle	Conversion of the hydrostatic pressure of a column of liquid into a level-proportional signal
Modularity	Pressure sensor DB 5X with electronic insert FEB XX
Construction	<ul style="list-style-type: none"> - DB 50, DB 50 L: compact version - DB 51: version with rod extension - DB 52, DB 53: version with rope extension
Signal transmission	Dependent on electronic insert type <ul style="list-style-type: none"> - FEB 11/11 P: 3-wire, analogue signal 0.2 mA...1.2 mA - FEB 17/17 P: 2-wire, PFM signal 200...1200 Hz - FEB 20/20 P (INTENSOR): 2-wire, 4...20 mA (Smart) - FEB 22/22 P (HART): 2-wire, 4...20 mA (Smart) - FEB 24/24 P (PROFIBUS-PA): 2-wire, digital communication signal

Measured variable	Level via the hydrostatic pressure of a column of liquid	
Measuring ranges	0...100 mbar	(0...1.5 psi)
FEB 11/11 P, FEB 20/20 P,	0...400 mbar	(0...6.0 psi)
FEB 22/22 P, FEB 24/24 P	0...1200 mbar	(0...15.0 psi)
	0...4000 mbar	(0...60.0 psi)
	-100...100 mbar	(-1.5...1.5 psi)
	-400...400 mbar	(-6.0...6.0 psi)
	-900...1200 mbar	(-13.0...15.0 psi)
	-900...4000 mbar	(-13.0...60.0 psi)
Sensitivity	10 Hz/mbar	666 Hz/psi
FEB 17/17 P	2.5 Hz/mbar	166.5 Hz/psi
	0.833 Hz/mbar	55.5 Hz/psi
	0.25 Hz/mbar)	16.65 Hz/psi
	5 Hz/mbar	333 Hz/psi
	1.25 Hz/mbar	83.25 Hz/psi
	0.476 Hz/mbar	31.7 Hz/psi
	0.204 Hz/mbar	13.6 Hz/psi
Calibration range of measuring span (turndown)	10:1 for FEB 17/17 P free adjustable on transmitter	
Zero point shift	90% of measuring range	

Electronic insert type	FEB 20/22	FEB 17	FEB 11
	FEB 20 P/22 P	FEB 17 P	FEB 11 P
Output signal	4...20 mA	PFM signal 200...1200 Hz f ₀ =200 Hz ± 5 Hz meas. range 100 mbar: f ₀ =200 Hz ± 10 Hz range of frequencies Δf see "Sensitivity"	0.2...1.2 mA
Transmitters	Silometer FMX 770 Silometer FXN 671	Silometer FMC 470 Z Silometer FMX 570 Silometer FMC 671 Z Silometer FMC 676 Z Silometer FMB 672 Z Silometer FMB 677 Z Prolevel FMB 662 Prolevel FMC 661	Silometer FMC 420 Silometer FMC 423 Silometer FMC 425
Load	without communication: with communication:	U _b =30 V: max 818 Ω FEB 20/20 P (INTENSOR): max. 680 W FEB 22/22 P (HART): U _b =30 V: max 800 Ω	max. 25 Ω/wire
Overrange signal	Optional 3.6 mA, 22 mA or hold (last current value held)		greater or equal to 1.5 mA
Integration time	0...99 s, factory setting: 0 s		
Integrated overvoltage protection	Protective diodes: Gas discharger 230 V, nominal surge current 10 kA		

Electronic insert type	FEB 24/24 P
Output signal	Digital communication signal, PROFIBUS-PA
PA function	Slave
Transmission rate	31.25 kBit/s
Response time	Slave: approx. 20 ms PLC: 300...600 ms (depending on segment coupler) for approx. 30 devices
Signal on alarm	Selectable -9999, +9999 or hold (last value)
Communication resistance	PROFIBUS-PA termination resistor
Physical layer	IEC 1158-2
Integration time	0...99 s, factory setting: 0 s
Integrated overvoltage protection	Protective diodes: Gas discharger 230 V, nominal surge current 10 kA

Reference conditions	25°C
Hysteresis	± 0.1% FS (DIN 16086)
Long-term stability	0.1% of nominal measuring range for 6 month
Effect of ambient temperature	0.01% FS/10 K (DIN 16086)
Effect of medium temperature	0.1% FS/10 K (DIN 16086)
Linearity	0.2% for measuring range (DIN 16086), option 0.1%

Application Conditions

Installation conditions For probes with integrated electronic insert	DB 50, DB 50 L	DB 51	DB 52, DB 53
Installation instructions	Any position, always below the lowest measuring point	Mounting from above, not in filling curtain and as far as possible from effects of flow and turbulence.	

Ambient conditions

Ambient temperature	-20...+60°C, with housing adapter -20...80°C
Limiting ambient temperature	-40...85°C
Storage temperature range	-40...85°C
Climate class	D (IEC 654-1)
Ingress protection	Housing: IP 66, with housing adapter: IP 68 Electronic insert: IP 20
Shock resistance	IEC 68-2-31
Vibration resistance	10...55 Hz, 2 gn, (IEC 68-2-6)
Electromagnetic compatibility	Interference emission to EN 50081-1 Interference immunity to EN 50082-2 and industrial standard NAMUR (Field strength 10 V/m)

Product conditions

	DB 50	DB 51	DB 52, DB 53
Product temperature	-10...+100°C	-10...+80°C	-10...+80°C
Cleaning temperature	For DB 50 L: 135°C, max. 30 min		
Limit medium pressure range	Measuring cell bar (psi) 0.1 (1.5) 0.4 (6.0) 1.2 (15.0) 4.0 (60.0)	Overload bar (psi) 8 (116) 8 (116) 24 (348) 25 (362.5)	Greatest measurable vacuum bar (psi) -0.1 (1.5) -0.4 (6.0) -0.9 (13.0) -0.9 (13.0)

Construction

Housing construction

Housing F6	- Material: GD-Al Si 10 Mg, DIN 1725, with plastic coating (blue/grey) - Sealing for housing cover: O-ring in EPDM (elastomer)
Housing F8	- Material: stainless steel 1.4301, unvarnished - Sealing for housing cover: profiled O-ring in silicone VMQ
Housing F10	- Material: glass fibre reinforced polyester (blue/grey) - Sealing for housing cover: O-ring in silicone

Process connections

	DB 50	DB 51	DB 52
Thread	G 1 1/2 A (BSP) 1 1/2 NPT	G 1 1/2 A (BSP) 1 1/2 NPT	G 1 1/2 A (BSP) 1 1/2 NPT
Flange	DN 40 PN 16 Form C DN 50 PN 16 Form C DN 80 PN 16 Form C DN 100 PN 16 Form C ANSI 1 1/2" 150 psi ANSI 2" 150 psi ANSI 3" 150 psi ANSI 4" 150 psi	DN 40 PN 16 Form C DN 50 PN 16 Form C DN 80 PN 16 Form C DN 100 PN 16 Form C ANSI 1 1/2" 150 psi ANSI 2" 150 psi ANSI 3" 150 psi ANSI 4" 150 psi	DN 40 PN 16 Form C DN 50 PN 16 Form C DN 80 PN 16 Form C DN 100 PN 16 Form C ANSI 1 1/2" 150 psi ANSI 2" 150 psi ANSI 3" 150 psi ANSI 4" 150 psi

Sanitary process connections for DB 50 L

Process connection	Dairy coupling DN 40 (DIN 11851) Dairy coupling DN 50 (DIN 11851) Flange diameter 65 mm (DRD) Tri-clamp coupling 2" (ISO 2852) SMS coupling 2" Varivent coupling D=68 mm IDF coupling (ISO 2853)
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Materials for wetted parts

Process connections	Thread and flange versions for DB 50, 51, 52 and all foodstuff process connections for DB 50 L in stainless steel 1.4435 (AISI 316L) or Hast. C4
Rod DB 51	- Material: steel 1.4435 (AISI 316L) or 2.4610 Hastelloy C4 - Rod length: max. 4 m (13.2 ft)
Rope DB 52, DB 53	- Multicore cable with steel mesh, insulation FEP (max. 80°C) or PE (max. 70°C) - Cable length ⁽¹⁾ max. 200 m (656 ft), in Ex areas 100 m (328 ft) - min. bending radius 200 mm (7.9 in)
Measuring cell tube	stainless steel 1.4435 or 2.4610 Hastelloy C4
Seals	- Measuring cell seal DB 50, DB 51, DB 52, DB 53: optional Viton, EPDM, Kalrez or measuring cell seal welded on (elastomer-free) - Measuring cell seal DB 50 L: welded on or silicone profiled seal for universal process adapter (supplied), suitable for foodstuffs as per BGA XV and FDA 177.2600 with welded flange and PTFE seal (supplied)
Process diaphragm	Hastelloy C4, R _a < 0.2 µm
Protective cover for diaphragm	For DB 51, DB 52, DB 53: plastic PFA (perfluoralkoxy)
Attachment accessories	- Housing adapter - Mounting clamp: galvanised steel with plastic jaws

Measuring cell	Filling liquid: Silicone oil TK002/500 with USDA/H1 approval to FDA directives
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Electrical connection	See "Electrical Connection" page 17...18
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Dimensions	See "Dimensions" page 10...15
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(1) Caution!
When using a housing adapter, the maximum length of the cable is 200 m (656 ft), hazardous areas 100 m (328 ft) and comprises the total length of the support cable plus the connecting cable of the housing adapter.

User Interface

Operating module FHB 20 with FEB 20/20 P, FEB 22/22 P

Display	<ul style="list-style-type: none"> - 4 digit LC display, with segmented bar chart, fault and communication indicator - optional for local display and operation, - plug-in unit
Operation	Via four keys -, +, V, H on the operating and display module FHB 20
Operation without operating module	Calibration and basic functions using four keys 0 %: -, + and 100 %: -, + on the electronic insert

Operating module FHB 20 with FEB 24/24 P

Display	<ul style="list-style-type: none"> - 4 digit LC display, with segmented bar chart, fault and communication indicator - optional for local display and operation, - plug-in unit
Operation	Via four keys -, +, V, H on the operating and display module FHB 20
Remote operation	Via PROFIBUS-PA with operating program Commuwin II or PA profile

Communication interfaces

FEB 20/20 P FEB 22/22 P	Operation with handheld terminal: <ul style="list-style-type: none"> - HART Communicator DXR 275 for HART protocol - Commulog VU 260 Z for INTENSOR protocol - Connection directly at the current output or any point in the signal line Communication resistance: 250 Ω
FEB 24/24 P	PROFIBUS-PA Communication resistance: PROFIBUS-PA terminal resistance, one per segment

Power Supply

Electronic insert	FEB 20/20 P FEB 22/22 P	FEB 17 FEB 17 P	FEB 11 FEB 11 P
Power supply	11.5...30 V _{DC}	14...16 V _{DC}	15...20 V _{DC}
Ripple (Smart devices)	<ul style="list-style-type: none"> - INTENSOR max. ripple (measured at 500 Ω) 0 Hz...100 Hz: U_{PP} ≤ 30 mV - HART max. ripple (measured at 500 Ω) 47 Hz...125 Hz: U_{PP} ≤ 200 mV - Max. noise (measured at 500 Ω) 500 Hz...10 kHz: U_{eff}=2.2 mV - In range 1 Hz...100 kHz max. interference level U_{PP} ≤ 1 V 		
Ripple for non-smart devices (within permissible voltage range)			
Start-up current	100 mA, for operating voltage 30 V, pulse width half life time 20 ms		

Electronic insert	FEB 24	FEB 24 P	
Power supply	In hazardous areas: 9...24 V _{DC} (1.2 W) In non-hazardous areas: 9...32 V _{DC}	In hazardous areas: 9.6...24 V _{DC} (1.2 W) In non-hazardous areas: 9.6...32 V _{DC}	
Current consumption	10 mA +/- 1mA		

Certificates and Approvals

Explosion protection	See "Product Structure" page 22...23
Overfill protection	See "Product Structure" page 22...23
CE-mark	By attaching the CE-mark, Endress+ Hauser confirms that the Deltapilot S fulfills all legal requirements of the relevant EU directives.

Ordering

See "Product Structure" page 22...23

Supplementary Documentation

<ul style="list-style-type: none"> - Deltapilot S System Information: SI 006F/00/e - Electronic insert FEB 20 with INTENSOR protocol/FEB 22 with HART protocol: Operating instructions: BA 152F/00/en - Electronic insert FEB 11/FEB 17 Operating instructions: KA 048F/00/a6 - Housing adapter and cable shortening kit Operating Instructions: KA 049F/00/a6 - CE Ex II 1/2 G, EEx ia IIC T6 Safety Instructions: XA 002F-B/00/z1 - CE Ex II 1/2 G bzw. 2 G, EEx ia IIC T4/T5/T6 Safety Instructions: XA 007F-B/00/z1 - EMC test procedures Technical Information: TI 241F/00/en - Planning notes PROFIBUS-PA Technical Information: TI 260F/00/en
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Product Structure

Deltapilot DB 50 L (S) compact foodstuffs version

10 Certificates, Approvals

- A Standard
- D EEx ia IIC T6, overspill protection: WHG / ATEX II 1/2 G (not for DB 50 S)
- E Overspill protection: WHG (not for DB 50 S)
- G EEx ia IIC T6 / ATEX II 1/2 G (not for DB 50 S)
- O FM, Cl. I, Div. 1,2, Group A...D (not for DB 50 L)
- S CSA, Cl. I, Div. 1, Group A...D
- T CSA, Cl. I, Div. 2, Group A...D
- Y Others

20 Special Versions

- C Compact
- Y Others

30 Process Connection Thread: Versions / Materials

- 00 Universal mounting adapter
- 40 Dairy coupling DN 40 (DIN 11851) / 1.4435 (AISI 316L)
- 41 Dairy coupling DN 50 (DIN 11851) / 1.4435 (AISI 316L)
- 44 Flange diameter 65 mm (DRD) / 1.4435 (AISI 316L)
- 50 Tri-clamp® coupling 2" (AISI 316L)
- 53 SMS coupling 2" / 1.4435 (AISI 316L)
- 54 Varivent coupling DN 50 / 1.4435 (AISI 316L)
- 56 IDF coupling 2" (ISO 2853) / 1.4435 (AISI 316L)
- 57 Universal mounting adapter 6" extension
- 99 Others

40 Measuring Ranges

- | | |
|---|---|
| BA Measuring range 0...100 mbar (0...1.5 psi) | DA Measuring range -100...100 mbar (-1.5...1.5 psi) |
| BB Measuring range 0...400 mbar (0...6 psi) | DB Measuring range -400...400 mbar (-6...6 psi) |
| BC Measuring range 0...1200 mbar (0...15 psi) | DC Measuring range -900...1200 mbar (-13...15 psi) |
| BD Measuring range 0...4000 mbar (0...60 psi) | DD Measuring range -900...4000 mbar (-13...60 psi) |

- Y9 Others

50 Measuring Cell Version

- 1 Measuring cell with linearity better than 0.2%, silicone filled
- 3 Measuring cell with linearity better than 0.1%, silicone filled
- 9 Others

60 Measuring Cell Seal

- 3 Welded
- 4 Viton
- 9 Others

70 Transmitter

- | | |
|---|---|
| A Without integrated transmitter | |
| B FEB 11: 3-wire analogue signal | M FEB 11P: 3-wire analogue., integr. overvoltage protection |
| C FEB 17: 2-wire PFM signal | N FEB 17P: 2-wire PFM, integr. overvoltage protection |
| D FEB 20: 4...20 mA compact, INTENSOR | P FEB 20P: as D + integr. overvoltage protection |
| E FEB 22: 4...20 mA compact, HART | R FEB 22 P: as E + integr. overvoltage protection |
| F FEB 20: 4...20 mA compact, INTENSOR, with display | S FEB 22 P: as F + integr. overvoltage protection |
| G FEB 22: 4...20 mA compact, HART, with display | T FEB 22P: as G + integr. overvoltage protection |
| H FEB 24: PROFIBUS-PA | U FEB 24 P: as H + integr. overvoltage protection |
| K FEB 24: PROFIBUS-PA, with display | W FEB 24 P: as K + integr. overvoltage protection |
| Y Others | |

80 Housing / Cable Entry / Ingress Protection

- A0 Without housing
- D1 Polyester housing / Pg 16 / IP 66
- D2 Aluminium housing coated / Pg 16 / IP 66
- D3 Stainless steel housing in 1.4301 (AISI 304) F 8 / PG 13.5 / IP 66
- E1 Polyester housing / 1/2 NPT / Nema 4X
- E2 Aluminium housing coated / 1/2 NPT / Nema 4X
- E3 Stainless steel housing in 1.4301 (AISI 304) F 8 / 1/2 NPT / Nema 4X
- F1 Polyester housing / G 1/2 / IP 66
- F2 Aluminium housing coated / G 1/2 / IP 66
- F3 Stainless steel housing in 1.4301 (AISI 304) F 8 / G 1/2 / IP 66
- G1 Polyester housing / M 20x1.5 / IP 66
- G2 Aluminium housing coated / M 20x1.5 / IP 66
- G3 Stainless steel housing in 1.4301 (AISI 304) F 8 / M 20x1.5 / IP 66
- P2 Aluminium housing coated F 6 / M12 / IP 66 PROFIBUS-PA
- P3 Stainless steel housing 1.4301 (AISI 304) F 8 / M 12 / IP 66 PROFIBUS-PA
- Y9 Others

90 Accessories

- 0 None
- 1 Housing adapter with 5000 mm (200 in) connection cable, IP 68
- 3 Housing adapter with connection cable (L max. 20000 mm; 800 in), IP 68
- 9 Others

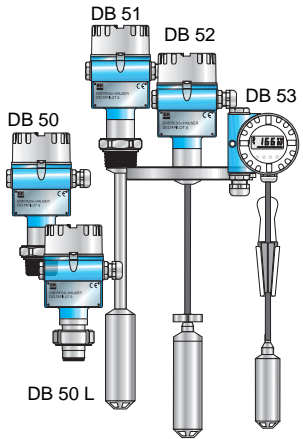
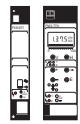
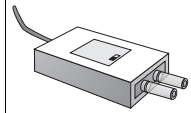
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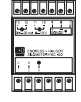
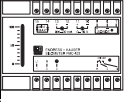


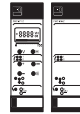
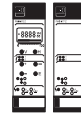
Product designation

Length L

Connection cable for housing adapter

Peripherals

Deltapilot S product family	Electronic insert	FEB 20/FEB 22 Smart 4...20 mA			FEB 24 PROFIBUS-PA
		CommuteC Transmitters in Racksyst design for mounting in racks 			
Type	FXN 671	FMX 770	FXA 191	KFD2-BR	
Version	CommuteC transmitter 4 HP wide	CommuteC transmitter 7 HP wide	Interface adapter	Segment coupler	
Certificates	[EEEx ia]	[EEEx ia], WHG, VbF, CSA, TIIS	[EEEx ia], FM, CSA	[EEEx ia] II C	
Output	4...20 mA Rackbus	0/4...20 mA, 0/2...10 V Rackbus	RS 232 for PC with Commuwin II	PROFIBUS RS-485 (DP)	
Power supply	20...30 V _{DC}	20...30 V _{DC}	24 V _{DC}	20...30 V _{DC}	
Input/Output	Electrically isolated	Electrically isolated	Electrically isolated	Electrically isolated	
Technical Information	TI 221F/00/en	TI 222F/00/en	TI 237F/00/en	BA 182F/00/en BA 183F/00/en (Ex)	

Electronic insert	FEB 11 Analogue signal along three wires			FEB 17 PFM signal			
	Silometer	Minipac 	Minipac 	96x96 mm 	Racksyst 	Racksyst 	Racksyst 
Type	FMC 420	FMC 423	FMC 425	FMX 570	FMC 671 Z FMC 676 Z without display and operating unit	FMB 672 Z FMB 677 Z without display and operating unit	Prolevel FMC 661 Prolevel FMB 662
Features				Vessel linearisation Calibration adjustment with Deltapilot and Liquiphant	Vessel linearisation Calibration adjustment with Deltapilot and Liquiphant	Two independent channels, differential pressure and density measurement	Two independent channels, vessel linearisation, calibration adjustment
Version	Minipac housing	Minipac housing	Control panel mounting	Racksyst card 7 HP wide	CommuteC transmitter 7 HP wide	CommuteC transmitter 7 HP wide	Field housing 292x253x176 mm
Certificates				Ex, [EEEx ia], WHG, VbF	Ex, [EEEx ia], WHG, VbF	Ex, [EEEx ia], WHG, VbF	[EEEx ia], FM, CSA
Output	0/4...20 mA 0...10 V	0/4...20 mA 0...10 V	0/4...20 mA 0...10 V	0/4...20 mA 0/2...10 V with adjustable output damping	0/4...20 mA 0/2...10 V with adjustable output damping	0/4...20 mA (2x) 0/2...10 V (2x) with adjustable output damping	0/4...20 mA (2x)
Connection	20...253 V _{AC}	20...253 V _{AC} 16...32 V _{DC}	20...253 V _{AC}	20...30 V _{DC}	20...30 V _{DC}	20...30 V _{DC}	16...60 V _{DC} 85...253 V _{DC}
Fault indication				Changeover contact	Changeover contact	Changeover contact	Changeover contact
Technical Information	TI 077F/00/en	TI 077F/00/en	TI 143F/00/en	TI 201F/00/en	TI 064F/00/en	TI 065F/00/en	TI 232F/00/en TI 234F/00/en

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