



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

## Technical Information

# Deltapilot M FMB50/51/52/53

Hydrostatic level measurement

Pressure sensor with the CONTITE™ measuring cell

Condensate-resistant offering long-term stability; communication via HART, PROFIBUS PA or FOUNDATION Fieldbus.



### Application

The hydrostatic pressure sensor is used for the following measuring tasks:

- Hydrostatic pressure measurement in liquids and paste-like media in all areas of process engineering, process measuring technology, pharmaceuticals and the food industry
- Level, volume or mass measurements in liquids

### Your benefits

- Very good reproducibility and long-term stability
- Turn down 100:1
- Hermetically sealed CONTITE™ measuring cell:
  - Condensate-resistant and climatic-proofed
  - High reference accuracy:  $\pm 0.2\%$ , optionally  $\pm 0.1\%$
  - Minimum temperature effects
- End-to-end modularity for differential pressure, hydrostatics and pressure (Deltabar M – Deltapilot M – Cerabar M), e.g.
  - replaceable display
  - universal electronics
- Easy commissioning without the need for an operating tool
- Easy and safe menu-guided operation
  - on-site via display module
  - via 4 to 20 mA with HART
  - via PROFIBUS PA
  - via FOUNDATION Fieldbus
- Wide range of approvals (e.g. ATEX, FM, CSA, etc.) for international use
- Usage in drinking water: KTW, NSF
- Used for process pressure monitoring up to SIL2, certified to IEC 61508 Edition 2.0 and IEC 61511 by TÜV NORD

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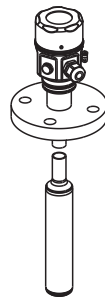
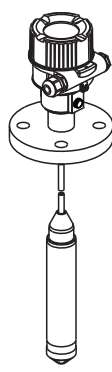
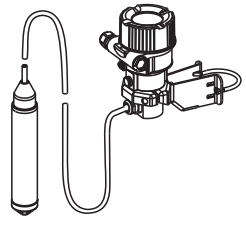
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## Function and system design

### Device selection

Deltapilot M – Product family	FMB50	FMB51	FMB52	FMB53
	<div></div> <div>P01-FMB5xxxx-14-xx-xx-xx-000</div> <div>Compact version</div>	<div></div> <div>P01-FMB5xxxx-14-xx-xx-xx-001</div> <div>Rod version</div>	<div></div> <div>P01-FMB5xxxx-14-xx-xx-xx-002</div> <div>Cable version</div>	<div></div> <div>P01-FMB5xxxx-14-xx-xx-xx-003</div> <div>Cable version with mounting clamp</div>
Field of application	– Level measurement – Pressure measurement			
Industries	Food, pharmaceuticals, chemicals			Environment (freshwater and wastewater)
Process connections	– Thread – Flanges – Flush-mounted hygienic connections	– Thread – Flanges	– Thread – Flanges	Suspension clamp
Measuring ranges	From –0.1 to +0.1 (–1,5 to +1,5 psi) bar to –1 bar to +10 bar (–15 to 150 psi)			
OPL <sup>1)</sup>	Max. 40 bar (600 psi)			
Process temperature range	–10 to +100°C (+14 to +212°F) (+135°C (275°F) for 30 minutes maximum)	–10 to +85°C (+14 to +185°F)	With PE cable: –10 to +70°C (+14 to +158°F) With FEP cable: –10 to +80°C (+14 to +176°F)	
Ambient temperature range	<div>■ Without LCD display: –40 to +85°C (–40 to +185°F)</div> <div>■ With LCD display: –20 to +70°C (–4 to +158°F) (extended temperature application range –40 to 85°C (–40 to +158°F) with restrictions in optical properties such as display speed and contrast)</div> <div>■ Separate housing: –20 to +60°C (–4 to +140°F)</div>			
Reference accuracy	0.2 % (option 0.1 %) depends on the measuring range → 21			
Supply voltage	– 11.5 to 45 V DC (versions with plug-in connection 35 V DC) – For intrinsically safe device versions: 11.5 to 30 V DC			
Output	4 to 20 mA with superimposed HART protocol, PROFIBUS PA or FOUNDATION Fieldbus			
Options	– Gold/rhodium-coated process isolating diaphragm – 3.1 inspection certificate – 3A approval and EHEDG approval for FMB50 – Specific firmware versions – Initial device settings can be ordered – Separate housing			
Specialties	– Absolute resistance to condensate thanks to hermetically sealed CONTITE™ cell – Maximum flexibility thanks to modular design – Special cleaning of the transmitter to remove paint-wetting substances, for use in paint shops			

1) OPL = over pressure limit; depends on the lowest-rated element, with regard to pressure, of the selected components

#### **FMB50/51/52 universal application**

- Modular probe program to ensure optimum process adaptation
- FMB50 compact version: installation in the tank from below or from the side
- FMB51/52 rod and cable extension: installation from above, i.e. easy to retrofit ground tanks, no additional opening in the tank floor



#### **FMB50 optimized for the food-processing and pharmaceutical industry**

- All typical flush-mounted process connections can be supplied
- Welding flanges
- Stainless steel housing
- All the sanitary process connections are gap-free and can be cleaned so that the unit is free of residue, e.g. CIP cleaning
- USDA/H1-approved transfer liquid as per FDA Directive
- 3A approval or EHEDG approvals

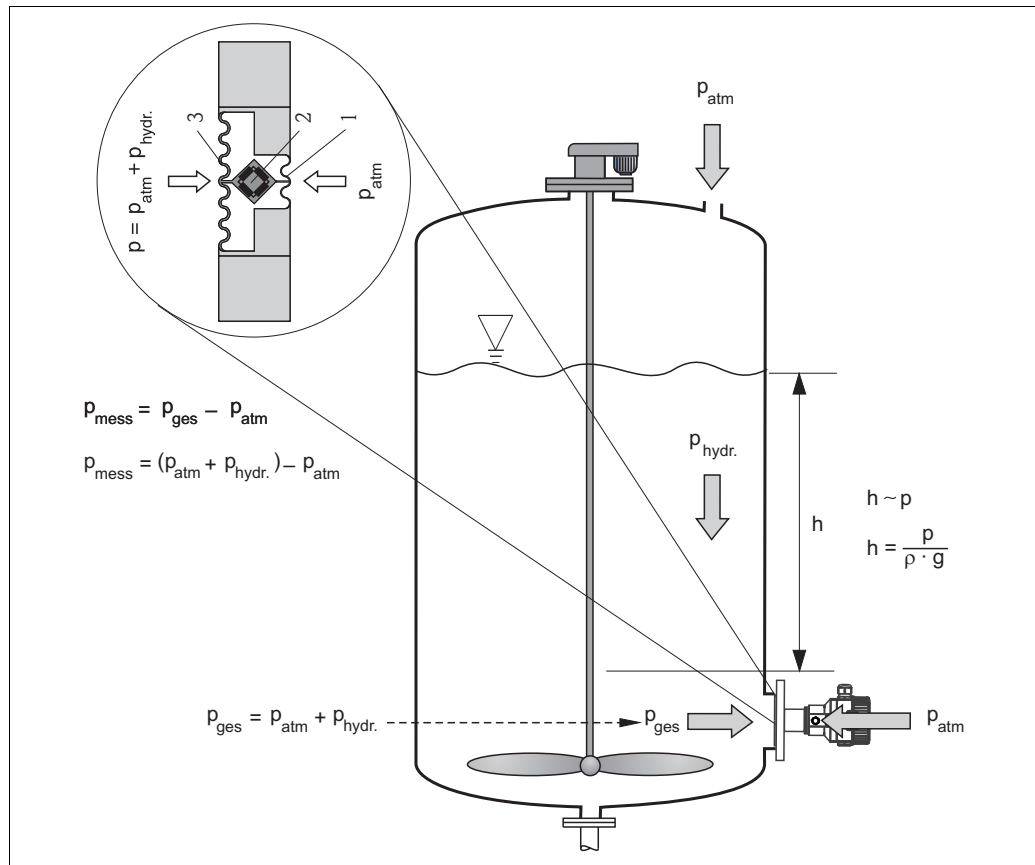


P01-DB5xxxxx-12-xx-xx-xx-004

#### **FMB53 for level measurement in water and wastewater**

- The housing with the electronic insert is mounted outside shafts and tanks in such a way that it is protected from flooding. The extension cable is secured with a suspension clamp.
- The measuring cell tube made of stainless steel (AISI 316L) and the Alloy process isolating diaphragm allow use in aggressive media such as wastewater for example.
- Extension cable up to 400 m (1312 ft) in length (up to 100 m (328 ft) 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); →  26.
- Special measuring cell with gold/platinum coating for acids, alkalis or sea water; →  26.

## Measuring principle



P01-FMB50xxx-15-xx-xx-xx-004

### Deltapilot M hydrostatic level measurement and measuring principle

- 1 Rear isolating membrane of the CONTITE™ measuring cell
- 2 Measuring element
- 3 Process isolating diaphragm
- $g$  Gravitational acceleration
- $h$  Level height
- $p_{\text{ges}}$  Total pressure = hydrostatic pressure + atmospheric pressure
- $p_{\text{atm}}$  Atmospheric pressure
- $p_{\text{hydr.}}$  Hydrostatic pressure
- $p_{\text{mess}}$  Measured pressure in the measuring cell = hydrostatic pressure
- $\rho$  Density of the medium

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.

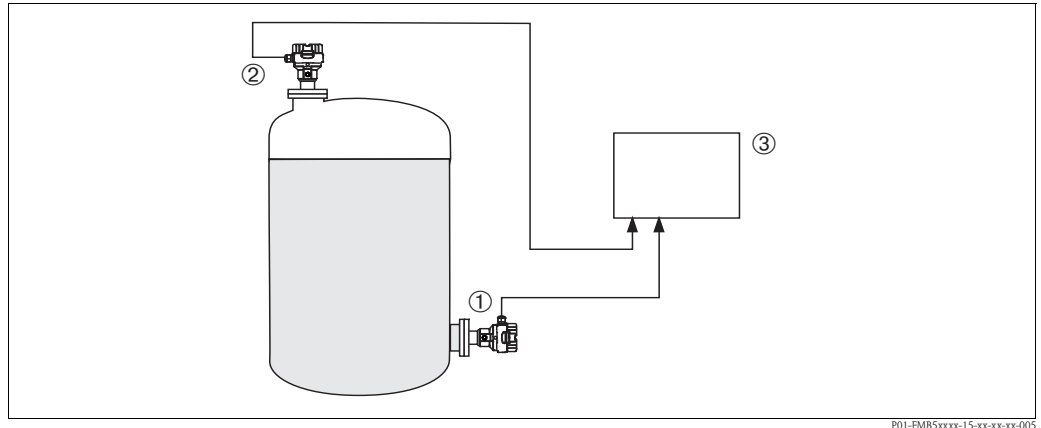
The CONTITE™ measuring cell, which works on the principle of the gauge pressure sensor, constitutes the core of Deltapilot M. In contrast to conventional gauge pressure sensors, the precision measuring element (2) in the CONTITE™ measuring cell is absolutely protected, situated between the process isolating diaphragm (3) and the rear isolating membrane (1). Thanks to this hermetic sealing of the measuring element, the CONTITE™ measuring cell is absolutely insensitive to condensate/condensation and aggressive gases. The pressure applied is transferred from the process isolating diaphragm to the measuring element by means of an oil without any loss in pressure.

Two temperature sensors, which measure the distribution of temperature in the cell, are arranged between the process isolating diaphragm and measuring element. The electronics can compensate any measuring errors resulting from fluctuations in temperature with these measured temperature values.

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

**Level measurement in closed tanks with pressure overlay**

You can determine the differential pressure in tanks with pressure overlay using two Deltapilot M. 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.



P01-FMB5xxxx-15-xx-xx-xx-005

*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 Signal processing unit determines the difference in pressure and uses this to calculate the level

**Note!**

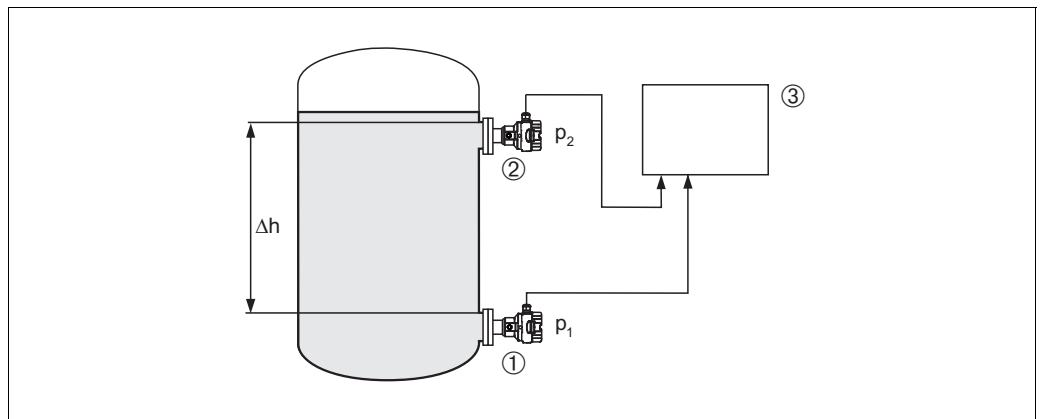
- When selecting the Deltapilot M probes, make sure you select measuring ranges that are sufficiently wide (→ see example).
- The process isolating diaphragm of probe 2 must not be flooded. This generates additional hydrostatic pressure which distorts the measurement.
- The ratio of hydrostatic pressure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

**Example:**

- Max. hydrostatic pressure = 0.6 bar (9 psi)
- Max. top pressure (probe 2) = 0.3 bar (4.5 psi)
- Max. total pressure, measured with probe 1 = 0.3 bar (4.5 psi) + 0.6 bar (9 psi) = 0.9 bar (13.5 psi)  
⇒ Measuring cell to be selected: 0 to 1.2 bar (0 to 18 psi)
- Max. pressure, measured with probe 2: 0.3 bar (4.5 psi)  
⇒ Measuring cell to be selected: 0 to 0.4 bar (0 to 6 psi)

**Density measurement**

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



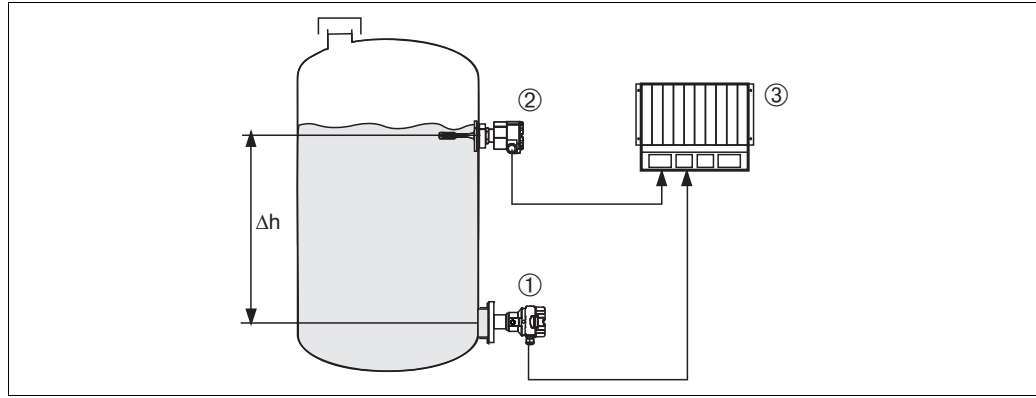
P01-FMB5xxxx-15-xx-xx-xx-006

*Level measurement in a closed tank with pressure overlay*

- 1 Deltapilot M determines pressure measured value  $p_1$
- 2 Deltapilot M 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  $\Delta h$

### Level measurement with automatic density correction (with media changing 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 M currently measured and the known distance between Deltapilot M and the limit switch. The signal processing unit then calculates the level from the new density and the measured pressure of the Deltapilot M.

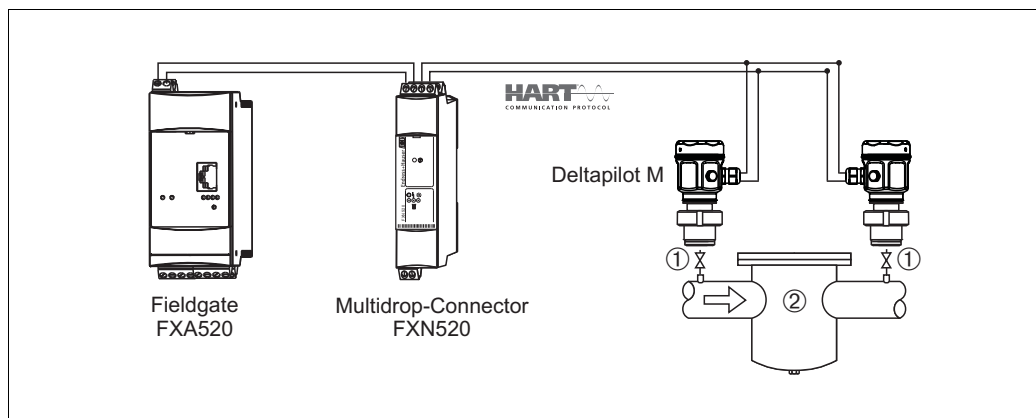


P01-FMB5xxxx-15-xx-xx-xx-007

Level measurement with automatic density correction

- 1 Deltapilot M
- 2 Liquiphant
- 3 PLC

### Electrical differential pressure measurement with gauge pressure sensors



P01-FMB5xxxx-14-xx-xx-xx-004

- 1 Shut-off valves
- 2 e.g. filter

In the example given, two Deltapilot M devices (each with a gauge pressure sensor) are interconnected. The pressure difference can thus be measured using two independent Deltapilot M devices.

#### Caution!

If using intrinsically safe devices, strict compliance with the rules for interconnecting intrinsically safe circuits as stipulated in IEC60079-14 (proof of intrinsic safety) is mandatory.

### System integration

The device can be fitted with a tag name and a preset bus address, see → 53 ff "Ordering information" feature 895 "Identification:" version "Z1" and "Z2".



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**Communication protocol**

- 4 to 20 mA with HART communication protocol
- PROFIBUS PA
  - The Endress+Hauser devices meet the requirements of the FISCO model.
  - Due to the low current consumption of  $11\text{ mA} \pm 1\text{ mA}$ , the following number of devices can be operated on one bus segment if installing as per FISCO:
    - up to 8 Deltapilot M for Ex ia, CSA IS and FM IS applications
    - up to 31 Deltapilot M for all other applications, e.g. in non-hazardous areas, Ex nA, etc.

Further information on PROFIBUS PA can be found in Operating Instructions BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning" and in the PNO Guideline.
- FOUNDATION Fieldbus
  - The Endress+Hauser devices meet the requirements of the FISCO model.
  - Due to the low current consumption of  $16\text{ mA} \pm 1\text{ mA}$ , the following number of devices can be operated on one bus segment if installing as per FISCO:
    - up to 6 Deltapilot M for Ex ia, CSA IS and FM IS applications
    - up to 22 Deltapilot M for all other applications, e.g. in non-hazardous areas, Ex nA, etc.

Further information on FOUNDATION Fieldbus, such as requirements for bus system components can be found in Operating Instructions BA00013S "FOUNDATION Fieldbus Overview".

## Input

**Measured variable** Hydrostatic pressure

### Measuring range

Nominal value	Range limit		Smallest span (factory calibration) <sup>1)</sup>	MWP <sup>2)</sup>	OPL <sup>3)</sup>	Vacuum resistance <sup>4)</sup>  Synthetic oil/ Inert oil  [bar <sub>abs</sub> (psi <sub>abs</sub> )]	Version in the order code <sup>5)</sup>
	lower (LRL) <sup>6)</sup>	upper (URL)					
[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]		
0.1 (1.45)	-0.1 (-1.5)	+0.1 (+1.5)	0.01 (0.15)	2.7 (40.5)	4 (60)	0.01/0.04 (0,15/0,6)	1C
0.4 (6)	-0.4 (-6)	+0.4 (+6)	0.02 (0.3)	5.3 (79.5)	8 (120)		1F
1.2 (18)	-1 (-15)	+1.2 (+18)	0.06 (1)	16 (240)	24 (360)		1H
4 (60)	-1 (-15)	+4 (+60)	0.2 (3)	16 (240)	24 (360)		1M
10 (150)	-1 (-15)	+10 (+150)	0.5 (7.5)	27 (405)	40 (600)		1P

- 1) Recommended Turn down: Max 100:1.  
Factory calibration Turn down: Max 20:1, higher on request.
- 2) The MWP (maximum working pressure) for the measuring device depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection (→ 30 ff) has to be taken into consideration in addition to the measuring cell (→ see Table above). Pay attention to the pressure-temperature dependence also. For the appropriate standards and other information, see → 29, Pressure specifications section.
- 3) OPL: over pressure limit; depends on the lowest-rated element, with regard to pressure, of the selected components
- 4) The vacuum resistance applies to the measuring cell at reference conditions.
- 5) → 53 ff, "Ordering information" section, feature 70 "Sensor range"
- 6) By default, the device is set to a lower range limit of 0 bar. Please specify in the order if the lower range limit is to be set to a different default value.

Explanation of terms

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

Case 1:

- Lower range value (LRV)  $\leq$  Upper range value (URV)

Example:

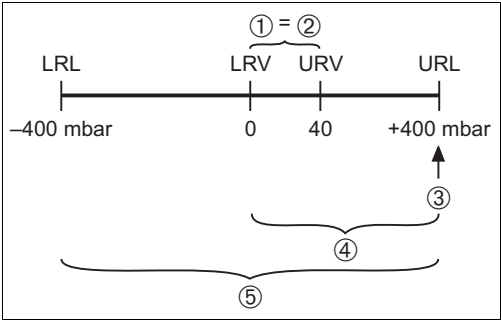
- Lower range value (LRV) = 0 mbar
- Upper range value (URV) = 40 mbar (0.6 psi)
- Nominal value (URL) = 400 mbar (6 psi)

Turn down:

- $TD = URL / |URV| = 10:1$

Set span:

- $URV - LRV = 40 \text{ mbar (0.6 psi)}$   
This span is based on the zero point.



Example: 400 mbar (6 psi) measuring cell

Case 2:

- Lower range value (LRV)  $\geq$  Upper range value (URV)

Example:

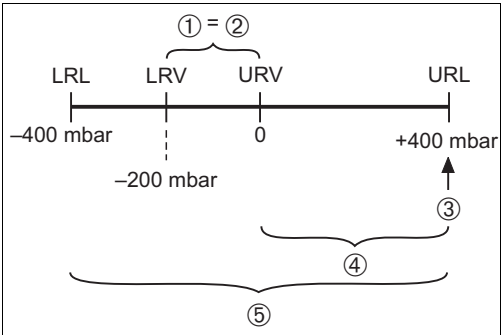
- Lower range value (LRV) = -200 mbar (3 psi)
- Upper range value (URV) = 0 mbar
- Nominal value (URL) = 400 mbar (6 psi)

Turn down:

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

Set span:

- $URV - LRV = 200 \text{ mbar (3 psi)}$   
This span is based on the zero point.



Example: 400 mbar (6 psi) 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

- 4 to 20 mA with superimposed digital communication protocol HART 6.0, 2-wire
- Digital communication signal PROFIBUS PA (Profile 3.02)
- Digital communication signal FOUNDATION Fieldbus

### Signal range – 4 to 20 mA HART

3.8 to 20.5 mA

### Signal on alarm

As per NAMUR NE 43

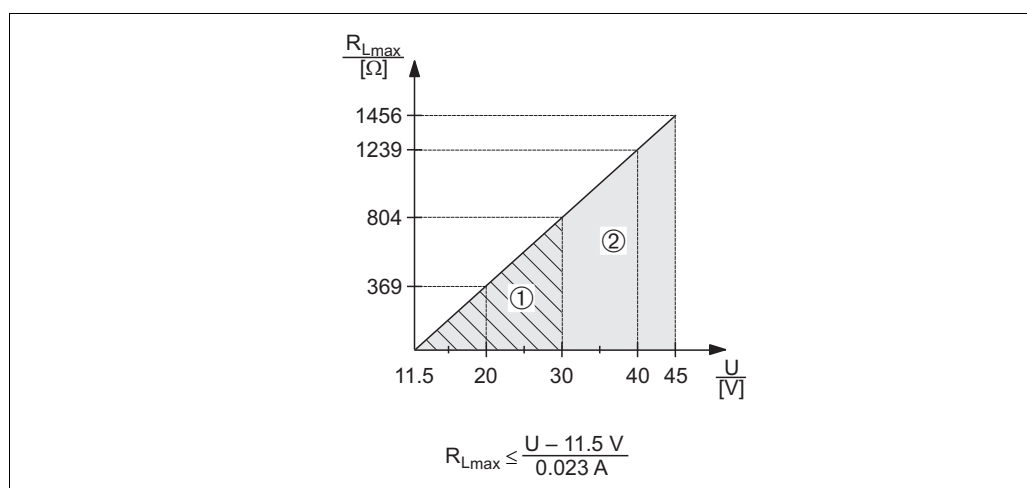
- 4 to 20 mA HART

Options:

- Max. alarm: can be set from 21 to 23 mA (Factory setting: 22 mA)
- Hold measured value: last measured value is held
- Min. alarm: 3.6 mA

- PROFIBUS PA: can be set in the Analog Input block,  
Options: Last Valid Out Value (factory setting), Fail-safe Value, Status Bad
- FOUNDATION Fieldbus: can be set in the Analog Input block,  
Options: Last Good Value, Fail-safe Value (factory setting), Wrong Value

### Load - 4 to 20 mA HART



Load diagram

1 Power supply 11.5 to 30 V DC for intrinsically safe device versions

2 Power supply 11.5 to 45 V DC (versions with plug-in connector 35 V DC) for other types of protection and for uncertified device versions

$R_{Lmax}$  Maximum load resistance

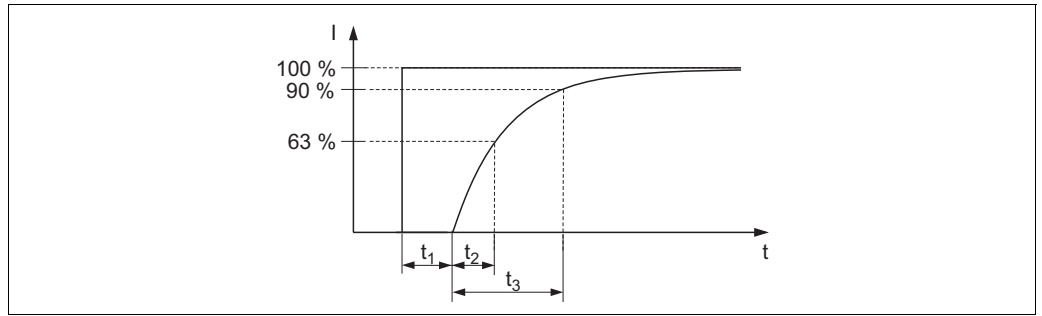
$U$  Supply voltage

### Note!

When operating via a handheld terminal or via a PC with an operating program, a minimum communication resistance of 250  $\Omega$  must be taken into account.

### Resolution

- Current output: 1  $\mu\text{A}$
- Display HART: can be set (factory setting: presentation of the maximum accuracy of the transmitter)

**Dead time, time constant***Presentation of the dead time and the time constant***Dynamic behavior:  
current output**

	Type	Dead time ( $t_1$ ) [ms]	Time constant T63 (= $t_2$ ) [ms]	Time constant T90 (= $t_3$ ) [ms]
max.	FMB50	60	90	210
max.	FMB51 FMB52 FMB53	500	250	–

**Dynamic behavior: HART**

	Type	Dead time ( $t_1$ ) [ms]	Dead time ( $t_1$ ) [ms] + Time constant T63 (= $t_2$ ) [ms]	Dead time ( $t_1$ ) [ms] + Time constant T90 (= $t_3$ ) [ms]
min.	FMB50	220	310	370
max.		1020	1110	1170
min.	FMB51	660	910	–
max.	FMB52 FMB53	1460	1710	–

**Reading cycle**

- Acyclic: max. 3/s, typical 1/s (depends on command # and number of preambles)
- Cyclic (Burst): max. 3/s, typical 2/s

The Deltapilot M commands the BURST MODE function for cyclic value transmission via the HART communication protocol.

**Cycle time (Update time)**

Cyclic (Burst): min. 300 ms

**Response time**

- Acyclic: min. 330 ms, typical 590 ms (depends on command # and number of preambles)
- Cyclic (Burst): min. 160 ms, typical 350 ms (depends on command # and number of preambles)

**Dynamic behavior:  
PROFIBUS PA**

	Type	Dead time ( $t_1$ ) [ms]	Dead time ( $t_1$ ) [ms] + Time constant T63 (= $t_2$ ) [ms]	Dead time ( $t_1$ ) [ms] + Time constant T90 (= $t_3$ ) [ms]
min.	FMB50	95	185	245
max.		1195	1285	1345
min.	FMB51	535	785	–
max.	FMB52 FMB53	1635	1885	–

**Reading cycle**

- Cyclic: max. 30/s (dependent on the number and type of function blocks used in a closed-control loop)
- Acyclic: typical 25/s

**Cycle time (update time)**

min. 100 ms

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

**Response time**

- Cyclic: approx. 8 to 13 ms (depends on Min. Slave Interval)
- Acyclic: approx. 23 to 35 ms (depends on Min. Slave Interval)

**Dynamic behavior:  
FOUNDATION Fieldbus**

	Type	Dead time ( $t_1$ ) [ms]	Dead time ( $t_1$ ) [ms] + Time constant T63 (= $t_2$ ) [ms]	Dead time ( $t_1$ ) [ms] + Time constant T90 (= $t_3$ ) [ms]
min.	FMB50	105	195	255
max.		1105	1195	1255
min.	FMB51	545	795	–
max.	FMB52 FMB53	1545	1795	–

**Reading cycle**

- Cyclic: max. 10/s (dependent on the number and type of function blocks used in a closed-control loop)
- Acyclic: typical 5/s

**Cycle time (update time)**

Cyclic: min. 100 ms

**Response time**

- Cyclic: max. 20 ms (for standard bus parameter settings)
- Acyclic: typical 70 ms (for standard bus parameter settings)

**Damping**

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

- Via on-site display, handheld terminal or PC with operating program, continuous from 0...999 s
- Via DIP-switch on the electronic insert, switch position  
"on" (= set value) and "off" (= damping switched off)
- Factory setting: 2 s

**Data of the FOUNDATION  
Fieldbus interface****Basic data**

Device Type	0x1023
Device Revision	01 (hex)
DD Revision	0x01021
CFF Revision	0x000102
ITK Version	5.2.0
ITK Certification Driver No.	IT067500
Link-Master (LAS) capable	Yes
Link Master / Basic Device selectable	Yes; Factory setting: Basic Device
Number of VCRs	44
Number of Link Objects in VFD	50
Number of FB-Schedule Objects	40

**Virtual communication references (VCRs)**

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

**Link settings**

Slot time	4
Min. inter PDU delay	12
Max. response delay	40

**Transducer Blocks**

Block	Content	Output values
TRD1 Block	Contains all parameters related to the measurement	<ul style="list-style-type: none"> <li>■ Pressure or level (channel 1)</li> <li>■ Process temperature (channel 2)</li> <li>■ Measured pressure value (channel 3)</li> <li>■ Max. pressure (channel 4)</li> <li>■ Level before linearization (channel 5)</li> </ul>
Diagnostic Block	Contains diagnostic information	Error code via DI channels (channel 10 to 15)
Display Block	Contains parameters to configure the onsite display	No output values

**Function blocks**

Block	Content	Number of blocks	Execution time	Functionality
Resource Block	The Resource Block contains all the data that uniquely identify the device. It is an electronic version of a nameplate of the device.	1		enhanced
Analog Input Block 1 Analog Input Block 2	The AI Block receives the measuring data from the Sensor Block, (selectable via a channel number) and makes the data available to other function blocks at its output. Enhancement: digital outputs for process alarms, fail safe mode.	2	25 ms	enhanced
Digital Input Block	This block contains the discrete data of the Diagnose Block (selectable via a channel number 10 to 15) and provides them for other blocks at the output.	1	20 ms	standard
Digital Output Block	This block converts the discrete input and thus initiates an action (selectable via a channel number) in the DP Flow Block or in the im TRD1 Block. Channel 20 resets the counter for max. pressure transgressions value and Channel 21 resets the Totalizer.	1	20 ms	standard
PID Block	The PID Block serves as a proportional-integral-derivative controller and is used almost universally for closed-loop-control in the field including cascade and feedforward. Input IN can be indicated on the display. The selection is performed in the Display Block (DISPLAY_MAIN_LINE_CONTENT).	1	40 ms	standard
Arithmetic Block	This block is designed to permit simple use of popular measurement math functions. The user does not have to know how to write equations. The math algorithm is selected by name, chosen by the user for the function to be performed.	1	35 ms	standard
Input Selector Block	The Input Selector Block facilitates the selection of up to four inputs and generates an output based on the configured action. This block normally receives its inputs from AI Blocks. The block performs maximum, minimum, average and 'first good' signal selection. Inputs IN1 to IN4 can be indicated on the display. The selection is performed in the Display Block (DISPLAY_MAIN_LINE_1_CONTENT).	1	30 ms	standard
Signal Characterizer Block	The Signal Characterizer Block has two sections, each with an output that is a non-linear function of the respective input. The non-linear function is generated by a single look-up table with 21 arbitrary x-y pairs.	1	40 ms	standard
Integrator Block	The Integrator Block integrates a variable as a function of the time or accumulates the counts from a Pulse Input Block. The block may be used as a totalizer that counts up until reset or as a batch totalizer that has a setpoint, where the integrated or accumulated value is compared to pre-trip and trip settings, generating a binary signal when the setpoint is reached.	1	35 ms	standard

**Additional function block information:**

Instantiate Function Block	YES
Number of instantiate blocks	20

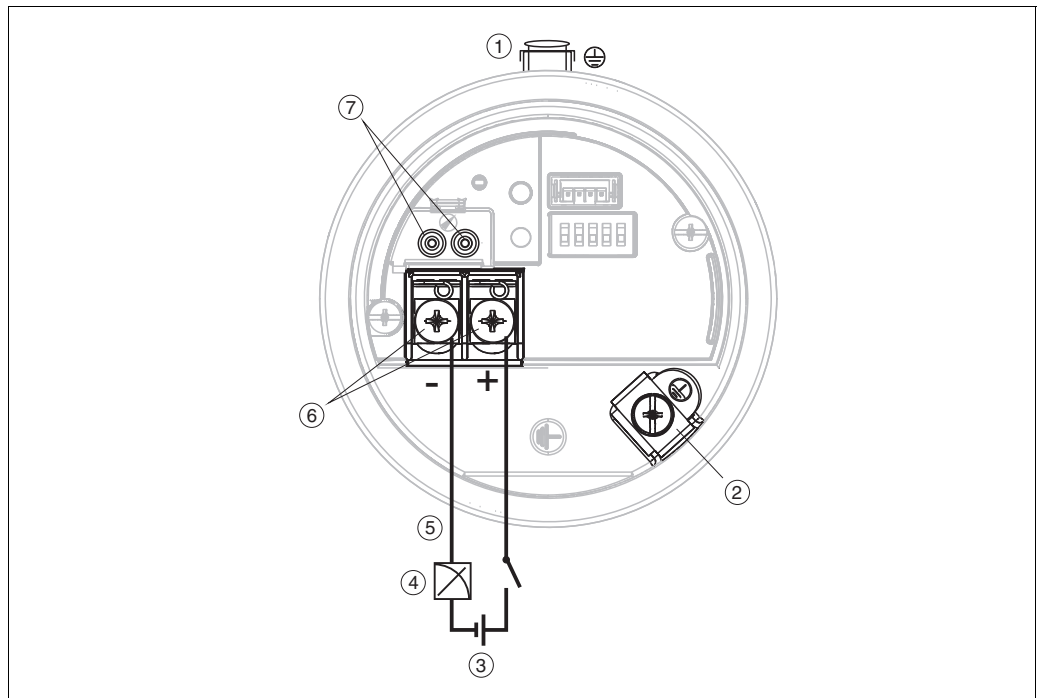


## Power supply

### Electrical connection

Note!

- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings. → 66 ff, "Safety Instructions" and "Installation/Control Drawings" sections.
- According to IEC/EN61010 a suitable disconnecter has to be installed for the device
- HART: Overvoltage protection HAW569-DA2B for the non-hazardous area, ATEX II 2 (1) Ex ia IIC and IEC Ex ia can be ordered as an option (see "Ordering information" section).
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.
- The digital communication signal is transmitted to the bus via a 2-wire connection. The bus also provides the power supply.



### Electrical connection

- 1 External grounding terminal
- 2 Internal grounding terminal
- 3 Supply voltage → 20
- 4 4...20 mA for HART devices
- 5 For HART and FOUNDATION Fieldbus devices: With a handheld terminal, all the parameters can be configured anywhere along the bus line via menu operation.
- 6 Terminals
- 7 For HART devices: test terminals, see section "Taking 4 to 20 mA test signal"

### 4 to 20 mA HART

#### Taking 4 to 20 mA test signal

A 4 to 20 mA test signal may be measured via the test terminals without interrupting the measurement.

### PROFIBUS PA

For further information on the network structure and grounding, and for further bus system components such as bus cables, see the relevant documentation, e.g. Operating Instructions BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning" and the PNO Guideline.

Cable specifications:

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

Note!

For further information on the cable specifications, see Operating Instructions BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning", the PNO Guideline 2.092

PROFIBUS PA User and Installation Guideline" and IEC 61158-2 (MBP).

### FOUNDATION Fieldbus

The digital communication signal is transmitted to the bus via a 2-wire connection. The bus also provides the power supply. For further information on the network structure and grounding and for further bus system components such as bus cables, see the relevant documentation, e.g. Operating Instructions BA00013S "FOUNDATION Fieldbus Overview" and the FOUNDATION Fieldbus Guideline.

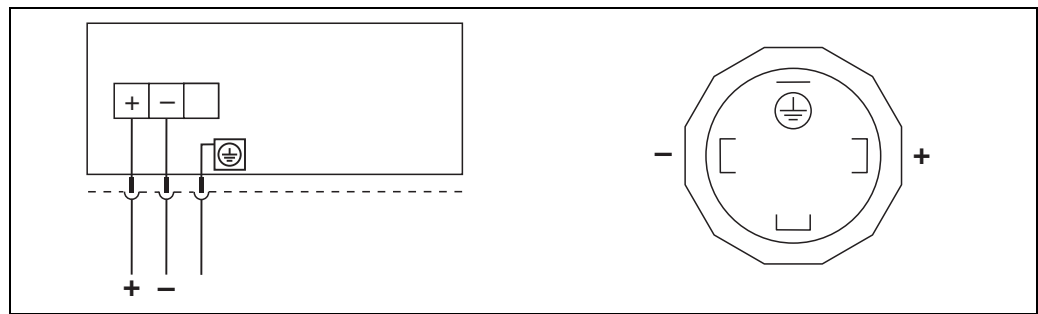
Cable specifications:

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

Note!

For further information on the cable specifications, see Operating Instructions BA00013S "FOUNDATION Fieldbus Overview", FOUNDATION Fieldbus Guideline and IEC 61158-2 (MBP).

### Devices with valve connector



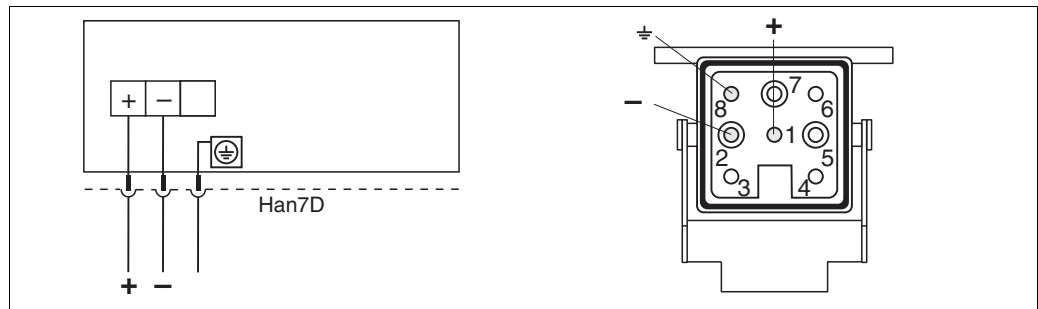
P01-xMx5xxxx-04-xx-xx-xx-005

Left: electrical connection for devices with a valve connector

Right: view of the connector at the device

Material: PA 6.6

### Devices with Harting plug Han7D



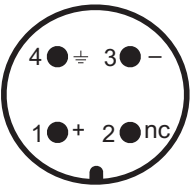
P01-xMD7xxxx-04-xx-xx-xx-000

Left: electrical connection for devices with Harting plug Han7D

Right: view of the plug connector at the device

Material: CuZn

**Devices with M12 plug***PIN assignment for M12 connector*

	PIN	Meaning
	1	Signal +
	2	Not assigned
	3	Signal –
	4	Earth

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

Plug-in jack M 12x1, straight

- Material: body PA; coupling nut CuZn, nickel-plated
- Degree of protection (fully locked): IP66/67
- Order number: 52006263

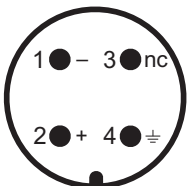
Plug-in jack M 12x1, elbowed

- Material: body PBT/PA; coupling nut GD-Zn, nickel-plated
- Degree of protection (fully locked): IP66/67
- Order number: 71114212

Cable 4x0.34 mm<sup>2</sup> (20 AWG) with M12 socket, elbowed, screw plug, length 5 m (16 ft)

- Material: body PUR; coupling nut CuSn/Ni; cable PVC
- Degree of protection (fully locked): IP66/67
- Order number: 52010285

**Devices with 7/8" plug***PIN assignment for 7/8" connector*

	PIN	Meaning
	1	Signal –
	2	Signal +
	3	Not assigned
	4	Earth

External thread: 7/8 - 16 UNC

- Material: housing / body CuZn, nickel-plated
- Protection: IP66/68

**Cable gland**

Approval	Type	Clamping area
Standard, CSA GP ATEX II1/2G or II2G Ex ia, IEC Ex ia Ga/Gb or Ex ia Gb, FM/ CSA IS	Plastic M20x1.5	5 to 10 mm (0,2 to 0,39 in)
ATEX II1/2D Ex t, II1/2GD Ex ia, II3G Ex nA, IEC Ex t Da/Db	Metal M20x1.5 (Ex e)	7 to 10.5 mm (0,28 to 0,41 in)

**Terminals**

For wire cross-sections of 0.5 to 2.5 mm<sup>2</sup> (20 to 14 AWG)

**Supply voltage**

Note!

- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas. → 66 ff, "Safety Instructions" and "Installation/Control Drawings" sections.

**4 to 20 mA HART**

Type of protection	Supply voltage
■ Intrinsically safe	11.5 ... 30 V DC
■ Other types of protection ■ Devices without certificate	11.5 ... 45 V DC (Versions with plug-in connection 35 V DC)

**PROFIBUS PA**

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

**FOUNDATION Fieldbus**

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

**Start-up current HART**

12 mA or 22 mA (selectable)

**Current consumption**

- PROFIBUS PA: 11 mA ± 1 mA, switch-on current corresponds to IEC 61158-2, Clause 21
- FOUNDATION Fieldbus: 16 mA ± 1 mA, switch-on current corresponds to IEC 61158-2, Clause 21

**Cable entry**

→ 53 ff, feature 50 "Electrical connection".

**Cable specification**

- Endress+Hauser recommends using twisted, shielded two-wire cables.
- Terminals for wire cross-sections 0.5 to 2.5 mm<sup>2</sup> (20 to 14 AWG)
- Cable outer diameter: 5 to 9 mm (0.2 to 0.35 in) depends on the used cable gland (→ 19)

**Residual ripple**

No influence on 4 to 20 mA signal up to ± 5 % residual ripple within the permitted voltage range [according to HART hardware specification HCF\_SPEC-54 (DIN IEC 60381-1)]

**Influence of power supply**

≤ 0.0006 % of URL/1 V

## Performance characteristics

### Reference operating conditions

- As per IEC 60770
- Ambient temperature  $T_A$  = constant, in the range of: +21 to +33°C (+70 to 91 °F)
- Humidity  $\phi$  = constant, in the range of: 5 to 80 % RH
- Ambient pressure  $p_A$  = constant, in the range of: 860 to 1060 mbar (12.47 to 15.37 psi)
- Position of the measuring cell: constant, in range:  
FMB50: horizontally  $\pm 1^\circ$   
FMB51/FMB52/FMB53: vertically  $\pm 1^\circ$
- Input of LOW SENSOR TRIM and HIGH SENSOR TRIM for lower range value and upper range value
- Span based on zero point
- Material of the process isolating diaphragm: Alloy C276 (2.4819) and Alloy C276 (2.4819) with coating (AuRh or AuPt)
- Measuring cell material (meter body): Alloy C276 (2.4819), 316L (1.4435)
- Filling oil: synthetic oil (FDA)/inert oil
- Supply voltage: 24 V DC  $\pm$  3 V DC
- Load with HART: 250  $\Omega$

### Long-term stability

Measuring cell	Long-term stability [%]
0.1 bar (1,5 psi)	<ul style="list-style-type: none"> <li>■ &lt; 0.18 of the upper range limit (URL) / year</li> <li>■ &lt; 0.45 of the upper range limit (URL) / 5 years</li> </ul>
0.4 bar (6 psi) 1.2 bar (18 psi)	<ul style="list-style-type: none"> <li>■ &lt; 0.1 of the upper range limit (URL) / year</li> <li>■ &lt; 0.25 of the upper range limit (URL) / 5 years</li> </ul>
4 bar (60 psi) 10 bar (150 psi)	<ul style="list-style-type: none"> <li>■ &lt; 0.05 of the upper range limit (URL) / year</li> <li>■ &lt; 0.125 of the upper range limit (URL) / 5 years</li> </ul>

### Influence of orientation

- < 2.3 mbar (0.0345 psi) when using synthetic oil (FDA)
- < 5 mbar (0.075 psi) when using inert oil

Note!

Position-dependent zero point shift can be corrected. → 23, "General installation instructions" section.

### Warm-up period

- 4 to 20 mA HART:
  - FMB50 =  $\leq 5$  s
  - FMB51/FMB52/FMB53 =  $\leq 8$  s
- PROFIBUS PA:  $\leq 8$  s
- FOUNDATION Fieldbus:  $\leq 20$  s (after a TOTAL-reset  $\leq 45$  s)

### Calibration position

<p>① FMB50</p> <p>② FMB51, FMB52, FMB53 To minimize the effect of the orientation (e.g. in the case of vertical device installation), position offset is preset at the factory.</p>	<p style="text-align: right;">P01-FMB5xxxx-11-xix-xx-xx-001</p>
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### Reference accuracy

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

Reference accuracy in % of the calibrated span			
Measuring cell	TD	"Standard" option	"Platinum" option
0.1 bar (1.5 psi)	<ul style="list-style-type: none"> <li>■ TD <math>\leq 2:1</math></li> <li>■ TD <math>&gt; 2:1</math></li> </ul>	<ul style="list-style-type: none"> <li>■ &lt; 0.2</li> <li>■ &lt; 0.1 x TD</li> </ul>	<ul style="list-style-type: none"> <li>■ &lt; 0.15</li> <li>■ &lt; 0.075 x TD</li> </ul>

Reference accuracy in % of the calibrated span			
Measuring cell	TD	"Standard" option	"Platinum" option
0.4 bar (6 psi)	■ $TD \leq 4:1$ ■ $TD > 4:1$	■ $< 0.2$ ■ $< 0.05 \times TD$	■ $< 0.15$ ■ $< 0.0375 \times TD$
1.2 bar (18 psi)	■ $TD \leq 2:1$ ■ $TD > 2:1$	■ $< 0.2$ ■ $< 0.1 \times TD$	■ $< 0.1$ ■ $< 0.05 \times TD$
4 bar (60 psi)	■ $TD \leq 4:1$ ■ $TD > 4:1$	■ $< 0.2$ ■ $< 0.05 \times TD$	■ $< 0.1$ ■ $< 0.025 \times TD$
10 bar (150 psi)	■ $TD \leq 2.5:1$ ■ $TD > 2.5:1$	■ $< 0.2$ ■ $< 0.08 \times TD$	■ $< 0.1$ ■ $< 0.04 \times TD$

**Total performance**

The "Total performance" specification comprises the non-linearity including hysteresis, non-reproducibility as well as the thermal change in the zero point.

Total performance in % of the URL				
Version	Measuring cell	-10 to +60°C (+14 to +140 °F)	60 to 85°C (140 to 185 °F)	85 to 100 °C (185 to 212 °F)
FMB50 FMB51/52/53 snap-on	0.1 bar (1.5 psi)	< 0.35	< 0.45	< 0.6
FMB51/52/53 welded	0.1 bar (1.5 psi)	< 0.8	< 1	< 1.4
FMB50/51/52/53	0.4 bar (6 psi)	< 0.35	< 0.45	< 0.6
	1.2 bar (18 psi), 4 bar (60 psi), 10 bar (150 psi)	< 0.15	< 0.2	< 0.25

**Total error**

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

Measuring cell	% of the URL/year (in the permitted temperature range)
0.1 bar (1.5 psi)	■ Snap-on: $\pm 0.63$ ■ Welded: $\pm 1.0$
0.4 bar (6 psi)	$\pm 0.61$
1.2 bar (18 psi)	$\pm 0.27$
4 bar (60 psi), 10 bar (150 psi)	$\pm 0.25$

**Thermal change in the zero output and the output span**

Version	Measuring cell	-10 to +60°C (-94 to +752°F)	60 to 85 °C (+140 to +185°F)	Only FMB50: 85 to 100 °C (+140 to +185°F)
		% of the calibrated span		
FMB50 FMB51/52/53 snap-on	0.1 bar (1.5 psi)	$< (0.32 + 0.30 \times TD)$	$< (0.34 + 0.40 \times TD)$	$< (0.34 + 0.55 \times TD)$
FMB51/52/53 welded	0.1 bar (1.5 psi)	$< (0.32 + 0.50 \times TD)$	$< (0.34 + 0.60 \times TD)$	-
FMB50/51/52/53	0.4 bar (6 psi)	$< (0.31 + 0.25 \times TD)$	$< (0.32 + 0.30 \times TD)$	-
	1.2 bar (18 psi), 4 bar (60 psi), 10 bar (150 psi)	$< (0.31 + 0.10 \times TD)$	$< (0.32 + 0.15 \times TD)$	$< (0.33 + 0.20 \times TD)$

## Operating conditions (installation)

### General installation instructions

- The position-dependent zero point shift can be corrected:
  - directly at the device via an operating key
  - directly at the device via operating keys on the display
  - via digital communication if the cover is not open
- Note!  
In hazardous areas, comply strictly with the safety instructions when the housing cover is closed and open.
- The local display can be rotated in 90° stages.

### FMB50

#### Level measurement

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

#### Pressure measurement in gases

- Mount Deltapilot M with shutoff device above the tapping point so that any condensate can flow into the process.

#### Pressure measurement in steams

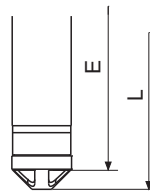
- Mount Deltapilot M with siphon above the tapping point.
- Fill the siphon with liquid before commissioning.  
The siphon reduces the temperature to almost the ambient temperature.

#### Pressure measurement in liquids

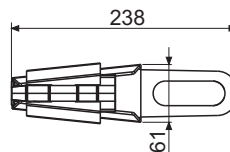
- Mount Deltapilot M with the shutoff device below or at the same level as the tapping point.

### FMB51/FMB52/FMB53

- When mounting 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 resulting from lateral movement, mount the probe in a guide tube (preferably made of plastic) or secure it with a clamping fixture.
- In the case of devices for hazardous areas, comply strictly with the safety instructions when the housing cover is open.
- The length of the extension cable or the probe rod is based on the planned level zero point. The height of the protective cap must be taken into consideration when designing the layout of the measuring point. The level zero point (E) corresponds to the position of the process isolating diaphragm.  
Level zero point = E; top of the probe = L.



- Suspension clamp (FMB53 only)  
Material: → 46 ff  
Order number: 52010869 → 53 ff, feature 620, "Accessory enclosed", version "PO".



## Supplementary installation instructions

### Process isolating diaphragm

- Do not clean or touch process isolating diaphragms with hard or pointed objects.
- The process isolating diaphragm in the rod and cable version is protected against mechanical damage by a plastic cap.

### Seal

- Deltapilot M devices with a G 1 1/2 thread:  
When screwing the device into the tank, the flat seal has to be positioned on the sealing surface of the process connection. To avoid additional strain on the process isolating diaphragm, the thread should never be sealed with hemp or similar materials.
- Deltapilot M devices with NPT threads:
  - Wrap Teflon tape around the thread to seal it.
  - Tighten the device at the hexagonal bolt only. Do not turn the device at the housing.
  - Do not overtighten the thread when screwing in the screw. Max. torque: 20 to 30 Nm (14.75 to 22.13 lbf ft)

### Sealing the probe housing

Moisture must not penetrate the housing when mounting the device, establishing the electrical connection and during operation.

- Always firmly tighten the housing cover and the cable entries.
- Lubricant is provided on the O-ring seal in the housing cover and on the thread of the aluminum cover. To ensure that the cover seals tight, any lubricant which has been removed must be replaced. Use silicone grease or graphite paste as the lubricant. Mineral oil-based grease can destroy the O-ring.

### PE cable length > 300 m (984 ft)

- Two suspension clamps must be used for PE cables longer than 300 meters (984 ft).


### Cable length tolerances

- FMB52
  - Cable length < 5 m (16 ft): up to -35 mm (-1.38 in)
  - Cable length 5...10 m (16...33 ft): up to -75 mm (-2.95 in)
  - Cable length 10...100 m (33...328 ft): up to -100 mm (-3.94 in)
- FMB53
  - Cable length < 5 m (16 ft): up to ±17.5 mm (±0.69 in)
  - Cable length 5...10 m (16...33 ft): up to ±37.5 mm (±1.48 in)
  - Cable length 10...100 m (33...328 ft): up to ±50 mm (±1.97 in)

### Rod length tolerances

- FMB51
  - Rod length < 4000 mm (157 in): up to -4 mm (-0.16 in)

## Wall and pipe mounting

For installing the device on pipes or walls, Endress+Hauser provides a mounting bracket which is included in the scope of supply or can be ordered as a separate accessory (part no. 71102216).  
For the dimensions, see →  39.



**"Separate housing" version**

With the "separate housing" version, you are able to mount the housing with the electronics insert at a distance from the measuring point. This allows for trouble-free measurement:

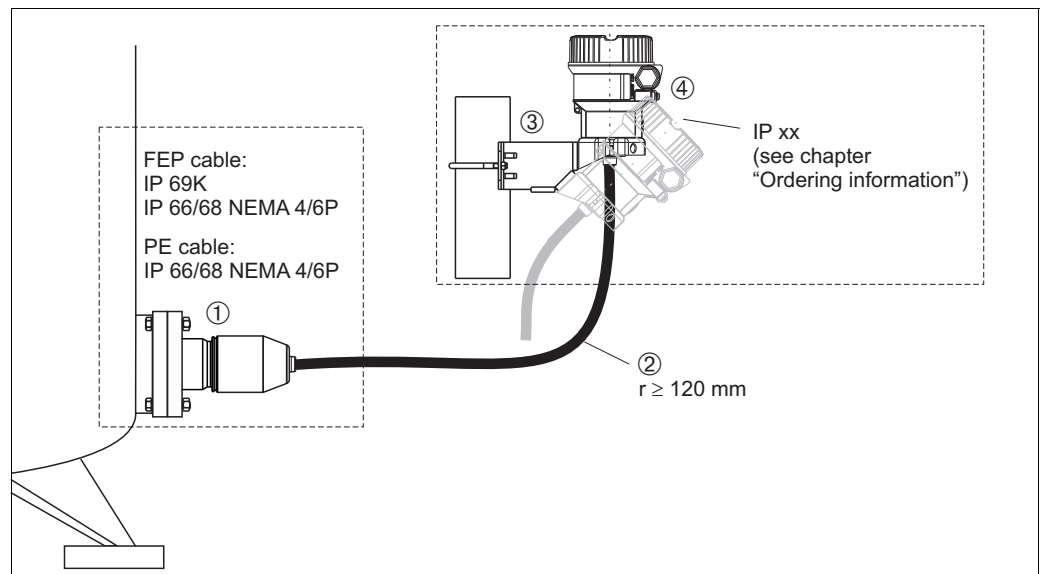
- Under particularly difficult measuring conditions (at installation locations that are cramped or difficult to access)
- If rapid cleaning of the measuring point is required
- If the measuring point is exposed to vibrations

You can choose between different cable versions:

- PE (2 m (6.6 ft), 5 m (16 ft) and 10 m (33 ft))
- FEP (5 m (16 ft)).

→ 53 ff, feature 600, "Separate housing".

For the dimensions, see → 39.



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

- 1 Process connection with sensor
- 2 Cable, both ends are fitted with a socket
- 3 Mounting bracket provided, suitable for pipe and wall mounting (for pipes from 1 1/4" up to 2" diameter)
- 4 Housing with electronic insert

Degree of protection for the process connection and sensor with the use of

- FEP cable:
  - IP 69K
  - IP 66 NEMA 4/6P
  - IP 68 (1.83 mH<sub>2</sub>O for 24 h) NEMA 4/6P
- PE cable:
  - IP 66 NEMA 4/6P
  - IP 68 (1.83 mH<sub>2</sub>O for 24 h) NEMA 4/6P

Technical data of the PE and FEP cable:

- Minimum bending radius: 120 mm (4.72 in)
- Cable extraction force: max. 450 N (101 lbf)
- Resistance to UV light

Use in hazardous area:

- Intrinsically safe installations (Ex ia/IS)
- FM/CSA IS: for Div.1 installation only

**Oxygen applications**

Oxygen and other gases can react explosively to oils, grease and plastics. As a result, the following are some of the precautions that must be taken:

- All components of the system, such as measuring devices, must be cleaned in accordance with the BAM (DIN 19247) requirements.
- Depending on the materials used, a certain maximum temperature and maximum pressure must not be exceeded for oxygen applications. The maximum temperature  $T_{\max}$  for oxygen applications is 60°C (140°F).

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

Order code for devices <sup>1)</sup> cleaned for oxygen applications	$p_{\max}$ for oxygen applications
FMB50 <sup>2)</sup>	<ul style="list-style-type: none"> <li>■ Depends on the lowest-rated element, with regard to pressure, of the selected components: over pressure limit (OPL) of the sensor or process connection (1.5 x PN) <sup>3)</sup></li> <li>■ Depends on filling oil <sup>4)</sup></li> </ul>
FMB51 <sup>2)</sup>	<ul style="list-style-type: none"> <li>■ Depends on the lowest-rated element, with regard to pressure, of the selected components: over pressure limit (OPL) of the sensor or process connection (1.5 x PN) <sup>3)</sup></li> <li>■ Depends on filling oil <sup>4)</sup></li> <li>■ Depends on seal material</li> </ul>

- 1) Only device, not accessory or enclosed accessory
- 2) Feature 570 "Service" version "HB"
- 3) → 10, "Measuring range" section and → 30 ff, "Mechanical construction" section
- 4) Oxygen applications possible with FKM seal and inert oil.

**PWIS cleaning**

Special cleaning of the transmitter to remove paint-wetting substances, for use in paint shops → 53 ff feature 570 "Service", version "HC".

The stability of the materials used must be checked before using them in the medium.

The protective cap of the process isolating diaphragm must be removed if necessary (FMB51/FMB52/FMB53).

**Applications with hydrogen**

With regard to materials in which hydrogen formation takes place (e.g. digested sludge), hydrogen atoms can diffuse through the metal process isolating diaphragm. This can result in incorrect measurement results.

Endress+Hauser offers process isolating diaphragms with a gold/rhodium coating for such instances.

→ Order via feature 170 "Material of the process isolating diaphragm", version "L".

Note!

To reduce the formation of hydrogen, you should not use galvanized assemblies.

**Special measuring cells for acids, alkalis or sea water (not FMB50)**

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

Note!

With temperature exposure (up to 85 °C (185 °F)) there is an additional zero point deviation of 1,1 mbar (0,0165 psi).

→ Order via feature 170 "Material of the process isolating diaphragm", version "N".

## Operating conditions (environment)

### Ambient temperature range

Version	FMB50	FMB51	FMB52	FMB53
Without LCD display	-40°C to +85°C (-40°F to +185°F)		With PE cable: -40°C to +70°C (-40°F to +158°F) With FEP cable: -40°C to +80°C (-40°F to +176°F)	
With LCD display <sup>1)</sup>	-20°C to +70°C (-4°F to +158°F)			
With M12 plug , elbowed	-25°C to +85°C (-13°F to +185°F)		With PE cable: -25°C to +70°C (-13°F to +158°F) With FEP cable: -25°C to +80°C (-13°F to +176°F)	
With separate housing (PE and FEP cable)	-20°C to +60 °C (-4°F to +140°F)			

- 1) Extended temperature application range (-40°C to +85°C (-40°F to +185°F)) with restrictions in optical properties such as display speed and contrast

### Storage temperature range

Version	FMB50	FMB51	FMB52	FMB53
Without LCD display	-40°C to +90°C (-40°F to +194 °F)		With PE cable: -40°C to +70°C (-40°F to +158°F) With FEP cable: -40°C to +80°C (-40°F to +176°F)	
With LCD display	-40°C to +85°C (-40°F to +185°F)			
With M12 plug , elbowed	-25°C to +90°C (-13°F to +194°F)		With PE cable: -25°C to +70°C (-13°F to +158°F) With FEP cable: -25°C to +80°C (-13°F to +176°F)	
With separate housing and FEP cable	-20°C to +60°C (-4°F to +140°F)			

### Degree of protection

- → 53 ff, feature 50 "Electrical connection".
- Separate housing → 25

### Climate class

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


### Vibration resistance

Device/accessory	Test standard	Vibration resistance
FMB50, FMB52, FMB53	GL VI-7-2 <ul style="list-style-type: none"> <li>■ Part 7: Guidelines for the Performance of Type Approvals</li> <li>■ Chapter 2: Test Requirements for Electrical / Electronic Equipment and Systems</li> </ul>	Guaranteed for: 3 to 25 Hz: ±1.6 mm (0.06 in); 25 to 100 Hz: 4 g in all 3 planes
FMB50, FMB52, FMB53 with mounting bracket	IEC 61298-3	Guaranteed for: 10 to 60 Hz: ±0.15 mm (0.01 in); 60 to 500 Hz: 2 g in all 3 planes
FMB51	IEC 60068-2-6	Guaranteed for: 10 to Hz: ±0.075 mm (0.003 in) 60...150 Hz 1g in all 3 planes

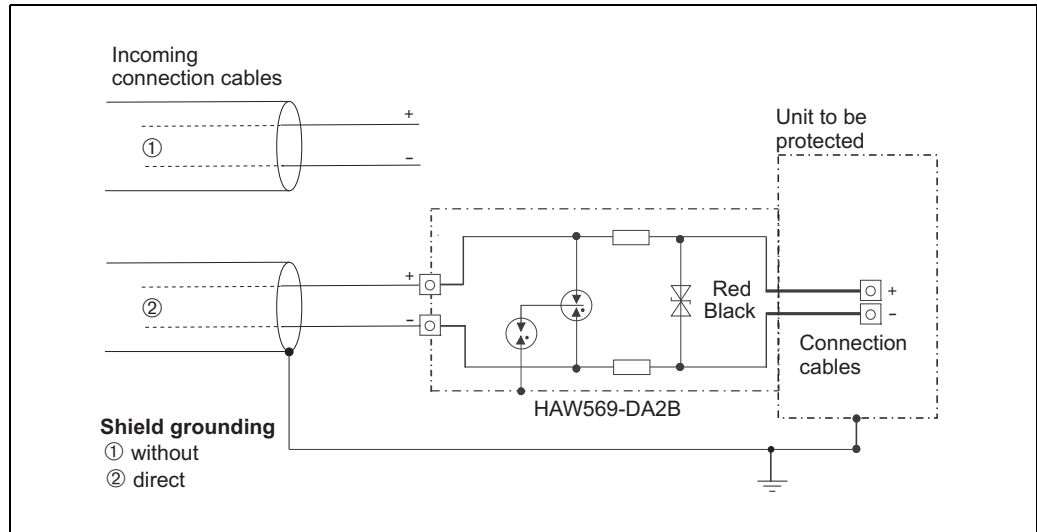
### Electromagnetic compatibility

- Electromagnetic compatibility as per all the relevant requirements of the EN 61326 series and NAMUR Recommendation EMC (NE21). Details can be found in the Declaration of Conformity (in the Download area of "www.de.endress.com", "search area - Approvals and Certificates", "Manufact. Declaration").
- Max. deviation during EMC-tests < 0.5% of the span
- All tests were performed with full measurement range (TD 1:1).

**Overvoltage protection  
(optional)**

The device can be fitted with overvoltage protection, see →  53 ff "Ordering information" feature 610 "Accessory mounted:" version "NA". The overvoltage protection is mounted at the factory on the housing thread (M20x1.5) for the cable gland and is approx. 70 mm (2.76 in) in length (take additional length into account when installing). The device is connected as illustrated in the following graphic.

For details refer to TI001013KEN, XA01003KA3 and BA00304KA2.



## Operating conditions (process)

Process temperature range	FMB50	FMB51	FMB52	FMB53
	-10°C to +100°C (+14°F to 212°F) 135°C (275°F) for 30 min. maximum	-10°C to +85°C (+14°F to +185°F)	With PE cable: -10°C to +70°C (-14°F to 158°F) With FEP cable: -10°C to +80°C (-14°F to 176°F)	
		Min. process temperature when using the KALREZ seal : -3 °C (27 °F).		

Lateral load FMB51 (static) ≤30 Nm

### Pressure specifications

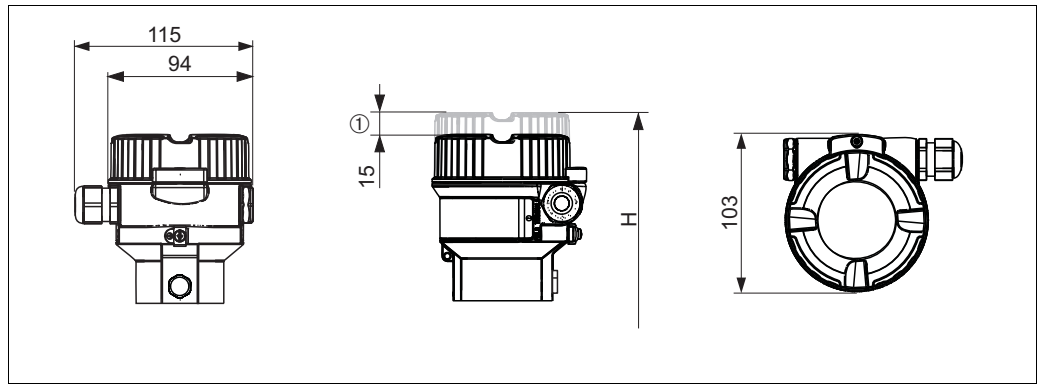
- The maximum pressure for the measuring device depends on the lowest-rated element with regard to pressure. See the following sections:
  - → 10 ff, "Measuring range" section
  - "Mechanical construction" section.

The MWP (maximum working pressure) is specified on the nameplate. This value refers to a reference temperature of +20°C (68°F) or 100°F (38°C) for ANSI flanges and may be applied to the device for an unlimited time. Pay attention to pressure-temperature dependencies.
- The pressure values permitted at higher temperatures can be found in the following standards:
  - EN 1092-1: 2001 Tab. 18 <sup>1</sup>
  - ASME B 16.5a – 1998 Tab. 2-2.2 F316
  - ASME B 16.5a – 1998 Tab. 2.3.8 N10276
  - JIS B 2220.
- The test pressure corresponds to the over pressure limit of the device (OPL = 1.5 x MWP) and may be applied for only a limited time period in order to avoid permanent damage.
- The Pressure Equipment Directive (EC Directive 97/23/EC) uses the abbreviation "PS". The abbreviation "PS" corresponds to the MWP (maximum working pressure) of the measuring device.
- In the case of sensor range and process connection combinations where the OPL (over pressure limit) of the process connection is smaller than the nominal value of the sensor, the device is set at the factory, at the very maximum, to the OPL value of the process connection. If you want to use the entire sensor range, select a process connection with a higher OPL value (1.5 x PN; PN = MWP).
- In oxygen applications, the values for "p<sub>max</sub> and T<sub>max</sub> for oxygen applications" as per → 26, "Oxygen applications" may not be exceeded.

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

## Mechanical construction

### F31 aluminum housing dimensions



P01-F31xxxx-06-00-xx-xx-000

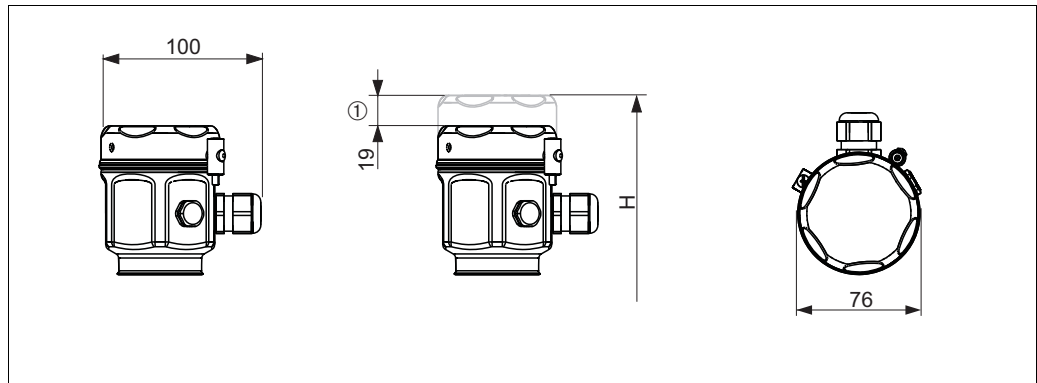
Front view, left-hand side view, top view

① The cover with viewing window is 15 mm (0,59 in) higher than the cover without viewing window.

→ For installation height H for housing with viewing window, see the specific process connection. Housing weight

→ 40

### F15 stainless steel housing dimensions (hygienic)



P01-F15xxxx-06-00-xx-xx-000

Front view, top view.

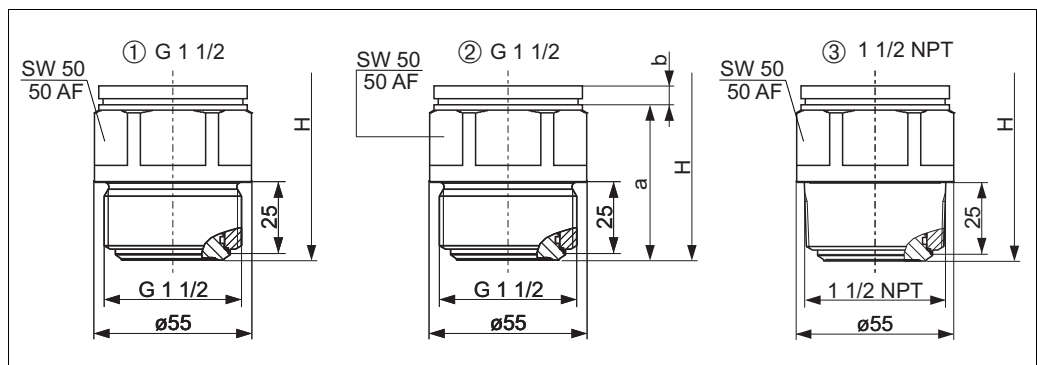
① The cover with viewing window is 19 mm (0,75 in) higher than the cover without viewing window.

→ For installation height H for housing with viewing window, see the specific process connection. Housing weight

→ 40

### Process connections FMB50 (compact version)

### Threaded connection ISO 228 and NPT



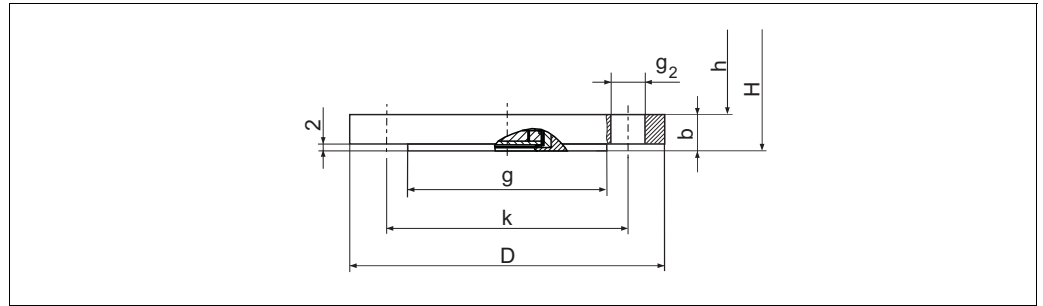
P01-FMB5xxxx-06-xx-xx-xx-005

→ For the installation height, see the following table. For weight, see → 40.

- 1 Thread ISO 228 G 1 1/2 A;  
Material version GG: AISI 316L (1.4435), version GGC: Alloy C276 (2.4819)
- 2 Thread ANSI 1 1/2 MNPT;  
Material version RG: AISI 316L (1.4435)

**Installation height H, devices with a thread**

F31 housing	F15 housing
156 mm (6.14 in)	148 mm (5.83 in)

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

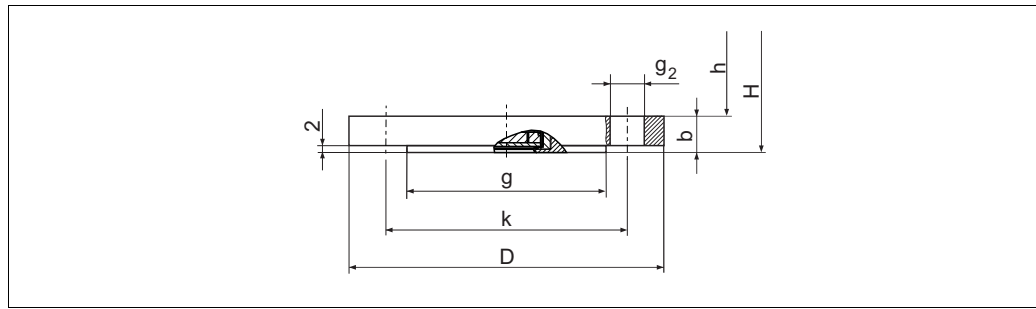
P01-FMB70xxx-06-09-xx-xx-002

*Flange with raised face**H: device height = height of device without flange h + flange thickness b**Height H, see → 33.*

	Flange <sup>1)</sup>								Boltholes			
Version	Material <sup>2)</sup>	Nominal diameter	Nominal pressure	Shape <sup>3)</sup>	Diameter	Thick-ness	Diameter of raised face	Height of raised face	Quant-ity	Diameter	Hole circle	Flange weight <sup>4)</sup>
					D [mm]	b [mm]	g [mm]	f [mm]		g <sub>2</sub> [mm]	k [mm]	[kg]
CEJ	AISI 316L	DN 40	PN 10/16	B1 (C)	150	18	88	2	4	18	110	2.6
CFJ	AISI 316L	DN 50	PN 10/16	B1 (C)	165	18	102	2	4	18	125	3.3
CGJ	AISI 316L	DN 80	PN 10/16	B1 (C)	200	20	138	2	8	18	160	5.1
CHJ	AISI 316L	DN 100	PN 10/16	B1 (C)	220	20	158	2	8	18	180	6.3

- 1) The roughness of the surface in contact with the medium, including the sealing surface of the flanges, is  $R_a$  0.8  $\mu\text{m}$  (31,5  $\mu\text{in}$ ). Lower surface roughness available on request.
- 2) Endress+Hauser supplies DIN/EN stainless steel flanges as per AISI 316L (DIN/ EN material number 1.4404 or 14435). With regard to their stability-temperature property, the materials 1.4404 and 1.4435 are grouped together under 13E0 in EN 1092-1: 2001 Tab.18. The chemical composition of the two materials can be identical.
- 3) Designation as per DIN 2526 in brackets
- 4) Weight incl. pipe and measuring cell, housing weight, see → 40

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



P01-FMB70xxx-06-09-xx-xx-002

Flange with raised face

H: device height = height of device without flange h + flange thickness b

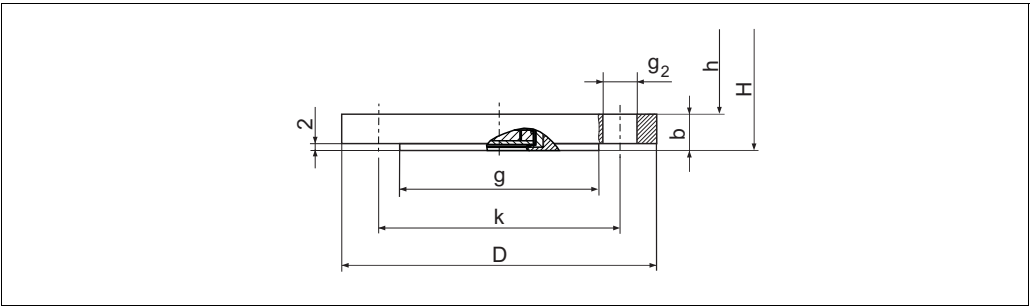
Height H, see → 33.

Version	Flange <sup>1)</sup>							Boltholes			Flange weight <sup>3)</sup>
	Material <sup>2)</sup>	Nominal diameter	Class	Dia- meter D	Thick- ness b	Diameter of raised face g	Height of raised face f	Quant- ity	Diameter g <sub>2</sub>	Hole circle k	
		[in]	[lb./sq in]	[in] [mm]	[in] [mm]	[in] [mm]	[in] [mm]		[in] [mm]	[in] [mm]	
AEJ Not FMB51/52	AISI 316/ 316L	1 1/2	150	5 127	0.69 17.5	2.88 73.2	0.06 1.6	4	0.62 15.7	3.88 98.6	2.1
AFJ	AISI 316/ 316L	2	150	6 152.4	0.75 19.1	3.62 91.9	0.06 1.6	4	0.75 19.1	4.75 120.7	3.0
AGJ	AISI 316/ 316L	3	150	7.5 190.5	0.94 23.9	5 127	0.06 1.6	4	0.75 19.1	6 152.4	5.7
AHJ	AISI 316/ 316L	4	150	9 228.6	0.94 23.9	6.19 157.2	0.06 1.6	8	0.75 19.1	7.5 190.5	7.8

- 1) The roughness of the surface in contact with the medium, including the sealing surface of the flanges, is  $R_a$  0.8  $\mu\text{m}$  (31,5  $\mu\text{in}$ ). Lower surface roughness available on request.
- 2) Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)
- 3) Weight incl. pipe and measuring cell, housing weight, see → 40



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



F01-FMB70xxx-06-09-xx-xx-002

Flange with raised face, material: AISI 316L (1.4435)

H: device height = height of device without flange + flange thickness b

Height H, see → 33.

Flange <sup>1)</sup>							Boltholes			
Vers ion	Nominal diameter	Nominal pressure	Dia- me- ter  D [mm]	Thick- ness  b [mm]	Diameter of raised face  g [mm]	Height of raised face  f [mm]	Quantity	Diameter  g <sub>2</sub> [mm]	Hole circle  k [mm]	Flange weight <sup>2)</sup> [kg]
KEJ	40 A	10 K	140	16	81	2	4	19	105	2.1
KFJ	50 A	10 K	155	16	96	2	4	19	120	2.5
KGJ	80 A	10 K	185	18	126	2	8	19	150	3.8
KHJ	100 A	10 K	210	18	151	2	8	19	175	4.9

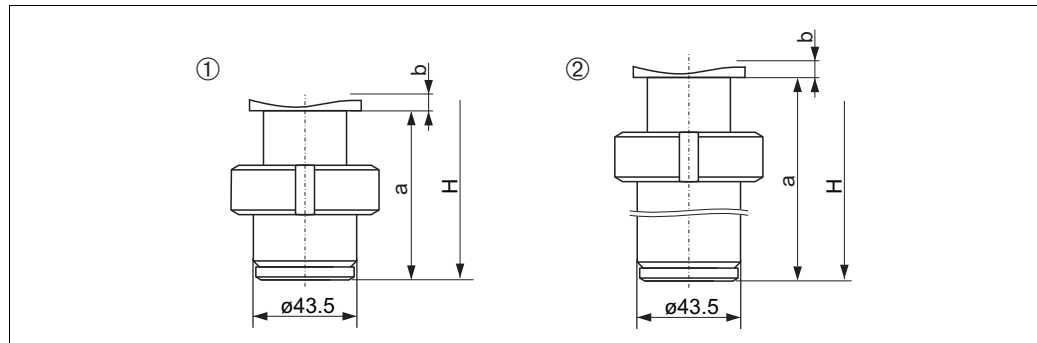
1) The roughness of the surface in contact with the medium, including the sealing surface of the flanges (all standards), is R<sub>a</sub> 0.8 µm (31,5 µin). Lower surface roughness available on request.

2) Weight incl. pipe and measuring cell, housing weight, see → 40

Installation height H, devices with flange

F31 housing	F15 housing
165 mm (6.5 in)	157 mm (6.18 in)

### Universal adapter



P01-FMB70xxx-06-09-xx-xx-003

material:  $b$  = top section AISI 316L (1.4404),  $a$  = bottom section AISI 316L (1.4435);

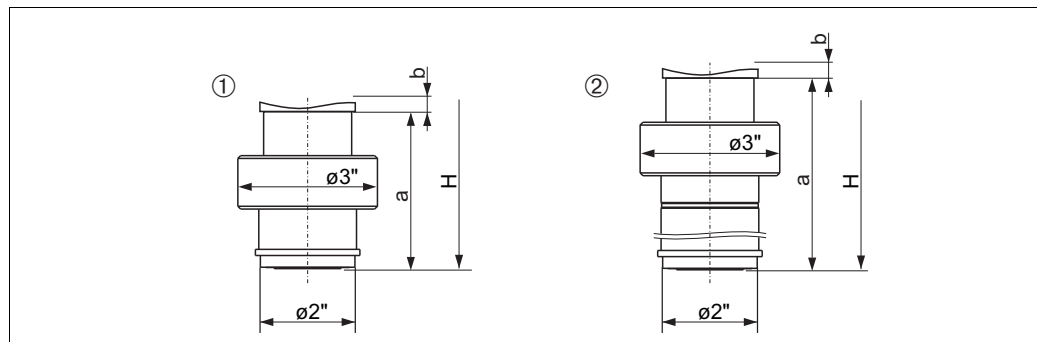
Surface roughness of the surfaces in contact with the medium  $R_a \leq 0.76 \mu\text{m}$  (30  $\mu\text{in}$ ) as standard. Lower surface roughness available on request.

- 1 Version UPJ<sup>1)</sup>: universal adapter incl. silicone molded seal, EHEDG, 3A Class I, FDA CFR 21§177.2600, USP Plastic Class VI-70C; Order no.: 52023572  
Version UNJ<sup>1)</sup>: universal adapter incl. EPDM molded seal, EHEDG, FDA CFR 21§177.2600; Order no.: 71100719
- 2 Version UQJ<sup>1)</sup>: universal adapter, 6 inch extension including silicone molded seal, EHEDG, 3A, FDA CFR 21§177.2600, USP Plastic Class VI-70C  
Version UOJ<sup>1)</sup>: universal adapter, 6 inch extension including EPDM molded seal, EHEDG, FDA CFR 21§177.2600

### Installation height H, devices with universal adapter

	F31 housing	F15 housing
Universal adapter	196 mm (7.72 in)	189 mm (7.44 in)
Universal adapter with 6 inch extension	307 mm (12.1 in)	299 mm (11.8 in)

### Anderson adapter



P01-FMBX0xxx-06-09-xx-xx-000

Material:  $b$  = top section AISI 316L (1.4404),  $a$  = bottom section AISI 316L (1.4435), slotted nut AISI 316L (1.4404);

Surface roughness of the surfaces in contact with the medium  $R_a \leq 0.76 \mu\text{m}$  (30  $\mu\text{in}$ ) as standard. Lower surface roughness available on request.

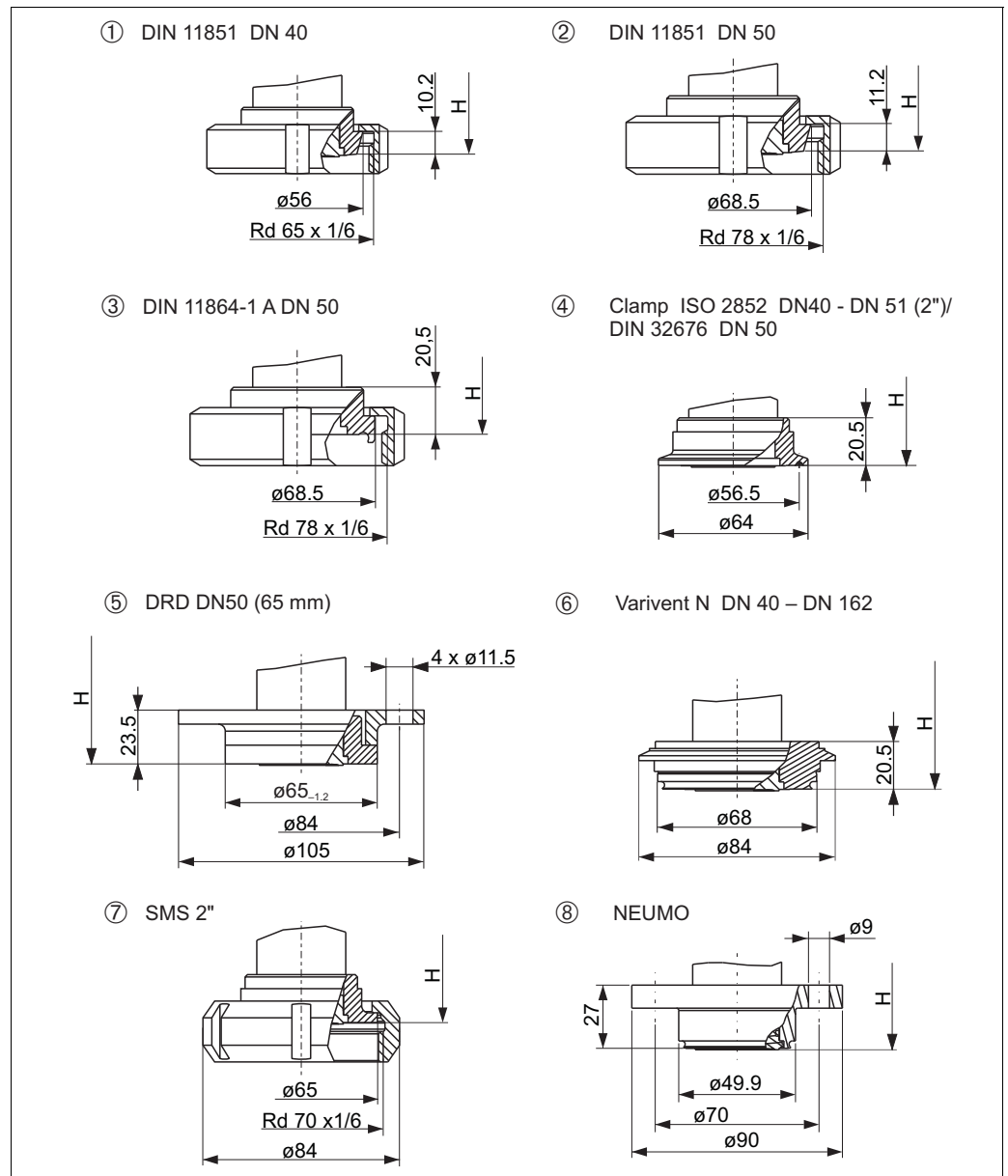
- 1 Version USJ: Anderson adapter short 2-3/16", incl. silicone molded seal, 3A, FDA CFR 21§177.2600
- 2 Version UTJ: Anderson adapter long 6-1/2", incl. silicone molded seal, 3A, FDA CFR 21§177.2600

### Installation height H, devices with Anderson adapter

	F31 housing	F15 housing
Anderson short	204 mm (8.03 in)	196 mm (7.72 in)
Anderson long	314 mm (12.4 in)	306 mm (12 in)

1) Endress+Hauser supplies these slotted nuts in stainless steel AISI 304 (DIN/EN material number 1.4301) or in AISI 304L (DIN/EN material number 1.4307).

## Hygienic connections



P01-FMB5xxxx-06-xx-xx-xx-001

Hygienic connections, material AISI 316L (1.4435)

Surface roughness of the surfaces in contact with the medium  $R_a \leq 0.76 \mu\text{m}$  (30  $\mu\text{in}$ ) as standard. Lower surface roughness available on request. For weight, see → 40.

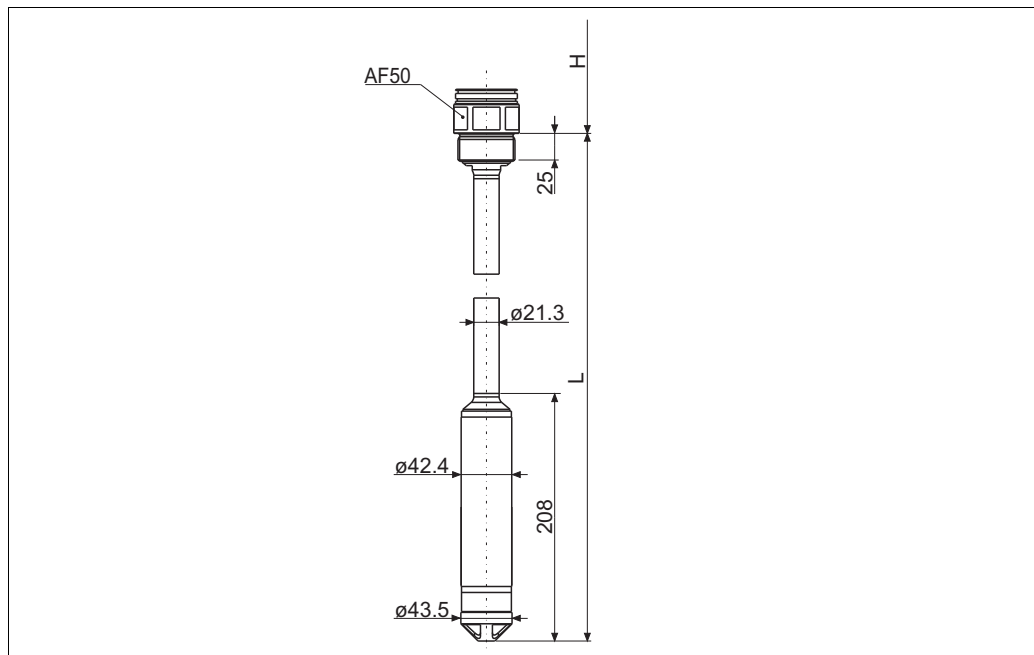
- 1 Version MZJ: DIN 11851 DN 40 PN 25, EHEDG, 3A
- 2 Version MRJ: DIN 11851 DN 50 PN 25, EHEDG, 3A
- 3 Version NDJ: DIN 11864-1 A DN50 PN16 pipe DIN 11866-A, slotted nut, 316L, EHEDG, 3A
- 4 Version TDJ: Tri-Clamp ISO 2852 DN 40 – DN 51 (2"), DIN 32676 DN 50, EHEDG, 3A
- 5 Version TIJ: DRD DN50 (65 mm) PN 25, 316L
- 6 Version TRJ: Varivent Typ N for pipes 40 – 162, PN 40, EHEDG, 3A
- 7 Version TXJ: SMS 2", PN25, EHEDG, 3A
- 8 Version S4J: NEUMO, D50, PN16, 316L, 3A

## Installation height H, devices with Tri-Clamp or hygienic connection

F31 housing	F15 housing
185 mm (7.28 in)	178 mm (7.01 in)

**Process connections FMB51  
(rod version)**

**Threaded connection ISO 228 and NPT**



P01-FMB51xxx-06-xx-xx-en-000

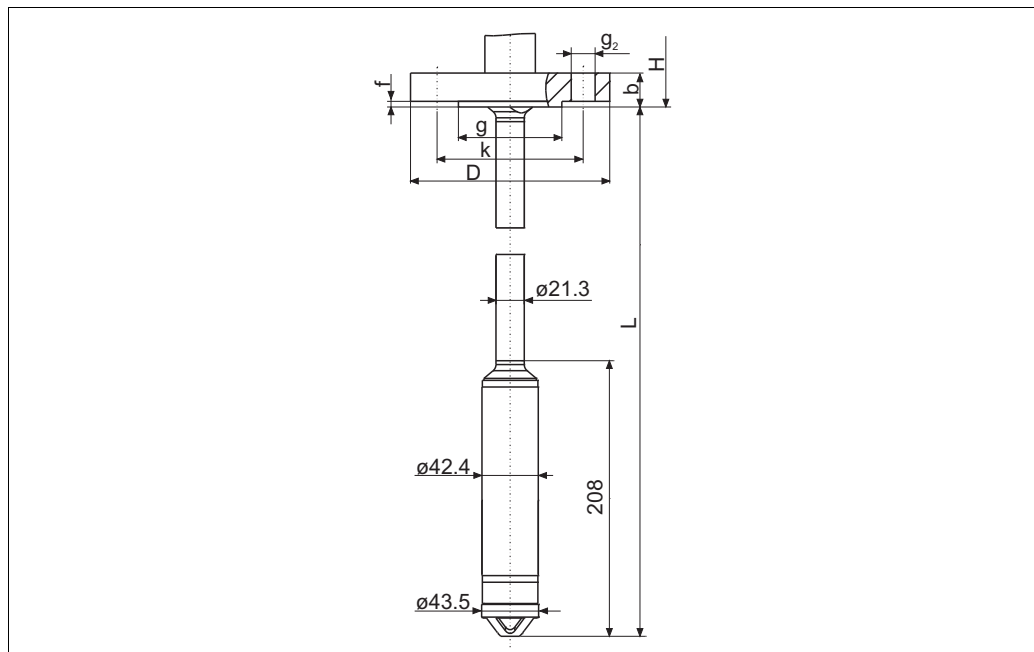
Rod version with thread G 1 1/2 or 1 1/2 NPT

$L$  Probe length = 0.4 to 4 m (1.3 ft to 13 ft)

$H$  For installation height  $H \rightarrow$  31

$\rightarrow$  For dimensions of process connections  $\rightarrow$  30 ff.

**EN/DIN, ANSI and JIS flanges**



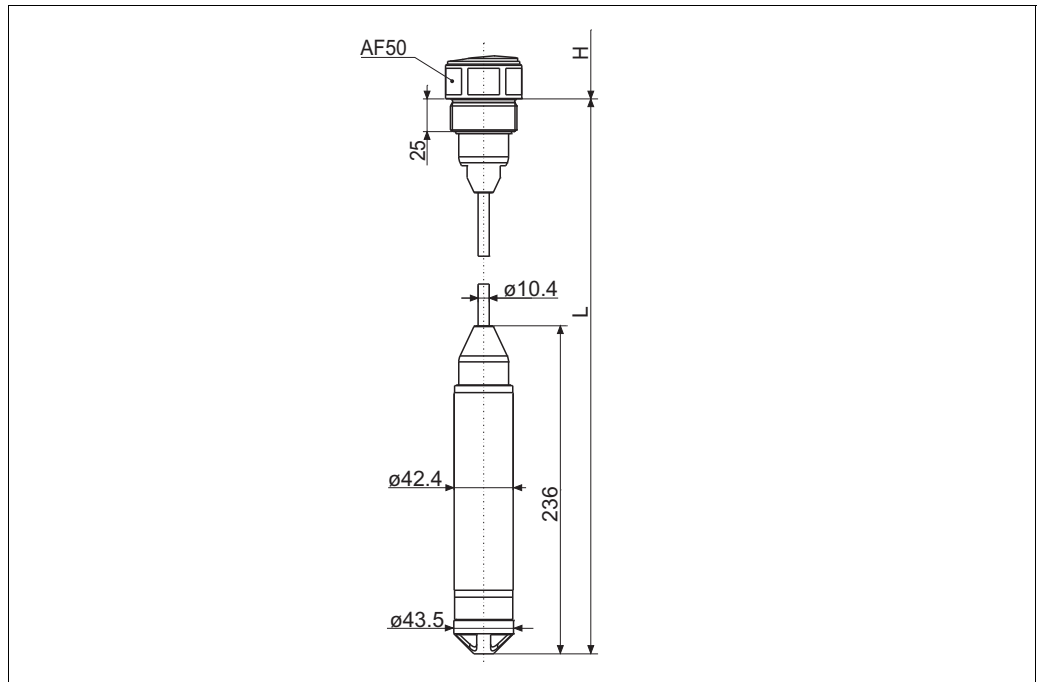
P01-FMB51xxx-06-xx-xx-en-001

Rod version with flange

$L$  Probe length = 0.4 to 4 m (1.3 ft to 13 ft)

$H$  For installation height  $H \rightarrow$  33

$\rightarrow$  For dimensions of process connections  $\rightarrow$  30 ff.

**Process connections FMB52  
(cable version)**
**Threaded connection ISO 228 and NPT**


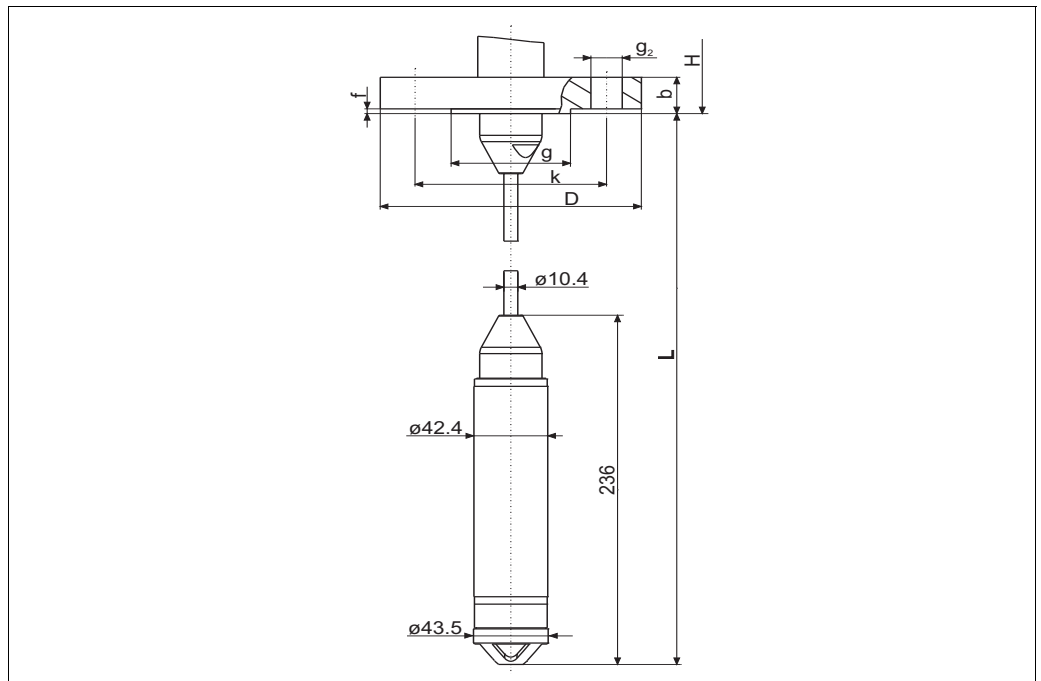
P01-FMB52xxx-06-xx-xx-en-000

Cable version with thread G 1 1/2 and 1 1/2 NPT

$L$  Probe length = 0.5 to 400 m (1.6 to 1312 ft)

$H$  For installation height  $H \rightarrow$  31

$\rightarrow$  For dimensions of process connections  $\rightarrow$  30 ff.

**EN/DIN, ANSI and JIS flanges**


P01-FMB52xxx-06-xx-xx-xx-001

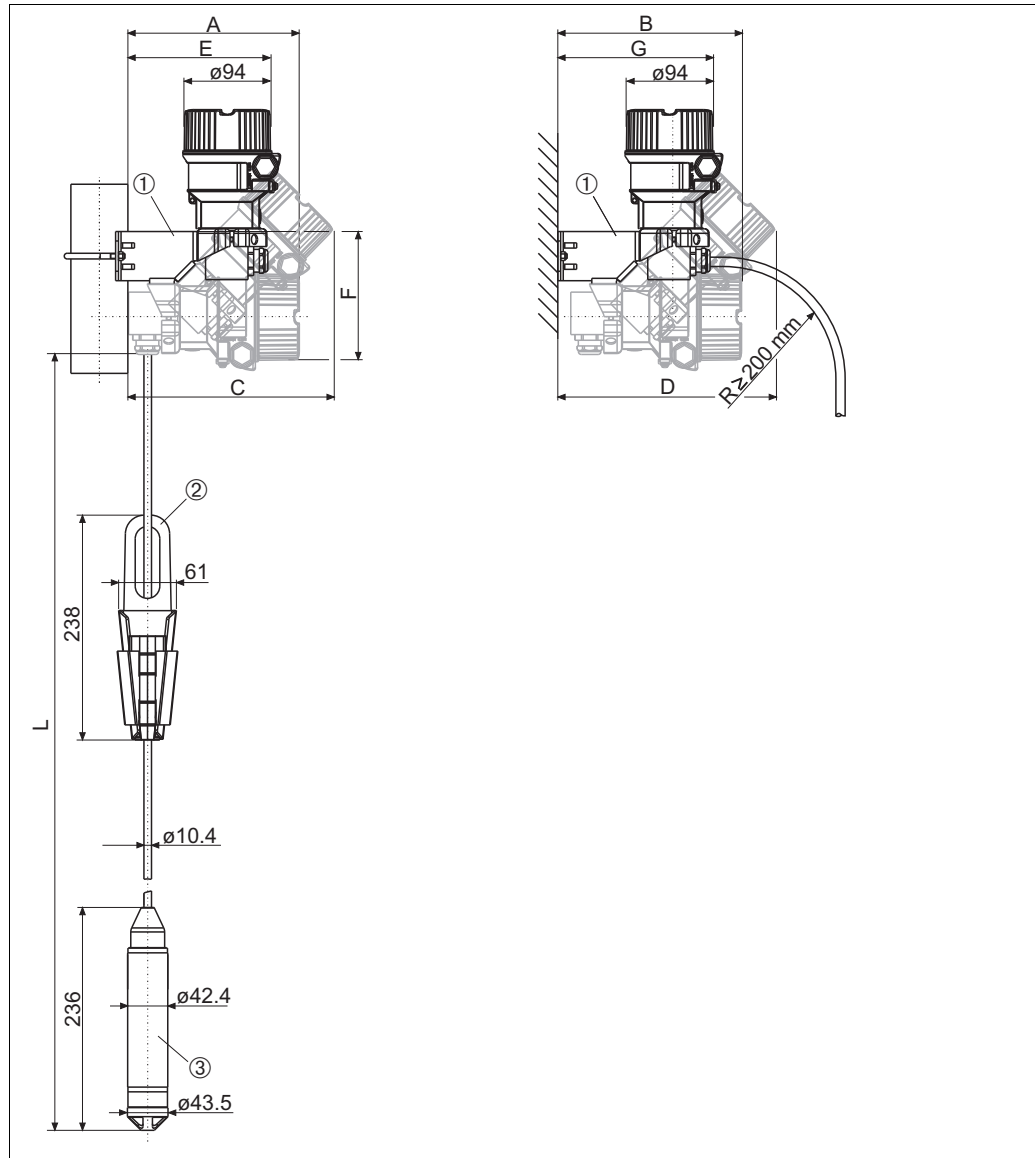
Cable version with flange

$L$  Probe length = 0.5 to 400 m (1.6 to 1312 ft)

$H$  For installation height  $H \rightarrow$  33

$\rightarrow$  For dimensions of process connections  $\rightarrow$  30 ff.

### Dimensions of Deltapilot M FMB53 (suspension clamp and mounting bracket)



P01-FMB53xxx-06-xx-xx-xx-000

FMB53 with suspension clamp and mounting bracket

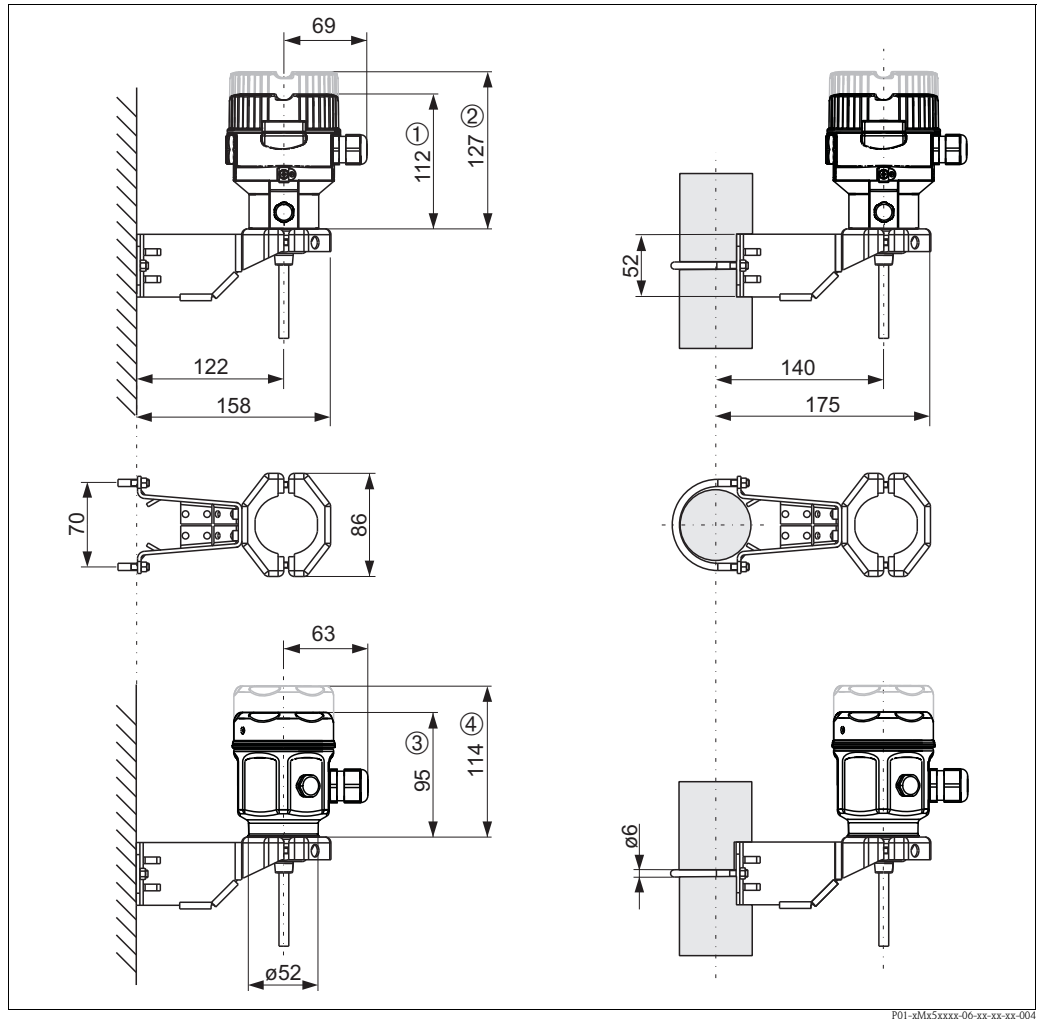
- 1 Mounting bracket for pipe and wall mounting (for pipes from 1 1/4" up to 2" diameter)
- 2 Suspension clamp
- 3 Measuring cell tube
- L Probe length = 0.5 to 400 m (1.6 to 1312 ft)

### Dimensions (in mm)

	Pipe mounting				Wall mounting			
	A [mm (in)]		C [mm (in)]		B [mm (in)]		D [mm (in)]	
	Cover flat	Cover high	Cover flat	Cover high	Cover flat	Cover high	Cover flat	Cover high
F15 housing	154.7 (6.09)	173.7 (6.84)	197.1 (7.76)	210.6 (8.29)	167.7 (6.6)	186.7 (7.35)	210.1 (8.27)	223.6 (8.8)
F31 housing	167 (6.57)	181.3 (7.14)	211.8 (8.34)	221.7 (8.73)	180 (7.09)	194.3 (7.65)	224.8 (8.85)	234.7 (9.24)

	E [mm (in)]	F [mm (in)]	G [mm (in)]
F15 housing	146 (5.75)	127 (5)	159 (6.26)
F31 housing	156.2 (6.15)	137.2 (5.4)	169.2 (6.66)

### Wall and pipe mounting with "Separate housing" version



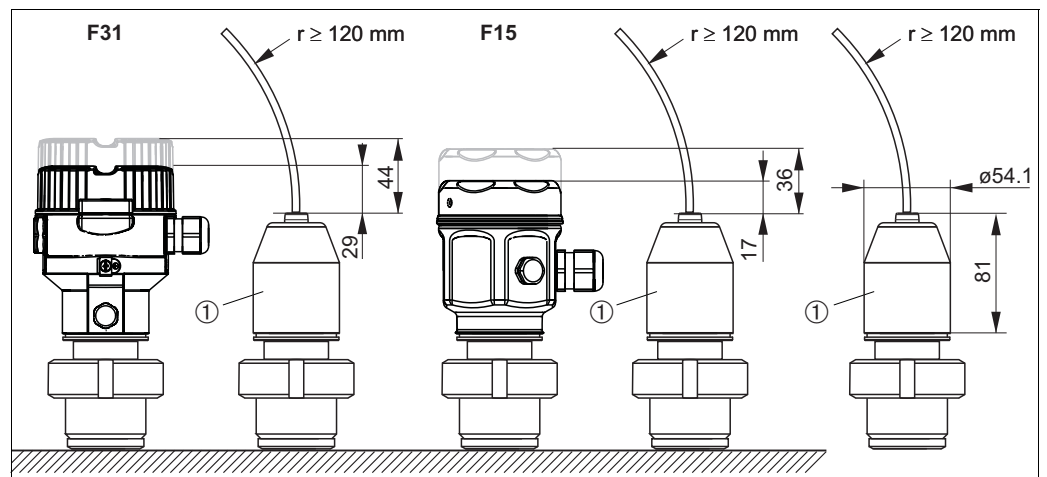
P01-xMx5xxxx-06-xx-xx-xx-004

F31 housing dimensions. Housing weight → 40. ① Cover without viewing window. ② Cover with viewing window.

F15 housing dimensions. Housing weight → 40. ③ Cover without viewing window. ④ Cover with viewing window.

### Reduction in installation height

If the separate housing is used, the mounting height of the process connection is reduced compared to the dimensions of the standard version (see graphic).

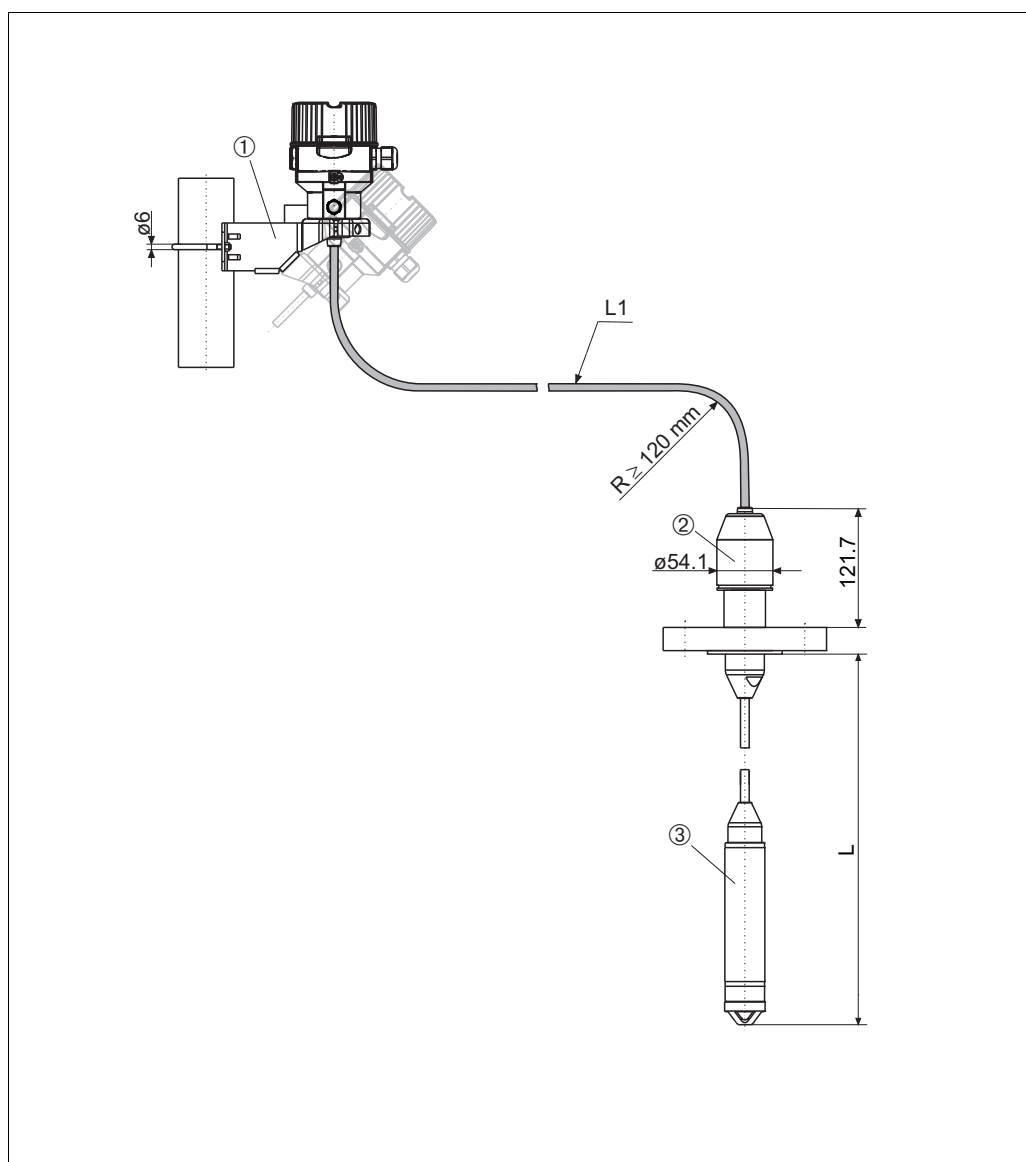


P01-xMx5xxxx-06-xx-xx-xx-000

1 Process connection adapter.

A minimum bending radius ( $r$ ) of 120 mm (4,72 in) must be observed for the cable.

## Example for a "Separate housing" version



P01-FMB5xxxx-06-xx-xx-xx-003

Connecting cable with process connection adapter and mounting bracket, here shown with an FMB52

- 1 Mounting bracket for pipe and wall mounting (for pipes from 1 1/4" up to 2" diameter)
- 2 Process connection adapter
- 3 Measuring cell tube
- L1 PE cable = 2 m (6.6 ft), 5 m (16 ft) or 10 m (33 ft)  
FEP cable = 5 m (16 ft)
- L Probe length = 0.5 to 400 m (1.6 to 1312 ft)

Note!

For FMB50, FMB51, FMB52, order the separate housing via feature 600 "Separate housing".

## Weight

## Housing

	F31 housing	F15 housing
	Aluminum	AISI 316L
With electronic insert and local display	1.1 kg (2.43 lbs)	0.8 kg (1.76 lbs)



**Separate housing**

Designation	Weight
Separate housing for FMB50	Weight of housing (→ 40) + 0.5 kg (1.10 lbs).
Separate housing for FMB51 and FMB52	Weight of housing (→ 40) + 0.65 kg (1.43 lbs).
Process connection adapter	0.4 kg (0.88 lbs)
Mounting bracket	0.2 kg (0.44 lbs)
Pipe bend incl. cable entry	0.65 kg (1.43 lbs)
PE cable 2 m (6,6 ft)	0.16 kg (0.35 lbs)
PE cable 5 m (16 ft)	0.32 kg (0.71 lbs)
PE cable 10 m (33 ft)	0.59 kg (1.30 lbs)
FEP cable 5 m (16 ft)	0.62 kg (1.37 lbs)

Note!

Total weight = weight of separate housing + weight cable + weight mounting bracket +

Pipe bend + weight process connection adapter + (see following chapters)

Process connections FMB50 or Process connection and pipe FMB51 or Process connection and cable FMB52

**Process connections FMB50**

Process connection incl. sensor	Weight
DIN 11851 DN 40	0.7 kg (1.54 lbs)
DIN 11851 DN 50	0.9 kg (1.98 lbs)
Tri-Clamp ISO 2852 DN 40 – DN 51 (2")/DIN 32676 DN 50	0.7 kg (1.54 lbs)
DRD DN50 (65 mm)	1.1 kg (2.43 lbs)
Varivent Typ N for pipes DN 40 – DN 162	1.0 kg (2.21 lbs)
SMS 2"	0.7 kg (1.54 lbs)
NEUMO D50	1.1 kg (2.43 lbs)
Universal adapter	0.8 kg (1.76 lbs)
Universal adapter with 6 inch extended diaphragm seal	1.7 kg (3.75 lbs)
Anderson Adapter short	1.5 kg (3.31 lbs)
Anderson Adapter long	2.9 kg (6.39 lbs)
Thread ISO228 G1 1/2A, AISI316L / 1.4435	0.8 kg (1.76 lbs)
Thread ISO228 G1 1/2A, Alloy C276 / 2.4819	0.8 kg (1.76 lbs)
Thread ANSI 1 1/2 MNPT, AISI316L / 1.4435	0.8 kg (1.76 lbs)
Flange connection, incl. sensor, without a flange	0.45 kg (0.99 lbs)

Note!

Total weight of device = weight of housing (→ 40) + weight of process connection FMB50

**Process connection and pipe FMB51**

Process connection incl. sensor	Weight
Pipe incl. cable	0.77 kg/m (1.70 lbs/3.3 ft)
Threaded connection incl. measuring cell tube and sensor	1.65 kg (3.64 lbs)
Flange connection incl. measuring cell tube and sensor, without a flange	1.3 kg (2.87 lbs)

Note!

- Total weight of device with threaded connection = weight of housing (→ 40) + weight of pipe incl. cable x length + weight of process connection FMB51

- Total weight of device with flange connection = weight of housing (→ 40) + weight of pipe incl. cable x length + weight of process connection FMB51

#### Process connection and cable FMB52

Process connection incl. sensor	Weight
PE cable	0.13 kg/m (0.28 lbs/3.3 ft)
FEP cable	0.18 kg/m (0.40 lbs/3.3 ft)
Threaded connection incl. measuring cell tube and sensor	1.65 kg (3.64 lbs)
Flange connection incl. measuring cell tube and sensor, without a flange	1.3 kg (2.87 lbs)

#### Note!

- Total weight of device with threaded connection = weight of housing (→ 40) + weight of cable x length + weight of process connection FMB52
- Total weight of device with flange connection = weight of housing (→ 40) + weight of pipe incl. cable x length + weight of process connection FMB52 + weight of flange (→ 31 ff)

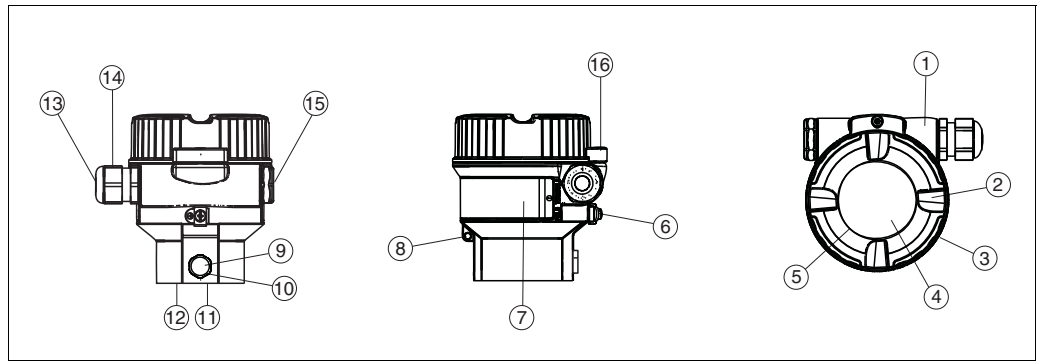
#### Process connection FMB53 – secured with suspension clamp and mounting bracket

Process connection incl. sensor	Weight
PE cable	0.13 kg/m (0.28 lbs/3.3 ft)
FEP cable	0.18 kg/m (0.40 lbs/3.3 ft)
Mounting bracket	0.2 kg (0.44 lbs)
Pipe bend incl. cable entry	0.65 kg (1.43 lbs)
Suspension clamp	0.4 kg (0.88 lbs)
Measuring cell tube incl. sensor	1.0 kg (2.21 lbs)

#### Note!

Total weight of device = weight of housing (→ 40) + weight of cable x length + weight of mounting bracket + weight of pipe bend + weight of suspension clamp + weight of measuring cell tube.

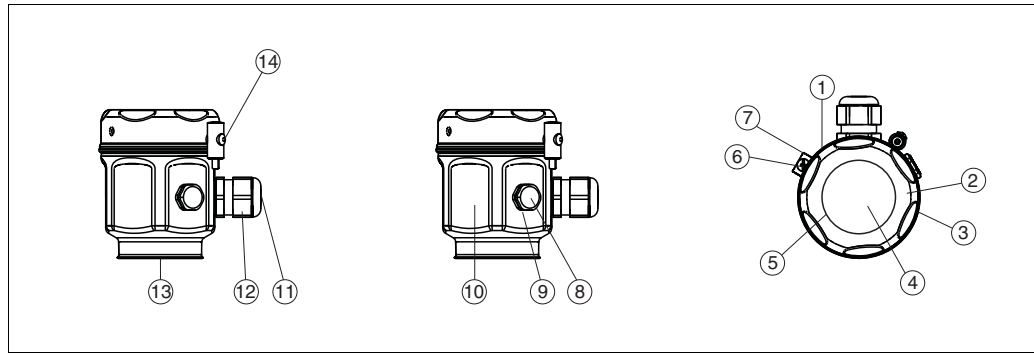
Cable length > 120 m (394 ft) = Delivery on cable reel.

**Material (not wetted)****Housing**

P01-xMxx3xxx-14-xx-xx-xx-002

*Front view, left-hand side view, top view*

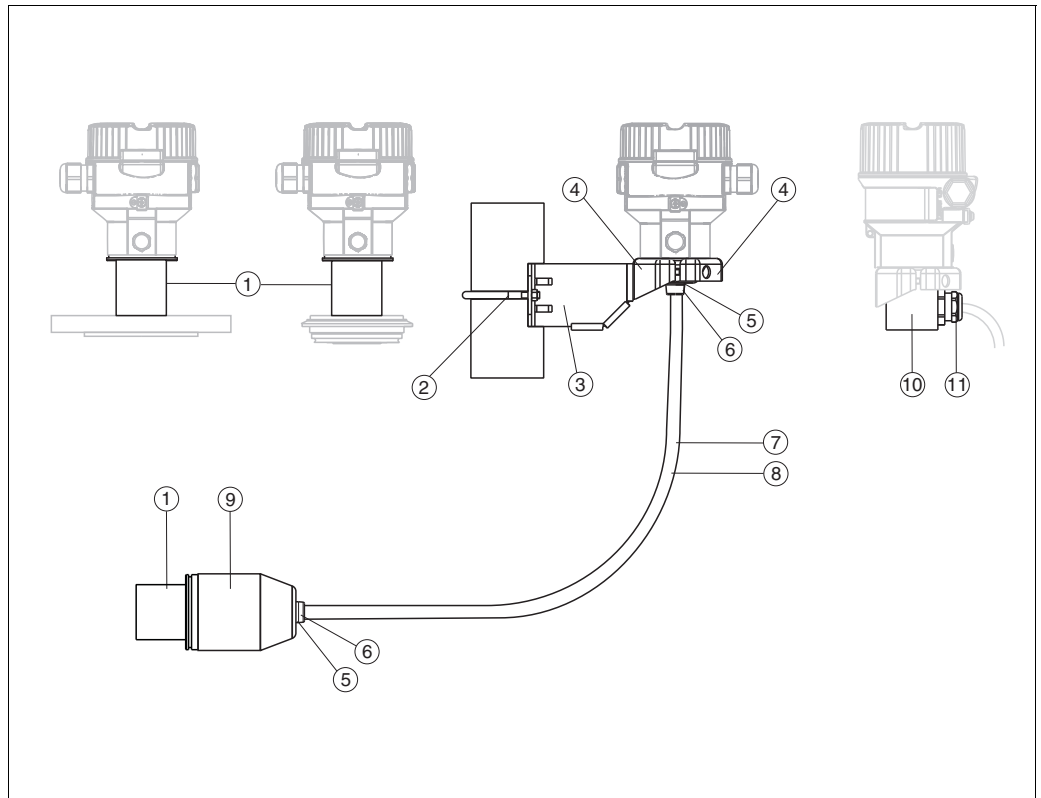
Item number	Component part	Material
1	F31 housing, RAL 5012 (blue)	Die-cast aluminum with protective powder-coating on polyester base
2	Cover, RAL 7035 (gray)	Die-cast aluminum with protective powder-coating on polyester base
3	Cover seal	EPDM
4	Sight glass	Mineral glass
5	Sight glass seal	Silicone (VMQ)
6	External ground terminal	AISI 304 (1.4301)
7	Nameplates	Plastic film
8	Attachement for tie-on label	AISI 304 (1.4301)/ AISI 316 (1.4401)
9	Pressure compensation filter	PA6 GF10
10	Pressure compensation filter, O-ring	Silicone (VMQ)
11	Sealing ring	EPDM
12	Snap ring	PC Plastic
13	Seal of cable gland and blind plug	EPDM/NBR
14	Cable gland	Polyamide (PA) or CuZn nickel-plated
15	Blind plug	PBT-GF30 FR for dust ignition-proof, Ex d, FM XP and CSA XP: AISI 316L (1.4435)
16	Cover clamp	Clamp AISI 316L (1.4435), screw A4



Front view, left-hand side view, top view

Item number	Component part	Material
1	F15 housing	AISI 316L (1.4404)
2	Cover	
3	Cover seal	Silicone with PTFE coating
4	Sight glass for non-hazardous area, ATEX Ex ia, NEPSI Zone 0/1 Ex ia, IECEx Zone 0/1 Ex ia, FM NI, FM IS, CSA IS	Polycarbonate (PC)
4	Sight glass for ATEX 1/2 D, ATEX 1/3 D, ATEX 1 GD, ATEX 1/2 GD, ATEX 3 G, FM DIP, CSA dust ignition-proof	Mineral glass
5	Sight glass seal	Silicone (VMQ)
6	External ground terminal	AISI 304 (1.4301)
7	Attachement for tie-on label	AISI 304 (1.4301)/ AISI 316 (1.4401)
8	Pressure compensation filter	PA6 GF10
9	Pressure compensation filter, O-ring	Silicone (VMQ)
10	Nameplates	lasered
11	Cable gland	Polyamide (PA), for dust ignition-proof: CuZn nickel-plated
12	Seal of cable gland and blind plug	NBR/Silicone/EPDM
13	Sealing ring	EPDM
14	Screw	A4-50

### Connecting parts



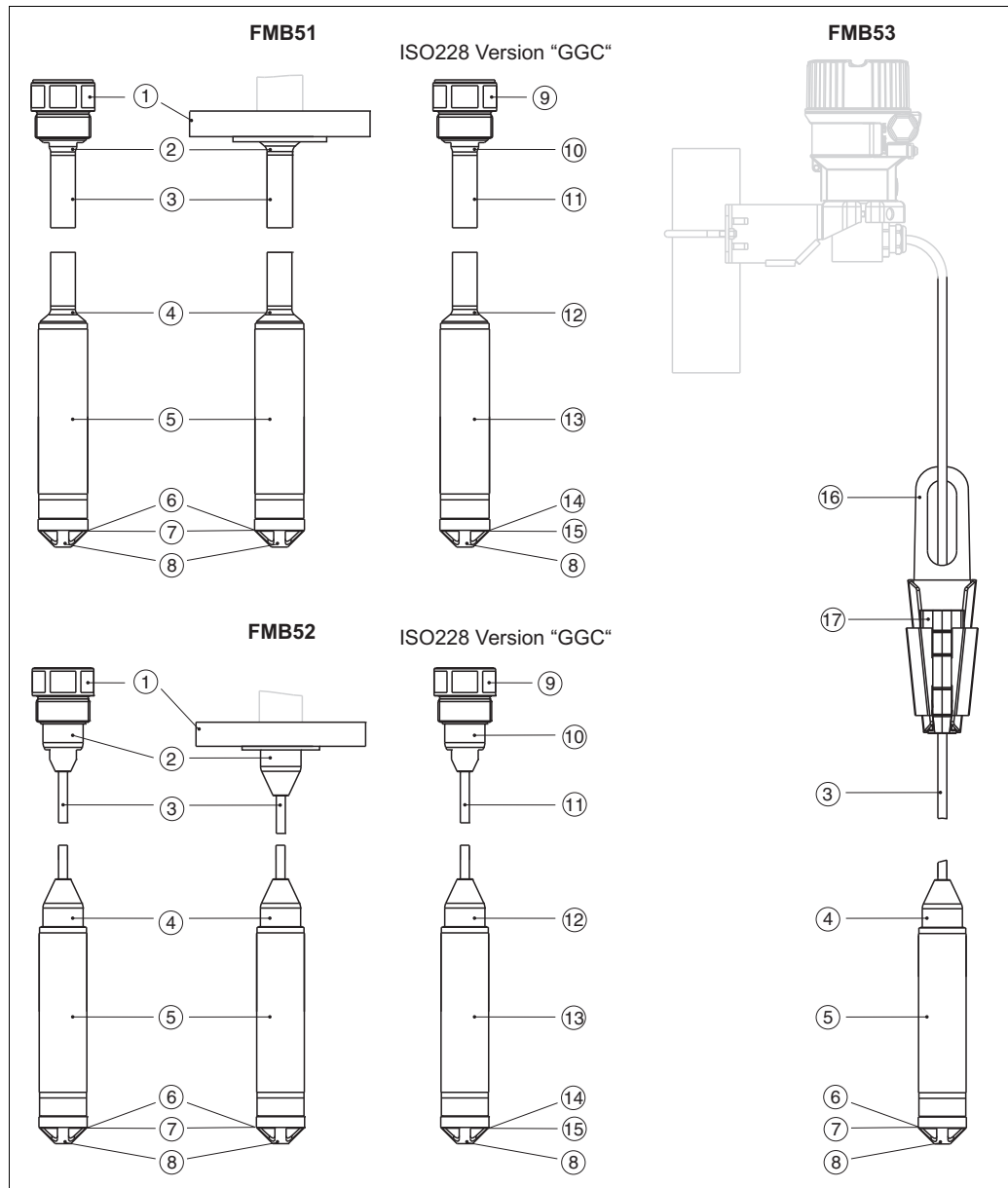
P01-xMxx3xxx-14-xx-xx-xx-003

Item number	Component part	Material
1	Connection between the housing and process connection	AISI 316L (1.4404)
2	Mounting bracket	Bracket AISI 304 (1.4301), AISI 304L (1.4306)
3		Screw and nuts A2-70
4		Half-shells: AISI 304L (1.4306)
5	Seal for cable from separate housing	FKM, EPDM
6	Gland for cable from separate housing: Screws:	AISI 316L (1.4404) A2
7	PE cable for separate housing	Abrasion-proof cable with strain-relief Dynema members; shielded using aluminum-coated film; insulated with polyethylene (PE-LD), black; copper wires, twisted, UV-resistant
8	FEP cable for separate housing	Abrasion-proof cable; shielded using galvanized steel wire netting; insulated with fluorinated ethylene propylene (FEP), black; copper wires, twisted, UV-resistant
9	Process connection adapter for separate housing	AISI 316L (1.4404)
10	Housing adapter	FMB50, FMB51, FMB52: AISI 316L (1.4404) FMB53: AISI 304 (1.4301)
11	Cable gland: Sealing insert: O-ring:	CuZn nickel-plated TPE-V NBR

### Filling oil

- Synthetic oil polyalphaolefin FDA 21 CFR 178.3570, NSF H1
- Inert oil

## Material (wetted)



P01-xMax3xxx-14-xx-xx-xx-005

Item number	Component part	Material
1	Process connection	→ 30 ff
2	Socket	AISI 316L (1.4404) or Alloy C4 (2.4610)
3	Rod	AISI 316L (1.4435) or Alloy C4 (2.4610)
	PE cable	Abrasion-proof cable with strain-relief Dynema members; shielded using aluminum-coated film; insulated with polyethylene (PE-LD), black/blue; copper wires, twisted, UV-resistant
	PE cable (with Drinking water approval)	Abrasion-proof cable with strain-relief Dynema members; shielded using aluminum-coated film; insulated with polyethylene (PE-LD), black; copper wires, twisted, UV-resistant
	FEP cable	Abrasion-proof cable; shielded using galvanized steel wire netting; insulated with fluorinated ethylene propylene (FEP), black; copper wires, twisted, UV-resistant
4	Socket	AISI 316L (1.4404) or Alloy C4 (2.4610)
5	Probe tube	AISI 316L (1.4404) or Alloy C22 (2.4602)
6	Process isolating diaphragm and meter body	→ 53 ff
7	Seals	→ 53 ff
8	Protection cap	PPO
9	Process connection	Alloy C276 (2.4819)

Item number	Component part	Material
10	Socket	Alloy C4 (2.4610)
11	Rod	Alloy C4 (2.4610)
12	Socket	Alloy C4 (2.4610)
13	Probe tube	Alloy C22 (2.4602)
14	Process isolating diaphragm and meter body	→ 53 ff
15	Seals	→ 53 ff
16	Suspension clamp	AISI 316L (1.4404)
17	Clamping jaw	PA-GF

**Note!**

The wetted device components are listed in the "Mechanical construction" (→ 30 ff) and "Ordering information" (→ 53 ff) sections.

**DIN/EN flanges**

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

**TSE Certificate of Suitability (Transmissible Spongiform Encephalopathy)**

The following applies to all process wetted device components:

- They do not contain any materials derived from animals.
- No auxiliaries or operating materials derived from animals are used in production or processing.

## Human interface

### Operating elements

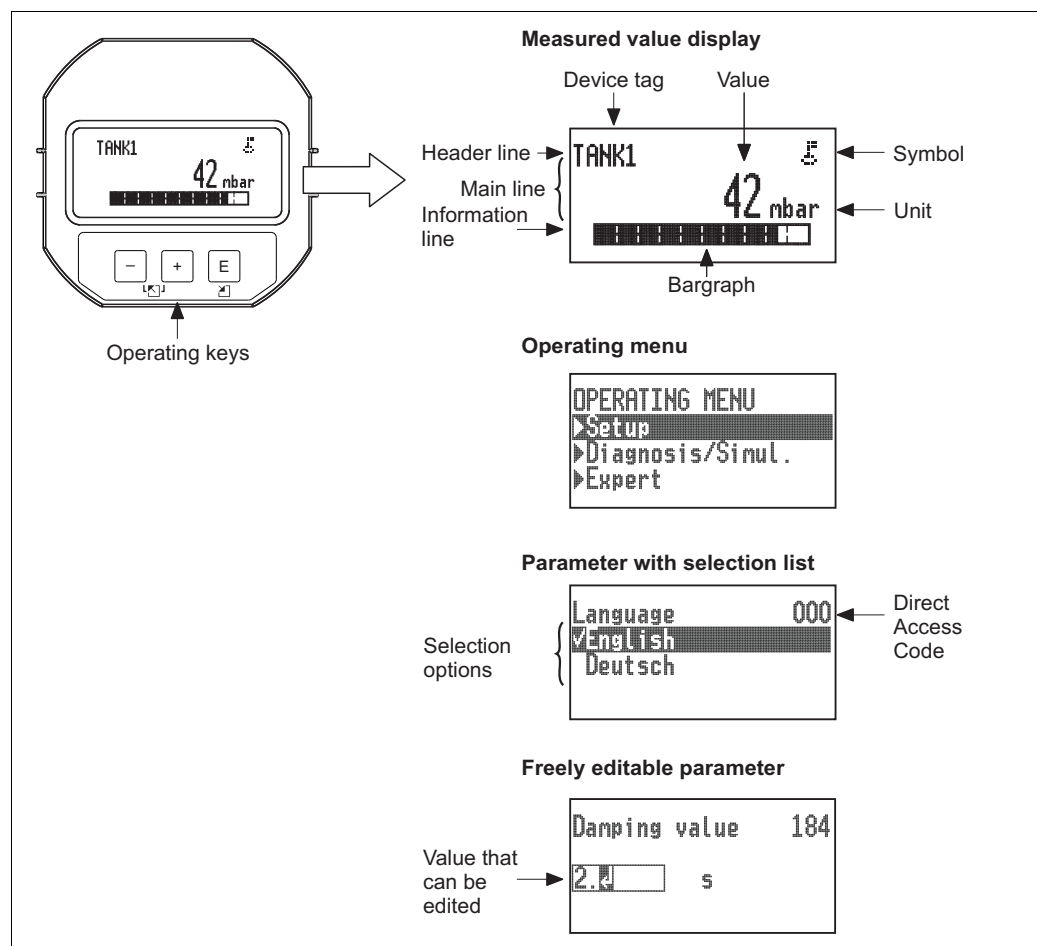
#### Local display (optional)

A 4-line liquid crystal display (LCD) is used for display and operation. The local display shows measured values, dialog texts as well as fault and notice messages in plain text, thereby supporting the user at every stage of operation. The liquid crystal display of the device can be turned in 90° stages.

Depending on the orientation of the device, this makes it easy to operate the device and read the measured values.

Functions:

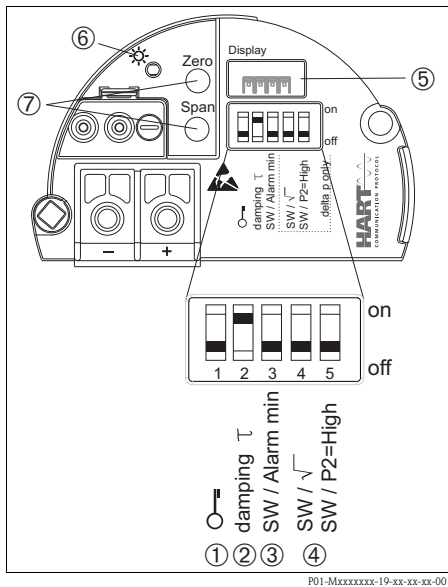
- 8-digit measured value display including sign and decimal point, bar graph for 4 to 20 mA HART as current display; or for PROFIBUS PA as graphic display of the standardized value of the AI Block; for FOUNDATION Fieldbus as graphic display of the transducer output in relation to the set pressure range.
- Three keys for operation
- Simple and complete menu guidance as parameters are split into several levels and groups
- Each parameter is given a 3-digit ID number for easy navigation
- Possibility of configuring the display to suit individual requirements and preferences, such as language, alternating display, contrast setting, display of other measured values such as sensor temperature etc.
- Comprehensive diagnostic functions (fault and warning message etc.)



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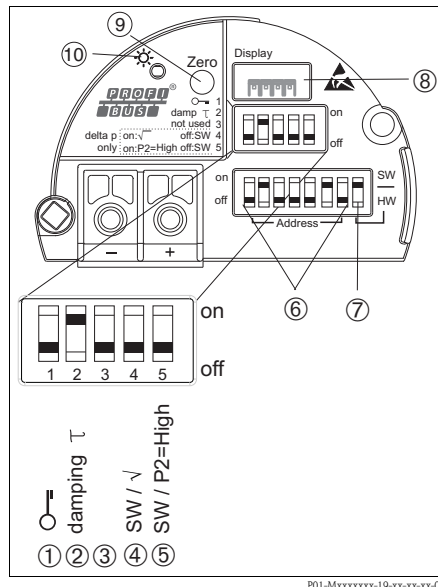


## Operating keys and elements located on the electronic insert



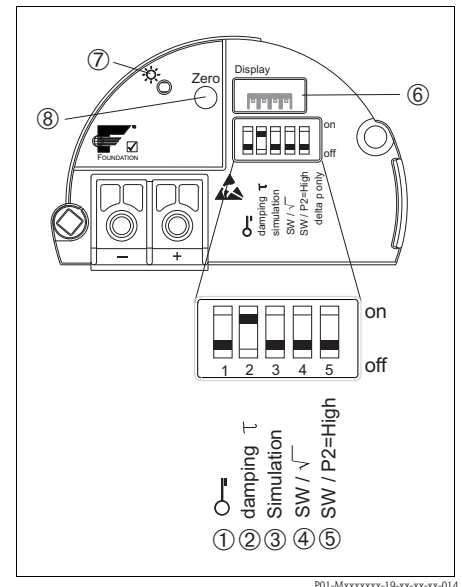
HART electronic insert

- 1 DIP switch for locking/unlocking parameters relevant to the measured value
- 2 DIP switch for switching damping on/off
- 3 DIP switch for alarm current SW / Alarm Min (3.6 mA)
- 4 DIP switch only for Deltabar M
- 5 Slot for optional local display
- 6 Green LED to indicate successful operation
- 7 Operating keys for lower range value (zero) and upper range value (span)



PROFIBUS PA electronic insert

- 1 DIP switch for locking/unlocking parameters relevant to the measured value
- 2 DIP switch for switching damping on/off
- 3/4/5 Not used
- 6 DIP-switch for hardware address
- 7 DIP-switch for bus address SW / HW
- 8 Slot for optional local display
- 9 Operating key for position zero adjustment or reset (Zero)
- 10 Green LED to indicate successful operation



FOUNDATION Fieldbus electronic insert

- 1 DIP switch for locking/unlocking parameters relevant to the measured value
- 2 DIP switch for switching damping on/off
- 3 DIP-switch for simulation mode
- 4/5 Not used
- 6 Slot for optional local display
- 7 Green LED to indicate successful operation
- 8 Operating key for position zero adjustment or reset (Zero)

## Onsite operation

Function	Operation with operating keys and operating elements on the electronic insert			
	Analog electronics	HART	PROFIBUS PA	FOUNDATION Fieldbus
Position adjustment (zero point correction)	X	X	X	X
Setting lower range value and upper range value - reference pressure present at the device	X	X	—	—
Device reset	X	X	X	X
Locking and unlocking parameters relevant to the measured value	—	X	X	X
Value acceptance indicated by the green LED	X	X	X	X
Switching damping on and off	X	X	X	X

Function	Operation via display			
	Analog electronics	HART	PROFIBUS PA	FOUNDATION Fieldbus
Position adjustment (zero point correction)	—	X	X	X
Setting lower range value and upper range value - reference pressure present at the device	—	X	X	X
Device reset	—	X	X	X
Locking and unlocking parameters relevant to the measured value	—	X	X	X
Value acceptance indicated by the green LED	—	—	—	—
Switching damping on and off	—	X	X	X

**Remote operation**

All software parameters are accessible depending on the position of the write protection switch on the device.

**HART**

Remote operation via:

- FieldCare (see "Hardware and software for onsite and remote operation" section → 51 ff) with Commubox FXA195 (see "Hardware and software for onsite and remote operation" section → 51 ff)
- Field Xpert SFX100. Field Xpert is an industrial PDA with integrated 3.5" touchscreen from Endress+Hauser based on Windows Mobile. It communicates via wireless with the optional VIATOR Bluetooth modem connected to a HART device point-to-point or wireless via WiFi and Endress+Hauser's Fieldgate FXA520. Field Xpert also works as a stand-alone device for asset management applications. For details refer to BA00060S/00/EN.

**PROFIBUS PA**

Remote operation via:

- FieldCare (see "Hardware and software for onsite and remote operation" section → 51 ff)
  - Profiboard: For connecting a PC to PROFIBUS
  - Proficard: For connecting a laptop to PROFIBUS

**FOUNDATION Fieldbus**

Remote operation via:

- Use an FF-configuration program for example NI-FBUS Configurator, to
  - connect devices with "FOUNDATION Fieldbus signal" into an FF-network
  - set FF-specific parameters

Operation with NI-FBUS Configurator:

The NI-FBUS Configurator is an easy-to-use graphical environment for creating linkages, loops, and a schedule based on the fieldbus concepts.

You can use the NI-FBUS Configurator to configure a fieldbus network as follows:

- Set block and device tags
- Set device addresses
- Create and edit function block control strategies (function block applications)
- Configure vendor-defined function and transducer blocks
- Create and edit schedules
- Read and write to function block control strategies (function block applications)
- Invoke Device Description (DD) methods
- Display DD menus
- Download a configuration
- Verify a configuration and compare it to a saved configuration
- Monitor a downloaded configuration
- Replace a virtual device by a real device
- Save and print a configuration
- FieldCare (see "Hardware and software for onsite and remote operation" → 51 ff)
  - NI PCMCIA-FBUS series 2 to connect a laptop to FF.

Note!

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

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**Hardware and software for  
onsite and remote operation**

**Commubox FXA195**

For intrinsically safe HART communication with FieldCare via the USB interface. For details refer to TI00404F/00/EN.

**Field Xpert SFX100**

Compact, flexible and robust industry handheld terminal for remote parametrization and measured value inspection via the HART current output (4-20mA).

For details refer to Operating Instructions BA00060S/04/EN.

**FieldCare**

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.

FieldCare supports the following functions:



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

Connection options:

- HART via Commubox FXA195 and the USB port on a computer
- PROFIBUS PA via segment coupler and PROFIBUS interface card
- FOUNDATION Fieldbus via NI interface card

For further information → [www.endress.com](http://www.endress.com)

## Certificates and approvals

<b>CE mark</b>	<p>The device meets the legal requirements of the relevant EC directives.</p> <p>Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.</p>	
<b>Ex approvals</b>	<ul style="list-style-type: none"> <li>■ ATEX</li> <li>■ FM</li> <li>■ CSA</li> <li>■ Also combinations of different approvals</li> </ul> <p>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.</p> <p>→ 66 ff, "Safety Instructions" and "Installation/Control Drawings" sections.</p>	
<b>Suitability for hygienic processes</b>	<p>The Deltapilot M is suitable for use in hygienic processes.</p> <p>Overview of permitted process connections from → 30.</p> <p>Many versions meet the requirements of 3A-Sanitary Standard No. 74 and are certified by the EHEDG.</p> <p>Suitable fittings and seals must be used for hygienic design in accordance with 3A and EHEDG specifications.</p> <p>Note!</p> <p>Gap-free connections can be cleaned without residue using the usual cleaning methods.</p>	 
<b>Functional safety SIL</b>	<p>The Deltapilot M with 4 to 20 mA output signal has been developed to assessed and certified by TÜV NORD CERT as per IEC 61508 Edition 2.0 and IEC 61511. These devices can be used to monitor the process level and pressure up to SIL 2.</p> <p>For a detailed description of the safety functions with Deltapilot M, settings and functional safety data, see the "Functional safety manual - Deltapilot M" SD00347P. Ordering Information → 53 ff, feature 590 "Additional Approval:" version LA "SIL".</p>	
<b>Pharma (CoC)</b>	<p><b>Certificate of Compliance (CoC) (according to ASME BPE-2007)</b></p> <p>See "Ordering information", → 53 ff, feature 590 "Additional Option:", option "LW".</p>	
<b>Standards and guidelines</b>	<p>DIN EN 60770 (IEC 60770):</p> <p>Transmitters for use in industrial process control systems</p> <p>Part 1: Methods for inspection and routine testing</p> <p>DIN 16086:</p> <p>Electrical pressure measuring instruments, pressure sensors, pressure transmitters, pressure measuring instruments,</p> <p>concepts, specifications on data sheets</p> <p>EN 61326 series:</p> <p>EMC product family standard for electrical equipment for measurement, control and laboratory use.</p>	
<b>Pressure Equipment Directive (PED)</b>	<p>The Deltapilot M device corresponds to Article 3 (3) of the EC directive 97/23/EC (Pressure Equipment Directive) and has been designed and manufactured according to good engineering practice.</p>	
<b>Drinking water approval</b>	<ul style="list-style-type: none"> <li>■ KTW certificate</li> <li>■ NSF 61 approval</li> <li>■ ACS approval</li> </ul>	
<b>North-American practice for installation of process seals</b>	<p>Endress+Hauser instruments are designed according to ANSI/ISA 12.27.01 either as single seal or dual seal devices with annunciation, allowing the user to waive the use and save the cost of installing external secondary process seals in the conduit as required by the process sealing sections of ANSI/NFPA 70 (NEC) and CSA 22.1 (CEC). These instruments comply with the North-American installation practice and provide a very safe and cost-saving installation for pressurized applications with hazardous fluids.</p> <p>Further information can be found in the control drawings of the relevant devices.</p>	

## Ordering information

### FMB50

This overview does not mark options which are mutually exclusive.

10	Approval:	
	AA	For non-hazardous areas
	BA	ATEX II 1/2G Ex ia IIC T6
	BB	ATEX II 1/2D Ex t IIIC
	BD	ATEX II 3G Ex nA IIC T6
	BE	ATEX II 2G Ex ia IIC T6
	BG	ATEX II 3G Ex ic IIC T6
	B1	ATEX II 1/2G Ex ia IIC T6 + ATEX II 1/2D, Ex iaD
	IA	IEC Ex ia IIC T6 Ga/Gb
	ID	IEC Ex t IIIC Da/Db
	IE	IEC Ex ic IIC T6 Gc
	I1	IEC Ex ia IIC T6 Ga/Gb+Ex ia IIIC Da/Db
	NA	NEPSI Ex ia IIC T6
	TA	TIIS Ex ia IIC T4
	CA	CSA C/US IS CL.I,II,III Div.1 Gr.A-G, CSA C/US IS CL.I Div.2 Gr.A-D, Ex ia, C: Zone 0,1,2/US: Zone 0,1,2,20,21,22
	CC	CSA C/US CL.II, III Div.1 Gr.E-G, US: Zone 21,22
	CD	CSA General Purpose
	FA	FM IS CL.I,II,III Div.1 Gr.A-G, AEx ia, FM NI CL.I Div.2 Gr.A-D, FM IS: zone 0,1,2,20,21,22/FM NI: zone 2
	FC	FM DIP CL.II, III Div.1 Gr.E-G, zone 21,22
	FD	FM NI CL.I Div.2 Gr.A-D, Zone 2
	8C	ATEX II Ex ia + FM/CSA IS ATEX II 2G Ex ia IIC T6 + FM/CSA IS CL.I Div. 1 Gr.A-D, FM/CSA: Zone 1,2
	99	Special version
20	Output:	
	2	4-20mA HART
	3	PROFIBUS PA
	4	FOUNDATION Fieldbus
	9	Special version
30	Display, operation	
	1	LCD, push buttons on display/electronics
	2	W/o LCD, push buttons on electronics
	9	Special version
40	Housing:	
	I	F31 aluminum
	J	F31 aluminum, glass window
	Q	F15 stainless steel Hygiene
	R	F15 stainless steel Hygiene, glass, window
	S	F15 stainless steel Hygiene, plastic, window
	Y	Special version
50	Electrical connection:	
	A	Gland M20, IP66/68 NEMA4X/6P
	C	Thread G1/2, IP66/68 NEMA4X/6P
	D	Thread NPT1/2, IP66/68 NEMA4X/6P
	I	Connector M12, IP66/67, NEMA4X/6P
	M	Connector 7/8", IP66/68, NEMA4X/6P
	P	Connector Han7D, 90deg, IP65
	S	PE Cable 5m, IP66/68 NEMA4X/6P + pressure compensation via cable
	V	Valve connector ISO4400 M16, IP64
	Y	Special version
70	Sensor range:	
	1C	100mbar/10kPa/1.5psi relative, 1mH2O/3ftH2O/40inH2O Overload: 4bar/400kPa/60psi
	1F	400mbar/40kPa/6psi relative, 4mH2O/13ftH2O/160inH2O Overload: 8bar/800kPa/120psi
	1H	1.2bar/120kPa/18psi relative, 12mH2O/40ftH2O/480inH2O Overload: 24bar/2.4MPa/350psi
	1M	4bar/400kPa/60psi relative, 40mH2O/133ftH2O/1600inH2O Overload: 24bar/2.4MPa/350psi
	1P	10bar/1MPa/150psi relative, 100mH2O/333ftH2O/4000inH2O Overload: 40bar/4MPa/600psi
	99	Special version

## FMB50 (continued)

80	<b>Reference accuracy:</b>		
	D	Platinum	
	G	Standard	
	Y	Special version	
90	<b>Calibration; Unit:</b>		
	A	Sensor range; %	
	B	Sensor range; mbar/bar	
	C	Sensor range; kPa/MPa	
	D	Sensor range; mm/mH <sub>2</sub> O	
	E	Sensor range; inH <sub>2</sub> O/ftH <sub>2</sub> O	
	F	Sensor range; psi	
	J	Customized pressure; see additional spec.	
110	<b>Process connection:</b>		
	<b>Threaded connection</b>		
	GGC	Thread ISO228 G1-1/2, AlloyC	
	GGJ	Thread ISO228 G1-1/2, 316L	
	RGJ	Thread ANSI MNPT1-1/2, 316L	
	<b>ANSI flanges</b>		
	AEJ	1-1/2" 150lbs RF, 316/316L, flange ANSI B16.5	
	AFJ	2" 150lbs RF, 316/316L, flange ANSI B16.5	
	AGJ	3" 150lbs RF, 316/316L, flange ANSI B16.5	
	AHJ	4" 150lbs RF, 316/316L, flange ANSI B16.5	
	<b>EN flanges</b>		
	CEJ	DN40 PN10/16 B1, 316L, flange EN1092-1	
	CFJ	DN50 PN10/16 B1, 316L, flange EN1092-1	
	CGJ	DN80 PN10/16 B1, 316L, flange EN1092-1	
	CHJ	DN100 PN10/16 B1, 316L, flange EN1092-1	
	<b>JIS flanges</b>		
	KEJ	10K 40A RF, 316L, flange JIS B2220	
	KFJ	10K 50A RF, 316L, flange JIS B2220	
	KGJ	10K 80A RF, 316L, flange JIS B2220	
	KHJ	10K 100A RF, 316L, flange JIS B2220	
	<b>Hygienic connections</b>		
	MRJ	DIN11851 DN50 PN25 cap-nut, 316L, EHEDG, 3A	
	MZJ	DIN11851 DN40 PN25 cap-nut, 316L, EHEDG, 3A	
	NDJ	DIN11864-1 A DN50 PN16 tube DIN11866-A, slotted nut, 316L, EHEDG, 3A	
	S4J	NEUMO BioControl D50 PN16, 316L, 3A	
	TXJ	SMS 2" PN25, 316L, EHEDG, 3A	
	TIJ	DRD DN50 65mm PN25, 316L	
	TRJ	Varivent N pipe DN40-162 PN40, 316L, EHEDG, 3A	
	UNJ	Universal adapter 44mm 316L, EPDM molded seal, EHEDG	
	UOJ	Universal adapter 44mm 316L, 6" ext., EPDM molded seal, EHEDG	
	UPJ	Universal adapter 44mm 316L, 3A, EHEDG, incl. silicone molded seal	
	UQJ	Universal adapter 44mm 316L, ext. 6", 3A, EHEDG, incl. silicone molded seal	
	USJ	Anderson short 2-3/16", 316L, 3A, incl. silicone seal	
	UTJ	Anderson long 6-1/2", 316L, 3A, incl. silicone seal	
	<b>Clamp connections</b>		
	TDJ	Tri-Clamp ISO2852 DN40-51 (2"), 316L, DIN32676 DN50, EHEDG, 3A	
	YYY	Special version	
170	<b>Material of the process isolating diaphragm :</b>		
		<b>Coating</b>	<b>Process isolating diaphragm</b> <b>Meter body</b>
	B	-	Alloy C276 (2.4819) 316L (1.4435) or Alloy C276 (2.4819) <sup>1)</sup>
	L	Gold>Rhodium (→ 26)	Alloy C276 (2.4819) Alloy C276 (2.4819)
	Y	Special version	

1) The material of the meter body corresponds to the material of the process connection.

180	<b>Fill fluid:</b>		
	2	Inert oil	
	3	Synthetic oil, FDA	
	9	Special version	
190	<b>Seal:</b>		
	U	None, welded cell	

## FMB50 (continued)

## Additional ordering information (optional)

<b>500</b>	<b>Additional Operating language:</b>	
	AA	English
	AB	German
	AC	French
	AD	Spanish
	AE	Italian
	AF	Dutch
	AK	Chinese
	AL	Japanese
<b>550</b>	<b>Calibration:</b>	
	F1	Factory calibration certificate, 5-point
	F2	DKD/DakS calibration certificate 10-point
<b>570</b>	<b>Service:</b>	
	HA	Oil and grease removed <sup>1)</sup>
	HB	Cleaned for oxygen service <sup>1)</sup>
	HC	Cleaned from PWIS (PWIS = paint wetting impairment substances) <sup>1)</sup>
	HK	Surface quality Ra<0.38um electropolished (wetted)
	IA	Configured min alarm current
	IB	Configured HART Burst Mode PV
	I9	Special version
1) Only device, not accessory or enclosed accessory		
<b>580</b>	<b>Test, certificate:</b>	
	JA	EN10204-3.1 wetted material, inspection certificate
	JB	NACE MR0175 wetted
	JF	EN10204-3.1 AD2000 material wetted parts, excepting process membrane inspection certificate
	KB	EN10204-3.1 wetted material + Ra, (Ra= surface roughness), dimensional check, inspection certificate
	KD	EN10204-3.1 helium leak test, inspection certificate
	KE	EN10204-3.1 pressure test, inspection certificate
	KF	EN10204-3.1 measurement Delta ferrite content, inspection certificate
	KG	EN10204-3.1 PMI test* (PMI = positive material identification), inspection certificate
		* Meter body and process isolating diaphragm not included.
	K9	Special version
<b>590</b>	<b>Other approvals:</b>	
	LA	SIL
	LC	WHG overfill prevention
	LQ	KTW potable water approval
	LR	NSF potable water approval
	LW	CoC Certificate of Compliance
<b>600</b>	<b>Separate housing:</b>	
	MA	Cable PE, 2m/80inch + housing mounting bracket, wall/pipe, 304
	MB	Cable PE, 5m/200inch + housing mounting bracket, wall/pipe, 304
	MC	Cable PE, 10m/400inch + housing mounting bracket, wall/pipe, 304
	MH	Cable FEP, 5m/200inch IP69K + housing mounting bracket, wall/pipe, 304
<b>610</b>	<b>Accessory mounted:</b>	
	NA	Overvoltage protection

## FMB50 (continued)

620	Accessory enclosed:	
	QJ	Welding neck G1-1/2, 316L
	QK	Welding neck G1-1/2, 316L, 3.1, EN10204-3.1 material, inspection certificate
	QL	Weld-in tool adapter G1-1/2, brass
	QP	Welding flange DRD DN50 65mm, 316L
	QR	Welding fl. DRD DN50 65mm, 316L 3.1, EN10204-3.1 material, inspection certificate
	QS	Weld-in tool flange DRD DN50 65mm, brass
	QT	Welding neck Uni D65, 316L
	QU	Welding neck Uni D65, 316L, 3.1, EN10204-3.1 material, inspection certificate
	Q1	Weld-in tool adapter Uni D65, brass
	Q2	Welding neck Uni D85, 316L
	Q3	Welding neck Uni D85, 316L, 3.1, EN10204-3.1 material, inspection certificate
	Q5	Welding neck Uni 6" D65, 316L
	Q6	Welding neck Uni 6" D65, 316L, 3.1, EN10204-3.1 material, inspection certificate
	Q7	Weld-in tool adapter Uni 6" D65, brass
	RA	Adapter Uni > DIN11851 DN40, 316L, slotted nut
	R1	Adapter Uni > DIN11851 DN40, 316L, 3.1, slotted nut, EN10204-3.1 material, inspection certificate
	RB	Adapter Uni > DIN11851 DN50, 316L, slotted nut
	R2	Adapter Uni > DIN11851 DN50, 316L, 3.1, slotted nut, EN10204-3.1 material, inspection certificate
	RC	Adapter Uni > DRD DN50 65mm, 316L
	R3	Adapter Uni > DRD DN50 65mm, 316L, 3.1, EN10201-3.1 material, inspection certificate
	RD	Adapter Uni > Clamp 2", 316L
	R4	Adapter Uni > Clamp 2", 316L, 3.1, EN10201-3.1 material, inspection certificate
	RF	Adapter Uni > Varivent, 316L
	R5	Adapter Uni > Varivent, 316L, 3.1, EN10201-3.1 material, inspection certificate
	RL	Plug-in jack M12
	RM	Plug-in jack M12, 90deg
	RN	Plug-in jack M12, 90deg+5m cable
850	Firmware version:	
	78	01.00.zz, HART, DevRev01
895	Identification:	
	Z1	Measuring point (TAG)
	Z2	Bus address

You can enter the versions for the specific feature in the following table. The versions entered make up the complete order code.

	10	20	30	40	50	70	80	90	110	170	180	190	500	550	570	580	590	600	610	620	850	895
FMB50 -																						



**FMB51**

This overview does not mark options which are mutually exclusive.

<b>10</b>	<b>Approval:</b>	
	AA	For non-hazardous areas
	BA	ATEX II 1/2G Ex ia IIC T6
	BB	ATEX II 1/2D Ex t IIIC
	BD	ATEX II 3G Ex nA IIC T6
	BE	ATEX II 2G Ex ia IIC T6
	BG	ATEX II 3G Ex ic IIC T6
	B1	ATEX II 1/2G Ex ia IIC T6 + ATEX II 1/2D, Ex iaD
	IA	IEC Ex ia IIC T6 Ga/Gb
	ID	IEC Ex t IIIC Da/Db
	IE	IEC Ex ic IIC T6 Gc
	I1	IEC Ex ia IIC T6 Ga/Gb+Ex ia IIIC Da/Db
	NA	NEPSI Ex ia IIC T6
	TA	TIIS Ex ia IIC T4
	CA	CSA C/US IS CL.I,II,III Div.1 Gr.A-G, C/US IS CL. I Div.2 Gr. A-D, Ex ia, C: zone 0,1,2/US: zone 0,1,2,20,21,22
	CC	CSA C/US CL.II, III Div.1 Gr.E-G, US: zone 21,22
	CD	CSA General Purpose
	FA	FM IS CL.I,II,III Div.1 Gr.A-G, AEx ia, FM NI CL.I Div.2 Gr.A-D, FM IS: Zone 0,1,2,20,21,22/FM NI: Zone 2
	FC	FM DIP CL.II, III Div.1 Gr.E-G, zone 21,22
	FD	FM NI CL.I Div.2 Gr. A-D, zone 2
	8C	ATEX II Ex ia + FM/CSA IS ATEX II 2G Ex ia IIC T6 + FM/CSA IS CL.I Div. 1 Gr.A-D, FM/CSA: Zone 1,2
	99	Special version
<b>20</b>	<b>Output:</b>	
	2	4-20mA HART
	3	PROFIBUS PA
	4	FOUNDATION Fieldbus
	9	Special version
<b>30</b>	<b>Display, operation:</b>	
	1	LCD, push buttons on display/electronics
	2	W/o LCD, push buttons on electronics
	9	Special version
<b>40</b>	<b>Housing:</b>	
	I	F31 aluminum
	J	F31 aluminum, glass window
	Q	F15 stainless steel Hygiene
	R	F15 stainless steel Hygiene, glass window
	S	F15 stainless steel Hygiene, plastic window
	Y	Special version
<b>50</b>	<b>Electrical connection:</b>	
	A	Gland M20, IP66/68 NEMA4X/6P
	C	Thread G1/2, IP66/68 NEMA4X/6P
	D	Thread NPT1/2, IP66/68 NEMA4X/6P
	I	Connector M12, IP66/67, NEMA4X/6P
	M	Connector 7/8", IP66/68, NEMA4X/6P
	P	Connector Han7D, 90deg, IP65
	V	Valve connector ISO4400 M16, IP64
	Y	Special version
<b>70</b>	<b>Sensor range:</b>	
	1C	100mbar/10kPa/1.5psi relative, 1mH2O/3ftH2O/40inH2O Overload: 4bar/400kPa/60psi
	1F	400mbar/40kPa/6psi relative, 4mH2O/13ftH2O/160inH2O Overload: 8bar/800kPa/120psi
	1H	1.2bar/120kPa/18psi relative, 12mH2O/40ftH2O/480inH2O Overload: 25bar/2.5MPa/375psi
	1M	4bar/400kPa/60psi relative, 40mH2O/133ftH2O/1600inH2O Overload: 25bar/2.5MPa/375psi
	1P	10bar/1MPa/150psi relative, 100mH2O/333ftH2O/4000inH2O Overload: 40bar/4MPa/600psi
	99	Special version
<b>80</b>	<b>Reference accuracy:</b>	
	D	Platinum
	G	Standard
	Y	Special version

## FMB51 (continued)

90	Calibration; Unit:		
	A	Sensor range; %	
	B	Sensor range; mbar/bar	
	C	Sensor range; kPa/MPa	
	D	Sensor range; mm/mH2O	
	E	Sensor range; inH2O/ftH2O	
	F	Sensor range; psi	
	J	Customized pressure; see additional spec.	
100	K	Customized level; see additional spec.	
	Y	Special version	
	Probe connection:		
	80	..... mm rod, 316L	400...4000 mm
	81	..... mm rod, AlloyC	400...4000 mm
	85	..... in rod, 316L	16...160 inch
	86	..... in rod, AlloyC	16...160 inch
	99	Special version	
110	Process connection:		
	Threaded connection		
	GGC	Thread ISO228 G1-1/2, AlloyC	
	GGJ	Thread ISO228 G1-1/2, 316L	
	RGJ	Thread ANSI MNPT1-1/2, 316L	
	ANSI flanges		
	AFJ	2" 150lbs RF, 316/316L, flange ANSI B16.5	
	AGJ	3" 150lbs RF, 316/316L, flange ANSI B16.5	
	AHJ	4" 150lbs RF, 316/316L, flange ANSI B16.5	
	EN flanges		
	CEJ	DN40 PN10/16 B1, 316L, flange EN1092-1	
	CFJ	DN50 PN10/16 B1, 316L, flange EN1092-1	
	CGJ	DN80 PN10/16 B1, 316L, flange EN1092-1	
	CHJ	DN100 PN10/16 B1, 316L, flange EN1092-1	
	JIS flanges		
	KEJ	10K 40A RF, 316L, flange JIS B2220	
	KFJ	10K 50A RF, 316L, flange JIS B2220	
	KGJ	10K 80A RF, 316L, flange JIS B2220	
	KHJ	10K 100A RF, 316L, flange JIS B2220	
	YYY	Special version	
170	Material of the process isolating diaphragm :		
		Coating	Process isolating diaphragm
	B	-	Alloy C276 (2.4819)
	L	Gold>Rhodium (→ ⓘ 26)	Alloy C276 (2.4819)
	N	Gold>Platin (→ ⓘ 26)	Alloy C276 (2.4819)
	Y	Special version	
Meter body			
			316L (1.4435) or Alloy C276 (2.4819) <sup>1)</sup>
			Alloy C276 (2.4819)
			Alloy C276 (2.4819)
1) The material of the meter body corresponds to the material of the process connection.			
180	Fill fluid:		
	2	Inert oil	
	3	Synthetic oil, FDA	
	9	Special version	
190	Seal:		
	A	FKM Viton	
	J	EPDM	
	L	Kalrez 6375	
	U	None, welded cell	

## FMB51 (continued)

## Additional ordering information (optional)

<b>500</b>	<b>Additional Operating language:</b>	
	AA	English
	AB	German
	AC	French
	AD	Spanish
	AE	Italian
	AF	Dutch
	AK	Chinese
	AL	Japanese
<b>550</b>	<b>Calibration:</b>	
	F1	Factory calibration certificate, 5-point
<b>570</b>	<b>Service:</b>	
	HA	Oil and grease removed <sup>1)</sup>
	HB	Cleaned for oxygen service <sup>1)</sup>
	HC	Cleaned from PWIS (PWIS = paint wetting impairment substances) <sup>1)</sup>
	IA	Configured min alarm current
	IB	Configured HART Burst Mode PV
	I9	Special version
1) Only device, not accessory or enclosed accessory		
<b>580</b>	<b>Test, certificate:</b>	
	JA	EN10204-3.1 wetted material, inspection certificate
	JB	NACE MR0175 wetted
	KD	EN10204-3.1 helium leak test, inspection certificate
	KE	EN10204-3.1 pressure test, inspection certificate
	KG	EN10204-3.1 PMI test* (PMI = positive material identification), inspection certificate
		* Meter body and process isolating diaphragm not included.
	K9	Special version
<b>590</b>	<b>Other approvals:</b>	
	LA	SIL
	LC	WHG overfill prevention
	LQ	KTW potable water approval
	LR	NSF potable water approval
<b>600</b>	<b>Separate housing:</b>	
	MA	Cable PE, 2m/80inch + housing mounting bracket, wall/pipe, 304
	MB	Cable PE, 5m/200inch + housing mounting bracket, wall/pipe, 304
	MC	Cable PE, 10m/400inch + housing mounting bracket, wall/pipe, 304
	MH	Cable FEP, 5m/200inch IP69K + housing mounting bracket, wall/pipe, 304
<b>610</b>	<b>Accessory mounted:</b>	
	NA	Overvoltage protection
<b>620</b>	<b>Accessory enclosed:</b>	
	QJ	Welding neck G1-1/2, 316L
	QK	Welding neck G1-1/2, 316L, 3.1, EN10204-3.1 material, inspection certificate
	QL	Weld-in tool adapter G1-1/2, brass
	RL	Plug-in jack M12
	RM	Plug-in jack M12, 90deg
	RN	Plug-in jack M12, 90deg+5m cable
<b>850</b>	<b>Firmware version:</b>	
	78	01.00.zz, HART, DevRev01
<b>895</b>	<b>Identification:</b>	
	Z1	Measuring point (TAG)
	Z2	Bus address

You can enter the versions for the specific feature in the following table. The versions entered make up the complete order code.

	10	20	30	40	50	70	80	90	100	110	170	180	190	500	550	570	580	600	610	620	850	895
FMB51 -																						

**FMB52**

This overview does not mark options which are mutually exclusive.

<b>10</b>	<b>Approval:</b>	
	AA	For non-hazardous areas
	BA	ATEX II 1/2G Ex ia IIC T6
	BD	ATEX II 3G Ex nA IIC T6
	BE	ATEX II 2G Ex ia IIC T6
	BG	ATEX II 3G Ex ic IIC T6
	IA	IEC Ex ia IIC T6 Ga/Gb
	IC	IEC Ex ia IIC T6 Gb
	IE	IEC Ex ic IIC T6 Gc
	NA	NEPSI Ex ia IIC T6
	TA	TIIS Ex ia IIC T4
	CA	CSA C/US IS Cl. I, II, III Div.1 Gr. A-G, CSA C/US IS Cl. I Div. 2 Gr. A-D, Ex ia, C: Zone 0,1,2/US: Zone 0,1,20,21,22
	CD	CSA General Purpose
	FE	FM IS Cl.I Div.1 Gr.A-D, AEx ia, Zone 0,1,2
	8C	ATEX II Ex ia + FM/CSA IS ATEX II 2G Ex ia IIC T6 + FM/CSA IS Cl.I Div. 1 Gr.A-D, FM/CSA: Zone 1,2
	99	Special version
<b>20</b>	<b>Output:</b>	
	2	4-20mA HART
	3	PROFIBUS PA
	4	FOUNDATION Fieldbus
	9	Special version
<b>30</b>	<b>Display, operation:</b>	
	1	LCD, push buttons on display/electronics
	2	W/o LCD, push buttons on electronics
	9	Special version
<b>40</b>	<b>Housing:</b>	
	I	F31 aluminum
	J	F31 aluminum, glass window
	Q	F15 stainless steel Hygiene
	R	F15 stainless steel Hygiene, glass window
	S	F15 stainless steel Hygiene, plastic window
	Y	Special version
<b>50</b>	<b>Electrical connection:</b>	
	A	Gland M20, IP66/68 NEMA4X/6P
	C	Thread G1/2, IP66/68 NEMA4X/6P
	D	Thread NPT1/2, IP66/68 NEMA4X/6P
	I	Connector M12, IP66/67, NEMA4X/6P
	M	Connector 7/8", IP66/68, NEMA4X/6P
	P	Connector Han7D, 90deg, IP65
	V	Valve connector ISO4400 M16, IP64
	Y	Special version
<b>70</b>	<b>Sensor range:</b>	
	1C	100mbar/10kPa/1.5psi relative, 1mH2O/3ftH2O/40inH2O Overload: 4bar/400kPa/60psi
	1F	400mbar/40kPa/6psi relative, 4mH2O/13ftH2O/160inH2O Overload: 8bar/800kPa/120psi
	1H	1.2bar/120kPa/18psi relative, 12mH2O/40ftH2O/480inH2O Overload: 25bar/2.5MPa/375psi
	1M	4bar/400kPa/60psi relative, 40mH2O/133ftH2O/1600inH2O Overload: 25bar/2.5MPa/375psi
	1P	10bar/1MPa/150psi relative, 100mH2O/333ftH2O/4000inH2O Overload: 40bar/4MPa/600psi
	99	Special version
<b>80</b>	<b>Reference accuracy:</b>	
	D	Platinum
	G	Standard
	Y	Special version

## FMB52 (continued)

90	Calibration; Unit:			
	A	Sensor range; %		
	B	Sensor range; mbar/bar		
	C	Sensor range; kPa/MPa		
	D	Sensor range; mm/mH2O		
	E	Sensor range; inH2O/ftH2O		
	F	Sensor range; psi		
	J	Customized pressure; see additional spec.		
	K	Customized level; see additional spec.		
	Y	Special version		
100	Probe connection:			
	15	..... mm cable, PE	500...400.000 mm	
	25	..... in cable, PE	500...400.000 mm	
	35	..... mm cable, FEP	20...15748 inch	
	45	..... in cable, FEP	20...15748 inch	
	99	Special version		
110	Process connection:			
	<b>Threaded connection</b>			
	GGC	Thread ISO228 G1-1/2, AlloyC		
	GGJ	Thread ISO228 G1-1/2, 316L		
	RGJ	Thread ANSI MNPT1-1/2, 316L		
	<b>ANSI flanges</b>			
	AFJ	2" 150lbs RF, 316/316L, flange ANSI B16.5		
	AGJ	3" 150lbs RF, 316/316L, flange ANSI B16.5		
	AHJ	4" 150lbs RF, 316/316L, flange ANSI B16.5		
	<b>EN flanges</b>			
	CEJ	DN40 PN10/16 B1, 316L, flange EN1092-1		
	CFJ	DN50 PN10/16 B1, 316L, flange EN1092-1		
	CGJ	DN80 PN10/16 B1, 316L, flange EN1092-1		
	CHJ	DN100 PN10/16 B1, 316L, flange EN1092-1		
	<b>JIS flanges</b>			
	KEJ	10K 40A RF, 316L, flange JIS B2220		
	KFJ	10K 50A RF, 316L, flange JIS B2220		
	KGJ	10K 80A RF, 316L, flange JIS B2220		
	KHJ	10K 100A RF, 316L, flange JIS B2220		
	YYY	Special version		
170	Material of the process isolating diaphragm :			
		<b>Coating</b>	<b>Process isolating diaphragm</b>	<b>Meter body</b>
	B	-	Alloy C276 (2.4819)	316L (1.4435) or Alloy C276 (2.4819) <sup>1)</sup>
	L	Gold>Rhodium (→ ⓘ 26)	Alloy C276 (2.4819)	Alloy C276 (2.4819)
	N	Gold>Platin (→ ⓘ 26)	Alloy C276 (2.4819)	Alloy C276 (2.4819)
	Y	Special version		

1) The material of the meter body corresponds to the material of the process connection.

180	Fill fluid:	
	2	Inert oil
	3	Synthetic oil, FDA
	9	Special version
190	Seal:	
	A	FKM Viton
	J	EPDM
	L	Kalrez 6375
	U	None, welded cell

## FMB52 (continued)

## Additional ordering information (optional)

<b>500</b>	<b>Additional Operating language:</b>	
	AA	English
	AB	German
	AC	French
	AD	Spanish
	AE	Italian
	AF	Dutch
	AK	Chinese
	AL	Japanese
<b>550</b>	<b>Calibration:</b>	
	F1	Factory calibration certificate, 5-point
<b>570</b>	<b>Service:</b>	
	HA	Oil and grease removed <sup>1)</sup>
	HC	Cleaned from PWIS (PWIS = paint wetting impairment substances) <sup>1)</sup>
	IA	Configured min alarm current
	IB	Configured HART Burst Mode PV
	I9	Special version
<b>580</b>	<b>Test, certificate:</b>	
	JA	EN10204-3.1 wetted material, inspection certificate
	JB	NACE MR0175 wetted
	KD	EN10204-3.1 helium leak test, inspection certificate
	KE	EN10204-3.1 pressure test, inspection certificate
	KG	EN10204-3.1 PMI test* (PMI = positive material identification), inspection certificate
		* Meter body and process isolating diaphragm not included.
	K9	Special version
<b>590</b>	<b>Other approvals:</b>	
	LA	SIL
	LC	WHG overfill prevention
	LQ	KTW potable water approval
	LR	NSF potable water approval
<b>600</b>	<b>Separate housing:</b>	
	MA	Cable PE, 2m/80inch + housing mounting bracket, wall/pipe, 304
	MB	Cable PE, 5m/200inch + housing mounting bracket, wall/pipe, 304
	MC	Cable PE, 10m/400inch + housing mounting bracket, wall/pipe, 304
	MH	Cable FEP, 5m/200inch IP69K + housing mounting bracket, wall/pipe, 304
<b>610</b>	<b>Accessory mounted:</b>	
	NA	Overvoltage protection
<b>620</b>	<b>Accessory enclosed:</b>	
	QJ	Welding neck G1-1/2, 316L
	QK	Welding neck G1-1/2, 316L, 3.1, EN10204-3.1 material, inspection certificate
	QL	Weld-in tool adapter G1-1/2, brass
	RL	Plug-in jack M12
	RM	Plug-in jack M12, 90deg
	RN	Plug-in jack M12, 90deg+5m cable
<b>850</b>	<b>Firmware version:</b>	
	78	01.00.zz, HART, DevRev01
<b>895</b>	<b>Identification:</b>	
	Z1	Measuring point (TAG)
	Z2	Bus address

1) Only device, not accessory or enclosed accessory

You can enter the versions for the specific feature in the following table. The versions entered make up the complete order code.

	10	20	30	40	50	70	80	90	100	110	170	180	190	500	550	570	580	600	610	620	850	895
FMB52 -																						

**FMB53**

This overview does not mark options which are mutually exclusive.

<b>10</b>	<b>Approval:</b>	
	AA	For non-hazardous areas
	BD	ATEX II 3G Ex nA IIC T6
	BE	ATEX II 2G Ex ia IIC T6
	BG	ATEX II 3G Ex ic IIC T6
	IC	IEC Ex ia IIC T6 Gb
	IE	IEC Ex ic IIC T6 Gc
	NA	NEPSI Ex ia IIC T6
	TA	TIIS Ex ia IIC T4
	CA	CSA C/US IS Cl. I, II, III Div.1 Gr. A-G, CSA C/US IS Cl. I Div. 2 Gr. A-D, Ex ia, Zone 0,1,2,20,21,22
	CD	CSA General Purpose
	FE	FM IS CL.I Div.1 Gr.A-D, AEx ia, Zone 0,1,2
	8C	ATEX II Ex ia + FM/CSA IS ATEX II 2G Ex ia IIC T6 + FM/CSA IS CL.I Div. 1 Gr.A-D, FM/CSA: Zone 1,2
	99	Special version
<b>20</b>	<b>Output:</b>	
	2	4-20mA HART
	3	PROFIBUS PA
	4	FOUNDATION Fieldbus
	9	Special version
<b>30</b>	<b>Display, operation:</b>	
	1	LCD, push buttons on display/electronics
	2	W/o LCD, push buttons on electronics
	9	Special version
<b>40</b>	<b>Housing:</b>	
	I	F31 aluminum
	J	F31 aluminum, glass window
	Q	F15 stainless steel
	R	F15 stainless steel, glass window
	S	F15 stainless steel, plastic window
	Y	Special version
<b>50</b>	<b>Electrical connection:</b>	
	A	Gland M20, IP66/68 NEMA4X/6P
	C	Thread G1/2, IP66/68 NEMA4X/6P
	D	Thread NPT1/2, IP66/68 NEMA4X/6P
	I	Connector M12, IP66/67, NEMA4X/6P
	M	Connector 7/8", IP66/68, NEMA4X/6P
	P	Connector Han7D, 90deg, IP65
	V	Valve connector ISO4400 M16, IP64
	Y	Special version
<b>70</b>	<b>Sensor range:</b>	
	1C	100mbar/10kPa/1.5psi relative, 1mH2O/3ftH2O/40inH2O
	1F	400mbar/40kPa/6psi relative, 4mH2O/13ftH2O/160inH2O
	1H	1.2bar/120kPa/18psi relative, 12mH2O/40ftH2O/480inH2O
	1M	4bar/400kPa/60psi relative, 40mH2O/133ftH2O/1600inH2O
	1P	10bar/1MPa/150psi relative, 100mH2O/333ftH2O/4000inH2O
	99	Special version
<b>80</b>	<b>Reference accuracy:</b>	
	D	Platinum
	G	Standard
	Y	Special version
<b>90</b>	<b>Calibration; Unit:</b>	
	A	Sensor range; %
	B	Sensor range; mbar/bar
	C	Sensor range; kPa/MPa
	D	Sensor range; mm/mH2O
	E	Sensor range; inH2O/ftH2O
	F	Sensor range; psi
	J	Customized pressure; see additional spec.
	K	Customized level; see additional spec.
	Y	Special version

## FMB53 (continued)

100	Probe connection:		
	15	..... m cable, can be shortened, PE	0,5...400 m
	25	..... ft cable, can be shortened, PE	0,5...400 m
	35	..... m cable, can be shortened, FEP	2...1312 inch
	45	..... ft cable, can be shortened, FEP	2...1312 inch
	99	Special version	
170	Material of the process isolating diaphragm :		
		Coating	Process isolating diaphragm
	B	-	Alloy C276 (2.4819)
	L	Gold>Rhodium (→ 26)	Alloy C276 (2.4819)
	N	Gold>Platin (→ 26)	Alloy C276 (2.4819)
	Y	Special version	
180	Fill fluid:		
	2	Inert oil	
	3	Synthetic oil, FDA	
	9	Special version	
190	Seal:		
	A	FKM Viton	
	J	EPDM	
	L	Kalrez 6375	
	U	None, welded cell	
	Y	Special version	



## FMB53 (continued)

## Additional ordering information (optional)

<b>500</b>	<b>Additional Operating language:</b>	
	AA	English
	AB	German
	AC	French
	AD	Spanish
	AE	Italian
	AF	Dutch
	AK	Chinese
	AL	Japanese
<b>550</b>	<b>Calibration:</b>	
	F1	Factory calibration certificate, 5-point
<b>570</b>	<b>Service:</b>	
	HA	Oil and grease removed <sup>1)</sup>
	HC	Cleaned from PWIS (PWIS = paint wetting impairment substances) <sup>1)</sup>
	IA	Configured min alarm current
	IB	Configured HART Burst Mode PV
	I9	Special version
<b>580</b>	<b>Test, certificate:</b>	
	JA	EN10204-3.1 wetted material, inspection certificate
	JB	NACE MR0175 wetted
	KD	EN10204-3.1 helium leak test, inspection certificate
	KE	EN10204-3.1 pressure test, inspection certificate
	KG	EN10204-3.1 PMI test* (PMI = positive material identification), inspection certificate
		* Meter body and process isolating diaphragm not included.
	K9	Special version
<b>590</b>	<b>Other approvals:</b>	
	LA	SIL
	LQ	KTW potable water approval
	LR	NSF potable water approval
<b>610</b>	<b>Accessory mounted:</b>	
	NA	Overvoltage protection
<b>620</b>	<b>Accessory enclosed:</b>	
	PO	Suspension clamp, 316L
	PW	Extension cable shortening kit
	RL	Plug-in jack M12
	RM	Plug-in jack M12, 90deg
	RN	Plug-in jack M12, 90deg+5m cable
<b>850</b>	<b>Firmware version:</b>	
	78	01.00.zz, HART, DevRev01
<b>895</b>	<b>Identification:</b>	
	Z1	Measuring point (TAG)
	Z2	Bus address

1) Only device, not accessory or enclosed accessory

You can enter the versions for the specific feature in the following table. The versions entered make up the complete order code.

	10	20	30	40	50	70	80	90	100	170	180	190	500	550	570	580	610	620	850	895
FMB53 -																				

## Documentation

### Technical Information

- EMC test procedures: TI00241F/00/EN
- Deltabar M: TI00434P/00/EN
- Cerabar M: TI00436P/00/EN

### Operating Instructions

- 4...20 mA HART: BA00382P/00/EN
- PROFIBUS PA: BA00383P/00/EN
- FOUNDATION Fieldbus: BA00384P/00/EN

### Brief Operating Instructions

- 4...20 mA HART: KA01033P/00/EN
- PROFIBUS PA: KA01034P/00/EN
- FOUNDATION Fieldbus: KA01035P/00/EN

**Functional safety manual (SIL)** Deltapilot M (4 to 20 mA): SD00347P/00/EN

### Safety Instructions

Authorities	Version in the order code	Approval	Category	Type	Electronics	Documentation
ATEX	BA	Ex ia IIC	II 1/2 G	FMB50, FMB51, FMB52	– 4 to 20 mA HART	– XA00474P/00
	BB	Ex t IIC	II 1/2 D	FMB50, FMB51	– 4 to 20 mA HART	– XA00475P/00
	BD	Ex nA	II 3 G	FMB50, FMB51, FMB52, FMB53	– 4 to 20 mA HART – PROFIBUS PA – FOUNDATION Fieldbus	– XA00477P/00
	BE	Ex ia IIC	II 2 G	FMB50, FMB51, FMB52, FMB53	– 4 to 20 mA HART	– XA00474P/00
	BG	Ex ic IIC	II 3 G	FMB50, FMB51, FMB52, FMB53	– 4 to 20 mA HART	– XA00494P/00
	B1	Ex ia IIC Ex ia IIC	II 1/2 G II 1/2 D	FMB50, FMB51	– 4 to 20 mA HART	– XA00476P/00

Authorities	Version in the order code	Approval	EPL	Type	Electronics	Documentation
IECEx	IA	Ex ia IIC	Ga/Gb	FMB50, FMB51, FMB52	– 4 to 20 mA HART	– XA00478P/00
	IC	Ex ia IIC	Gb	FMB52, FMB53	– 4 to 20 mA HART	– XA00478P/00
	ID	Ex t IIIC	Da/Db	FMB50, FMB51	– 4 to 20 mA HART	– XA00479P/00
	IE	Ex ic IIC	Gc	FMB50, FMB51, FMB52, FMB53	– 4 to 20 mA HART	– XA00493P/00
	I1	Ex ia IIC Ex ia IIIC	Ga/Gb Da/Db	FMB50, FMB51	– 4 to 20 mA HART	– XA00480P/00

Authorities	Version in the order code	Approval	Electronics	Documentation
NEPSI	NA	Ex ia IIC	– 4...20 mA HART	– XA534P/00

## Installation/Control Drawings

Authorities	Version in the order code	Approval	Type	Electronics	Documentation
FM	FA	FM IS Cl.I,II,III Div.1 Gr.A-G, AEx ia, FM NI Cl.I Div.2 Gr.A-D, FM IS: Zone 0,1,2,20,21,22/FM NI: Zone 2	FMB50	– 4...20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– ZD00236P/00 – XA00566P/00
		FM IS Cl.I,II,III Div.1 Gr.A-G, AEx ia, Zone 0,1,2,20,21,22	FMB51	– 4...20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– – XA00566P/00
	FC	FM DIP Cl.II,III Div.1 Gr.E-G, Zone 21,22	FMB50, FMB51	– 4...20 mA HART	–
CSA	CA	C/US IS Cl.I,II,III Div.1 Gr.A-G, C/US IS Cl.I Div.2 Gr.A-D, Ex ia, Zone 0,1,2	FMB50, FMB53	– 4...20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– ZD00239P/00 – XA00560P/00
		C/US IS Cl.I,II,III Div.1 Gr.A-G, C/US IS Cl.I Div.2 Gr.A-D, Ex ia C: Zone 0,1,2/ US: Zone 0,1,2,20,21,22	FMB51, FMB52	– 4...20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– – XA00560P/00
	CC	CSA C/US Cl.II, III Div.1 Gr.E-G	FMB50	– 4...20 mA HART	–
		CSA C/US Cl.II, III Div.1 Gr.E-G US: Zone 21,22	FMB51	– 4...20 mA HART	–

## Overfill protection

■ WHG (FMB50, FMB51, FMB52): ZE00275P/00/DE

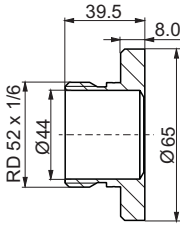
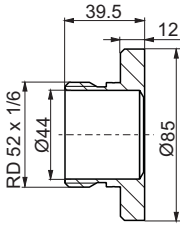
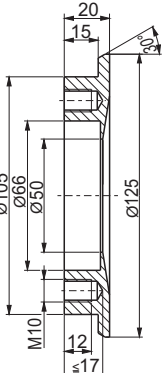
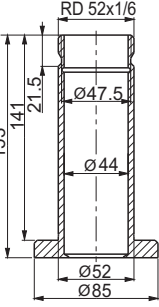
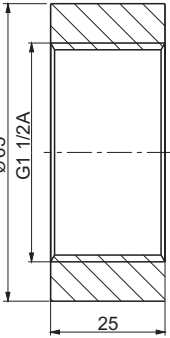
## Accessories

**Suspension clamp (FMB53 only)** → 23 ff

**Extension cable shortening kit (FMB53 only)** → 53 ff, feature 620, "Accessory enclosed", version "PW" or can be ordered as a separate accessory (part no. 71125862). For details refer to SD00553P/00/A2.

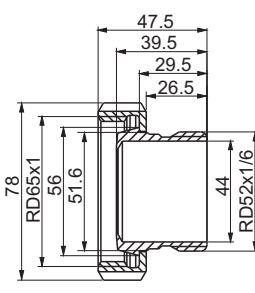
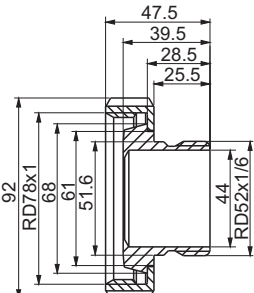
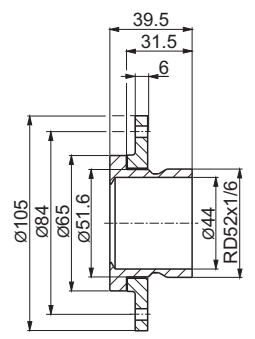
**M12 connector** → 19 ff

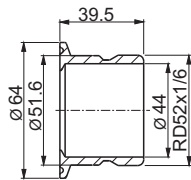
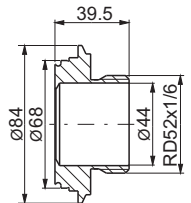
### Welding necks and Weld-in tool flanges

					
	P01-PMx5xxxx-06-xx-xx-xx-008	P01-PMx5xxxx-06-xx-xx-xx-009	P01-PMx5xxxx-06-xx-xx-xx-010	P01-PMx5xxxx-11-xx-xx-xx-011	P01-PMx5xxxx-06-xx-xx-xx-005
<b>Typ</b>	<b>Uni D65</b>	<b>Uni D85</b>	<b>DRD DN50</b>	<b>Uni extens. 6" D85</b>	<b>G1-1/2, flush mounted</b>
<b>Material</b>	316L				
<b>DIN/EN material number</b>	1.4435				
<b>Order</b>	→ 53 ff, feature 620, "Accessory enclosed", versions see following table rows				
FMB50	QT (214880-0002) QU (52010174)	Q2 (52006262) Q3 (52010173)	QP (52002041) QR (52011899)	Q5 (71114160) Q6 (71114171)	QJ (52024469) QK (52024470)
FMB51	—	—	—	—	QJ (52024469) QK (52024470)
FMB52	—	—	—	—	QJ (52024469) QK (52024470)
<b>Weld-in tool adapters</b>					
<b>Material</b>	brass				
FMB50	QI (71114210)	QI (71114210)	QS (71114209)	Q7 (71114211)	QL (52024471)
FMB51	—	—	—	—	QL (52024471)
FMB52	—	—	—	—	QL (52024471)

**Adapter Uni**

The following adapters can be used to create a connection between the customer's process connection and the Deltapilot M with a universal adapter:

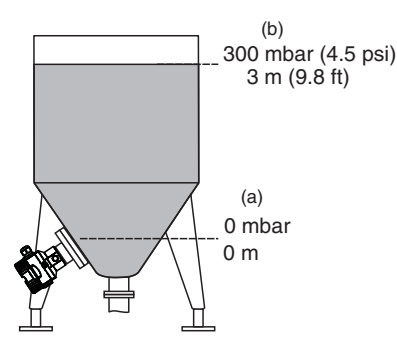
			
	P01-PMx5xxxx-06-xx-xx-xx-012	P01-PMx5xxxx-06-xx-xx-xx-013	P01-PMx5xxxx-06-xx-xx-xx-014
<b>Typ</b>	<b>DIN11851 DN40</b>	<b>DIN11851 DN50</b>	<b>DRD DN50</b>
<b>Material</b>	316L (1.4435)		
<b>Order</b>	→ 53 ff, feature 620, "Accessory enclosed", versions see following table row		
<b>FMB50</b>	RA (71114172) R1 (71114178)	RB (71114173) R2 (71114205)	RC (71114174) R3 (71114206)

		
	P01-PMx5xxxx-06-xx-xx-xx-015	P01-PMx5xxxx-06-xx-xx-xx-017
<b>Typ</b>	<b>Clamp 2"</b>	<b>Varivent</b>
<b>Material</b>	316L (1.4435)	
<b>Order</b>	→ 53 ff, feature 620, "Accessory enclosed", versions see following table row	
<b>FMB50</b>	RD (71114176) R4 (71114207)	RF (71114177) R6 (71114208)

## Configuration data sheet

### Level

The following configuration data sheet has to be filled in and included with the order if the version "K - Customized level" has been selected in feature 90 "Calibration; unit" in the product structure.

Pressure Engineering Unit		Output Unit (Scaled unit)														
<div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/> mbar</div> <div style="width: 50%;"><input type="checkbox"/> mmH<sub>2</sub>O</div> <div style="width: 50%;"><input type="checkbox"/> mmHg</div> <div style="width: 50%;"><input type="checkbox"/> Pas</div> <div style="width: 50%;"><input type="checkbox"/> bar</div> <div style="width: 50%;"><input type="checkbox"/> mH<sub>2</sub>O</div> <div style="width: 50%;"><input type="checkbox"/> kPa</div> <div style="width: 50%;"><input type="checkbox"/> MPa</div> <div style="width: 50%;"><input type="checkbox"/> psi</div> <div style="width: 50%;"><input type="checkbox"/> ftH<sub>2</sub>O</div> <div style="width: 50%;"><input type="checkbox"/> kgf/cm<sup>2</sup></div> <div style="width: 50%;"><input type="checkbox"/> inH<sub>2</sub>O</div> </div>		<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; padding: 5px;">Mass</th> <th style="text-align: left; padding: 5px;">Length</th> <th style="text-align: left; padding: 5px;">Volume</th> <th style="text-align: left; padding: 5px;">Volume</th> <th style="text-align: left; padding: 5px;">Percent</th> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> <input type="checkbox"/> kg  <input type="checkbox"/> t  <input type="checkbox"/> lb </td> <td style="vertical-align: top; padding: 5px;"> <input type="checkbox"/> m  <input type="checkbox"/> dm  <input type="checkbox"/> cm  <input type="checkbox"/> mm    <input type="checkbox"/> ft  <input type="checkbox"/> inch </td> <td style="vertical-align: top; padding: 5px;"> <input type="checkbox"/> l  <input type="checkbox"/> hl    <input type="checkbox"/> m<sup>3</sup>  <input type="checkbox"/> ft<sup>3</sup>  <input type="checkbox"/> in<sup>3</sup> </td> <td style="vertical-align: top; padding: 5px;"> <input type="checkbox"/> gal  <input type="checkbox"/> lgal </td> <td style="vertical-align: top; padding: 5px;"> <input type="checkbox"/> % </td> </tr> </table>					Mass	Length	Volume	Volume	Percent	<input type="checkbox"/> kg <input type="checkbox"/> t <input type="checkbox"/> lb	<input type="checkbox"/> m <input type="checkbox"/> dm <input type="checkbox"/> cm <input type="checkbox"/> mm  <input type="checkbox"/> ft <input type="checkbox"/> inch	<input type="checkbox"/> l <input type="checkbox"/> hl  <input type="checkbox"/> m <sup>3</sup> <input type="checkbox"/> ft <sup>3</sup> <input type="checkbox"/> in <sup>3</sup>	<input type="checkbox"/> gal <input type="checkbox"/> lgal	<input type="checkbox"/> %
Mass	Length	Volume	Volume	Percent												
<input type="checkbox"/> kg <input type="checkbox"/> t <input type="checkbox"/> lb	<input type="checkbox"/> m <input type="checkbox"/> dm <input type="checkbox"/> cm <input type="checkbox"/> mm  <input type="checkbox"/> ft <input type="checkbox"/> inch	<input type="checkbox"/> l <input type="checkbox"/> hl  <input type="checkbox"/> m <sup>3</sup> <input type="checkbox"/> ft <sup>3</sup> <input type="checkbox"/> in <sup>3</sup>	<input type="checkbox"/> gal <input type="checkbox"/> lgal	<input type="checkbox"/> %												
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> <p>Empty pressure [a]: Low pressure value (empty) _____ [pres. eng. unit]</p> <p>Full pressure [b]: High pressure value (full) _____ [pres. eng. unit]</p> </div> <div style="width: 45%;"> <p>Empty calibration [a]: Low level value (empty) _____ [Scaled Unit]</p> <p>Full calibration [b]: High level value (full) _____ [Scaled Unit]</p> </div> <div style="width: 10%; text-align: center;"> <p><b>Example</b></p>  </div> </div>																
Display Information																
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>1st Value Display <sup>1)</sup></p> <p><input type="checkbox"/> Main Value</p> </div> <div style="width: 45%;"> <p>2nd Value Display <sup>1)</sup></p> <p><input type="checkbox"/> none (Default)</p> <p><input type="checkbox"/> Main Value [%]</p> <p><input type="checkbox"/> Pressure</p> <p><input type="checkbox"/> Current [mA] (HART only)</p> <p><input type="checkbox"/> Temperature</p> </div> </div> <p><sup>1)</sup> Depending on sensor and communication variant</p>																
Damping																
<p>Damping: _____ sec (Default 2 sec)</p>																

**Pressure**

The following configuration data sheet has to be filled in and included with the order if the version "J - Customized pressure" has been selected in feature 90 "Calibration; unit" in the product structure.

Pressure Engineering Unit	
<input type="checkbox"/> mbar	<input type="checkbox"/> mmH <sub>2</sub> O
<input type="checkbox"/> bar	<input type="checkbox"/> mmHg
<input type="checkbox"/> psi	<input type="checkbox"/> Pa
<input type="checkbox"/> ftH <sub>2</sub> O	<input type="checkbox"/> kgf/cm <sup>2</sup>
<input type="checkbox"/> inH <sub>2</sub> O	<input type="checkbox"/> kPa
	<input type="checkbox"/> MPa

Calibration Range / Output	
Low range value (LRV):	_____ [pressure engineering unit]
Upper range value (URV):	_____ [pressure engineering unit]

Display Information	
1st Value Display <sup>1)</sup>	2nd Value Display <sup>1)</sup>
<input type="checkbox"/> Main Value	<input type="checkbox"/> none (Default)
	<input type="checkbox"/> Main Value [%]
	<input type="checkbox"/> Pressure
	<input type="checkbox"/> Current [mA] (HART only)
	<input type="checkbox"/> Temperature

<sup>1)</sup> Depending on sensor and communication variant

Damping	
Damping:	_____ sec (Default 2 sec)

Note!  
Smallest span (factory calibration) → 10.

#### Instruments International

Endress+Hauser  
Instruments International AG  
Kaegenstrasse 2  
4153 Reinach  
Switzerland

Tel.+41 61 715 81 00  
Fax+41 61 715 25 00  
[www.endress.com](http://www.endress.com)  
[info@ii.endress.com](mailto:info@ii.endress.com)

**Endress+Hauser**   
People for Process Automation