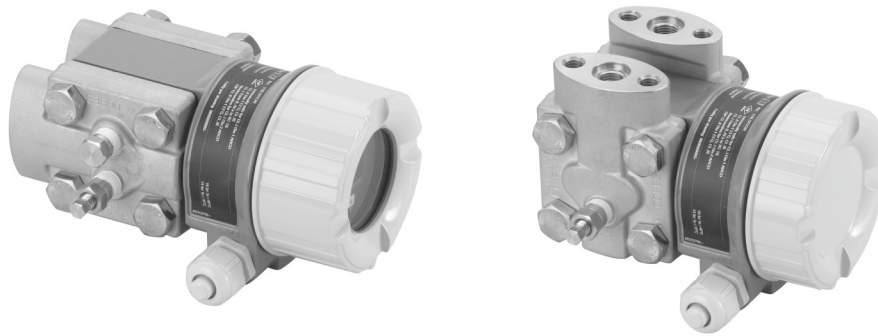


Technical Information

Deltabar M PMD55

Differential pressure measurement



Differential pressure transmitter with metal sensor; communication via HART, PROFIBUS PA or FOUNDATION Fieldbus

Application

The Deltabar M differential pressure transmitter is used for the following measuring tasks:

- Flow measurement (volume or mass flow) in conjunction with primary elements in gases, vapours and liquids
- Level, volume or mass measurement in liquids
- Differential pressure monitoring, e.g. of filters and pumps

Your benefits

- Reference accuracy: 0.1%
as PLATINUM version: up to 0.075%
- Turn down up to 100:1
- Compact transmitter design
- Quick commissioning via DIP switches
- Easy and safe menu-guided operation
 - onsite via display module
 - via 4 to 20 mA with HART
 - via PROFIBUS PA
 - via FOUNDATION Fieldbus
- Continuous modularity for differential pressure, hydrostatic and pressure (Deltabar M, Deltapilot M Cerabar M), e.g.
 - replaceable display
 - universal electronics
- International usage thanks to a wide range of approvals
- 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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Document information

Document conventions






Safety symbols

Symbol	Meaning
 <small>A0011189-EN</small>	DANGER! This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
 <small>A0011190-EN</small>	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
 <small>A0011191-EN</small>	CAUTION! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or moderate injury.
 <small>A0011192-EN</small>	NOTE! This symbol contains information on procedures and other facts, which do not result in personal injury.









Electrical symbols

Symbol	Meaning
 <small>A0018335</small>	Direct current A terminal at which DC voltage is present or through which direct current flows.
 <small>A0018336</small>	Alternating current A terminal at which AC voltage is present or through which alternating current flows.
 <small>A0018337</small>	Direct current and alternating current <ul style="list-style-type: none"> ▪ A terminal at which AC voltage or DC voltage is present. ▪ A terminal through which alternating current or direct current flows.
 <small>A0018338</small>	Ground connection A grounded terminal which, from the operator's point of view, is grounded via a grounding system.
 <small>A0018339</small>	Protective ground connection A terminal that must be connected to ground before other connections may be established.
 <small>A0011201</small>	Equipotential connection A connection that must be made with the plant grounding system; depending on national or company codes of practice, this may be a potential matching line or a star-shaped grounding system, for example.



Tool symbols

Symbol	Meaning
 <small>A0011219</small>	Phillips head screwdriver
 <small>A0011220</small>	Flat blade screwdriver
 <small>A0013442</small>	Torx screwdriver
 <small>A0011222</small>	Hexagon wrench
 <small>A0011221</small>	Allen key

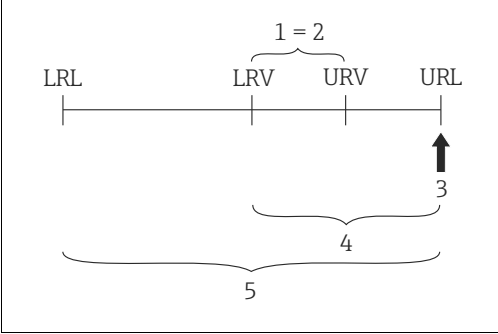
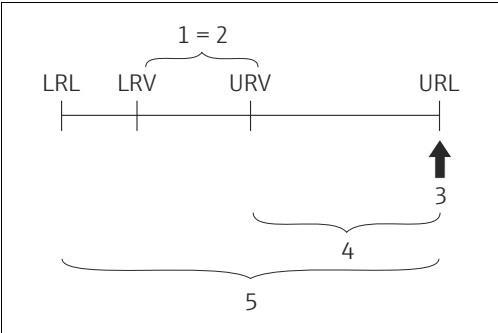
Symbols for types of information

Symbol	Meaning
 A0011182	Allowed Indicates procedures, processes or actions that are allowed.
 A0011183	Preferred Indicates procedures, processes or actions that are preferred.
 A0011184	Forbidden Indicates procedures, processes or actions that are forbidden.
 A0011193	Tip Indicates additional information.
 A0015483	Reference to documentation Refers to the relevant device documentation.
 A0015484	Reference to page Refers to the relevant page number.
 A0015486	Reference to graphics Refers to the relevant graphic number and page number.
1. , 2. , ...	Series of steps
 A0015488	Help in the event of a problem

Symbols in graphics

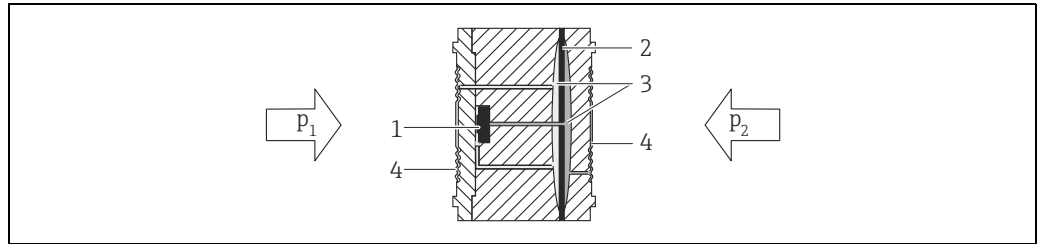
Symbol	Meaning
1, 2, 3, 4, ...	Numbering for main positions
1. , 2. , ...	Series of steps
A, B, C, D, ...	Views
A-A, B-B, ...	Sections
 A0011187	Hazardous area Indicates a hazardous area.
 A0011188	Safe area (non-hazardous area) Indicates a non-hazardous area.

Terms and abbreviations

Term/abbreviation	Explanation
MWP	The MWP (maximum working pressure) for the individual sensors depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection must be taken into account in addition to the measuring cell. Also observe the pressure-temperature dependency. For the relevant standards and additional information, see the "→ 31" section.
OPL	The OPL (over pressure limit) for the sensor depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection must be taken into account in addition to the measuring cell. Also observe the pressure-temperature dependency. For the relevant standards and additional information, see the "→ 31" section.
LRL	Lower range limit
URL	Upper range limit
LRV	Lower range value
URV	Upper range value
TD	Turn Down (TD)
<p><i>Case 1:</i></p> <ul style="list-style-type: none"> ▪ $\text{Lower range value} \leq \text{Upper range value}$ <p><i>Example:</i></p> <ul style="list-style-type: none"> ▪ Lower range value (LRV) = 0 mbar ▪ Upper range value (URV) = 100 mbar (1.5 psi) ▪ Nominal value (URL) = 500 mbar (7.5 psi) <p><i>Turn down:</i></p> <ul style="list-style-type: none"> ▪ $\text{TD} = \text{URL} / \text{URV} = 5:1$ <p><i>set span:</i></p> <ul style="list-style-type: none"> ▪ $\text{URV} - \text{LRV} = 100 \text{ mbar (1.5 psi)}$ This span is based on the zero point. 	 <p style="text-align: right; font-size: small;">A0019783</p> <p><i>Example: 500 mbar (7.5 psi) sensor</i></p>
<p><i>Case 2:</i></p> <ul style="list-style-type: none"> ▪ $\text{Lower range value} \geq \text{Upper range value}$ <p><i>Example:</i></p> <ul style="list-style-type: none"> ▪ Lower range value (LRV) = -300 mbar (-4.5 psi) ▪ Upper range value (URV) = 0 bar ▪ Nominal value (URL) = 500 mbar (7.5 psi) <p><i>Turn down:</i></p> <ul style="list-style-type: none"> ▪ $\text{TD} = \text{URL} / (\text{LRV}) = 1.67:1$ <p><i>set span:</i></p> <ul style="list-style-type: none"> ▪ $\text{URV} - \text{LRV} = 300 \text{ mbar (4.5 psi)}$ This span is based on the zero point. 	 <p style="text-align: right; font-size: small;">A0016451</p> <p><i>Example: 500 mbar (7.5 psi) sensor</i></p>
	<p>1 Set span 2 Zero based span 3 Nominal value ≙ upper range limit (URL) 4 Nominal measuring range 5 Sensor measuring range</p>

Function and system design

Measuring principle



A0023081

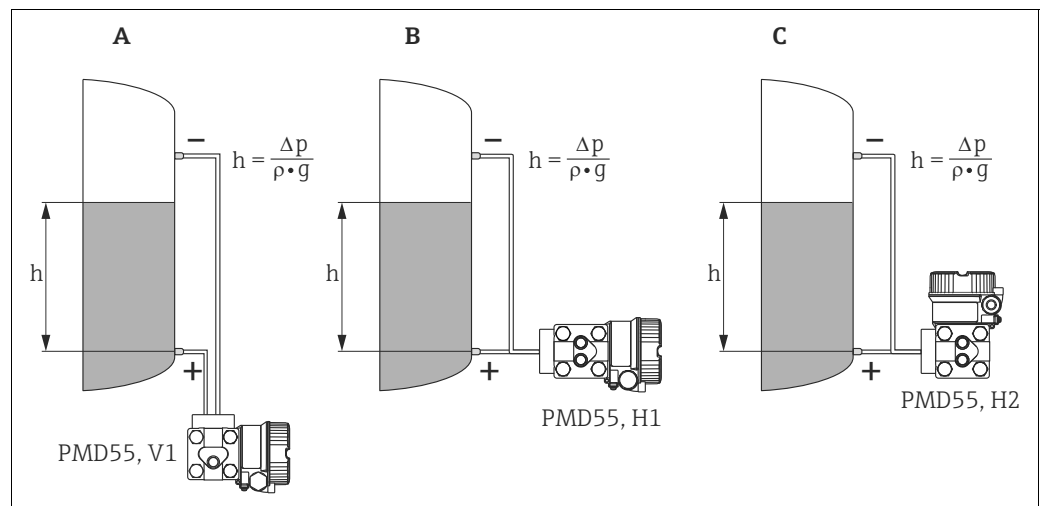
Measuring cell of the Deltabar M

- 1 Sensing element
- 2 Overload diaphragm/Middle diaphragm
- 3 Filling oil
- 4 Process isolating diaphragm

The metal separating diaphragms (4) are deflected on both sides by the acting pressures p_1 and p_2 . A filling oil (3) transfers the pressure to a resistance circuit bridge (semiconductor technology). The differential-pressure-dependent change of the bridge output voltage is measured and further processed.

Level measurement (level, volume and mass)

Design and operation mode



A0023082

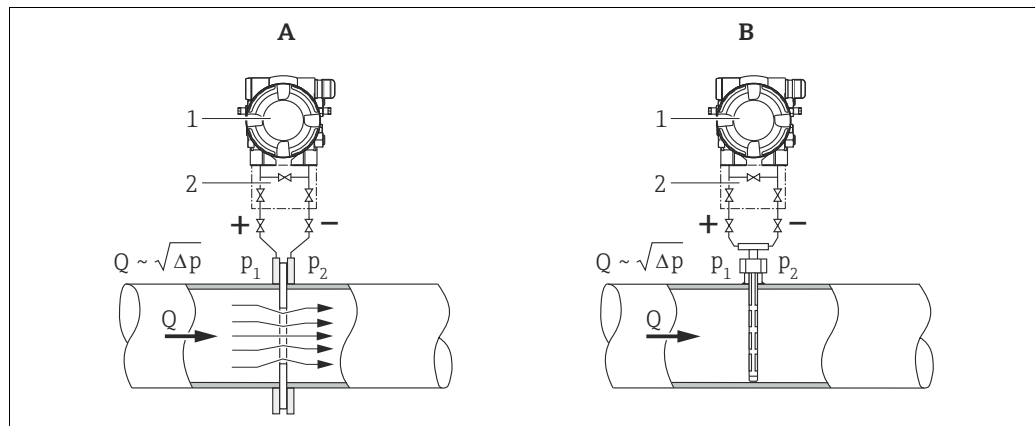
Level measurement with Deltabar M

- A Version V1; vertical impulse line; 90° alignment
- B Version H1; horizontal impulse line; 180° alignment
- C Version H2; horizontal impulse line; 90° alignment

- h Height (level)
- Δp Differential pressure
- ρ Density of the medium
- g Gravitation constant

Your benefits

- Volume and mass measurements in any tank shapes by means of a freely programmable characteristic curve
- Choice of diverse level units
- Has a wide range of uses, e.g.
 - for level measurement in tanks with superimposed pressure
 - in the event of foam formation
 - in tanks with agitators or screen fittings
 - in the event of liquid gases
 - for standard level measurement



A0023086

Flow measurement with Deltabar M PMD55 and Deltatop primary element

A	with orifice plate
B	with Pitot tube
1	Deltabar M PMD55
2	3-valve manifold
Q	Flow
Δp	Differential pressure, $\Delta p = p_1 - p_2$

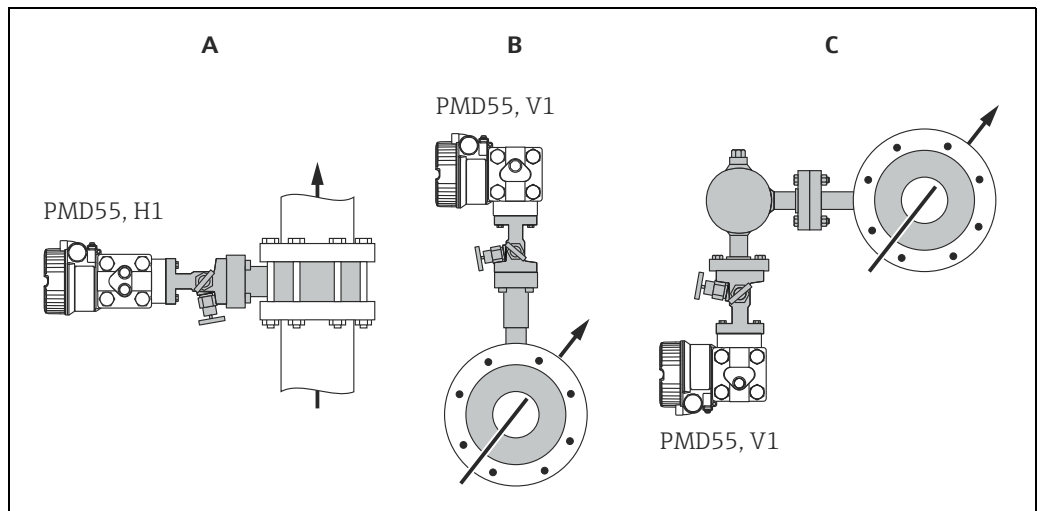
Your benefits

- Choice between five flow modes of operation:
 - Volume flow
 - Norm volume flow (European norm conditions)
 - Standard volume flow (American standard conditions)
 - Mass flow
 - %
- Choice of diverse flow units with automatic unit conversion.
- Low flow cut off: when activated, this function suppresses small flows which can lead to large fluctuations in the measured value.
- Contains two totalizers as standard. One totalizer can be reset to zero.
- The totalizing unit can be individually set for each totalizer. This allows independent daily and annual quantity totalizing.



For more information about the Deltatop flow measurement system, see
 TI00422P: Deltatop Differential Pressure Flow Measurement with Orifices
 TI00425P: Deltatop Differential Pressure Flow Measurement with Pitot Tubes

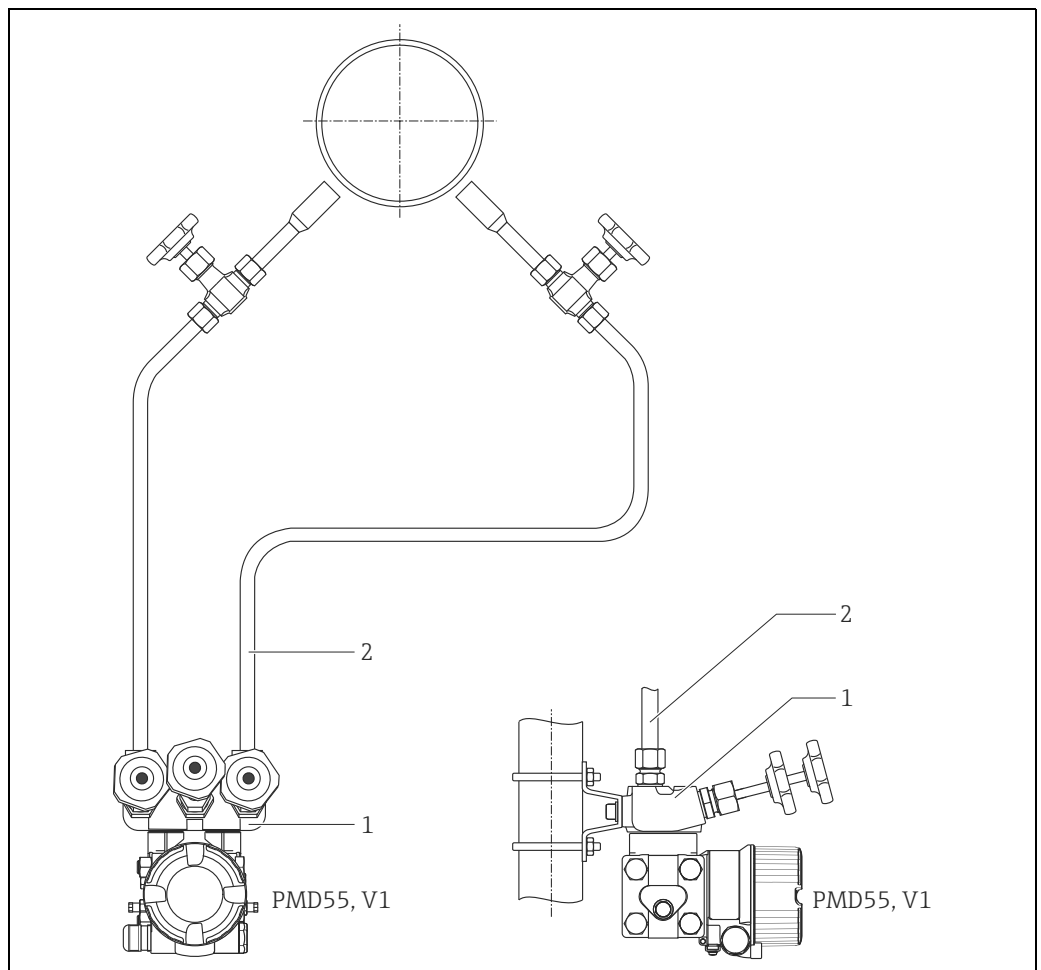
Typical arrangements for flow measurements



A0023088

- A Liquid in vertical pipe; H1 version; horizontal impulse line; 180° alignment
- B Gas in horizontal pipe; V1 version; vertical impulse line; 90° alignment
- C Vapour in horizontal pipe; V1 version; vertical impulse line; 90° alignment

Mounting example



A0023089

- 1 Valve manifold
- 2 Impulse line

Communication and data processing

- 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 Deltabar M for Ex ia, CSA IS and FM IS applications
 - up to 31 Deltabar 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 Deltabar M for Ex ia, CSA IS and FM IS applications
 - up to 22 Deltabar 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 Differential pressure, from which flow (volume or mass current) and level (level, volume or mass) are derived.

Measuring range

Nominal value [mbar (psi)]	Measurement limit		Smallest span (factory calibration) ¹⁾ [mbar (psi)]	MWP [bar (psi)]	OPL		Min. operating pressure ²⁾ [mbar _{abs} (psi _{abs})]	Version ³⁾
	lower (LRL) [mbar (psi)]	upper (URL) [mbar (psi)]			on one side [bar (psi)]	on both sides [bar (psi)]		
10 (0.15)	-10 (- 0.15)	+10 (+ 0.15)	0.5 (0.0075)	1 (15) ⁴⁾	1 (15) ⁴⁾	1.5 (22.5) ⁴⁾	0.1 (0.0015) ⁴⁾	7B
30 (0.45)	-30 (- 0.45)	+30 (+ 0.45)	1.5 (0.0225)					7C
100 (1.5)	-100 (- 1.5)	+100 (+ 1.5)	5 (0.075)	70 (1050) ⁵⁾ 160 (2400) ⁶⁾	70 (1050) ⁵⁾ 160 (2400) ⁶⁾	105 (1575) ⁵⁾ 240 (3600) ⁶⁾	0.1 (0.0015) ⁵⁾ 0.1 (0.0015) ⁶⁾	7D
500 (7.5)	-500 (- 7.5)	+500 (+ 7.5)	25 (0.375)					7F
1000 (15)	-1000 (- 15)	+1000 (+ 15)	50 (0.75)					7G
3000 (45)	-3000 (- 45)	+3000 (+ 45)	150 (2.25)					7H
16000 (240)	-16000 (- 240)	+16000 (+ 240)	800 (12)					7L
40000 (600)	-40000 (- 600)	+40000 (+ 600)	2000 (30)					7M

- 1) Recommended Turn down: Max 100:1.
Factory calibration Turn down: Max 20:1
- 2) The minimum operating pressure indicated in the table applies to silicone oil under reference operating conditions. Minimum operating pressure at 85°C (185°F) for silicone oil: 10 mbar (0.15 psi) (abs)
- 3) Product Configurator, "Sensor Nominal Value" section
- 4) Version "2" in the Order Code - Feature 60
- 5) Version "6" in the Order Code - Feature 60
- 6) Version "7" in the Order Code - Feature 60

Nominal Pressure PN	Version ¹⁾
Prepared for Deltatop	D
1 bar / 100 kPa / 14.5 psi	2
70 bar / 7 MPa / 1015 psi	6
160 bar / 16 MPa / 2400 psi	7

- 1) Product Configurator "Nominal Pressure PN" section

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

Output	Version ¹⁾
4 to 20mA HART	2
PROFIBUS PA	3
FOUNDATION Fieldbus	4

1) Product Configurator "Output" section

Signal range – 4 to 20 mA HART

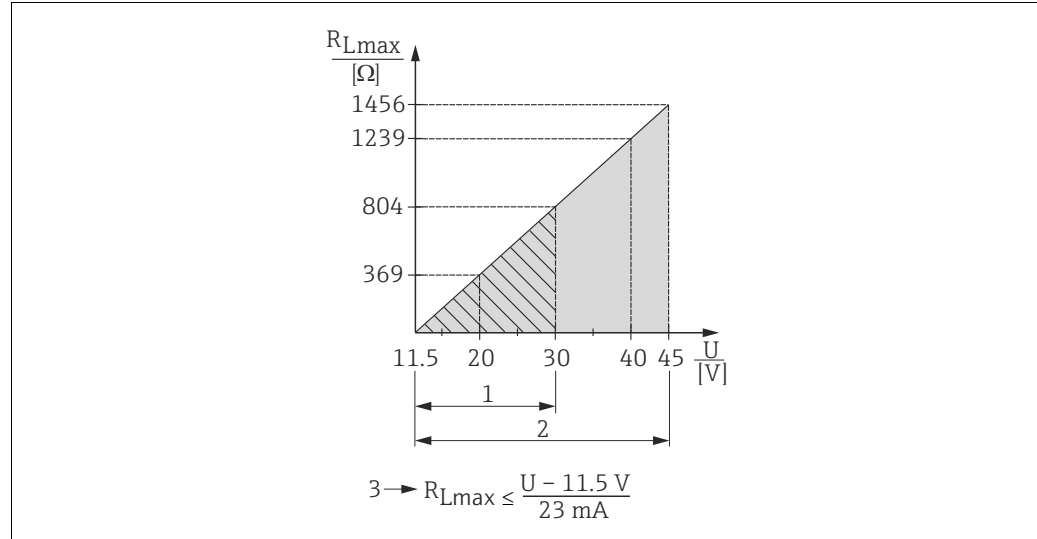
3.8 mA to 20.5 mA

Signal on alarm

As per NAMUR NE 43

- 4 to 20 mA HART
 - Options:
 - Max. alarm*: can be set from 21...23 mA (factory setting: 22 mA)
 - Keep measured value: last measured value is kept
 - 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



Load diagram

1 Supply voltage 11.5 ... 30 V DC for intrinsically safe instrument versions

2 Supply voltage 11.5 ... 45 V DC (versions with plug-in connector 35 V DC) for other types of protection and for uncertified instrument versions

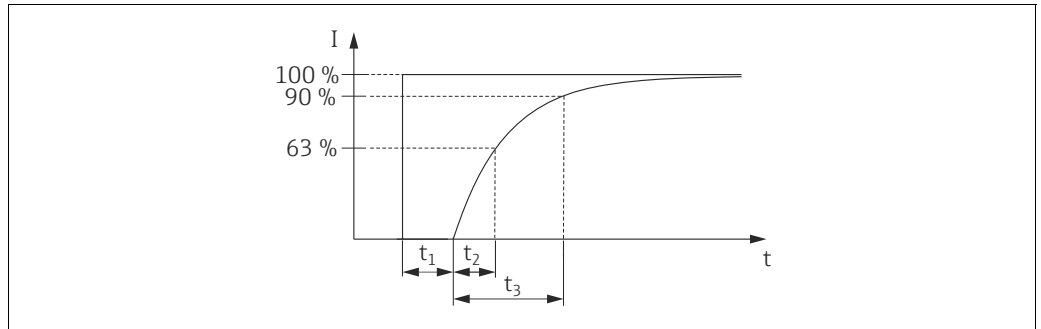
R_{Lmax} Maximum load resistance

U Supply voltage



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

Dead time, Time constant



Presentation of the dead time and the time constant

**Dynamic behavior:
current output**

	Dead time (t_1) [ms]	Time constant T63 (= t_2) [ms]	Time constant T90 (= t_3) [ms]
max.	60	90	210

**Dynamic behavior:
digital output
(HART electronics)**

	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.	220	310	370
max.	1020	1110	1170

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 Deltabar 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**

	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.	95	185	245
max.	1195	1285	1345

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**

	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.	105	195	255
max.	1105	1195	1255

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 onsite 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

Firmware version

Designation	Version ¹⁾
01.00.zz, HART, DevRev01	78

1) Product Configurator "Firmware version" section

Protocol-specific data

HART

Manufacturer ID	17 (11 hex)
Device Type Code	33 (21 hex)
Device Revision	01 (01 hex) - SW version 01.00.zz
HART specification	6
DD Revision	<ul style="list-style-type: none"> ■ 01 (netherlands) ■ 02 (russian)
Device description files (DTM, DD)	Information and files can be found: <ul style="list-style-type: none"> ■ www.endress.com ■ www.hartcomm.org
HART load	Min. 250 Ω
HART device variables	The measured values can be freely assigned to the device variables: <p>Measured values for PV (primary variable)</p> <ul style="list-style-type: none"> ■ Pressure ■ Flow ■ Level ■ Tank content <p>Measured values for SV, TV (second and third variable)</p> <ul style="list-style-type: none"> ■ Pressure ■ Level ■ Totalizer
Supported functions	<ul style="list-style-type: none"> ■ Burst mode ■ Additional Transmitter Status ■ Device Locking ■ Alternative operating modes

PROFIBUS PA

Manufacturer ID	17 (11 hex)
Ident number	1554 hex
Profile Version	3.02 SW Version 01.00.zz
GSD Revision	5
DD Revision	1
GSD File	Information and files can be found:
DD Files	<ul style="list-style-type: none"> ▪ www.endress.com ▪ www.profibus.org
Output values	<p>Measured values for PV (via Analog Input Function Block)</p> <ul style="list-style-type: none"> ▪ Pressure ▪ Flow ▪ Level ▪ Tank content <p>Measured values for SV</p> <ul style="list-style-type: none"> ▪ Pressure <p>Measured values for QV</p> <ul style="list-style-type: none"> ▪ Totalizer
Input values	Input value sent from PLC, can be shown on display
Supported functions	<ul style="list-style-type: none"> ▪ Identification & Maintenance <ul style="list-style-type: none"> Simple device identification via control system and nameplate ▪ Condensed status ▪ Automatic ident number adaptation and switchable to following ident numbers: <ul style="list-style-type: none"> - 9700: Profile-specific transmitter identification number with the "Classic" or "Condensed" status". - 1554: Identification number for Deltabar M. ▪ Device locking: The device can be locked by hardware or software.

Data of the FOUNDATION Fieldbus interface

Basic data

Device Type	0x1021
Device Revision	01 (hex)
DD Revision	0x01021
CFR Revision	0x000102
ITK Version	5.2.0
ITK Certification Driver No.	IT067600
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"> ■ Pressure or level (channel 1) ■ Process temperature (channel 2) ■ Measured pressure value (channel 3) ■ Max. pressure (channel 4) ■ Level before linearization (channel 5)
Dp Flow Block	enthält Durchfluss und Summenzähler Parameter	<ul style="list-style-type: none"> ■ Totalizer 1 (channel 6) ■ Totalizer 2 (channel 7)
Diagnostic Block	Contains diagnostic information	<ul style="list-style-type: none"> ■ 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 nonlinear function of the respective input. The nonlinear 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

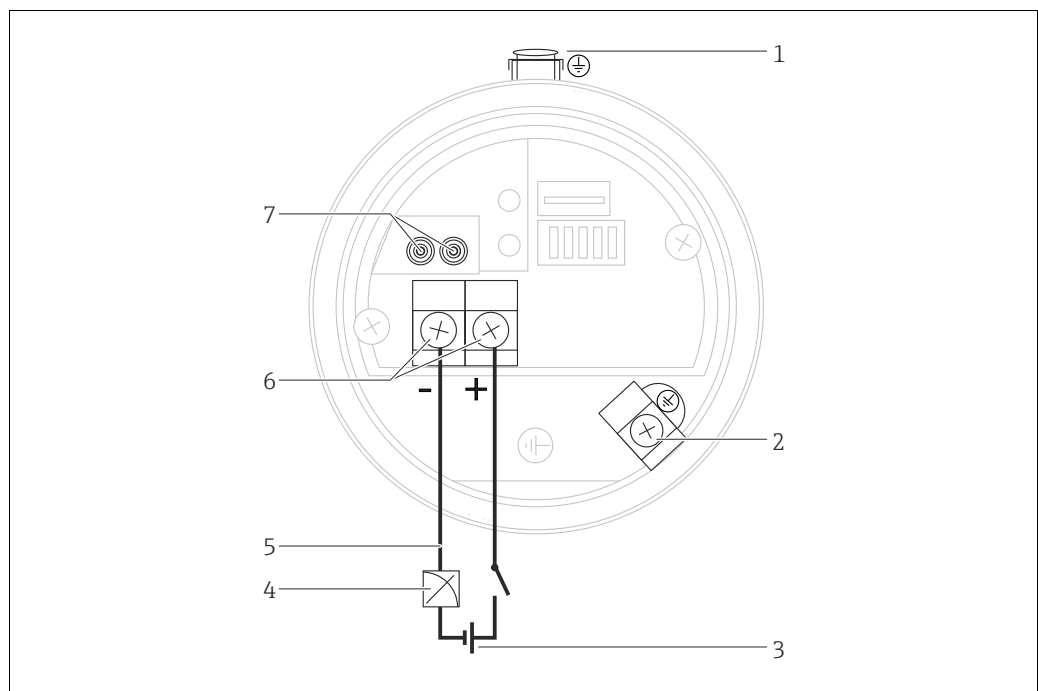
Power supply

⚠ WARNING

An incorrect connection compromises electrical safety!

- ▶ When using the measuring device in hazardous areas, the relevant national standards and regulations as well as the safety instructions or installation or control drawings must be observed. → 47, "Safety Instructions" and "Installation/Control Drawings" sections.
- ▶ 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 → 47, sections "Safety Instructions" and "Installation/Control drawing".
- ▶ 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.

Terminal assignment



Electrical connection

- 1 External grounding terminal
- 2 Internal grounding terminal
- 3 Supply voltage → 18
- 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 a 4 to 20 mA test signal"

Supply voltage

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)

Taking a 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

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

FOUNDATION Fieldbus

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

Current consumption

- PROFIBUS PA: 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

Electrical connection

Cable entry	Degree of protection	Version ¹⁾
M20 coupling	IP66/68 NEMA 4x/6P	A
M20 thread	IP66/68 NEMA 4X/6P	B
G ½" thread	IP66/68 NEMA 4X/6P	C
NPT ½" thread	IP66/68 NEMA 4X/6P	D
M12 connector	IP66/67 NEMA 4X/6P	I
7/8" connector	IP66/68 NEMA 4X/6P	M
HAN7D plug 90 degrees	IP65	P
M16 valve connector	IP64	V

1) Product Configurator "Electrical Connection" section

PROFIBUS PA

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 BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning" and the PNO Guideline.

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.

Terminals

For wire cross-sections of 0.5 to 2.5 mm² (20 to 14 AWG).

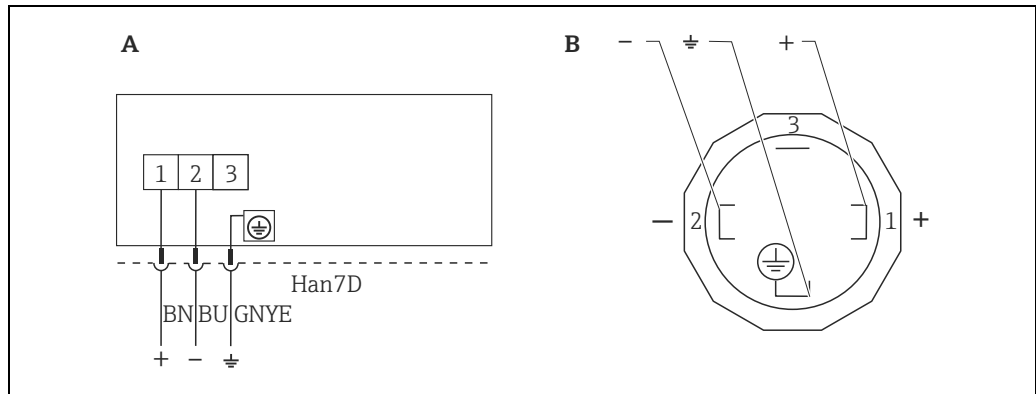
Cable entry

Approval	Type	Clamping area
Standard, II1/2G Exia, IS	Plastic M20x1.5	5 to 10 mm (0.2 to 0.39 in)
ATEX II1/2D, II1/2GD Exia, II3G Ex nA	Metal M20x1.5 (Ex e)	7 to 10.5 mm (0.28 to 0.41 in)

For additional technical data, see housing section →  32 ff".

Device plug connectors

Devices with valve connector

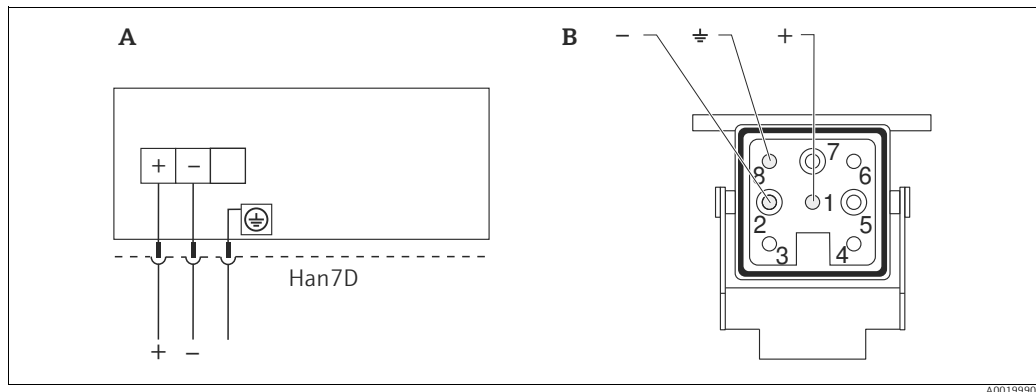


BN = brown, BU = blue, GNYE = green/yellow

- A Electrical connection for devices with valve connector
- B View of the plug connector at the device

Material: PA 6.6

Devices with Harting plug Han7D



- A Electrical connection for devices with Harting plug Han7D
- B View of the plug-in connector at the device

Material: CuZn, contacts for plug-in jack and connector are gold-plated

Devices with M12 plug

PIN assignment for M12 connector

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 connector:

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

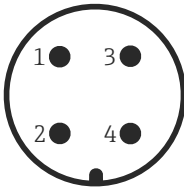
- Material: body PBT/PA; coupling nut GD-Zn, nickel-plated
- Degree of protection (fully locked): IP66/67
- Order number: 71114212

Cable 4x0.34 mm² (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 assignment for 7/8" connector	PIN	Meaning
	1	Signal -
	2	Signal +
	3	Not assigned
	4	Shield

External thread: 7/8 - 16 UNC

- Material: 316L (1.4401)
- Protection: IP66/68

Cable specification

HART

- Endress+Hauser recommends using a twisted, shielded two-wire cable.
- The outer diameter of the cable depends on the cable entry used.

PROFIBUS PA

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



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

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



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

Startup current HART

12 mA or 22 mA (selectable)

Residual ripple

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

Influence of power supply

≤ 0.001% of URL/V

Performance characteristics

Reference operating conditions

- As per IEC 60770-1 and IEC 61298-1, Sections 5 to 7
- Ambient temperature T_U = constant, in the range of: +21...+33°C (+70...91 °F)
- Humidity ϕ = constant, in the range of: 5...80 % r.H
- Ambient pressure p_U = constant, in the range of: 860...1060 mbar (12.47...15.37 psi)
- Position of the measuring cell: constant, in the range of: $\pm 1^\circ$ horizontally and $\pm 1^\circ$ vertically
- P1 = high pressure side
- Input of "Lo Trim Sensor" and "Hi Trim Sensor" for lower range value and upper range value
- Measuring span URV - LRV
- Membrane material 316L
- Filling oil: silicone oil
- Side flanges material: AISI 316L
- Supply voltage: 24 V DC \pm 3 V DC
- Load with HART: 250 Ω

Long-term stability

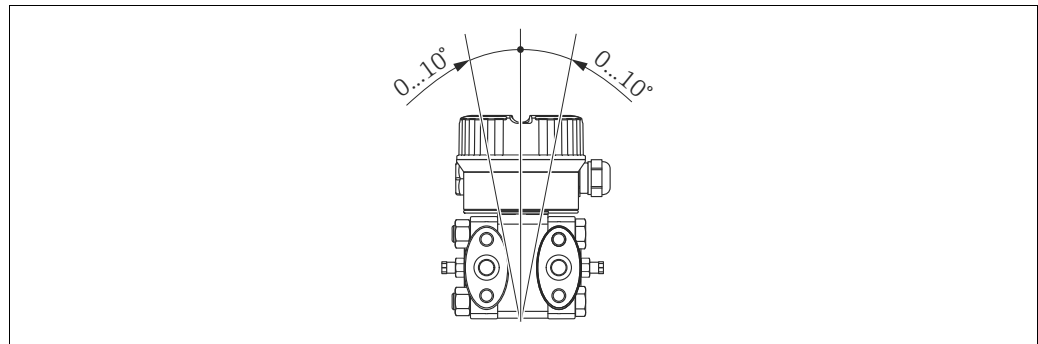
Measuring cell	% of URL / 1 year	% of URL / 5 years
10 mbar (0.15 psi) 30 mbar (0.45 psi)	± 0.25	± 1.25
100 mbar (1.5 psi)	± 0.18	± 0.35
500 mbar (7.5 psi) 1 bar (15 psi) 3 bar (45 psi) 16 bar (240 psi) 40 bar (600 psi)	± 0.05	± 0.13

Influence of the installation position

The recommended maximum angle to the axis of the diaphragm is 10° and results in a measuring error of ± 0.72 mbar (0.01 psi). The value is doubled for devices with inert oil.



Position-dependent zero shift can be corrected → [25](#), section "General installation instructions".



Resolution

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

Reference accuracy

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

The following applies for the root-extracting characteristic curve:

The accuracy data of the Deltabar M is taken into the accuracy calculation of the flow rate with a factor of 0.5.

Measuring cell	% of the set span	
	Standard	Platinum
10 mbar (0.15 psi) 30 mbar (0.45 psi)	<ul style="list-style-type: none"> ■ TD 1:1 = ±0.2 ■ TD > 1:1 = ±(0.2 x TD) 	--
100 mbar (1.5 psi)	<ul style="list-style-type: none"> ■ TD 1:1 to TD 4:1 = ±0.1 ■ TD > 4:1 = ±(0.012 x TD + 0.052) 	<ul style="list-style-type: none"> ■ TD 1:1 to TD 4:1 = ±0.075 ■ TD > 4:1 = ±(0.012 x TD + 0.027)
500 mbar (7.5 psi) 1 bar (15 psi) 3 bar (45 psi) 16 bar (240 psi) 40 bar (600 psi)	<ul style="list-style-type: none"> ■ TD 1:1 to TD 10:1 = ±0.1 ■ TD > 10:1 = ±(0.0015 x TD + 0.085) 	<ul style="list-style-type: none"> ■ TD 1:1 to TD 10:1 = ±0.075 ■ TD > 10:1 = ±(0.0015 x TD + 0.060)

Reference accuracy	Version ¹⁾
Platinum	D
Standard	G

1) Product Configurator "Reference Accuracy" section

**Total performance:
current output**

The "Total performance" specification comprises the non-linearity including hysteresis, non-reproducibility, the thermal change of the zero point as well as the influence of the line pressure p_{st} . The line pressure p_{st} is 70 bar (1050 psi) for the 100 mbar, 500 mbar, 1 bar, 3 bar, 16 bar und 40 bar measuring cell.

Measuring cell	% of the set span			
	Standard, TD 1:1		Platinum, TD 1:1	
	-10 to +60°C (14 to 140°F)	-40 to -10°C; +60 to +85°C (-40 to +14°F; 140 to 185°F)	-10 to +60°C (14 to 140°F)	-40 to -10°C; +60 to +85°C (-40 to +14°F; 140 to 185°F)
10 mbar (0.15 psi)	±0.94	±1.03	--	--
30 mbar (0.45 psi)	±0.92	±1.01	--	--
100 mbar (1.5 psi)	±0.51	±0.66	±0.51	±0.38
500 mbar (7.5 psi) 1 bar (15 psi) 3 bar (45 psi)	±0.40	±0.44	±0.40	±0.32
16 bar (240 psi)	±0.43	±0.53	±0.43	±0.38
40 bar (600 psi)	±0.40	±0.70	±0.40	±0.33

Total Error

Measuring cell	% of URL / 1 year	% of URL / 5 years
10 mbar (0.15 psi) 30 mbar (0.45 psi)	±0.97	±0.95
100 mbar (1.5 psi)	±0.26	±0.39
500 mbar (7.5 psi) 1 bar (15 psi) 3 bar (45 psi)	±0.14	±0.18
16 bar (240 psi)	±0.17	±0.20
40 bar (600 psi)	±0.14	±0.18

Warm-up period

- 4 to 20 mA HART: ≤5 s
- PROFIBUS PA: ≤8 s
- FOUNDATION Fieldbus: ≤20 s (after a TOTAL-reset ≤45 s)

Thermal stability current output

Measuring cell	-10 to +60°C (+14 to +140°F)	-40 to -10°C, +60 to +85°C (-40 to +14°F, +140 to +185°F)
	% of the set span	
10 mbar (0.15 psi) 30 mbar (0.45 psi)	±(0.31 x TD + 0.58)	±(0.45 x TD + 0.54)
100 mbar (1.5 psi)	±(0.18 x TD + 0.3)	±(0.3 x TD + 0.34)
500 mbar (7.5 psi) 1 bar (15 psi) 3 bar (45 psi)	±(0.08 x TD + 0.3)	±(0.12 x TD + 0.3)
16 bar (240 psi)	±(0.10 x TD + 0.32)	±(0.15 x TD + 0.36)
40 bar (600 psi)	±(0.08 x TD + 0.3)	±(0.37 x TD + 0.32)

Influence of the static pressure

Measuring cell	Influence on zero point	Influence on span
10 mbar (0.15 psi)	±0.2 % of URL / 1 bar	±0.2 % of URL / 1 bar
30 mbar (0.45 psi)	±0.07 % of URL / 1 bar	±0.07 % of URL / 1 bar
100 mbar (1.5 psi)	±0.15 % of URL / 70 bar	±0.14 % of URL / 70 bar
500 mbar (7.5 psi) 1 bar (15 psi) 3 bar (45 psi) 16 bar (240 psi) 40 bar (600 psi)	±0.075 % of URL / 70 bar	±0.14 % of URL / 70 bar




The influence of the static pressure on the zero point can be calibrated out.

Vibration effects

Test standard	Vibration effects
GL VI-7-2 <ul style="list-style-type: none"> ■ Part 7: Guidelines for the Performance of Type Approvals ■ Chapter 2: Test Requirements for Electrical / Electronic Equipment and Systems 	guaranteed for 5 to 25 Hz: ±1.6 mm (0.06 in); 25 to 100 Hz: 4 g in all 3 planes
IEC 61298-3 IEC 60068-2-6	≤ reference accuracy to 10...60 Hz: ±0.35 mm (0.01 in); 60...2000 Hz: 5 g in all 3 planes

Installation

General installation instructions

- The position-dependent zero shift can be corrected directly at the device via operating keys.
- Endress+Hauser offers a mounting bracket for installing the device on pipes or walls →  26, section "Wall and pipe mounting".
- When measuring in media with solid proportions, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.
- Using a three-valve or five-valve manifold allows for easy commissioning, installation and maintenance without interrupting the process.
- General recommendations for the impulse piping can be found in DIN 19210 "Methods for measurement of fluid flow; differential piping for flow measurement devices" or the corresponding national or international standards.
- Install the impulse piping with a continuous gradient of at least 10 %.
- When routing the impulse piping outdoors, ensure that sufficient anti-freeze protection is used, e.g. by using pipe heat tracing.

Measuring arrangement

Flow measurement

- Measuring arrangement for gases: Mount device above the measuring point.
- Measuring arrangement for liquids and vapours: Mount the device below the measuring point.
- For flow measurement in vapours, mount the condensate traps at the same level as the same the tapping point and at the same distance from Deltabar M.

Level measurement

Measuring arrangement level measurement in open tanks

- Mount device below the lower measuring connection. The low-pressure side is open to atmosphere pressure.

Measuring arrangement level measurement in closed tanks and closed tanks with superimposed vapor

- Mount device below the lower measuring connection. Always connect the low-pressure side above the maximum level.
- In the case of level measurement in closed tanks with superimposed vapor, a condensate trap ensures pressure which remains constant on the low-pressure side.

Pressure measurement

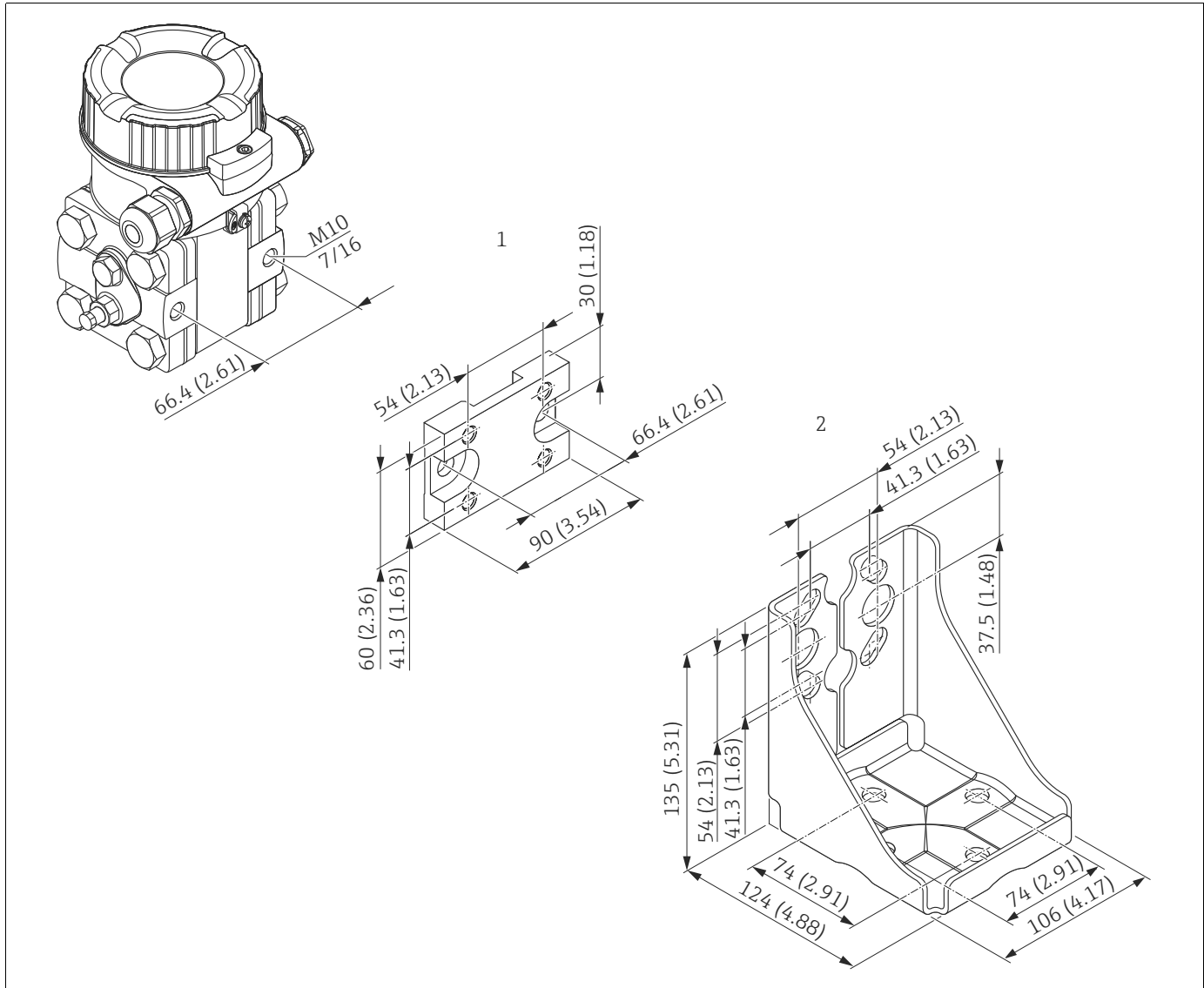
- Measuring arrangement for gases: Mount device above the measuring point.
- Measuring arrangement for liquids and vapours: Mount the device below the measuring point.
- For differential pressure measurement in vapor, mount the condensate traps at the same level as the same the tapping point and at the same distance from Deltabar M.

Wall and pipe-mounting (optional)

Endress+Hauser offers a mounting bracket for installing the device on pipes or walls. A bracket with mounting accessories for pipe mounting is included with the device.



When using a valve block, the block's dimensions must be taken into account.



Mounting bracket for wall and pipe mounting

- 1 Adapter plate (+ six screws and six washers)
2 Mounting bracket (+ bracket for pipe mounting and two nuts)

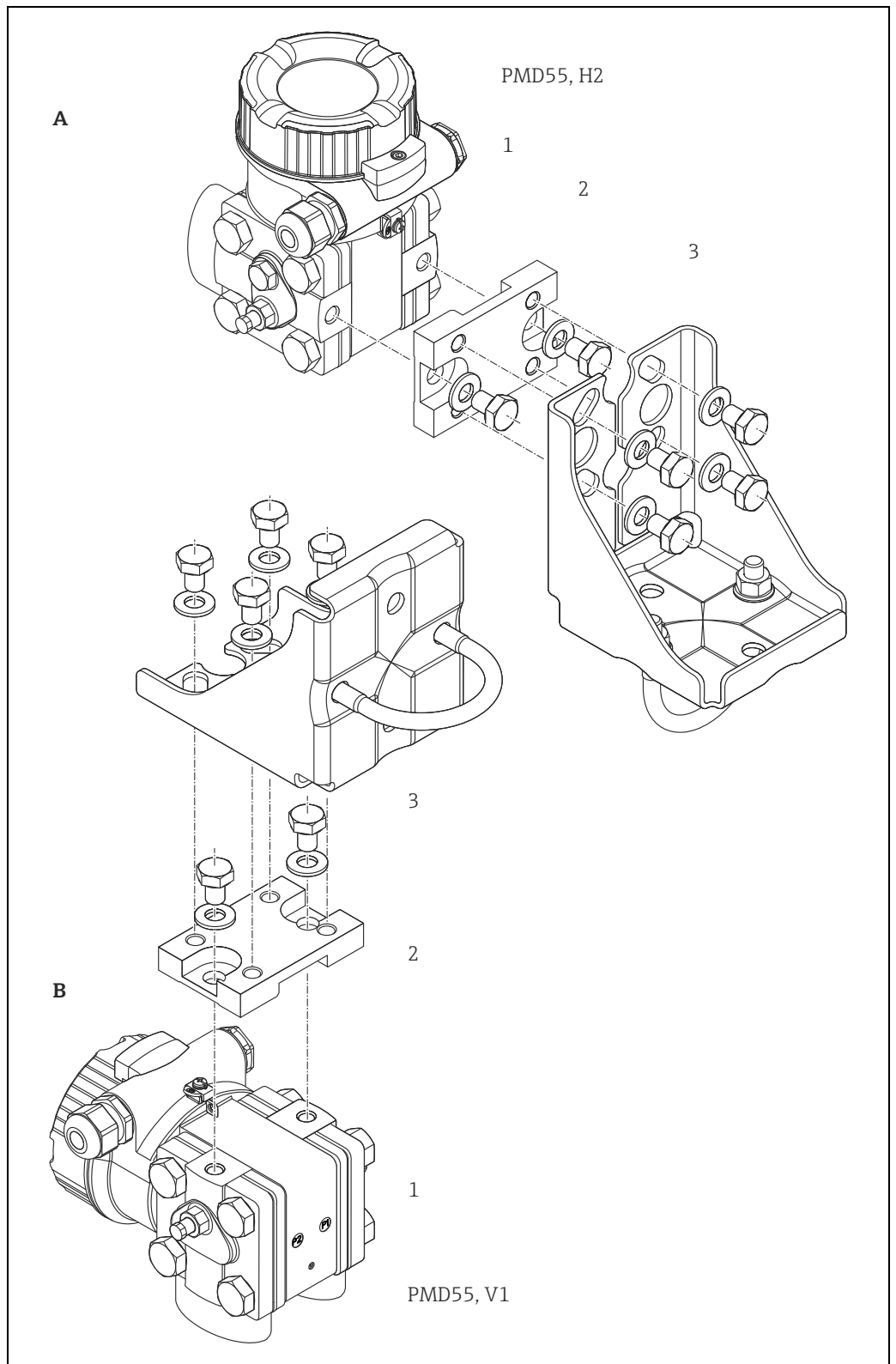
Please note the following when mounting:

- To prevent the mounting screws from scoring, lubricate them with a multipurpose grease prior to mounting.
- In the case of pipe mounting, the nuts on the bracket must be tightened uniformly with a torque of at least 30 Nm (22.13 lbf ft).

Ordering information:

- Product Configurator "Accessory Enclosed" section, PB and PC versions
- As Accessory:
 - Adapter plate 7/16 - 20 UNF part number: 71098632
 - Adapter plate M10 part number: 71101935
 - Mounting bracket and adapter plate 7/16 - 20 UNF part number: 71098630
 - Mounting bracket and adapter plate M10 part number: 71101934

Typical installation arrangements



A Installation for horizontal impulse lines; H2 version

B Installation for vertical impulse lines; V1 version

1 Deltabar M

2 Adapter

3 Mounting bracket

A0023109

Oxygen applications

Oxygen and other gases can react explosively to oils, grease and plastics, such that, among other things, the following precautions must be taken:

- All components of the system, such as measuring devices, must be cleaned in accordance with the BAM (DIN 19247) requirements.

Ordering information:

Product Configurator "Service" section, HB version

- Dependent on the materials used, a certain maximum temperature and a maximum pressure for oxygen applications must not be exceeded.

P_{max} for Oxygen applications	T_{max} for Oxygen applications	Version¹⁾
30 bar (450 psi)	-18 to +60°C (0 to 140°F)	A (FKM Viton)

1) Product Configurator "Seal" section

PWIS cleaning

Special cleaning of the transmitter to remove paint-wetting impairment substances, for use in paint shops for example.

Ordering information :

Product Configurator "Service" section, HC version

Ultra pure gas applications

Endress+Hauser also offers devices for special applications, such as ultra pure gas, cleaned from oil and grease.

Ordering information :

Product Configurator "Service" section, HA version

No special restrictions regarding the process conditions apply to these devices.

Environment

Ambient temperature range

- -40 to +85°C (-40 to +185°F)
- Onsite display: -20 to +70°C (-4 to 158°F)
Enhanced temperature range with limitations concerning display speed and contrast: -40 to +85°C (-40 to +185°F)

For devices for use in hazardous areas, see Safety instructions, Installation or Control Drawing → 47, sections "Safety InstructionSafety Instructions" and "Installation/Control drawings").

Storage temperature range

- -40 to +90°C (-40 to +194°F)
- Onsite display: -40 to +85°C (-40 to +185°F)

Degree of protection Ordering information :
Product Configurator "Electrical Connection" section

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

Vibration resistance

Device	Test standard	Vibration resistance
PMD55	GL	guaranteed for 5 to 25 Hz: ±1.6 mm (0.06 in); 25 to 100 Hz: 4 g in all 3 planes
	IEC 61298-3	guaranteed for: 10...60 Hz: ±0.35 mm (0.014 in); 60...2000 Hz: 5 g in all 3 planes
PMD55 with mounting bracket	IEC 61298-3	guaranteed for: 10...60 Hz: ±0.15 mm (0.006 in); 60...500 Hz: 2 g 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").
- Maximum deviation: < 0.5% of span
- Larger deviations possible with 10 mbar (0.15 psi) measuring cell.

Overvoltage protection (optional)

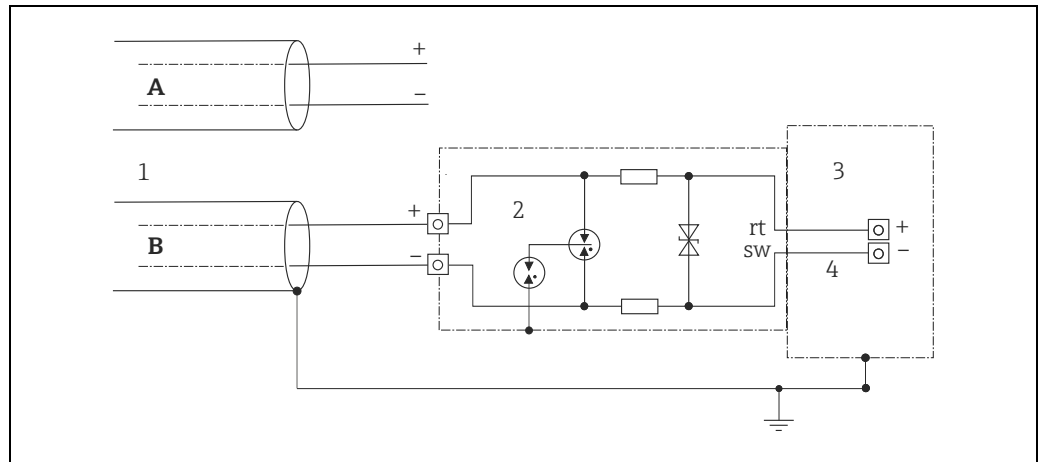
The device can be fitted with overvoltage protection.

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.

Ordering information :

Product Configurator "Accessory Mounted", NA version



A0023111

- A Without direct shield grounding
- B With direct shield grounding
- 1 Incoming connection cable
- 2 HAW569-DA2B
- 3 Unit to be protected
- 4 Connection cable

Process

Process temperature limits (temperature at transmitter)

- Process connections made of 316L:
-40 to +85°C (-40 to +185°F)
- Process connections made of C22.8:
-10 to +85°C (+14 to +185°F)

The process temperature at the transmitter can be reduced through the use of impulse lines.



- For oxygen applications, observe → 28 "Oxygen applications" section.
- Observe the process temperature range of the seal (see also the following section "Process temperature range, Seals").

Process temperature range, Seals

Seal	Process temperature range ¹⁾	Version ²⁾
FKM Viton	-20 to +85°C (-4 to +185°F)	A
PTFE	-40 to +85°C (-40 to +185°F)	C
PTFE (EPDM core)	-40 to +85 °C (-40 to +185 °F) ³⁾	D
NBR	-20 to +85°C (-4 to +185°F)	F
EPDM	-20 to +85°C (-4 to +185°F)	J

- 1) Restrictions for oxygen applications, → 28
- 2) Product Configurator "Seal" section
- 3) Only 10 mbar (0.15 psi) und 30 mbar (0.45 psi) measuring cell.

Pressure specifications

▲ WARNING

The maximum pressure for the measuring device depends on the lowest rated element with regard to pressure → 11 ff, "Measuring range" section and → 32 ff "Mechanical construction" section

- ▶ The measuring device must be operated only within the specified limits!
- ▶ 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. Observe pressure-temperature dependency.
- ▶ The pressure values permitted at higher temperatures can be found in the standards
EN 1092-1: 2001 Tab. 18
ASME B 16.5a - 1998 Tab. 2-2.2 F316
ASME B 16.5a - 1998 Tab. 2.3.8 N10276
JIS B 2220.
- ▶ The MWP applies for the temperature ranges specified in the "Ambient temperature range" (→ 29) and "Process temperature limits" (see above) sections.
- ▶ The test pressure corresponds to the over pressure limit of the measuring instrument (Over pressure limits OPL = 1.5 x MWP) and may fit only temporally limited, so that no permanent damage develops.
- ▶ The Pressure Equipment Directive (EC Directive 97/23/EC) uses the abbreviation "PS". The abbreviation "PS" corresponds to the MWP (maximum working pressure) of the measuring device.
- ▶ In the case of sensor range and process connections where the OPL (Over Pressure Limit) of the pressure connection is smaller than the nominal value of the sensor, the device is set at the factory, at the very maximum, to the OPL value of the process connection. If you want to use the entire sensor range, select a process connection with a higher OPL value (1.5 x PN; PN = MWP).
- ▶ In oxygen applications, the values for "p_{max} and T_{max} for oxygen service" as per → 28 "Oxygen service" section must not be exceeded.

Mechanical construction

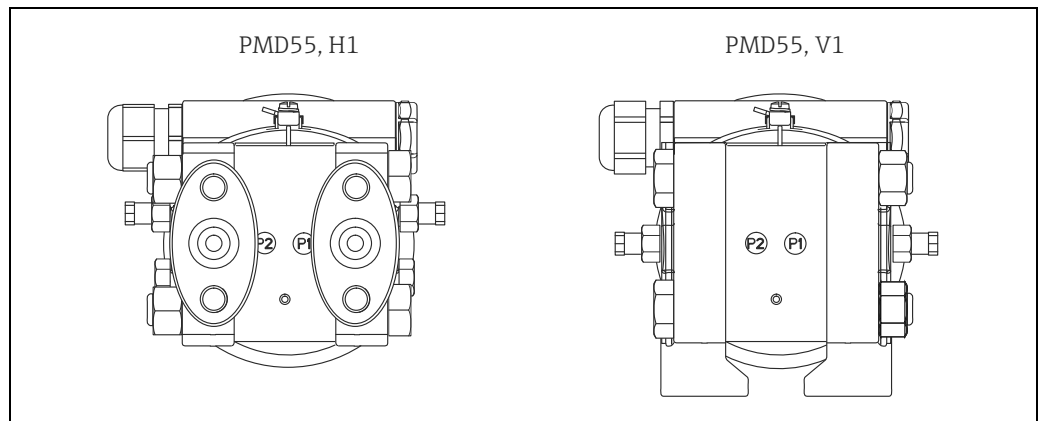
Housing

Material		Weight kg (lbs)	Version ¹⁾
Housing	Cover seal		
Aluminum, without viewing window	EPDM	1.0 (2.21)	A
Aluminum, with viewing window	EPDM	1.1 (2.43)	B

1) Product Configurator "Housing" section

Process connection

Oval flange, connection 1/4-18 NPT IEC61518



A0023115

Designation of the process connections "P1" and "P2"

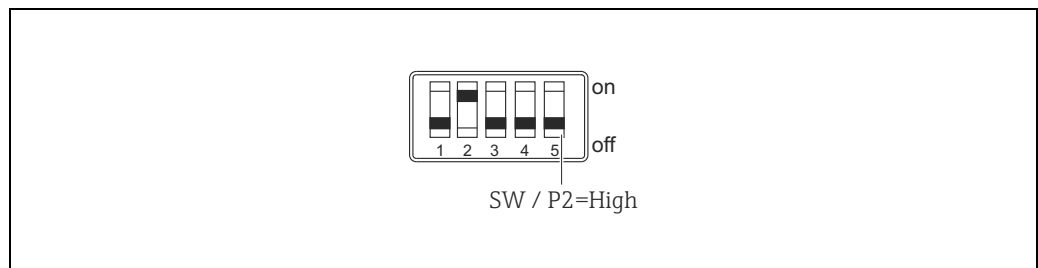
Ordering information:

- Product Configurator "Process connection" section
- As Accessory: Product Configurator "Accessory Enclosed" section, version "P1"

Factory setting

- P1: High pressure side (+)
- P2: Low pressure side (-)

This setting can be changed via a DIP switch in the connection department of the instrument and via the operating menu:

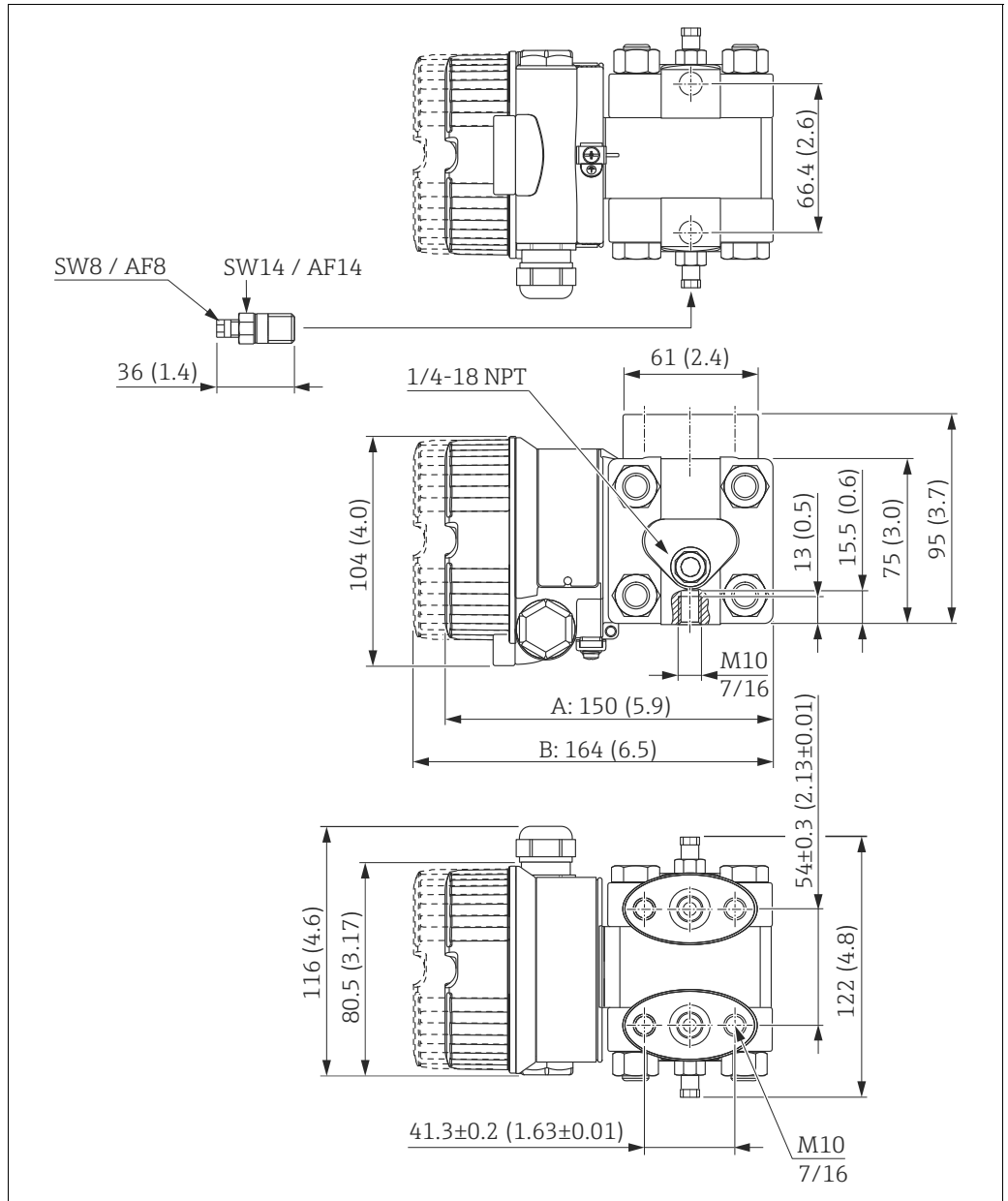


A0023116

DIP switches in the connection compartment of the device. DIP switch 5 defines the high pressure side.

- DIP5 = off: The high pressure side is defined in the operating menu.
Menu "Setup", parameter 006: "High pressure side"; default: P1)
- DIP 5 = on: P2 is the high pressure side, independent of the setting in the operating menu.

Dimensions V1 version;
Impulse pipe vertical;
alignment 90°



A0023117

Engineering unit mm (in)

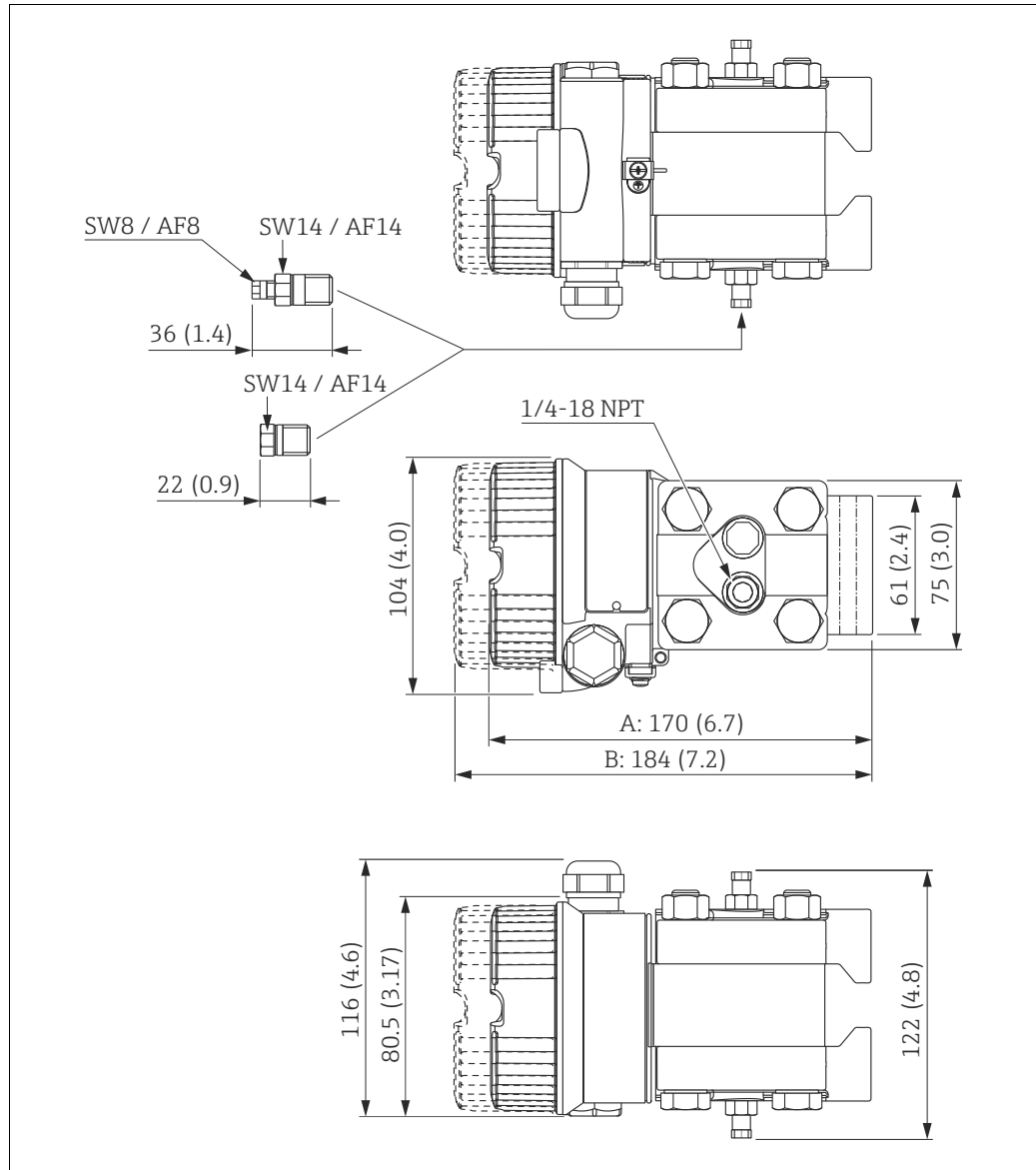
A Version cover without viewing window

B Version cover with viewing window.

Designation	Material	Weight	Version ¹⁾
		kg (lbs)	
NPT 1/4-18 IEC61518 UNF 7/16-20	AISI 316L	3 (6.62)	HAJ
NPT 1/4-18 IEC61518 UNF 7/16-20	C22.8		HA4
NPT 1/4-18 IEC61518 M10	AISI 316L		HBJ
NPT 1/4-18 IEC61518 M10	C22.8		HB4

1) Product Configuration "Process Connection" section

Dimensions H1 version;
Impulse pipe horizontal;
alignment 180°



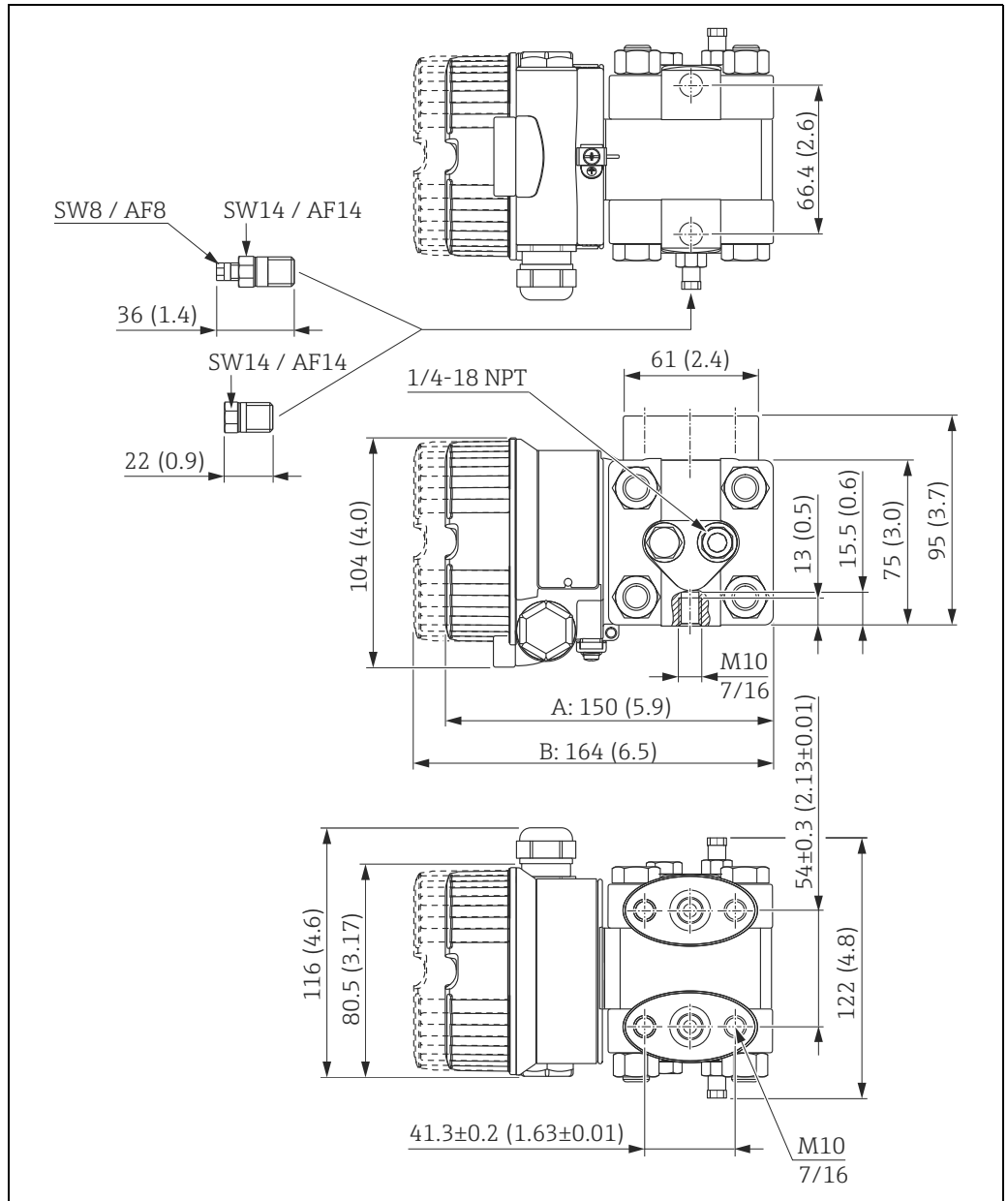
Engineering unit mm (in)

A Version cover without viewing window
B Version cover with viewing window.

Designation	Material	Weight	Version ¹⁾
		kg (lbs)	
NPT 1/4-18 IEC61518 UNF 7/16-20	AISI 316L	3 (6.62)	HGJ
NPT 1/4-18 IEC61518 UNF 7/16-20	C22.8		HG4
NPT 1/4-18 IEC61518 M10	AISI 316L		HHJ
NPT 1/4-18 IEC61518 M10	C22.8		HH4

1) Product Configuration "Process Connection" section

Dimensions H2 version;
Impulse pipe horizontal;
alignment 90°



A0023121

Engineering unit mm (in)

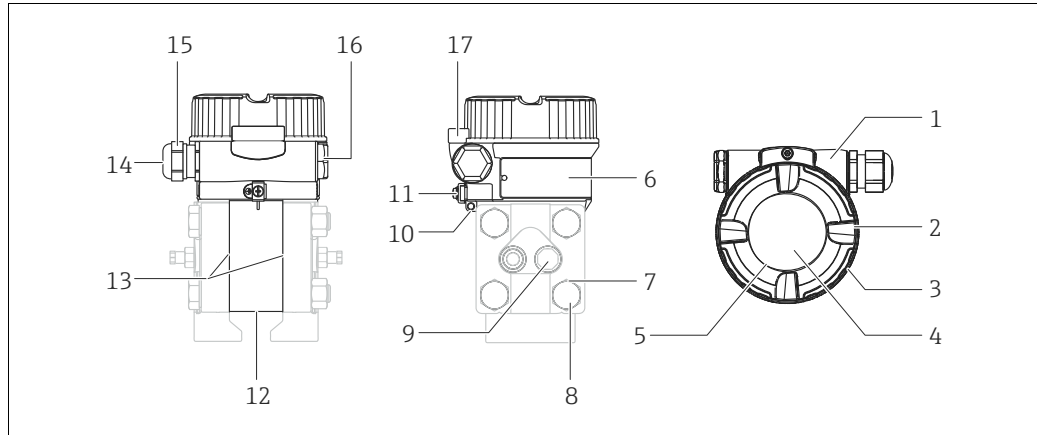
A Version cover without viewing window

B Version cover with viewing window.

Designation	Material	Weight	Version ¹⁾
		kg (lbs)	
NPT 1/4-18 IEC61518 UNF 7/16-20	AISI 316L	3 (6.62)	HNJ
NPT 1/4-18 IEC61518 UNF 7/16-20	C22.8		HN4
NPT 1/4-18 IEC61518 M10	AISI 316L		HOJ
NPT 1/4-18 IEC61518 M10	C22.8		HO4

1) Product Configuration "Process Connection" section

Materials not in contact with process **Housing**



Front view, right-hand side view, top view.

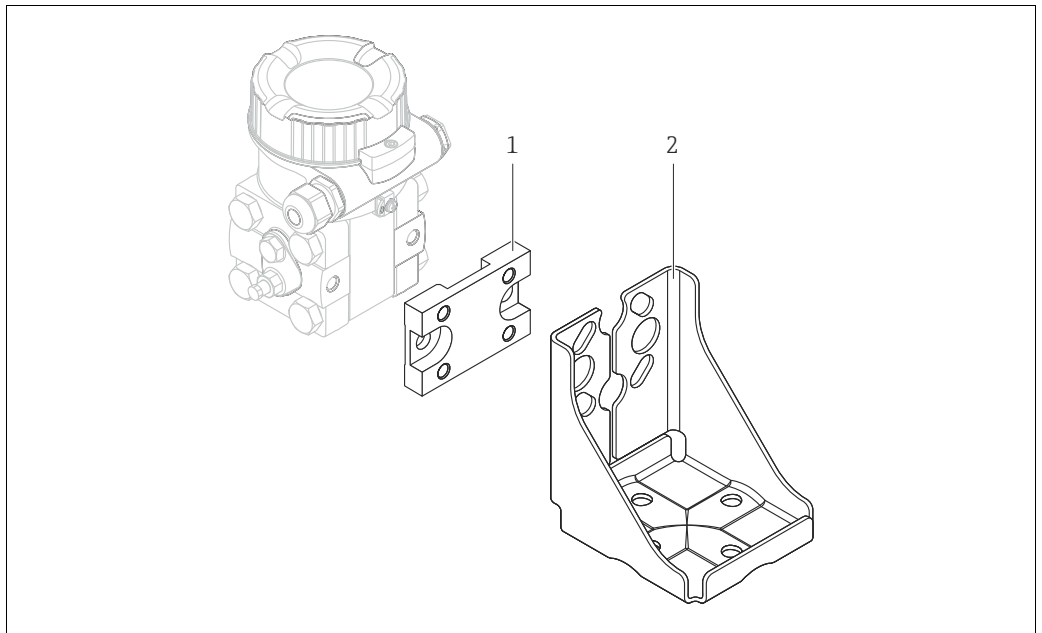
Item number	Component part	Material
1	F30 housing, RAL 5012 (blue)	Die-cast aluminum with protective powder-coating on polyester base
2	Cover, RAL 7035 (gray)	Die-cast aluminum with protective powder-coating on polyester base
3	Cover seal	EPDM
4	Sight glass	Mineral glass
5	Sight glass seal	Silicone (VMQ)
6	Nameplates	Plastic film
7	Plain washer	A4
8	Screws	A2-70 or A4-70
9	Screw	316L
10	External ground terminal	AISI 304 (1.4301)
11	Attachement for tie-on label	AISI 304 (1.4301)/ AISI 316 (1.4401)
12	Pressure compensation filter	Silicone
13	Sealing ring	EPDM
14	Seal of cable gland and blind plug	EPDM/NBR
15	Cable gland	Polyamide (PA) or CuZn nickel-plated
16	Blind plug	PBT-GF30 FR for dust ignition-proof, Ex d, FM XP and CSA XP: AISI 316L (1.4435)
17	Cover clamp	Clamp AISI 316L (1.4435), screw A4

Filling oil

Oil	Version ¹⁾
Silicone oil	1
Inert oil	2

1) Product Configurator "Fill Fluid" section

Connecting parts



A0023123

Item number	Component part	Material
1	Adapter plate	AISI 304
2	Mounting bracket	AISI 304
		Screw and nuts A2-70

Materials in contact with process

Side flanges

Endress+Hauser supplies side flanges made of stainless steel AISI 316L as per material numbers 1.4404 or 1.4408 or side flanges of C22.8 (Zn 5-8 / 1.0460 + Zn 5-8) with zinc plating. Endress+Hauser recommends to use side flanges made out of 316L for applications with water.

Process isolating diaphragm

Material	Version ¹⁾
316L	A
Alloy C	C

1) Product Configurator "Process isolating diaphragm material" section

Oval flange adapters

AISI 316L (1.4404)

Vent valves

AISI 316L (1.4404)

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 additives or operating materials derived from animals are used in production or processing.

Operability

Operating concept

Operator-oriented menu structure for user-specific tasks

- Commissioning
- Operation
- Diagnosis
- Expert level

Quick and safe commissioning

Guided menus for applications

Reliable operation

- Local operation possible in several languages
- Standardized operation at the device and in the operating tools
- Parameters relating to measured values can be locked/unlocked using the device's write protection switch, using the device software or via remote control

Efficient diagnostic behavior increases measurement availability

- Remedial measures are integrated in plain text
- Diverse simulation options

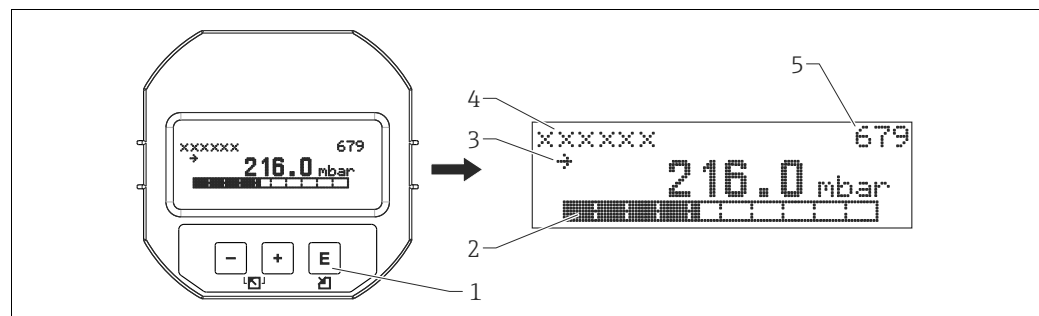
Local operation

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.
- 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, peak-hold indicators etc.)

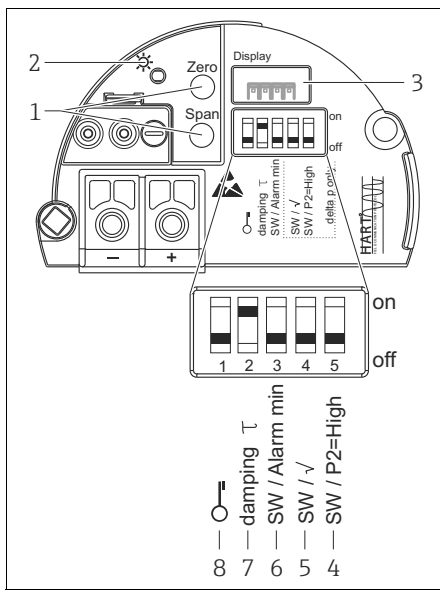


- 1 Operating keys
- 2 Bar graph
- 3 Symbol
- 4 Header line
- 5 Parameter identification number

Ordering information:
Product Configurator, "Output, Operation" section

Function	Operation via display		
	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

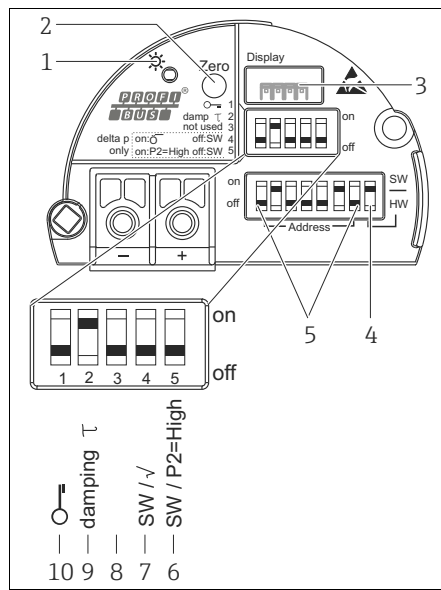
Operating keys and elements located internally on the electronic insert



A0023125

HART electronic insert

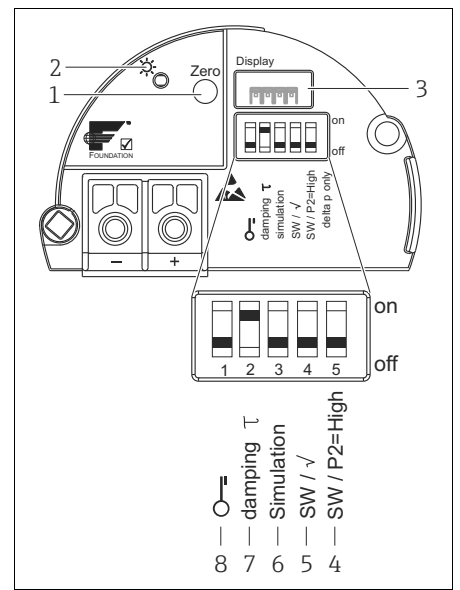
- 1 Operating keys for lower range value (zero) and upper range value (span)
- 2 Green LED to indicate successful operation
- 3 Slot for optional local display
- 4 DIP switch for defining high pressure side
- 5 DIP switch for defining operating mode and output characteristics
- 6 DIP switch for alarm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



A0023126

PROFIBUS PA electronic insert

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



A0023127

FOUNDATION Fieldbus electronic insert

- 1 Operating key for position zero adjustment or reset (Zero)
- 2 Green LED to indicate successful operation
- 3 Slot for optional local display
- 4 DIP switch for defining high pressure side
- 5 DIP switch for defining operating mode and output characteristics
- 6 DIP-switch for simulation mode
- 7 DIP switch for switching damping on/off
- 8 DIP switch for locking/unlocking parameters relevant to the measured value

Function	Operation with operating keys and operating elements on the electronic insert		
	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	--	--
Device reset	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
Switching damping on and off	X	X	X

Ordering information:
Product Configurator, "Output, Operation" section

Operating languages

You can also choose another language in addition to the standard language "English":

Designation	Version ¹⁾
English	AA
German	AB
French	AC
Spanish	AD
Italian	AE
Dutch	AF
Chinese	AK
Japanese	AL

1) Product Configurator "Additional Operation Language" section

Remote operation

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

Hardware and software for remote operation	HART	PROFIBUS PA	FOUNDATION Fieldbus
FieldCare → 40 ff	✓ ¹⁾	✓ ²⁾	✓
FieldXpert SFX100 → 40 ff	✓	–	✓
NI-FBUS Configurator → 41 ff	–	–	✓

1) Commubox FXA195 required → 40 ff

2) Profiboard or Proficard required → 41 ff

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)
- HistoROM[®]/M-DAT analysis
- 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
- Service interface with Commubox FXA291 and ToF adapter FXA291 (USB).

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

Field Xpert SFX100

Field Xpert is an industrial PDA with integrated 3.5" touchscreen from Endress+Hauser based on Windows Mobile. It offers wireless communication via the optional VIATOR Bluetooth modem or 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.

Commubox FXA195

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

Commubox FXA291

The Commubox FXA291 connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) with the USB interface of a PC or laptop. For details refer to TI00405C/07/EN.



For the following Endress+Hauser devices you will also need the "ToF adapter FXA291" as an accessory:

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

ToF Adapter FXA291

The ToF adapter FXA291 connects the Commubox FXA291 with devices from the ToF platform, pressure devices and the Gammapilot via the USB interface of a PC or laptop. For details refer to KA00271F.

Profiboard

For connecting a PC to the PROFIBUS.

Proficard

For connecting a laptop to the PROFIBUS

FF configuration program

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

Remote operation via:

- 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
 - Reading and writing of data from control and regulation systems
 - Invoke methods specified in the manufacturer-specific DD (e.g. basic device settings)
 - Display DD menus (e.g. tab for calibration data)
 - 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



System integration

The device can be given a tag name (max. 8 alphanumeric characters)

Designation	Version ¹⁾
Tagging (TAG), see additional spec.	Z1
Bus address, see additional spec.	Z2

1) Product configurator "Marking" section

Certificates and approvals

CE mark	The device meets the legal requirements of the relevant EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.										
Ex approvals	<ul style="list-style-type: none"> ▪ ATEX ▪ FM ▪ CSA ▪ NEPSI ▪ IECEX <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. →  47, "Safety Instructions" section and "Installation/Control Drawings".</p>										
Marine certificate (in preparation)	<ul style="list-style-type: none"> ▪ Germanischer Lloyd (GL) ▪ American Bureau of Shipping (ABS) 										
Functional safety SIL	The Deltabar 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. For a detailed description of the safety functions with Deltabar M, settings and functional safety data, see the "Functional safety manual - Deltabar M" SD00347P. Ordering information: Product Configurator "Other approvals" section, "LA" version										
AD2000	The pressure retaining material 316L (1.4435/1.4404) corresponds to AD2000 - W2/W10.										
CRN approval	Some device versions have CRN approval. For a CRN-approved device, a CRN-approved process connection (→  44 ff, feature 110 "Process connection") must be ordered with a CSA approval (→  44 ff, feature 10 "Approval"). These devices are fitted with a separate plate bearing the registration number 0F13907.5C.										
Pressure Equipment Directive (PED)	PMD55 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.										
Standards and guidelines	<p>DIN EN 60770 (IEC 60770): Transmitters for use in industrial-process control systems Part 1: Methods for inspection and routine testing</p> <p>DIN 16086: Electrical pressure measuring instruments, pressure sensors, pressure transmitters, pressure measuring instruments, concepts, specifications in data sheets</p> <p>EN 61326-X: EMC product family standard for electrical equipment for measurement, control and laboratory use.</p>										
North-American practice for installation of process seals	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. Further information can be found in the control drawings of the relevant devices.										
Inspection certificate	<table border="1"> <thead> <tr> <th>Designation</th> <th>Version ¹⁾</th> </tr> </thead> <tbody> <tr> <td>EN10204-3.1 material wetted parts, inspection certificate</td> <td>JA</td> </tr> <tr> <td>NACE MR0175 wetted parts</td> <td>JB</td> </tr> <tr> <td>EN10204-3.1 AD2000 material wetted parts, expecting process membrane, inspection certificate</td> <td>JF</td> </tr> <tr> <td>EN10204-3.1 Helium leak test, inspection certificate</td> <td>KD</td> </tr> </tbody> </table>	Designation	Version ¹⁾	EN10204-3.1 material wetted parts, inspection certificate	JA	NACE MR0175 wetted parts	JB	EN10204-3.1 AD2000 material wetted parts, expecting process membrane, inspection certificate	JF	EN10204-3.1 Helium leak test, inspection certificate	KD
Designation	Version ¹⁾										
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EN10204-3.1 Helium leak test, inspection certificate	KD										

Designation	Version ¹⁾
EN10204-3.1 pressure test, inspection certificate	KE

1) Product Configurator "Test, Certificate" section

Calibration; Unit

Designation	Version ¹⁾
Nominal value; mbar/bar	B
Nominal value; kPa/MPa	C
Nominal value; mm/mH ₂ O	D
Nominal value; inH ₂ O/ftH ₂ O	E
Nominal value; psi	F
Customized pressure; see additional specification	J
Customized level; see additional spec.	K
Customized flow; see additional spec.	L
Adjusted for Deltatop; see additional spec.	8

1) Product Configurator "Calibration; Unit" section

Calibration

Designation	Version ¹⁾
Factory calib. certificate 5-point	F1
DKD/DAkkS calib. certificate 10-point	F2

1) Product Configurator "Calibration" section

Service

Designation	Version ¹⁾
Cleaned from oil+grease ²⁾	HA
Cleaned for oxygen service ²⁾	HB
Cleaned from PWIS (PWIS = paint wetting impairment substances) ²⁾	HC
Adjusted min alarm current	IA
Adjusted HART Burst Mode PV	IB

1) Product Configurator "Service" section

2) Only device, not accessory or enclosed accessory

Ordering information

Detailed ordering information is available as follows:

- In the Product Configurator on the Endress+Hauser website: www.endress.com → Select country → Products → Select product → Product page function: Configure this product
- From your Endress+Hauser Sales Center: www.endress.com/worldwide



Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: direct input of information specific to the measuring point, such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic generation of the order code with its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

Configuration data sheet

Pressure

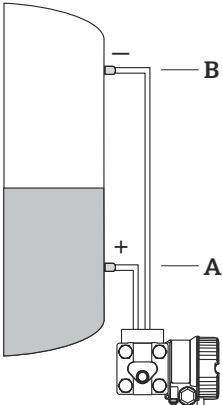
If the version "J" was selected in the "Kalibration; Einheit" section of the Product Configurator, the following configuration data sheet must be completed and included with the order.

Pressure Engineering Unit	
<input type="checkbox"/> mbar	<input type="checkbox"/> mmH ₂ O
<input type="checkbox"/> bar	<input type="checkbox"/> mH ₂ O
<input type="checkbox"/> psi	<input type="checkbox"/> inH ₂ O
<input type="checkbox"/> mmHg	<input type="checkbox"/> Pa
<input type="checkbox"/> kgf/cm ²	<input type="checkbox"/> kPa
<input type="checkbox"/>	<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 ¹⁾	2nd Value Display ¹⁾
<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
¹⁾ Depending on sensor and communication variant	
Damping	
Damping:	_____ sec (Default 2 sec)

Smallest span (factory calibration) → 11

Level

If the version "K" was selected in the "Kalibration; Einheit" section of the Product Configurator, the following configuration data sheet must be completed and included with the order.

Pressure Engineering Unit		Output Unit (Scaled unit)																																						
<input type="checkbox"/> mbar <input type="checkbox"/> mmH ₂ O <input type="checkbox"/> mmHg <input type="checkbox"/> Pas <input type="checkbox"/> bar <input type="checkbox"/> mH ₂ O <input type="checkbox"/> kPa <input type="checkbox"/> psi <input type="checkbox"/> ftH ₂ O <input type="checkbox"/> kgf/cm ² <input type="checkbox"/> MPa <input type="checkbox"/> inH ₂ O	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr style="border-bottom: 1px solid black;"> <th style="text-align: left; padding: 2px;">Mass</th> <th style="text-align: left; padding: 2px;">Length</th> <th style="text-align: left; padding: 2px;">Volume</th> <th style="text-align: left; padding: 2px;">Volume</th> <th style="text-align: left; padding: 2px;">Percent</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;"><input type="checkbox"/> kg</td> <td style="padding: 2px;"><input type="checkbox"/> m</td> <td style="padding: 2px;"><input type="checkbox"/> l</td> <td style="padding: 2px;"><input type="checkbox"/> gal</td> <td style="padding: 2px;"><input type="checkbox"/> %</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> t</td> <td style="padding: 2px;"><input type="checkbox"/> dm</td> <td style="padding: 2px;"><input type="checkbox"/> hl</td> <td style="padding: 2px;"><input type="checkbox"/> lgal</td> <td></td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> lb</td> <td style="padding: 2px;"><input type="checkbox"/> cm</td> <td style="padding: 2px;"><input type="checkbox"/> m³</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding: 2px;"><input type="checkbox"/> mm</td> <td style="padding: 2px;"><input type="checkbox"/> ft³</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding: 2px;"><input type="checkbox"/> ft</td> <td style="padding: 2px;"><input type="checkbox"/> in³</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding: 2px;"><input type="checkbox"/> inch</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					Mass	Length	Volume	Volume	Percent	<input type="checkbox"/> kg	<input type="checkbox"/> m	<input type="checkbox"/> l	<input type="checkbox"/> gal	<input type="checkbox"/> %	<input type="checkbox"/> t	<input type="checkbox"/> dm	<input type="checkbox"/> hl	<input type="checkbox"/> lgal		<input type="checkbox"/> lb	<input type="checkbox"/> cm	<input type="checkbox"/> m ³				<input type="checkbox"/> mm	<input type="checkbox"/> ft ³				<input type="checkbox"/> ft	<input type="checkbox"/> in ³				<input type="checkbox"/> inch			
Mass	Length	Volume	Volume	Percent																																				
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	<input type="checkbox"/> inch																																							
<p>Empty pressure [a]: Low pressure value (empty) _____ [Pressure engineering unit]</p> <p>Full pressure [b]: High pressure value (full) _____ [Pressure engineering unit]</p>		<p>Empty calibration [a]: Low level value (empty) _____ [Scaled Unit]</p> <p>Full calibration [b]: High level value (full) _____ [Scaled Unit]</p>																																						
		<p>Example</p>  <p style="font-size: small; text-align: right;">A0023130</p> <p>A 50 mbar (1 psi) / 3 m³ (106 ft³) B 500 mbar (7.5 psi) / 100 m³ (3532 ft³).</p>																																						
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<p>1st Value Display ¹⁾</p> <input type="checkbox"/> Main Value		<p>2nd Value Display ¹⁾</p> <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																																						
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<p>Damping: _____ sec (Default 2 sec)</p>																																								

Flow

If the option "L" was selected in the "Calibration; Unit" section of the Product Configurator, the following configuration data sheet must be completed and included with the order.

Pressure Engineering Unit	Flow Unit / Measured Value (PV)
<input type="checkbox"/> mbar <input type="checkbox"/> mmH ₂ O <input type="checkbox"/> mmHg <input type="checkbox"/> Pa <input type="checkbox"/> bar <input type="checkbox"/> mH ₂ O <input type="checkbox"/> psi <input type="checkbox"/> ftH ₂ O <input type="checkbox"/> kgf/cm ² <input type="checkbox"/> kPa <input type="checkbox"/> <input type="checkbox"/> inH ₂ O <input type="checkbox"/> MPa	<input type="checkbox"/> Mass <input type="checkbox"/> Volume <input type="checkbox"/> Volume <input type="checkbox"/> Volume <input type="checkbox"/> Percent <div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <input type="checkbox"/> kg/s <input type="checkbox"/> kg/min <input type="checkbox"/> kg/h <input type="checkbox"/> t/s <input type="checkbox"/> t/min <input type="checkbox"/> t/h <input type="checkbox"/> oz/s <input type="checkbox"/> oz/min <input type="checkbox"/> lb/s <input type="checkbox"/> lb/min <input type="checkbox"/> lb/h </div> <div style="width: 20%;"> <input type="checkbox"/> m³/s <input type="checkbox"/> m³/min <input type="checkbox"/> m³/h <input type="checkbox"/> l/s <input type="checkbox"/> l/min <input type="checkbox"/> l/h <input type="checkbox"/> US Gal/s <input type="checkbox"/> US Gal/min <input type="checkbox"/> US Gal/h <input type="checkbox"/> ACFS <input type="checkbox"/> ACFM <input type="checkbox"/> ACFH </div> <div style="width: 20%;"> <input type="checkbox"/> Nm³/s <input type="checkbox"/> Nm³/min <input type="checkbox"/> Nm³/h <input type="checkbox"/> Nm³/d </div> <div style="width: 20%;"> <input type="checkbox"/> Sm³/s <input type="checkbox"/> Sm³/min <input type="checkbox"/> Sm³/h <input type="checkbox"/> Sm³/d <input type="checkbox"/> SCFS <input type="checkbox"/> SCFM <input type="checkbox"/> SCF3 <input type="checkbox"/> SCFD </div> <div style="width: 20%;"> <input type="checkbox"/> % </div> </div> <p style="text-align: center;">Default: Volume; m³ /h</p>
Output Characteristic	
<input type="checkbox"/> linear (HART only)	<input type="checkbox"/> square root (HART only)
<p>Operation Point</p> Max Pressure _____ [Pressure engineering unit] Max Flow _____ [flow unit] LRV _____ [Pressure engineering unit] (Lower Range Value (HART only))	<p>Operation Point</p> Max Pressure _____ [Pressure engineering unit] Max Flow _____ [flow unit] LRV _____ [flow unit] (Lower Range Value (HART only))
Low flow cut off	
Value: _____ [%] (default = 5)	
Display Information	
1st Value Display ¹⁾ <input type="checkbox"/> Main Value	2nd Value Display ¹⁾ <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 <input type="checkbox"/> Totalizer 1 <input type="checkbox"/> Totalizer 2
¹⁾ Depending on sensor and communication variant	
Damping	
Damping: _____ sec (Default 2 sec)	

Additional documentation

Field of Activities	Pressure measurement, powerful instruments for process pressure, differential pressure, level and flow: FA00004P/00/EN
Technical Information	<ul style="list-style-type: none"> ■ EMC test procedures TI00241F/00/EN ■ Cerabar M: TI00436P/00/EN ■ Deltapilot M: TI00437P/00/EN
Operating Instructions	<ul style="list-style-type: none"> ■ 4 to 20 mA HART: BA00382P/00/EN ■ PROFIBUS PA: BA00383P/00/EN ■ FOUNDATION Fieldbus: BA00384P/00/EN
Brief operating instruction	<ul style="list-style-type: none"> ■ 4 to 20 mA HART: KA01027P/00/EN ■ PROFIBUS PA: KA01028P/00/EN ■ FOUNDATION Fieldbus: KA01029P/00/EN
Functional safety manual (SIL)	Deltabar M (4 to 20 mA): SD00347P/00/EN

Safety Instructions

Directive	Approval	Category	Electronics	Documentation	Version ¹⁾
ATEX	Ex ia IIC	II 1/2 G	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00457P/00	BA
	Ex t IIIC	II 1/2 D	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00458P/00	BB
	Ex d IIC	II 2G	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00459P/00	BC
	Ex nA IIC	II 3 G	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00461P/00	BD
	Ex ic IIC	II 3 G	- 4...20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA01301P/00	BG
	Ex ia IIC Ex ia D	II 1/2 G II 1/2 D	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00460P/00	B1
	Ex ia IIC Ex d IIC	II 1/2 G II 2 G	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00505P/00	8A

1) Product Configurator "Approval" section

Directive	Approval	Electronics	Documentation	Version ¹⁾
NEPSI	Ex ia IIC	- 4 to 20 mA HART	- XA00534P/00	NA
	Ex d IIC	- 4 to 20 mA HART	- XA00514P/00	NB

1) Product Configurator "Approval" section

Directive	Approval	Electronics	Version ¹⁾
TIIS	Ex ia ICT4	- 4 to 20 mA HART	TA

1) Product Configurator "Approval" section

Directive	Approval	EPL	Electronics	Documentation	Version ¹⁾
IECEX	Ex ia IIC	Ga/Gb	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00462P/00	IA
	Ex d IIIC	Gb	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00463P/00	IB
	Ex t IIIC	Da/Db	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00490P/00	ID
	Ex ic IIC	Gc	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00492P/00	IE
	Ex ia IIC Ex ia IIIC	Ga/Gb Da/Db	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA00491P/00	I1

1) Product Configurator "Approval" section

Directive	Approval	Electronics	Documentation	Version ¹⁾
INMETRO	Ex ia IIC T6...T4 Ga/Gb	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	- XA01303P/00	MA

1) Product Configurator "Approval" section

Installation/Control Drawings

Directive	Approval	Electronics	Documentation	Version ¹⁾
FM	IS Cl.I,II,III Div.1 Gr. A-G, AEx ia NI Cl. I Div.2 Gr.A-D	- 4 to 20 mA HART - PROFIBUS PA, FOUNDATION Fieldbus	- ZD00234P/00 - XA00565P/00	FA
	FM XP Cl.I,II Div.1 Gr.A-G Zone 1 IIC T6 (Conduit seal not required), Zone 1,2	- 4 to 20 mA HART - PROFIBUS PA - FOUNDATION Fieldbus	--	FB
	FM DIP Cl.II,III Div.1 Gr.E-G, Zone 21,22	--	--	FC
	FM NI Cl.I Div.2 Gr.A-D, Zone 2	--	--	FD
	FM IS/XP Cl.I,II Div.1 Gr.A-G, Zone 1,2	- PROFIBUS PA, FOUNDATION Fieldbus	- XA00568P/00	F1
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	- 4 to 20 mA HART - PROFIBUS PA, FOUNDATION Fieldbus	- XA00557P/00 - XA00559P/00	CA
	CSA C/US XP Cl.I,II Div.1 Gr.B-G, Ex d, (Conduit seal not required), Zone 1,2	--	--	CB
	CSA C/US Cl.II,III Div.1 Gr.E-G, US: Zone 21,22	--	--	CC
	CSA C/US IS/XP Cl.I,II Div.1Gr.A- G/B-G, Zone 1,2	- 4 to 20 mA HART - PROFIBUS PA, FOUNDATION Fieldbus	- XA00576P/00 - XA00562P/00	C1

1) Product Configurator "Approval" section

Combined certificate

Directive	Approval	Electronics	Documentation	Version ¹⁾
FM/CSA	FM/CSA IS + XP Cl.I,II Div.1 Gr.A-D/B-G FM IS/FM XP Cl.I,II Div.1 Gr.A-G + CSA IS/XP Cl.I,II Div.1 Gr.A-G, FM/CSA: Zone 1,2	- 4 to 20 mA HART	- ZD00247P/00 - XA00576P/00 - ZD00250P/00	8B
		PROFIBUS PA, FOUNDATION Fieldbus	- XA00568P/00 - XA00562P/00	

1) Product Configurator "Approval" section

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PROFIBUS®	Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany
FOUNDATION™ Fieldbus	Registered trademark of the Fieldbus Foundation, Austin, Texas, USA



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