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

Technical Information

Cerabar S PMP72

Process pressure measurement at high process temperatures
Pressure transmitter with metal sensors
Overload-resistant and function-monitored; Communication via HART, PROFIBUS PA or FOUNDATION Fieldbus

Application

The Cerabar S pressure transmitter is used for the following measuring tasks:
- Absolute pressure in gases, steams or liquids in all areas of process engineering and process measurement technology
- Level, volume or mass measurements in liquids
- High process temperatures without diaphragm seals (up to 280 °C (536 °F))
- International usage thanks to a wide range of approvals

Your benefits

- Very good reproducibility and long-term stability
- High reference accuracy: up to ±0.075 %
- Turn down 10:1, higher on request
- Used for process pressure monitoring up to SIL3, certified to IEC 61508 by TÜV SÜD
- HistoROM®/M-DAT memory module
- Function-monitored from the measuring cell to the electronics
- Quick commissioning with Quick Setup menu
- Menu-guided operation
- Extensive diagnostic functions

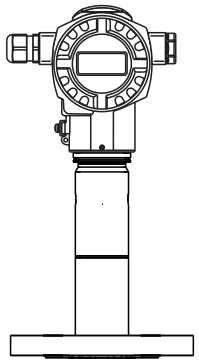
TI438P/00/EN/05.10
No 71114110

Endress+Hauser
People for Process Automation

Table of contents

Function and system design

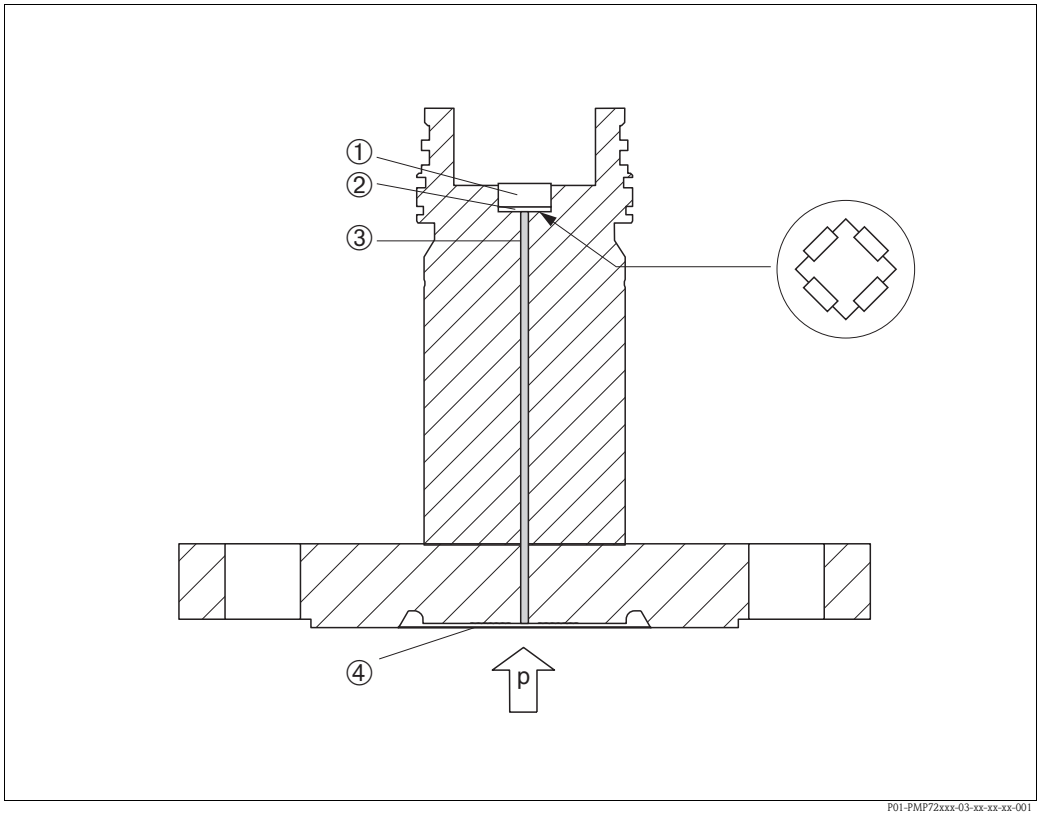
Device selection

Cerabar S	**PMP72**  P01-PMP72xxx-16-xx-xx-xx-003 **With piezoresistive measuring cell and metal welded process isolating diaphragm**
Field of application	– Absolute pressure – Level
Process connections	– DN 25 – DN 80 flanges – ANSI 2" – 3" flanges
Measuring ranges	– 0 to 0.4 bar_{abs} (0 to 6 psi_{abs}) – 0 to 1 bar_{abs} (0 to 15 psi_{abs})
OPL [1]	Max. 10 bar (150 psi)
Process temperature range	–10 to +280 °C (–14 to +536 °F)
Ambient temperature range	Depends on the minimum process pressure –10 to +50 °C (–14 to +122 °F)
Reference accuracy	– Up to ±0.075 % of the set span
Supply voltage	– Version for non-hazardous areas: 10.5 to 45 V DC – EEx ia: 10.5 to 30 V DC
Output	– 4 to 20 mA with superimposed HART protocol – PROFIBUS PA – FOUNDATION Fieldbus
Options	– NACE-compliant materials – inspection certificate 3.1 – HistoROM®/M-DAT memory module
Specialties	– High-precision process pressure measurement at high process temperatures – Process connections with minimum oil volume – Gas-tight, elastomer-free

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

Measuring principle

Metal process isolating diaphragm



Metal sensor

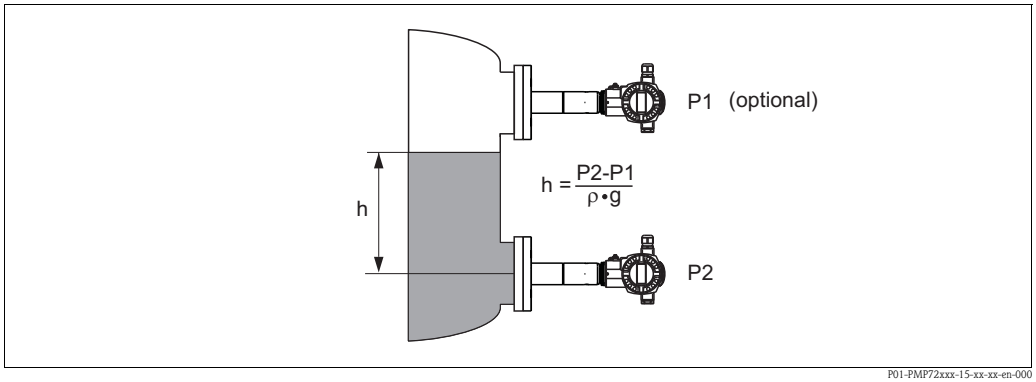
1 Silicon measuring element, substrate
2 Wheatstone bridge
3 Channel with fill fluid
4 Metal process isolating diaphragm

The operating pressure deflects the process isolating diaphragm and a fill fluid transfers the pressure to a resistance bridge (semiconductor technology). The pressure-dependent change in the bridge output voltage is measured and evaluated.

Advantages:
- Can be used for process pressures up to 1 bar (15 psi) absolute pressure
- High long-term stability
- Guaranteed overload resistance up to 10 times the nominal pressure
- Secondary containment for enhanced integrity
- Measurement far more accurate compared to diaphragm seal systems

Level measurement (level, volume and mass)

Design and operation mode



Level measurement

h *Height (level)*
p *Pressure*
ρ *Density of the medium*
g *Gravitation constant*

Your benefits

- Selection of the level operating mode which is optimum for your application in the device software.
- Volume and mass measurements in any tank shapes by means of a freely programmable characteristic curve.
- Choice of diverse level units with automatic unit conversion.
- A specific unit can be defined.
- Has a wide range of uses, even in the following cases:
  - in the event of foam formation
  - in tanks with agitators of screen fittings
  - in the event of liquid gases

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 13 mA ± 1 mA, the following number of devices can be operated on one bus segment if installing as per FISCO:
    - up to 7 Cerabar S for Ex ia, CSA IS and FM IS applications
    - up to 27 Cerabar S for all other applications, e.g. in non-hazardous areas, Ex nA etc.

  Further information on PROFIBUS PA can be found in Operating Instructions BA034S "PROFIBUS DP/PA: Guidelines for planning and commissioning" and in the PNO Guideline.
- FOUNDATION Fieldbus
  - The Endress+Hauser devices meet the requirements of the FISCO model.
  - Due to the low current consumption of 15 mA ± 1 mA, the following number of devices can be operated on one bus segment if installing as per FISCO:
    - up to 6 Cerabar S for Ex ia, CSA IS and FM IS applications
    - up to 24 Cerabar S 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 BA013S "FOUNDATION Fieldbus Overview".

Input

Measured variable

Absolute pressure, from which level (level, volume or mass) is derived

Measuring range

Metal process isolating diaphragm for absolute pressure

Nominal value	Range limit		Smallest calibratable span [4]	MWP [1]	OPL [2]	Versions in the order code [3]
	lower (LRL)	upper (URL)				
[bar_{abs} (psi_{abs})]	[bar_{abs}]	[bar_{abs} (psi_{abs})]	[bar (psi)]	[bar_{abs} (psi_{abs})]	[bar_{abs} (psi_{abs})]	
0.4 (6)	0	+0.4 (+6)	0.040 (0.6)	4 (60)	6 (90)	2F
1 (15)	0	+1 (+15)	0.100 (1.5)	6.7 (100.5)	10 (150)	2H

1) 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 (→ 22 ff) has to taken into consideration in addition to the measuring cell (→ see Table above). Also observe pressure-temperature dependency. For the appropriate standards and further information, see → 21, "Pressure specifications" section.
2) OPL: over pressure limit
3) Version in the order code → 31 ff, feature 40 "Sensor range; Sensor over pressure limit (= OPL)"
4) Turn down > 10:1 on request or can be set at the device

Explanation of terms

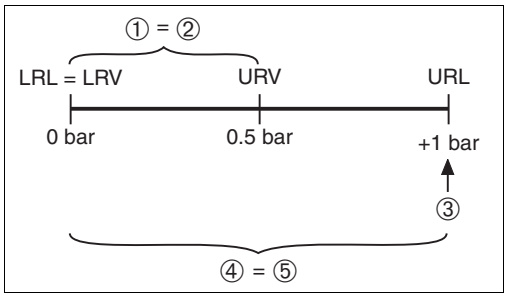
Explanation of the terms "turn down (TD)", "set span" and "zero-based span"

- |Lower range value (LRV)| ≤ |Upper range value (URV)|

Example:
- Lower range value (LRV) = 0 bar
- Upper range value (URV) = 0.5 bar (7.5 psi)
- Nominal value (URL) = 1 bar (15 psi)

Turn down:
- TD = URL / |URV| = 2:1

Set span:
- URV – LRV = 0.5 bar (7.5 psi)
  This span is based on the zero point.



Example: 1 bar (15 psi) measuring cell

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

Output

Output signal

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

Signal range – 4 to 20 mA HART

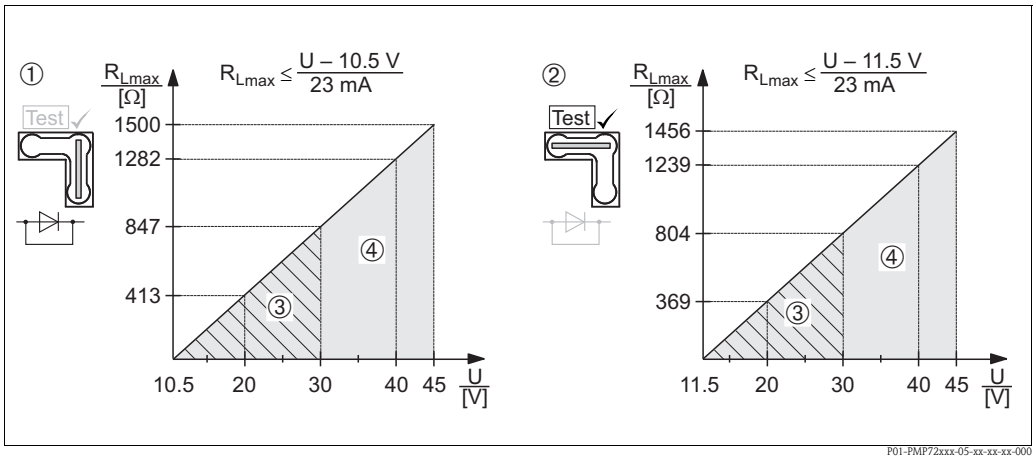
3.8 mA to 20.5 mA

Signal on alarm

As per NAMUR NE43

- 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, Fsafe Value (factory setting), 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, observe the position of the jumper and the explosion protection (→ See also Page 14, "Measuring a 4 to 20 mA test signal" section.)

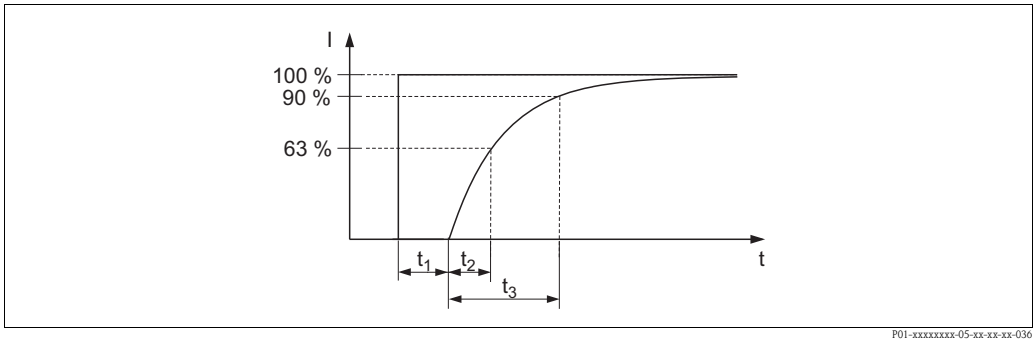
1 Jumper for 4 to 20 mA test signal set to "Non-test" position
2 Jumper for 4 to 20 mA test signal set to "Test" position
3 Power supply 10.5 (11.5) to 30 V DC for 1 GD, 1/2 GD, FM IS, CSA IS, IECEx ia, NEPSI Ex ia
4 Power supply 10.5 (11.5) to 45 V DC for devices for non-hazardous areas, 1/2 D, 1/3 D, 3 G Ex nA, FM DIP, FM NI, CSA dust ignition proof
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 Ω must exist within the loop.

Resolution

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

Dead time, time constant



Presentation of the dead time and the time constant

Dynamic behavior, current output

Dead time t_1	Time constant (T63), t_2	Time constant (T90), t_3
60 ms	160 ms	250 ms

Dynamic behavior, HART

Dead time t_1	Time constant (T63), t_2	Time constant (T90), t_3
310 ms	160 ms	250 ms

Reading cycle

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

Response time

≤ 250 ms

Cycle time (update time)

On average 250 to 330 ms.

Dynamic behavior, PROFIBUS PA

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

Dead time t_1	Time constant (T63), t_2	Time constant (T90), t_3
310 ms	160 ms	250 ms

Response time

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

All values are typical values.

Cycle time (update time)

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

Dynamic behavior, FOUNDATION Fieldbus

A typical configuration for the macro cycle time (host system) of 250 ms results in the following behavior:

Dead time t_1	Time constant (T63), t_2	Time constant (T90), t_3
310 ms	160 ms	250 ms

Reading cycle

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

Response time

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

All values are typical values.

Cycle time (update time)

250 ms

Damping

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

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

Data of the FOUNDATION Fieldbus interface

Basic data

Device Type	1007F (hex)
Device Revision	06 (hex)
DD Revision	01 (hex)
CFF Revision	01 (hex)
ITK Version	5.0
ITK Certification Driver No.	IT054600
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

Virtual communication references (VCRs)

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

Link settings

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

Transducer Blocks

Block	Content	Output values
TRD1 Block	Contains all parameters related to the measurement	■ Pressure or level (channel 1) ■ Process temperature (channel 2)
Service Block	Contains service information	■ Pressure after damping (channel 3) ■ Pressure peakhold indicator (channel 4) ■ Counter for max. pressure transgressions (channel 5)
Diagnostic Block	Contains diagnostic information	Error code via DI channels (channel 0 to 16)
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	45 ms	enhanced
Digital Input Block	This block contains the discrete data of the Diagnose Block (selectable via a channel number 0 to 16) and provides them for other blocks at the output.	1	40 ms	standard
Digital Output Block	This block converts the discrete input and thus initiates an action (selectable via a channel number) in the DP Flow Block or in the Service Block. Channel 1 resets the counter for max. pressure transgressions..	1	60 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	120 ms	standard
Arithmetic Block	This block is designed to permit simple use of popular measurement math functions. The user does not have to know how to write equations. The math algorithm is selected by name, chosen by the user for the function to be performed.	1	50 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_CONTENT).	1	35 ms	standard
Signal Characterizer Block	The Signal Characterizer Block has two sections, each with an output that is a non-linear function of the respective input. The non-linear function is generated by a single look-up table with 21 arbitrary x-y pairs.	1	30 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
Analog Alarm Block	This block contains all process alarm conditions (working like a comparator) and represents them at the output.	1	35 ms	standard

Additional function block information:

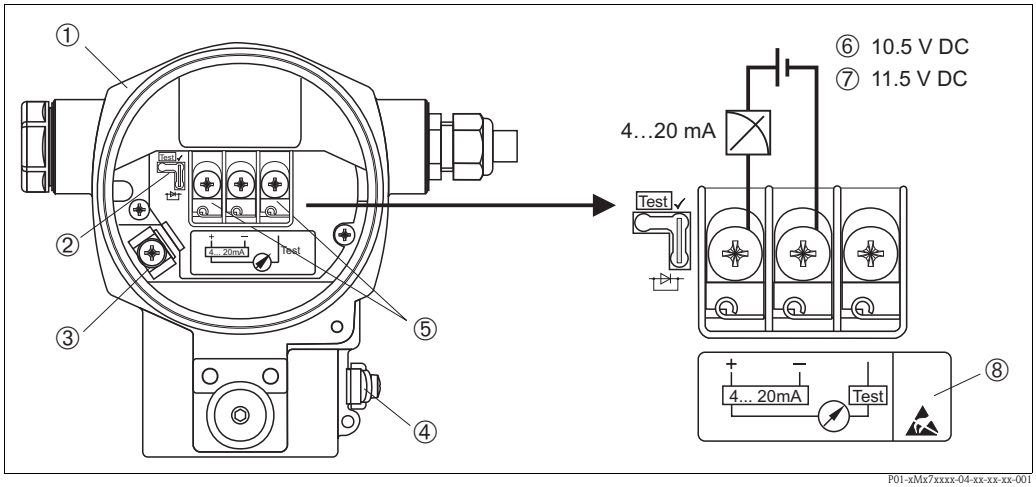
Instantiate Function Block	YES
Number of instantiate blocks	15

Power supply

Electrical connection

Note!
- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
  → 📄 33 ff, "Safety Instructions" and "Installation/Control Drawings" sections.
- Devices with integrated overvoltage protection must be grounded. → 📄 20.
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.

4 to 20 mA HART



Electrical connection 4 to 20 mA HART

1 Housing
2 Jumper for 4 to 20 mA test signal
→ 📄 14, "Measuring a 4 to 20 mA test signal" section.
3 Internal ground terminal
4 External ground terminal
5 4 to 20 mA test signal between positive and test terminal
6 Minimum supply voltage = 10.5 V DC, jumper is set as illustrated in the diagram.
7 Minimum supply voltage = 11.5 V DC, jumper is inserted in "Test" position.
8 Devices with integrated overvoltage protection are labeled OVP (overvoltage protection) here (→ 📄 20).

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 BA034S "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 BA034S "PROFIBUS DP/PA: Guidelines for planning and commissioning", the PNO Guideline 2.092 PROFIBUS PA User and Installation Guideline" and IEC 61158-2 (MBP).

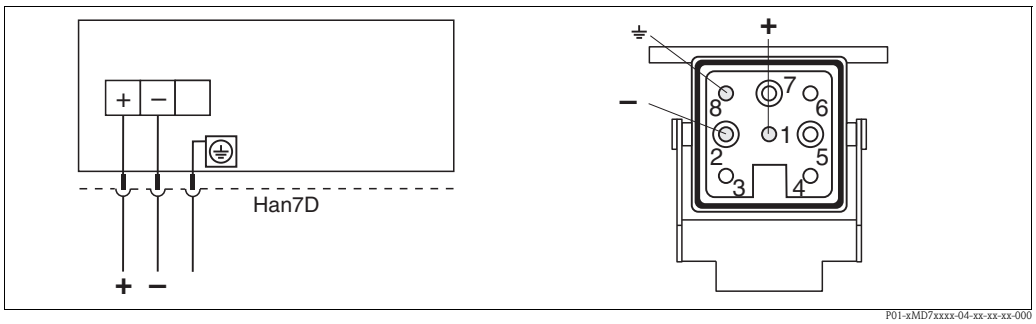
FOUNDATION Fieldbus

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 BA013S "FOUNDATION Fieldbus Overview" and the FOUNDATION Fieldbus Guideline.

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

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

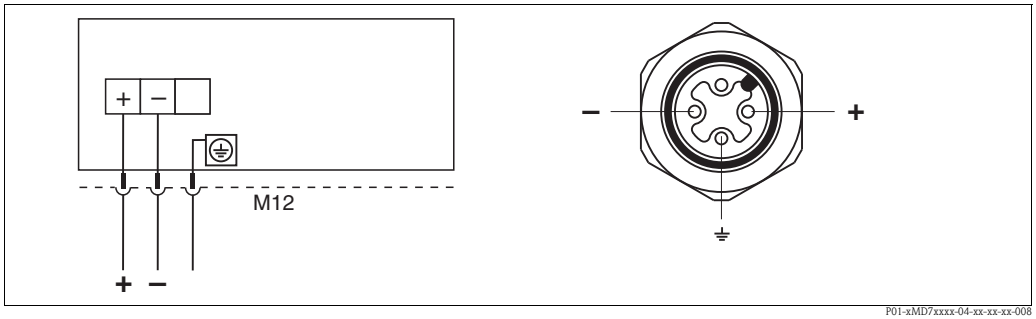
Devices with Harting plug Han7D



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

Material: CuZn

Devices with M12 plug



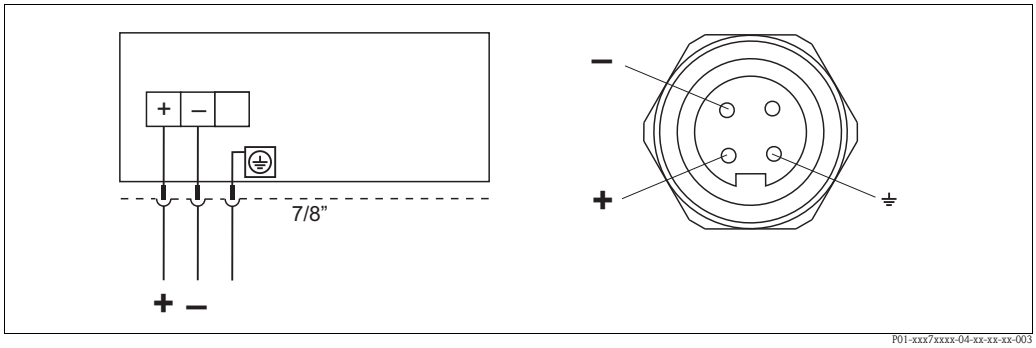
Left: electrical connection for devices with M12 plug
Right: view of the plug at the device

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): IP67
- Order number: 52006263

Plug-in jack M 12x1, elbowed
- Material: body PBT/PA; coupling nut GD-Zn, nickel-plated
- Degree of protection (fully locked): IP67
- Order number: 71091284

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): IP67
- Order number: 52010285

Devices with 7/8" plug



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

External thread: 7/8 – 16 UNC
- Material: housing / body CuZn, nickel-plated
- Protection: IP68
- Order number: 52010285

Cable gland

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, II1/3D, II1/2GD Exia, II1GD Exia II3G Ex nA	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 mm² (20 to 14 AWG)

Measuring a 4 to 20 mA test signal

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

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

Supply voltage

Note!
- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas.
→ 📄 33 ff, "Safety Instructions" and "Installation/Control Drawings" sections.

4 to 20 mA HART

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

PROFIBUS PA

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

FOUNDATION Fieldbus

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

Current consumption

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

Cable entry

→ 📄 31 ff, feature 30 "Housing; Cable entry; Degree of protection".

Cable specification

- If only the analog signal is to be used, a normal instrument cable suffices. If the superimposed digital communication signal is to be used, use a shielded cable.
- Terminals for core cross-sections 0.5 to 2.5 mm^2 (20 to 14 AWG)
- Cable outer diameter: 5 to 9 mm (0.2 to 0.35 in)

Residual ripple

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

Influence of power supply

≤ 0.0006% of URL/1 V

Performance characteristics

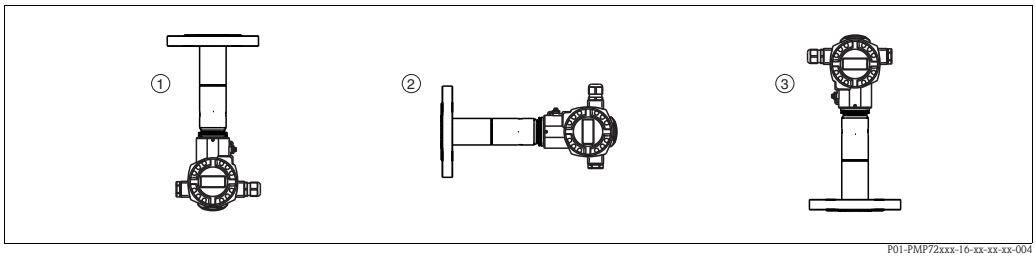
Reference operating conditions

- As per IEC 60770
- Ambient temperature T_A = constant, in the range of: +21 to +33 °C (+70 to 91 °F)
- Humidity φ = 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: horizontally ±1°
- Input of LOW SENSOR TRIM and HIGH SENSOR TRIM for lower range value and upper range value
- Zero based span
- Process isolating diaphragm material: AISI 316L/1.4435
- Filling oil: silicone oil
- Supply voltage: 24 V DC ± 3 V DC
- Load with HART: 250 Ω

Long-term stability

- For measuring range 0.4 bar_{abs} (6 psi_{abs}): ±0.44 % of URL/year
- For measuring range 1 bar_{abs} (15 psi_{abs}): ±0.175 % of URL/year

Influence of the installation position



Orientation: ① Suspended; ② Horizontal; ③ Vertical

Suspended: ≤40 mbar (0.6 psi)
Horizontal: ≤20 mbar (0.3 psi)
Vertical: ≤1 mbar (0.015 psi)

Note!
Position-dependent zero shift can be corrected.

Reference accuracy

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

Measuring cell	% of the set span
0.4 bar_{abs} (6 psi_{abs})	■ TD 1:1 = ±0.15 ■ TD > 1:1 = ±0.15 x TD
1 bar_{abs} (15 psi_{abs})	■ TD 1:1 to TD 2.5:1 = ±0.075 ■ TD > 2.5:1 = ±0.03 x 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.
All specifications apply to the temperature range -10 to +60 °C (+14 to +140 °F) (process temperature = ambient temperature) and a turn down of 1:1.

Measuring cell	% of URL
0.4 bar_{abs} (6 psi_{abs})	±0.375
1 bar_{abs} (15 psi_{abs})	±0.225

Total error

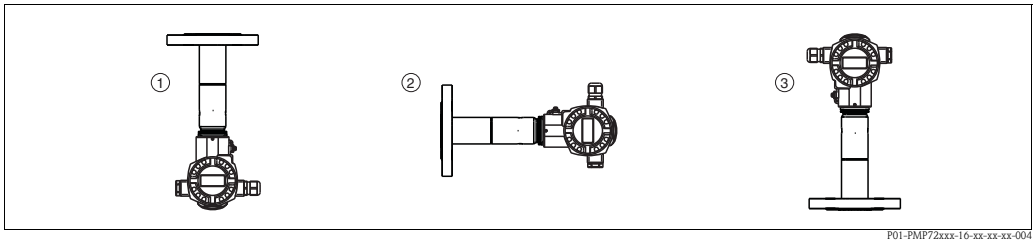
The total error comprises the total performance and long-term stability.
All specifications apply to the temperature range –10 to +60 °C (+14 to +140 °F) and a turn down of 1:1.

Measuring cell	% of URL/year
0.4 bar_{abs} (6 psi_{abs})	■ ±0.82
1 bar_{abs} (15 psi_{abs})	■ ±0.4

Warm-up period

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

Thermal change of the zero output and the output span



Orientation: ① Suspended; ② Horizontal; ③ Vertical

Thermal change mbar (psi) with "Suspended" orientation:

	Process temperature °C (°F)				
T ambient °C (°F)	**–10 ≤ T <100 (14 ≤ T <212)**	**100 ≤ T <150 (212 ≤ T <302)**	**150 ≤ T <200 (302 ≤ T <392)**	**200 ≤ T <250 (392 ≤ T <482)**	**250 ≤ T ≤280 (482 ≤ T ≤536)**
–10 (14)	3.4 (0.051)	5.2 (0.078)	7.0 (0.105)	8.8 (0.132)	9.9 (0.149)
0	3.5 (0.053)	5.4 (0.081)	7.1 (0.107)	9.8 (0.147)	11.9 (0.179)
25 (77)	3.6 (0.054)	5.9 (0.089)	9.4 (0.141)	13.4 (0.201)	16.5 (0.248)
50 (122)	3.6 (0.054)	7.2 (0.108)	12.0 (0.18)	17.5 (0.263)	21.6 (0.324)

Thermal change mbar (psi) with "Horizontal" orientation:

	Process temperature °C (°F)				
T ambient °C (°F)	**–10 ≤ T <100 (14 ≤ T <212)**	**100 ≤ T <150 (212 ≤ T <302)**	**150 ≤ T <200 (302 ≤ T <392)**	**200 ≤ T <250 (392 ≤ T <482)**	**250 ≤ T ≤280 (482 ≤ T ≤536)**
–10 (14)	3.7 (0.056)	5.9 (0.089)	8 (0.12)	10.3 (0.155)	11.8 (0.177)
0	3.8 (0.057)	6.1 (0.092)	8.1 (0.122)	11.3 (0.170)	13.8 (0.207)
25 (77)	3.9 (0.0585)	6.6 (0.099)	10.4 (0.156)	14.9 (0.224)	18.4 (0.276)
50 (122)	3.9 (0.0585)	7.9 (0.119)	13 (0.195)	19 (0.285)	23.5 (0.353)

Thermal change mbar (psi) with "Vertical" orientation:

	Process temperature °C (°F)				
T ambient °C (°F)	**–10 ≤ T <100 (14 ≤ T <212)**	**100 ≤ T <150 (212 ≤ T <302)**	**150 ≤ T <200 (302 ≤ T <392)**	**200 ≤ T <250 (392 ≤ T <482)**	**250 ≤ T ≤280 (482 ≤ T ≤536)**
–10 (14)	4.2 (0.063)	7.0 (0.105)	9.7 (0.146)	12.9 (0.194)	14.9 (0.224)
0	4.3 (0.065)	7.2 (0.108)	9.8 (0.147)	13.9 (0.209)	16.9 (0.254)
25 (77)	4.4 (0.066)	7.7 (0.116)	12.1 (0.182)	17.5 (0.263)	21.5 (0.323)
50 (122)	4.4 (0.066)	9.0 (0.135)	14.7 (0.221)	21.6 (0.324)	26.6 (0.399)

Operating conditions (Installation)

Measuring arrangement

Cerabar S transmitters are mounted as per the norms for a manometer (DIN EN 837-2).
Endress+Hauser recommends the use of shutoff devices. The orientation depends on the measuring application.

Pressure measurement in gases

Mount Cerabar S with shutoff device above the tapping point so that any condensate can flow into the process.

Pressure measurement in steams

The Cerabar S can be operated in hot media within the permitted temperature and pressure limits.

Pressure measurement in liquids

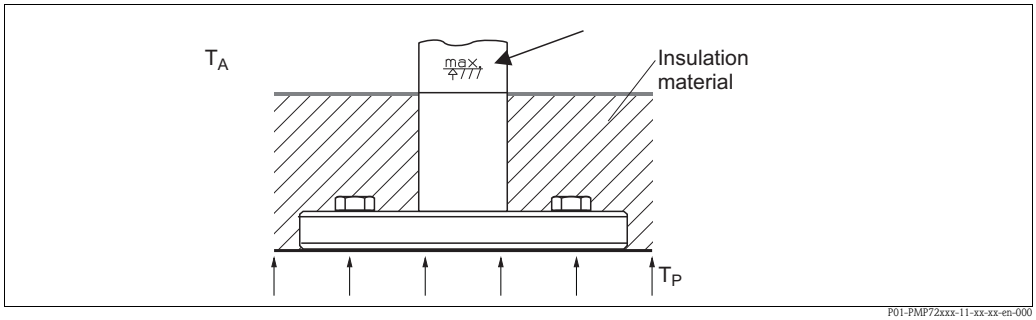
Mount Cerabar S with shutoff device below or at the same level as the tapping point.

Level measurement

- Mount Cerabar S below the lowest measuring point.
- Do not mount the device at the following positions:
  In the filling curtain, in the tank outlet or at a point in the container which could be affected by pressure pulses from an agitator or a pump.
- The adjustment and functional test can be carried out more easily if you mount the device downstream of a shutoff device.

High-temperature version heat insulation

The PMP72 must only be insulated up to a certain height. The maximum permitted insulation height is indicated on the devices and applies to an insulation material with a heat conductivity ≤ 0.04 W/(m x K) at 100 °C (212 °F) with a linear increase to 0.07 W/(m x K) at 300 °C (572 °F) and to the maximum ambient temperature → 📄 20 and process temperature → 📄 21 permitted. The data were determined under the most critical application "quiescent air".



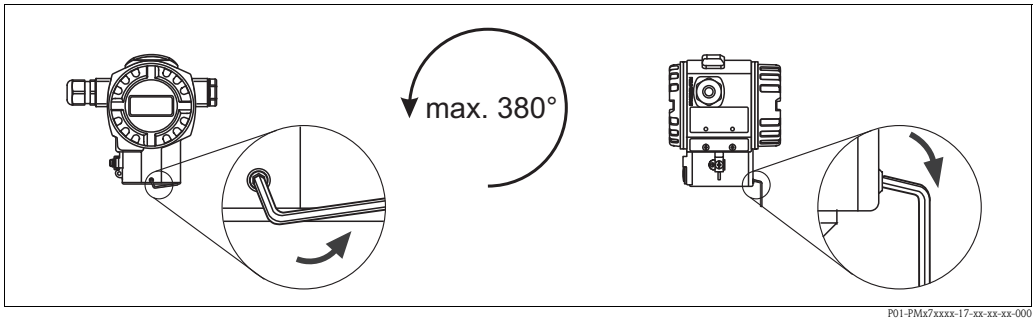
Maximum permitted insulation height

Turning the housing

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

Your benefits

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



Aligning the housing by releasing the setscrew
T14 housing: 2 mm (0.08 in) Allen screw

Operating conditions (Environment)

Ambient temperature range

–10 to +60 °C (–14 to +140 °F)
Note:
Observe the minimum process pressure (see table in the "Process pressure limits" section → 21)!

For devices for use in hazardous areas, see Safety Instructions, Installation or Control Drawing. (→ 33 ff, "Safety Instructions" and "Installation/Control Drawings" sections)

Storage temperature range

- –20 to +100 °C (–4 to +212 °F)
- Onsite display: –40 to +85 °C (–40 to +185 °F)

Degree of protection

- → See Page 31 ff, feature 30 "Housing; Cable entry; Degree of protection".

Climate class

Class 3K5 (air temperature: –5 to 45 °C (+23 to 113 °F), relative humidity: 4 to 95 %)
fulfilled as per IEC 721-3-3 (condensation possible)

Vibration resistance

	Vibration resistance	
Test standard	**Aluminum housing**	**Stainless steel housing**
IEC 61298-3	Guaranteed for 10 to 60 Hz: ±0.15 mm (0.059 in); 60 to 500 Hz: 2 g in all 3 planes	The vibration resistance with stainless steel housings is reduced.

Electromagnetic compatibility

- Electromagnetic compatibility to EN 61326 and NAMUR recommendation EMC (NE21). For details refer to the Declaration of Conformity.
- With enhanced immunity against electromagnetic fields as per EN 61000-4-3:
  30 V/m with closed cover
- Maximum deviation: < 0.5 % of span
- The values indicated apply to a turn down (TD) = 1:1.

Overvoltage protection (optional)

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

→ 31 ff, feature 100 "Additional option 1" and feature 110 "Additional option 2", version "M Overvoltage protection".

Note!
Devices with integrated overvoltage protection must be grounded.

Operating conditions (Process)

Process temperature limits

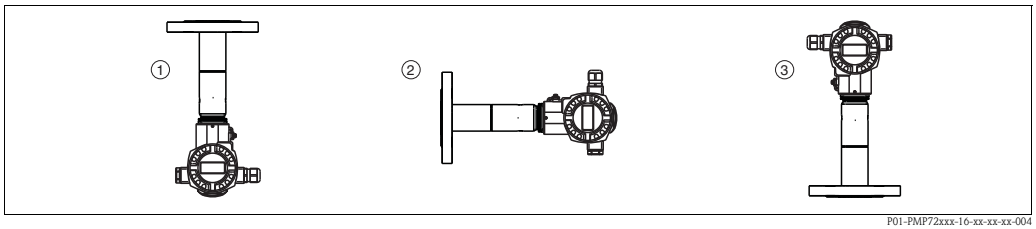
–10 to +280 °C (–14 to +536 °F)
Note:
Observe the minimum process pressure (see table in the "Process pressure limits" section → 🖹 21)!

Pressure specifications

- The maximum pressure for the measuring device depends on the lowest-rated element with regard to pressure. See the following sections:
  – → 🖹 6 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. Observe the temperature dependency of the MWP.
- The pressure values permitted at higher temperatures can be found in the following standards:
  – EN 1092-1: 2001 Tab. 18 [1]
  – ASME B 16.5a – 2006 Tab. 2-2.2 F316
- The test pressure corresponds to the over pressure limit of the measuring device (OPL = 1.5 x MWP) and may only be applied temporarily 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.

1) With regard to their stability-temperature property, the materials 1.4435 and 1.4404 are grouped together under 13EO in EN 1092-1: 2001 Tab. 18. The chemical composition of the two materials can be identical.

Process pressure limits



Orientation: ① Suspended; ② Horizontal; ③ Vertical

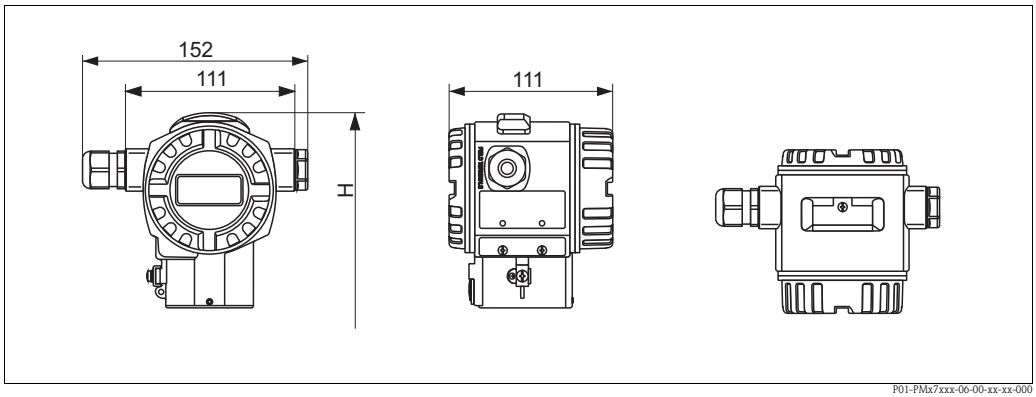
Use the following table to determine the minimum, absolute process pressures depending on the orientation.

		T ambient °C (°F)		
		-10 ≤ T <30 (14 ≤ T <86)	**30 ≤ T <40 (86 ≤ T <104)**	**40 ≤ T ≤50 (104 ≤ T ≤122)**
Orientation	**T process °C (°F)**	**Minimum process pressure $mbar_{abs}$ (psi_{abs})**		
Suspended	-10 to 200 (14 to 392)	15 (0.23)	30 (0.45)	50 (0.75)
	201 to 240 (394 to 464)	30 (0.45)	40 (0.6)	55 (0.83)
	241 to 280 (466 to 536)	50 (0.75)	55 (0.83)	60 (0.9)
Horizontal	-10 to 200 (14 to 392)	35 (0.53)	55 (0.83)	75 (1.13)
	201 to 240 (394 to 464)	55 (0.83)	65 (0.98)	80 (1.2)
	241 to 280 (466 to 536)	75 (1.13)	80 (1.2)	85 (1.28)
Vertical	-10 to 200 (14 to 392)	60 (0.9)	80 (1.2)	100 (1.5)
	201 to 240 (394 to 464)	80 (1.2)	90 (1.35)	105 (1.58)
	241 to 280 (466 to 536)	100 (1.5)	105 (1.58)	110 (1.65)
The maximum measuring range, or the information regarding the MWP and OPL, applies for the maximum process pressure.				

Calculation example:
Horizontal orientation, process temperature is 230 °C (446 °F), ambient temperature is max. 35 °C (95 °F).
Result: minimum process pressure 65 $mbar_{abs}$ (0.98 psi_{abs}).

Mechanical construction

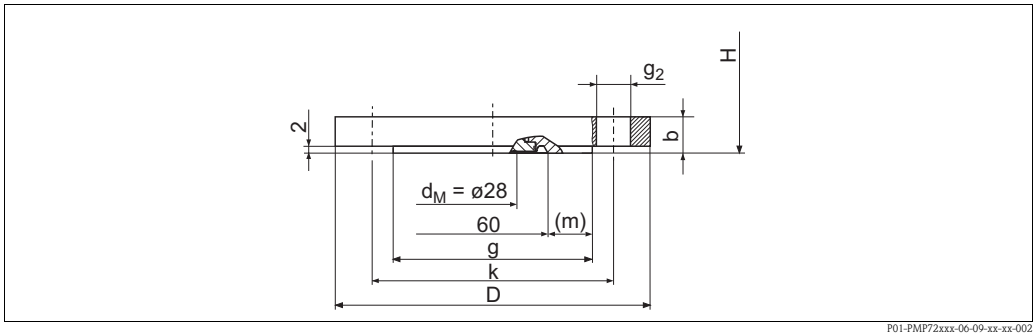
Dimensions of T14 housing, optional display on the side



Front view, left-hand side view, top view
→ Installation height H, see process connection in question. Housing weight → 📄 23.

Process connections

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



EN/DIN flange with raised face, material AISI 316L

H: device height = 311 mm (12.2 in)

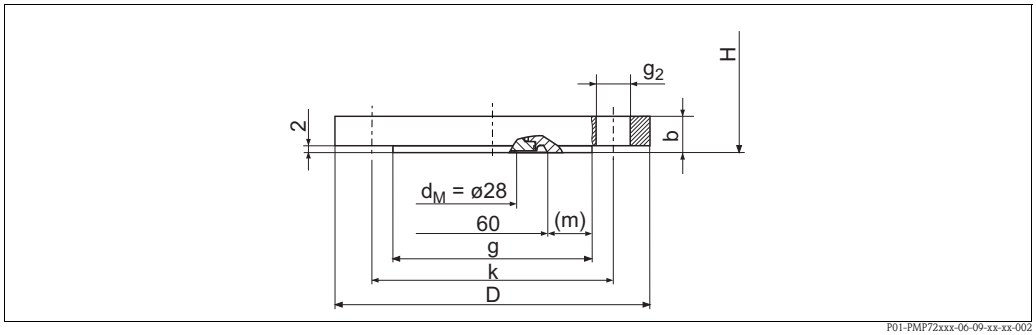
	Flange							Boltholes			
Version	**Nominal diameter**	**Nominal pressure**	**Shape** [1]	**Dia-meter D** [mm]	**Thick-ness b** [mm]	**Raised face g** [mm]	**Width of raised face (m)** [mm]	**Quantity**	**Diameter g_2** [mm]	**Hole circle k** [mm]	**Flange weight** [2] [kg]
CN	DN 25	PN 10-40	B1 (D)	115	18	68 [3]	4	4	14	85	2.3
B3	DN 50	PN 10-40	B1 (D)	165	20	-	21	4	18	125	4.1
B4	DN 80	PN 10-40	B1 (D)	200	24	-	39	8	18	160	6.5

1) Designation as per DIN 2527 in brackets

2) Housing weight → 📄 23

3) With these process connections the raised face is smaller than described in the standard. Due to a smaller raised face a special seal must be used. Refer to a manufacturer of seals or your local Endress+Hauser Sales Center.

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



ANSI flange with raised face RF (see table below)

H: device height = 311 mm (12.2 in)

	Flange							Boltholes			
Version	**Material**	**Nominal diameter**	**Class/ nominal pressure**	**Diameter** **D** [in (mm)]	**Thickness** **b** [in (mm)]	**Diameter of raised face** **g** [in (mm)]	**Width of raised face** **(m)** [in (mm)]	**Quantity**	**Diameter** **g_2** [in (mm)]	**Hole circle** **k** [in (mm)]	**Flange weight** [1] [kg]
ANSI flanges											
AF	AISI 316/316L [2]	2 in	150 lb./sq.in	6 (152.4)	0.75 (19.1)	3.62 (91.9)	0.63 (16)	4	0.75 (19.1)	4.75 (120.7)	3.5
AG	AISI 316/316L [2]	3 in	150 lb./sq.in	7.5 (190.5)	0.94 (23.9)	5 (127)	1.34 (34)	4	0.75 (19.1)	6 (152.4)	6

1) Housing weight → 🖹 23

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

Weight

Housing

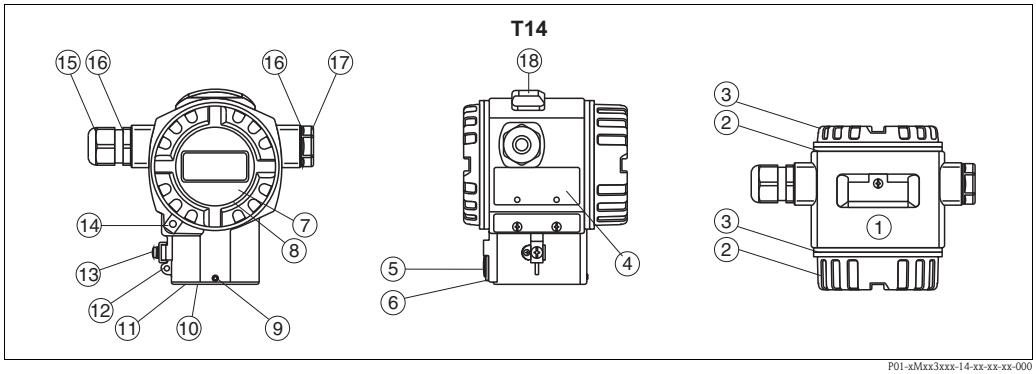
	Aluminum	AISI 316L
With electronic insert and display	1.2 kg (2.65 lbs)	2.1 kg (4.63 lbs)

Process connections

→ 🖹 22 ff

Material (not wetted)

Housing



Front view, left-hand side view, top view

Item number	Component part	Material
1	T14 housing, RAL 5012 (blue)	Die-cast aluminum with protective powder-coating on polyester base
	T14 housing	Precision cast AISI 316L (1.4435)
2	Cover, RAL 7035 (gray)	Die-cast aluminum with protective powder-coating on polyester base
	Cover	Precision cast AISI 316L (1.4435)
3	Cover seal	EPDM
4	Nameplates	AISI 304 (1.4301)
5	Pressure compensation filter	PA6 GF10
6	Pressure compensation filter, O-ring	Silicone (VMQ)
7	Sight glass	Mineral glass
8	Sight glass seal	Silicone (VMQ)
9	Screw	A4
10	Sealing ring	EPDM
11	Snap ring	PA66-GF25
12	Snap ring for nameplates	AISI 304 (1.4301)/ AISI 316 (1.4401)
13	External ground terminal	AISI 304 (1.4301)
14	Cover clamp	Clamp AISI 316L (1.4435), screw A4
15	Cable gland	Polyamide (PA)
16	Seal of cable gland and blind plug	Silicone (VMQ)
17	Blind plug	PBT-GF30 FR, for dust ignition-proof: AISI 316L (1.4435)
18	External operation (keys and key cover), RAL 7035 (gray)	Polycarbonate PC-FR, screw A4

Filling oil

High-temperature oil, silicone

Miscellaneous

Connection between the process connection and housing: AISI 316L (1.4404).

Material (wetted)

Process-wetted device components are listed in the "Mechanical construction" (→ 📄 22) and "Ordering information" (→ 📄 31) sections.

Process connections

- ANSI and DIN/EN flanges (see also "Ordering information" section):
  Stainless steel 316L with material number 1.4435 or 1.4404
  (With regard to their stability-temperature property, the materials 1.4435 and 1.4404 are grouped together under 13E0 in EN 1092-1: 2001 Tab. 18. The chemical composition of the two materials can be identical.)

Process isolating diaphragm

AISI 316L (1.4435)

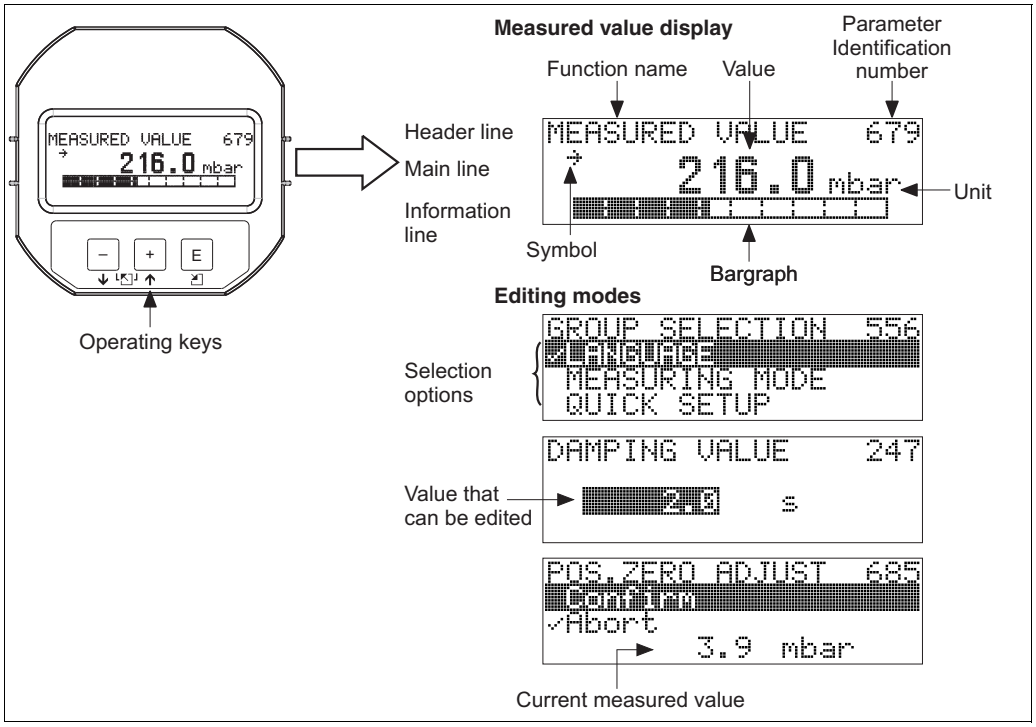
Human interface

Operating elements

Onsite display (optional)

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

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

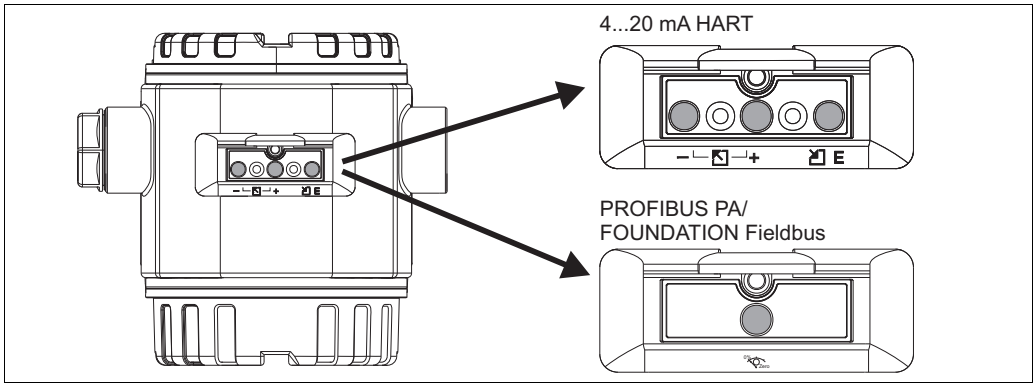


P01-xxxxxxxx-07-xx-xx-en-011

Operating elements

Operating keys on the exterior of the device

With the T14 housing (aluminum or stainless steel), the operating keys are located either outside of the housing, under the protection cap or inside on the electronic insert.

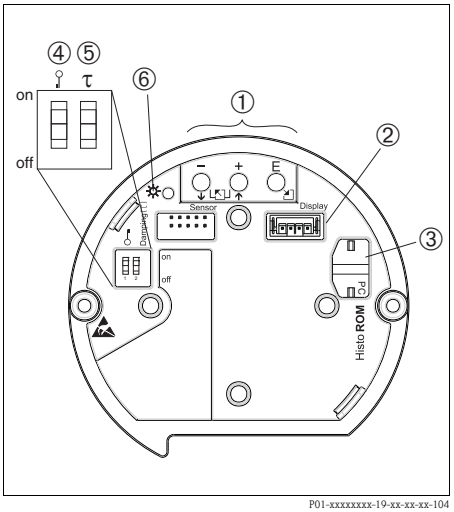


P01-PMx7xxxx-19-xx-xx-xx-038

The operating keys located externally on the device work on the Hall sensor principle. As a result, no additional openings are required in the device. This guarantees:

- Complete protection against environmental influences such as moisture and contamination.
- Simple operation without any tools.
- No wear.

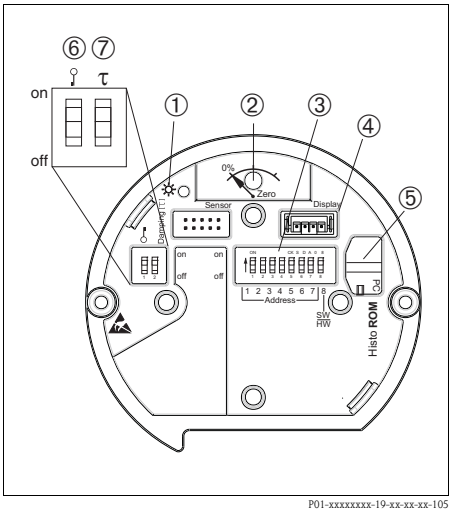
Operating keys and elements located internally on the electronic insert



P01-xxxxxxxx-19-xx-xx-xx-104

Electronic insert HART

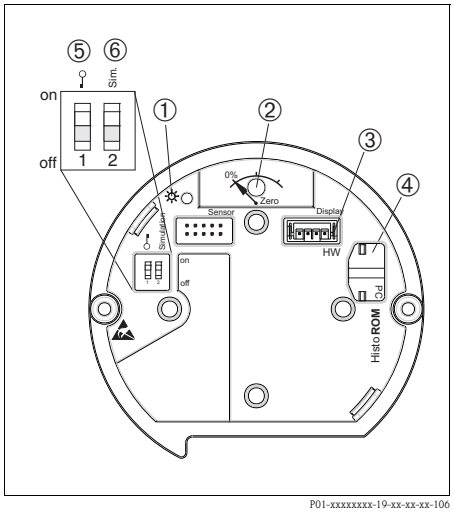
1 *Operating keys*
2 *Slot for optional display*
3 *Slot for optional HistoROM®/M-DAT*
4 *DIP-switch for locking/unlocking parameters relevant to the measured values*
5 *DIP-switch for damping on/off*
6 *Green LED to indicate value being accepted*



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

Electronic insert PROFIBUS PA

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



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

Electronic insert FOUNDATION Fieldbus

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

Local operation

Function	External operation (operating keys, optional)	Internal operation (electronic insert)	Display (optional)
Position adjustment (zero point correction)	X	X	X
Setting lower-range value and upper-range value - reference pressure present at the device	X (HART only)	X (HART only)	X
Device reset	X	X	X
Locking and unlocking parameters relevant to the measured value	---	X	X
Value acceptance indicated by green LED	X	X	X
Switching damping on and off	---	X (HART and PA only)	X
Setting bus address (PA)	---	X	X
Switching simulation mode on and off (FOUNDATION Fieldbus)	---	X	X

Remote operation

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

HART

Remote operation via:
- Handheld terminal Field Communicator 375 (see "Hardware and software for onsite and remote operation" section → 🖹 28)
- FieldCare (see "Hardware and software for onsite and remote operation" section → 🖹 28 ff) with
  - Commubox FXA191 (see "Hardware and software for onsite and remote operation" section → 🖹 28 ff)
  - Commubox FXA195 (see "Hardware and software for onsite and remote operation" section → 🖹 28 ff)
- Field Xpert:
  Field Xpert is an industrial PDA with integrated 3.5" touchscreen from Endress+Hauser based on Windows Mobile. It communicates via wireless with the optional VIATOR Bluetooth modem connected to a HART device point-to-point or wireless via WiFi and Endress+Hauser's Fieldgate FXA520. Field Xpert also works as a stand-alone device for asset management applications. For details, refer to BA060S/04/EN.

PROFIBUS PA

Remote operation via:
- FieldCare (see "Hardware and software for onsite and remote operation" section → 🖹 28 ff)
  - Profiboard: For connecting a PC to PROFIBUS
  - Proficard: For connecting a laptop to PROFIBUS

FOUNDATION Fieldbus

Remote operation via:
- Handheld terminal Field Communicator 375 (see "Hardware and software for onsite and remote operation" section → 🖹 28 ff)
- 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

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

Hardware and software for onsite and remote operation

Commubox FXA191

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

Commubox FXA195

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

Commubox FXA291

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

Note!
For the PMP72, you also need the "ToF adapter FXA291" accessory.

ToF adapter FXA291

The ToF adapter FXA291 connects the Commubox FXA291 with devices of the ToF platform, pressure equipment and the Gammapilot via the USB port of a computer or laptop. For details refer to KA271F.

Field Communicator 375

With a handheld terminal, all the parameters can be configured anywhere along the bus line via menu operation.

HistoROM®/M-DAT (optional)

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

Your benefits

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

HistoROM®/M-DAT can be ordered via feature 100 "Additional option 1" or feature 110 "Additional option 2" or as a spare part. → 31 ff. A CD with an Endress+Hauser operating program is also included in the scope of delivery.
You can copy data from one transmitter to another transmitter when operating a FOUNDATION Fieldbus device via an FF configuration program. You need the Endress+Hauser FieldCare operating program and the Commubox FXA291 service interface and the ToF adapter FXA291 to be able to access the data and events saved in the HistoROM®/M-DAT.
FieldCare and the service interface Commubox FXA291 and the ToF adapter FXA291.

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 FXA191 and the RS232C serial interface of a computer
- HART via Commubox FXA195 and the USB port on a computer
- PROFIBUS PA via segment coupler and PROFIBUS interface card
- FOUNDATION Fieldbus via Commubox FXA193 and the RS 232 C serial interface of a computer
- Service interface with Commubox FXA291 and ToF adapter FXA291 (USB).

For further information → www.endress.com

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

- ATEX
- FM
- CSA
- NEPSI
- IECEx
- Also combinations of approvals

All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas.
→ 33 ff, "Safety Instructions" and "Installation/Control Drawings" sections.

Functional safety SIL/ IEC 61508 Declaration of Conformity (optional)

The Cerabar S devices with a 4 to 20 mA output signal have been developed in accordance with the IEC 61508 standard. These devices can be used to monitor the process level and pressure up to SIL 3.
For a detailed description of the safety functions with Cerabar S, settings and functional safety data, see the "Functional safety manual – Cerabar S" SD190P.
For devices up to SIL 3 / IEC 61508 Declaration of Conformity, see → 31 ff, feature 100 "Additional option 1" and feature 110 "Additional option 2" version E "SIL / IEC 61508 Declaration of Conformity".

Pressure Equipment Directive (PED)

The 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.

Standards and guidelines

DIN EN 60770 (IEC 60770):
Transmitters for use in industrial-process control systems
Part 1: Methods for performance evaluation

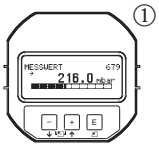
DIN 16086:
Electrical pressure measuring instruments, pressure sensors, pressure transmitters, pressure measuring instruments,
concepts, specifications on data sheets

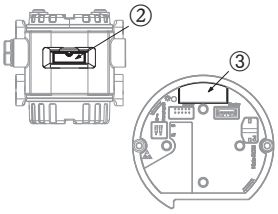
EN 61326-X:
EMC product family standard for electrical equipment for measurement, control and laboratory use.

Ordering information

PMP72

This overview does not mark options which are mutually exclusive.





10	**Approval:**						
	A	For non-hazardous areas					
	1	ATEX II 1/2 G Ex ia IIC T6					
	2	ATEX II 1/2 D					
	4	ATEX II 1/3 D					
	8	ATEX II 1 GD Ex ia IIC T6					
	3	ATEX II 1/2 GD Ex ia IIC T6					
	7	ATEX II 3 G Ex nA II T6					
	S	FM IS, Class I, II, III Division 1, Groups A – G; NI Class I Division 2, Groups A – D; AEx ia; Zone 0,1,2,20,21,22					
	Q	FM DIP, Class II, III Division 1, Groups E – G; Zone 21,22					
	R	FM NI, Class I, Division 2, Groups A – D; Zone 2					
	U	CSA IS, Class I, II, III Division 1, Groups A – G; Class I Division 2, Groups A – D, Ex ia; Zone 0,1,2					
	W	CSA Class II, III Division 1, Groups E – G (Dust-Ex)					
	H	NEPSI Ex ia IIC T6					
	I	IECEx Zone 0/1 Ex ia IIC T6					

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

30			**Housing; Cable entry; Protection:**				
	A	Aluminum T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, Gland M 20x1.5					
	B	Aluminum T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, Thread G 1/2					
	C	Aluminum T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, Thread 1/2 NPT					
	D	Aluminum T14 housing, optional display on the side, IP66/67/NEMA 4X/ 6P, M 12x1 PA plug,					
	E	Aluminum T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, 7/8" FF plug					
	F	Aluminum T14 housing, optional display on the side, IP 65/NEMA 4X, Han7D plug, 90°					
	1	AISI 316L T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, Gland M 20x1.5					
	2	AISI 316L T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, Thread G 1/2					
	3	AISI 316L T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, Thread 1/2 NPT					
	4	AISI 316L T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, M 12x1 PA plug					
	5	AISI 316L T14 housing, optional display on the side, IP 66/67/NEMA 4X/ 6P, 7/8" FF plug					
	6	AISI 316L T14 housing, optional display on the side, IP 65/NEMA 4X, Han7D plug, 90°					

40				**Sensor range; Sensor over pressure limit (= OPL):**			
				Sensors for absolute pressure			
					Sensor rated value (URL)	**OPL (over pressure limit)**	
				2F	0.4 bar/40 kPa/6 psi abs	6 bar/600 kPa/90 psi abs	
				2H	1 bar/100 kPa/15 psi abs	10 bar/1 MPa/150 psi abs	

50					**Calibration; Unit:**		
					1	Sensor range; mbar/bar	
					2	Sensor range; kPa/MPa	
					3	Sensor range; mmH_2O/mH_2O	
					4	Sensor range; inH_2O/ftH_2O	
					6	Sensor range; psi	
					E	Customer-specific pressure; see additional specification	
					F	Customer-specific level; see additional specification	
					H	Customer-specific pressure + 5-point factory calibration certificate; see additional specification	
					I	Customer-specific level + 5-point factory calibration certificate; see additional specification	

60						**Material of the process isolating diaphragm:**	
						1	AISI 316L

PMP72 (continued)

70		**Process connection; Material:**
		EN/DIN flanges, flush-mounted process isolating diaphragm
	CN	DN 25 PN 10-40 B1, AISI 316L
	B3	DN 50 PN 10-40 B1, AISI 316L
	B4	DN 80 PN10-40 B1, 316L, flush-mounted
		ANSI flanges, flush-mounted process isolating diaphragm
	AF	2" 150 lbs RF, AISI 316/316L (CRN)
	AG	3" 150 lbs RF, AISI 316/316L (CRN)

90		**Fill fluid:**
	U	High-temperature oil, silicone

100		**Additional option 1:**
	A	Not selected
	B	Material test certificate for wetted components, inspection certificate as per EN 10204 3.1 acc. to specification 52005759
	C	NACE MR0175 (wetted parts)
	D	Material test certificate for wetted components as per EN 10204 3.1 and NACE MR0175 material, inspection certificate as per EN 10204 acc. to specification 52010806
	E	SIL Declaration of Conformity
	M	Overvoltage protection
	N	HistoROM/M-DAT
	3	Routine test with certificate, inspection certificate as per EN 10204 3.1

110		**Additional option 2:**
	A	Not selected
	E	SIL Declaration of Conformity
	M	Overvoltage protection
	N	HistoROM/M-DAT
	3	Individual testing with test certificate, inspection certificate as per EN10204 3.1
	5	Helium leak test EN 1528 with test certificate, inspection certificate as per EN 10204 3.1

995		**Identification:**
	1	Measuring point TAG, see additional specification
	2	Bus address, see additional specification

Additional documentation

Field of Activities

- Pressure measurement, powerful instruments for process pressure, differential pressure, level and flow: FA004P/00/EN

Technical Information

- Cerabar S: TI383P/00/EN
- Deltabar S: TI382P/00/EN
- Deltapilot S: TI416P/00/EN
- EMC test procedures TI241F/00/EN

Operating Instructions

4 to 20 mA HART:
- Cerabar S: BA271P/00/EN
- Description of device functions Cerabar S/Deltabar S/Deltapilot S: BA274P/00/EN

PROFIBUS PA:
- Cerabar S: BA295P/00/EN
- Description of device functions Cerabar S/Deltabar S/Deltapilot S: BA296P/00/EN

FOUNDATION Fieldbus:
- Cerabar S: BA302P/00/EN
- Description of device functions Cerabar S/Deltabar S/Deltapilot S: BA303P/00/EN

Brief Operating Instructions

- 4 to 20 mA HART, Cerabar S: KA1019P/00/EN
- PROFIBUS PA, Cerabar S: KA1022P/00/EN
- FOUNDATION Fieldbus, Cerabar S: KA1025P/00/EN

Functional safety manual (SIL)

- Cerabar S (4 to 20 mA): SD190P/00/EN

Safety Instructions

Certificate/type of protection	Electronics	Documentation	Version in the order code
ATEX II 1/2 G Ex ia IIC T6	– 4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA244P	1
ATEX II 1/2 D	– 4 to 20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– XA246P – XA289P	2
ATEX II 1/2 D Ex ia IIC	– 4 to 20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– XA247P – XA290P	2
ATEX II 1/3 D	– 4 to 20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– XA248P – XA291P	4
ATEX II 3 G Ex nA II T6	– 4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA251P	7
ATEX II 1/2 GD Ex ia IIC T6	– 4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA253P	3
ATEX II 1 GD Ex ia IIC T6	– 4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XA276P	8

Certificate/type of protection	Electronic insert	Documentation	Version in the order code
IECEx Zone 0/1 Ex ia IIC T6	– 4 to 20 mA HART	– XB005P	I

Certificate/type of protection	Electronic insert	Documentation	Version in the order code
NEPSI Ex ia IIC T6	– 4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	– XC003P	H

Installation/Control Drawings

Certificate/type of protection	Electronics	Documentation	Version in the order code
FM IS Class I, II, III, Division 1, Groups A – G; NI, Class I Division 2, Groups A – D; AEx ia	– 4 to 20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– ZD147P – ZD188P	S
CSA IS Class I, II, III, Division 1, Groups A – G; Class I Division 2, Groups A – G	– 4 to 20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– ZD148P – ZD189P	U
CSA +XP Class I Division 1, Groups B - D, Class II Division 1, Groups E - G, Class III	– 4 to 20 mA HART – PROFIBUS PA, FOUNDATION Fieldbus	– Under development	V

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
info@ii.endress.com

Endress+Hauser
People for Process Automation

TI438P/00/EN/05.10
No 71114110
CSS/FM+SGML 6.0

71114110