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01.00.zz

Operating Instructions
Cerabar M
PMC51, PMP51, PMP55

Process pressure measurement
Analog

Endress+Hauser
People for Process Automation

Make sure the document is stored in a safe place such that it is always available when working on or with the device.
To avoid danger to individuals or the facility, read the "Basic safety instructions" section carefully, as well as all other safety instructions in the document that are specific to working procedures.
The manufacturer reserves the right to modify technical data without prior notice. Your Endress+Hauser distributor will supply you with current information and updates to this manual.

Contents

1 About this document

1.1 Document function

These Operating Instructions contain all the information that is required in the various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

1.2 Symbols

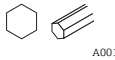
1.2.1 Safety symbols

Symbol	Meaning
DANGER A0011189-EN	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
WARNING A0011190-EN	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
CAUTION A0011191-EN	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE A0011192-EN	**NOTE!** This symbol contains information on procedures and other circumstances that do not result in personal injury.

1.2.2 Electrical symbols

Symbol	Meaning	Symbol	Meaning
⎓	Direct current	~	Alternating current
⎓ ~	Direct current and alternating current	⏚	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
⏚	**Protective ground connection** A terminal that must be connected to the ground prior to establishing any other connections.	⏚	**Equipotential connection** A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.

1.2.3 Tool symbols

Symbol	Meaning
 A0011221	Allen key
 A0011222	Open-ended wrench

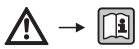
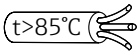
1.2.4 Symbols for certain types of Information

Symbol	Meaning
 A0011182	**Permitted** Indicates procedures, processes or actions that are allowed.
 A0011184	**Not permitted** Indicates procedures, processes or actions that are forbidden.
 A0011193	**Tip** Indicates additional information.
 A0015482	Reference to documentation
 A0015484	Reference to page.
 A0015487	Reference to graphic
1. , 2. , ...	Series of steps
 A0018343	Result of a series of actions
 A0015502	Visual check

1.2.5 Symbols in graphics

Symbol	Meaning
1, 2, 3, 4 etc.	Numbering of main items
1. , 2. , ...	Series of steps
A, **B**, **C**, **D** etc.	Views

1.2.6 Symbols on device

Symbol	Meaning
 A0019159	**Safety notice** Observe the safety instructions contained in the associated operating instructions.
	**Temperature resistance of the connecting cables** Indicates that the connecting cables must be able to withstand temperatures of at least 85 °C.

1.2.7 Registered Trademarks

KALREZ®
Registered label of E.I. Du Pont de Nemours & Co., Wilmington, USA

TRI-CLAMP®
Registered label of Ladish & Co., Inc., Kenosha, USA

GORE-TEX®
Trademark of W.L. Gore & Associates, Inc., USA

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel responsible for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
- Trained, qualified specialists must have a relevant qualification for this specific function and task
- They must be authorized by the plant operator
- They must be familiar with national regulations
- Before beginning work, the specialist staff must have read and understood the instructions in the manuals and supplementary documentation as well as in the certificates (depending on the application)
- They must follow instructions and comply with basic conditions

The operating personnel must fulfill the following requirements:
- Are instructed and authorized according to the requirements of the task by the facility's owner-operator
- They must follow the instructions in these Operating Instructions

2.2 Designated use

The Cerabar M is a pressure transmitter for measuring pressure and level.

2.2.1 Incorrect use

The manufacturer is not liable for damage caused by improper or non-designated use.
Clarification for borderline cases:
In the case of special fluids and fluids used for cleaning, Endress+Hauser is glad to provide assistance in clarifying the corrosion resistance of wetted materials, but does not accept any warranty or liability.

2.3 Workplace safety

When working on and with the device:
- Wear the required personal protective equipment as per national regulations.
- Switch off the supply voltage before connecting the device.

2.4 Operational safety

Risk of injury!
- ▶ Operate the device only if it is in proper technical condition, free from errors and faults.
- ▶ The operator is responsible for ensuring that the device is in good working order.

Modifications to the device
Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers:
- ▶ If, despite this, modifications are required, consult with Endress+Hauser.

Repair
To ensure continued operational safety and reliability:
- ▶ Carry out repairs on the device only if they are expressly permitted.
- ▶ Observe federal/national regulations pertaining to the repair of an electrical device.
- ▶ Use original spare parts and accessories from Endress+Hauser only.

2.5 Hazardous area

To eliminate danger to persons or the installation when the device is used in the hazardous area (e.g. explosion protection, pressure vessel safety):

- Check the nameplate to determine whether the ordered device can be used for the intended
  application in the hazardous area.
- Observe the instructions in the separate supplementary documentation, which is an integral part of this manual.

2.6 Product security

This measuring instrument is designed in accordance with good engineering practice to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. It meets general safety standards and legal requirements. It also conforms to the EC directives listed in the device-specific EC Declaration of Conformity. Endress+Hauser confirms this by affixing the CE mark to the device.

3 Identification

3.1 Product identification

The measuring instrument can be identified in the following ways:
- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter the serial number from the nameplates in W@M Device Viewer (www.endress.com/deviceviewer): All the information about the measuring instrument is displayed.

For an overview of the technical documentation provided, enter the serial number from the nameplates in W@M Device Viewer (www.endress.com/deviceviewer).

3.1.1 Manufacturer's address

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg, Germany
Address of the manufacturing plant: See nameplate

3.2 Device designation

3.2.1 Nameplate

Different nameplates are used depending on the device version.

The nameplates contain the following information:
- Manufacturer name and device name
- Address of the certificate holder and country of manufacture
- Order code and serial number
- Technical data
- Approval-specific information

Compare the data on the nameplate with your order.

3.3 Scope of delivery

The scope of delivery comprises:
- Measuring instrument
- Optional accessories

Documentation supplied:
- Operating Instructions BA00385P are available on the Internet.
  → See: www.de.endress.com → Download
- Brief Operating Instructions: KA01036P
- Final inspection report
- Optional: factory calibration certificate, test certificates

3.4 CE mark, Declaration of Conformity

The devices are designed to meet state-of-the-art safety requirements, have been tested and left the factory in a condition in which they are safe to operate. The device complies with the applicable standards and regulations as listed in the EC declaration of conformity and thus complies with the statutory requirements of the EC Directives.
Endress+Hauser confirms the successful testing of the device by affixing to it the CE mark.

4 Installation

4.1 Incoming acceptance

- Check the packaging and contents for any signs of damage.
- Check the shipment, make sure nothing is missing and that the scope of supply matches your order.

4.2 Storage and transport

4.2.1 Storage

The measuring instrument must be stored in a dry, clean area and protected against damage from impact (EN 837-2).
Storage temperature range:
See the Technical Information for Cerabar M TI00436P.

4.2.2 Transport

⚠ WARNING
Incorrect transport
Housing, membrane and capillary may become damaged, and there is a risk of injury!
- ▶ Transport the measuring instrument to the measuring point in its original packaging or at the process connection.
- ▶ Observe the safety instructions and transport conditions for devices weighing more than 18 kg (39.6 lbs).
- ▶ Do not use capillaries as a carrying aid for the diaphragm seals.

4.3 Installation conditions

4.3.1 Installation dimensions

For dimensions, please refer to the Technical Information for Cerabar M TI00436P, "Mechanical construction" section.

4.4 General installation instructions

- Devices with a G 1 1/2 thread:
  When screwing the device into the tank, the flat seal has to be positioned on the sealing surface of the process connection. To avoid additional strain on the process membrane, the thread should never be sealed with hemp or similar materials.
- Devices with NPT threads:
  - Wrap Teflon tape around the thread to seal it.
  - Tighten the device at the hexagonal bolt only. Do not turn at the housing.
  - Do not overtighten the thread when screwing in. Max. torque: 20 to 30 Nm (14.75 to 22.13 lbf ft)
- For the following process connections, a tightening torque of max. 40 Nm (29.50 lbf ft) is specified:
  - Thread ISO228 G1/2 (Order option "GRC" or "GRJ" or "G0J")
  - Thread DIN13 M20 x 1.5 (Order option "G7J" or "G8J")

4.4.1 Mounting sensor modules with PVDF thread

⚠ WARNING

Risk of damage to process connection!

Risk of injury!

▶ Sensor modules with PVDF process connections with threaded connection must be installed with the mounting bracket provided!

⚠ WARNING

Material fatigue from pressure and temperature!

Risk of injury due to bursting of parts! The thread can become loose if exposed to high pressures and temperatures.

▶ The integrity of the thread must be checked regularly and the thread may need to be re-tightened to the maximum tightening torque of 7 Nm (5.16 lbf ft). Teflon tape is recommended for sealing the ½" NPT thread.

4.5 Installation

- Due to the orientation of the Cerabar M, a zero point shift may occur; i.e. when the container is empty, the measured value does not display zero. You can correct this zero point shift → 27, Kap. 6.1.2 "Function of the operating elements".
- For PMP55, please refer to Kap. 4.5.2 "Installation instructions for devices with diaphragm seals – PMP55", → 14.
- Endress+Hauser offers a mounting bracket for installations on pipes or walls. → 15, Kap. 4.5.5 "Wall and pipe mounting (optional)".

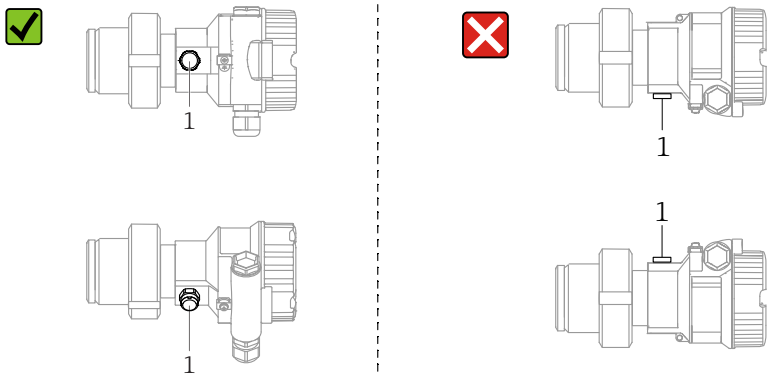
4.5.1 Installation instructions for devices without diaphragm seals – PMP51, PMC51

NOTICE

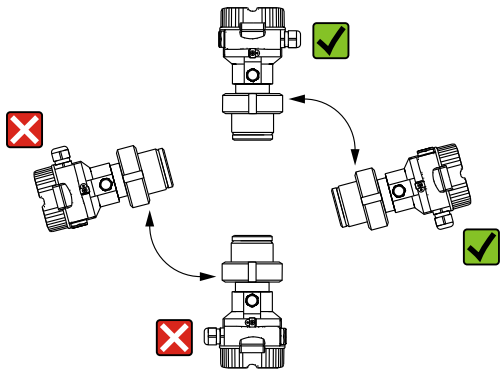
Damage to the device!

If a heated Cerabar M is cooled during the cleaning process (e.g. by cold water), a vacuum develops for a short time and, as a result, moisture can enter the sensor through the pressure compensation (1).

▶ Mount the device as follows.



- Keep the pressure compensation and GORE-TEX® filter (1) free from dirt.
- Cerabar M transmitters without diaphragm seals are mounted as per the norms for a manometer (DIN EN 837-2). We recommend the use of shutoff devices and siphons. The orientation depends on the measuring application.
- Do not clean or touch process membranes with hard or pointed objects.
- To comply with ASME-BPE requirements regarding cleanability (Part SD Cleanability), the device must be installed as follows:



Pressure measurement in gases

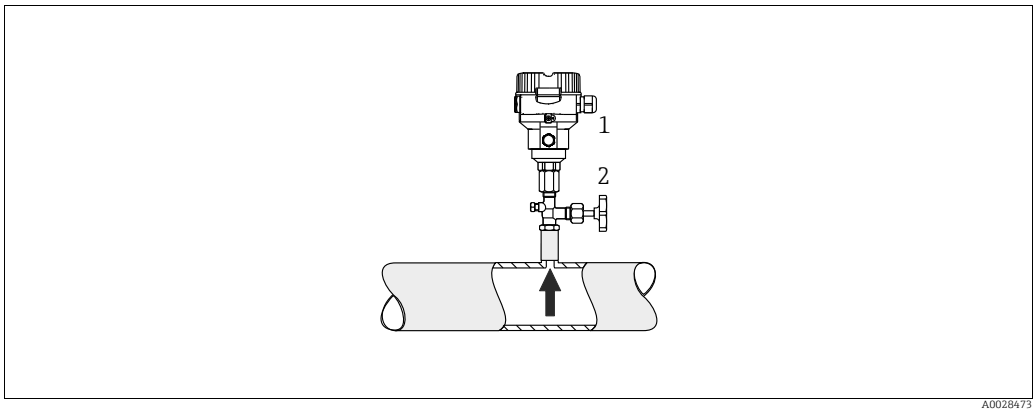


Fig. 1: Measuring arrangement for pressure measurement in gases

1 Cerabar M
2 Shutoff device

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

Pressure measurement in steam

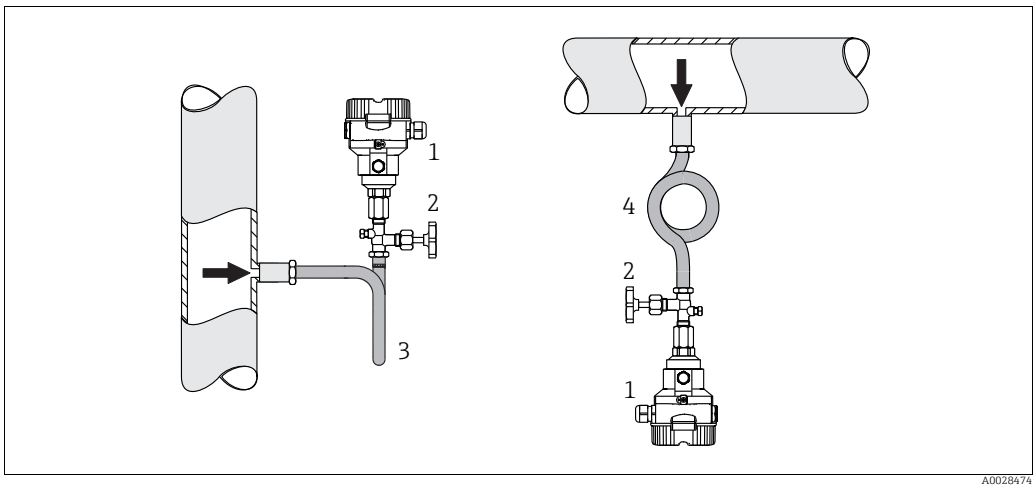


Fig. 2: Measuring arrangement for pressure measurement in steam

1 Cerabar M
2 Shutoff device
3 U-shaped siphon
4 Circular siphon

Observe the maximum permitted ambient temperature of the transmitter!

Installation:
- Preferably mount the device with an O-shaped siphon below the tapping point
  The device may also be mounted above the tapping point
- Fill the siphon with liquid before commissioning

Advantages of using siphons:
- Protection of the measuring instrument from hot, pressurized media caused by the formation and accumulation of condensate
- Damping of pressure shocks
- The defined water column only causes minimal (negligible) measurement errors and minimal (negligible) thermal effects on the device

For technical data (e.g. materials, dimensions or order numbers), see the accessory document SD01553P.

Pressure measurement in liquids

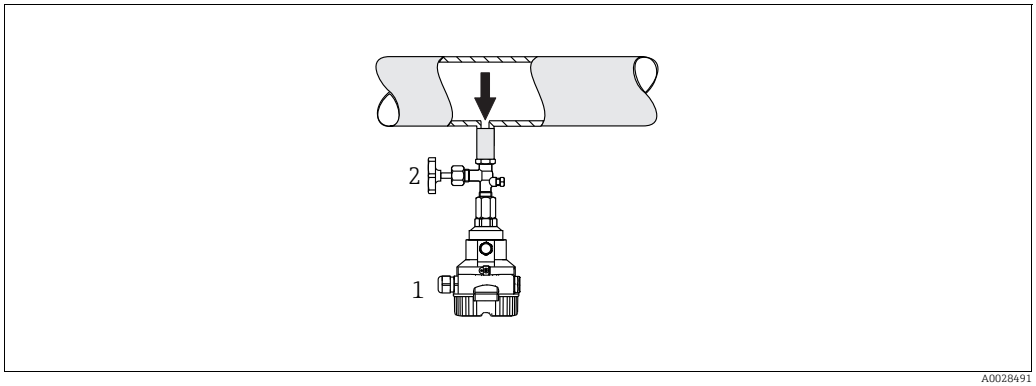


Fig. 3: Measuring arrangement for pressure measurement in liquids

1 Cerabar M
2 Shutoff device

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

Level measurement

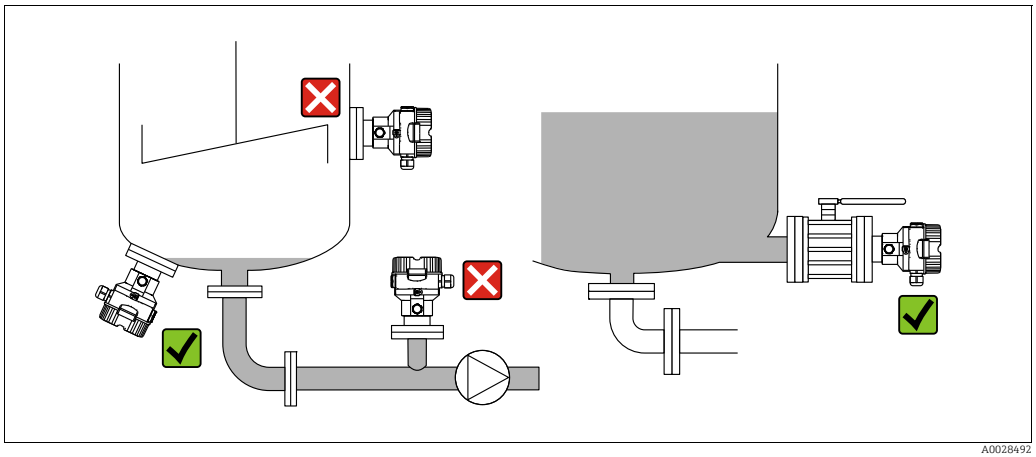


Fig. 4: Measuring arrangement for level

- Always install the Cerabar M below the lowest measuring point.
- Do not mount the device at the following positions: In the fill flow or at a point in the tank which could be affected by pressure pulses from an agitator.
- Do not mount the device in the suction area of a pump.
- The adjustment and functional test can be carried out more easily if you mount the device downstream of a shutoff device.

4.5.2 Installation instructions for devices with diaphragm seals – PMP55

- Cerabar M devices with diaphragm seals are screwed in, flanged or clamped, depending on the type of diaphragm seal.
- Please note that the hydrostatic pressure of the liquid columns in the capillaries can cause zero point shift. The zero point shift can be corrected.
- Do not clean or touch the process membrane of the diaphragm seal with hard or pointed objects.
- Do not remove the protection on the process membrane until just before installation.

NOTICE

Incorrect handling!

Damage to the device!

- ▶ The diaphragm seal and the pressure transmitter together form a closed, calibrated system which is filled with oil. The filling hole is sealed and should not be opened.
- ▶ When using a mounting bracket, sufficient strain relief must be ensured for the capillaries in order to prevent the capillary bending down (bending radius ≥ 100 mm (3.94 in)).
- ▶ Please observe the application limits of the diaphragm seal fill fluid as detailed in the Technical Information for Cerabar M TI00436P, "Planning instructions for diaphragm seal systems" section.

NOTICE

In order to obtain more precise measurement results and to avoid a defect in the device, mount the capillaries

- ▶ vibration-free (in order to avoid additional pressure fluctuations)
- ▶ Do not mount in the vicinity of heating or cooling lines
- ▶ Insulate the capillaries if the ambient temperature is below or above the reference temperature
- ▶ With a bending radius of ≥ 100 mm (3.94 in)
- ▶ Do not use the capillaries as a carrying aid for the diaphragm seals!

Vacuum application

See Technical Information.

Mounting with temperature isolator

See Technical Information.

4.5.3 Seal for flange mounting

NOTICE

Incorrect measurement results.

The seal is not allowed to press against the process membrane as this could affect the measurement result.

- ▶ Ensure that the seal is not touching the process membrane.

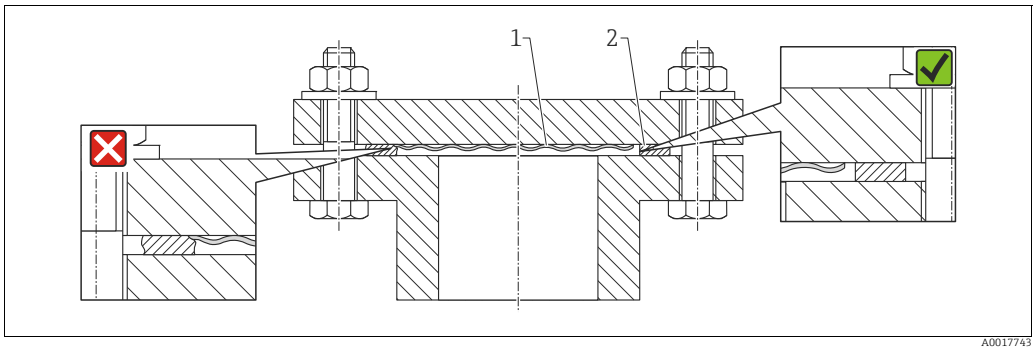


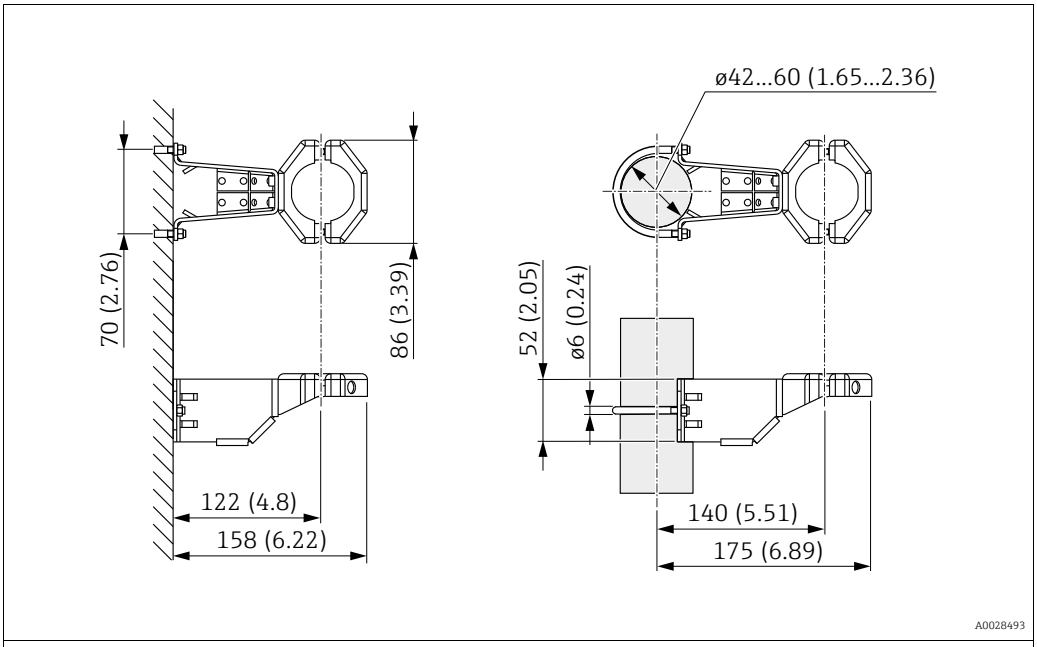
Fig. 5:
1 Process membrane
2 Seal

4.5.4 Thermal insulation – PMP55

See Technical Information.

4.5.5 Wall and pipe mounting (optional)

Endress+Hauser offers a mounting bracket for installations on pipes or walls (for pipe diameters from 1 ¼" to 2").



Unit mm (in)

Please note the following when mounting:
- Devices with capillaries: Mount capillaries with a bending radius of ≥ 100 mm (3.94 in).
- When mounting on a pipe, tighten the nuts on the bracket uniformly to a torque of at least 5 Nm (3.69 lbf ft).

4.5.6 Assembling and mounting the "separate housing" version

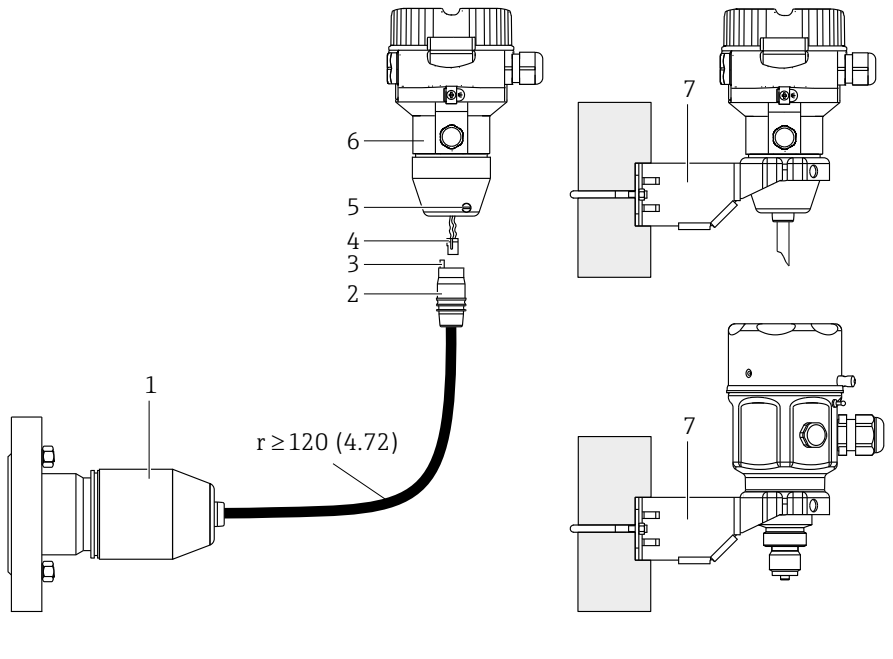


Fig. 6: "Separate housing" version

1 In the "separate housing" version, the sensor is supplied with process connection and cable fitted.
2 Cable with connection jack
3 Pressure compensation
4 Plug
5 Locking screw
6 Housing mounted with housing adapter, included
7 Mounting bracket provided, suitable for pipe and wall mounting (for pipe diameters from 1 ¼" to 2")

Unit mm (in)

Assembly and mounting

1. Connect plug (item 4) into the corresponding connection jack of the cable (item 2).
2. Plug the cable into the housing adapter (item 6).
3. Tighten the locking screw (item 5).
4. Mount the housing on a wall or pipe using the mounting bracket (item 7).
   When mounting on a pipe, tighten the nuts on the bracket uniformly to a torque of at least 5 Nm (3.69 lbf ft).
   Mount the cable with a bending radius (r) ≥ 120 mm (4.72 in).

Routing the cable (e.g. through a pipe)

You will need the cable shortening kit.
Order number: 71093286
For details on mounting, see SD00553P/00/A6.

4.5.7 PMP51, version prepared for diaphragm seal mount – welding recommendation

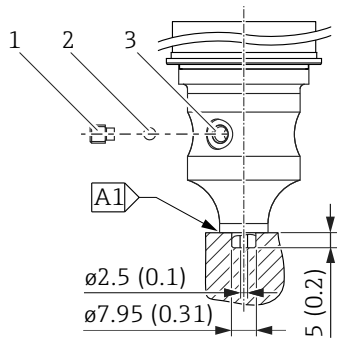
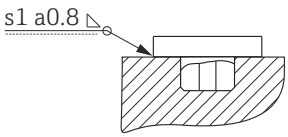


Fig. 7: Version XSJ: Prepared for diaphragm seal mount

1 Filling hole
2 Bearing
3 Threaded pin
A1 See the "Welding recommendation" table below

Unit mm (in)

Endress+Hauser recommends welding on the diaphragm seal as follows for the "XSJ - Vorbereitet für Druckmittleranbau" version in feature 110 "Prozessanschluss" in the order code up to and including 40 bar (600 psi) sensors: The total welding depth of the fillet weld is 1 mm (0.04 in) with an outer diameter of 16 mm (0.63 in). Welding is performed according to the WIG method.

Consecutive seam no.	Sketch/welding groove shape, dimension as per DIN 8551	Base material matching	Welding method DIN EN ISO 24063	Welding position	Inert gas, additives
A1 for sensors ≤ 40 bar (600 psi)		Adapter made of AISI 316L (1.4435) to be welded to diaphragm seal made of AISI 316L (1.4435 or 1.4404)	141	PB	Inert gas Ar/H 95/5 Additive: ER 316L Si (1.4430)

Information on filling

The diaphragm seal must be filled as soon as it has been welded on.

- After welding into the process connection, the sensor assembly must be properly filled with a fill fluid and sealed gas-tight with a sealing ball and lock screw.
  Once the diaphragm seal has been filled, the device display should not exceed 10% of the full scale value of the cell measuring range at the zero point. The internal pressure of the diaphragm seal must be corrected accordingly.
- Adjustment/calibration:
  - The device is operational once it has been fully assembled.
  - Perform a reset. The device must then be calibrated to the process measuring range as described in the Operating Instructions.

4.6 Closing the housing covers

NOTICE

Devices with EPDM cover seal - leaking transmitter!

Mineral-, animal- or plant-based lubricants cause the EPDM cover seal to swell and the transmitter to leak as a result.

- ▶ It is not necessary to grease the thread due to the coating applied to the thread at the factory.

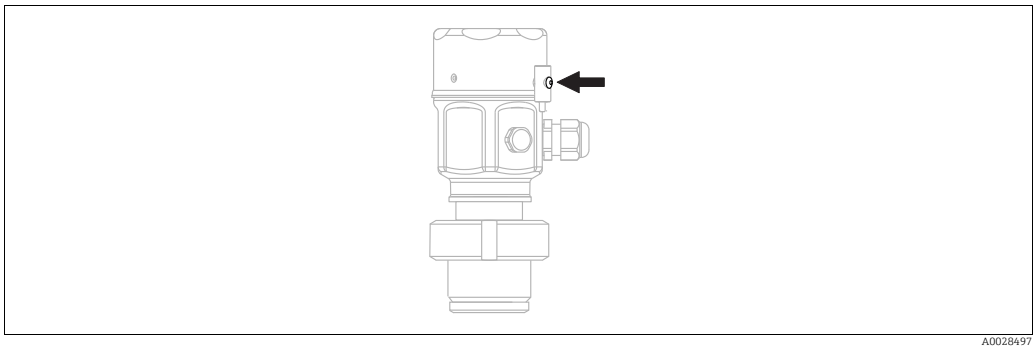
NOTICE

The housing cover can no longer be closed.

Damaged thread!

- ▶ When closing the housing cover, please ensure that the thread of the cover and housing are free from dirt, e.g. sand. If you encounter resistance when closing the covers, then check the threads again for dirt or fouling.

4.6.1 Closing the cover on the stainless steel housing



A0028497

Fig. 8: Closing the cover

The cover for the electronics compartment is tightened by hand at the housing as far as it will go. The screw serves as DustEx protection (only available for devices with DustEx approval).

4.7 Mounting the profiled seal for the universal process adapter

For details on mounting, see KA00096F/00/A3.

4.8 Post-installation check

O	Is the device undamaged (visual check)?
O	Does the device comply with the measuring point specifications? For example: ▪ Process temperature ▪ Process pressure ▪ Ambient temperature ▪ Measuring range
O	Are the measuring point identification and labeling correct (visual check)?
O	Is the device adequately protected against precipitation and direct sunlight?
O	Are the mounting screw and securing clamp securely tightened?

5 Electrical connection

5.1 Connecting the device

⚠ WARNING

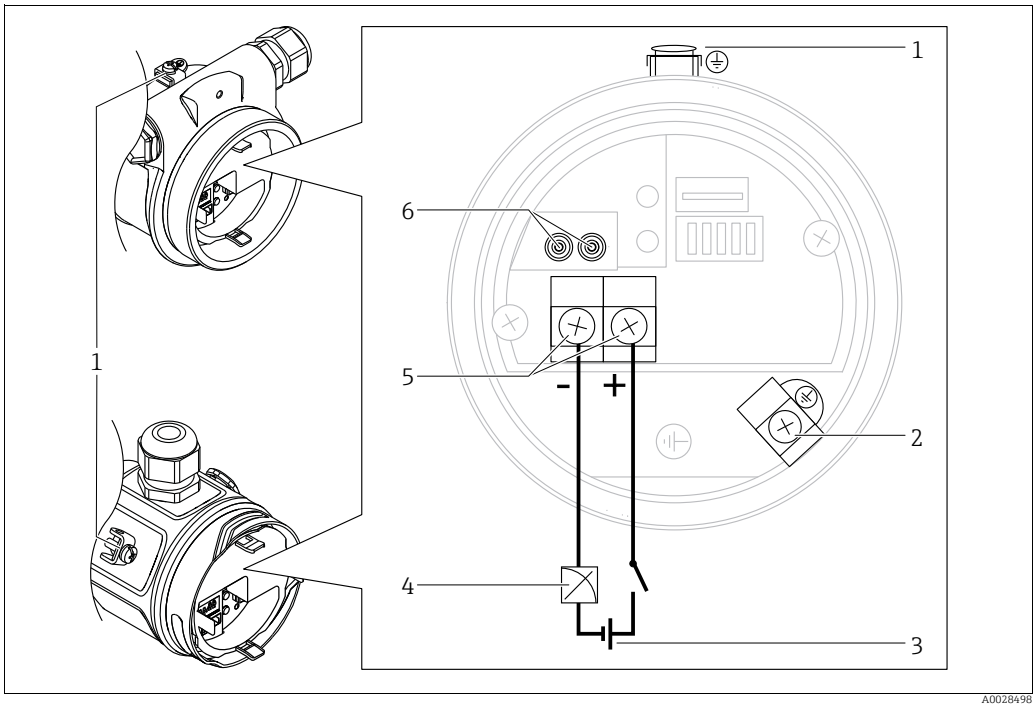
Supply voltage might be connected!

Danger of electric shock and/or explosion!

- Ensure that no uncontrolled processes are activated in the system.
- Switch off the supply voltage before connecting the device.
- When using the measuring instrument in hazardous areas, installation must also comply with the applicable national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- According to IEC/EN 61010, a suitable disconnector has to be installed for the device.
- Devices with integrated overvoltage protection must be grounded.
- Protective circuits against reverse polarity, HF influences, and overvoltage peaks are integrated.

Connect the device in the following order:

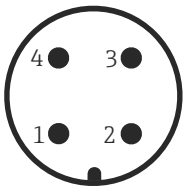
1. Check if the supply voltage matches the specified supply voltage on the nameplate.
2. Switch off the supply voltage before connecting the device.
3. Remove the housing cover.
4. Guide the cable through the gland. Preferably use twisted, shielded two-wire cable. Tighten the cable glands or cable entries so that they are leak-tight. Counter-tighten the housing entry. Use a suitable tool with width across flats SW24/25 (8 Nm (5.9 lbf ft) for the M20 cable gland.
5. Connect the device as indicated in the following diagram.
6. Screw down housing cover.
7. Switch on the supply voltage.



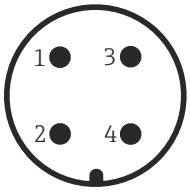
Electrical connection 4 to 20 mA

1 External grounding terminal
2 Internal grounding terminal
3 Supply voltage: 11.5 to 45 V DC (versions with plug-in connector 35 V DC)
4 4 to 20 mA
5 Terminals for supply and signal
6 Test terminals

5.1.1 Devices with M12 plug

PIN assignment for M12 plug	PIN	Meaning
	1	Signal +
	2	Not used
	3	Signal –
	4	Ground

5.1.2 Devices with 7/8" plug

PIN assignment for 7/8" plug	PIN	Meaning
	1	Signal –
	2	Signal +
	3	Not used
	4	Shielding

5.1.3 Connecting the cable version

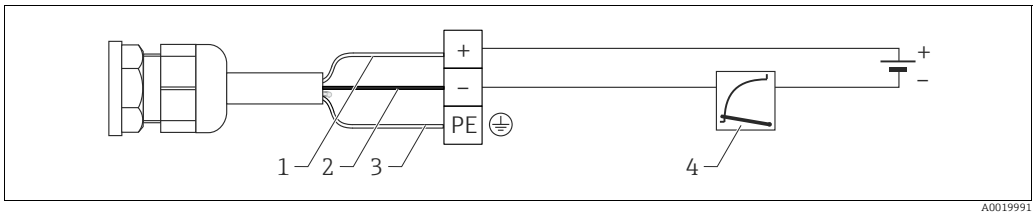


Fig. 9:

1 rd = red
2 bk = black
3 gnye = green
4 4 to 20 mA

5.2 Connecting the measuring unit

5.2.1 Supply voltage

Electronic version	
4 to 20 mA	11.5 to 45 V DC (versions with plug-in connector 35 V DC)

Taking 4 to 20 mA test signal

A 4 to 20 mA test signal may be measured via the test terminals without interrupting the measurement. To keep the corresponding measurement error below 0.1%, the current measuring device should exhibit an internal resistance of < 0.7 Ω.

5.2.2 Terminals

- Supply voltage and internal ground terminal: 0.5 to 2.5 mm^2 (20 to 14 AWG)
- External ground terminal: 0.5 to 4 mm^2 (20 to 12 AWG)

5.2.3 Cable specification

- Endress+Hauser recommends using twisted, shielded two-wire cables.
- Cable outer diameter: 5 to 9 mm (0.2 to 0.35 in) depending on the cable gland used (see Technical Information)

5.2.4 Load

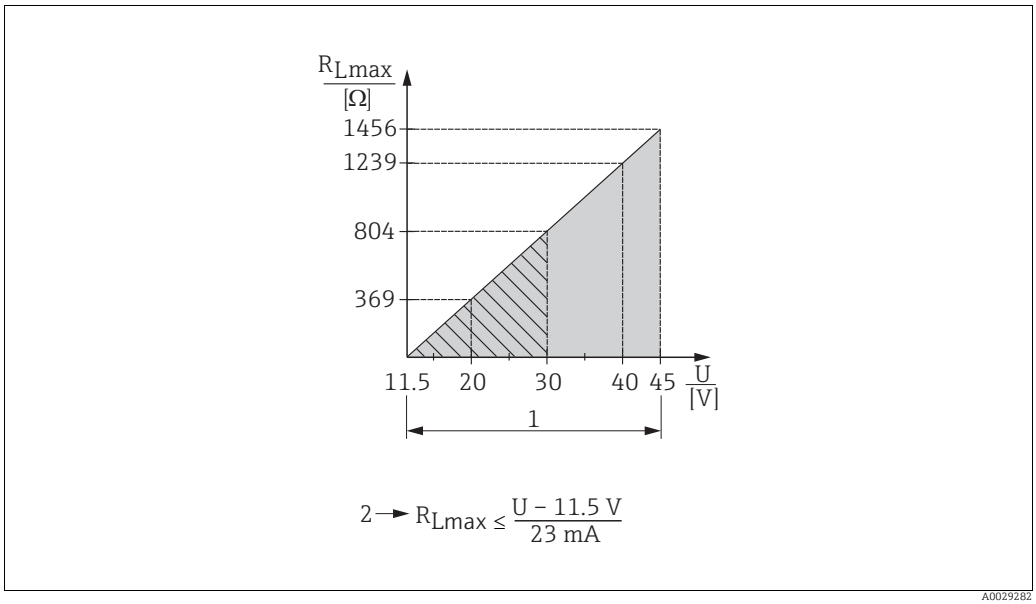


Fig. 10: Load diagram

1 Power supply 11.5 to 45 V DC (versions with plug-in connector 35 V DC) for other types of protection and for uncertified device versions
2 RLmax Maximum load resistance
U Supply voltage

5.2.5 Shielding/potential equalization

You can achieve optimum shielding against interference if the shielding is connected on both sides (in the control cabinet and on the device). If potential equalization currents are expected in the system, only ground the shielding on one side, preferably at the transmitter.

5.3 Potential equalization

Observe the applicable regulations.

5.4 Overvoltage protection (optional)

Devices showing version "NA" in feature 610 "Zubehör montiert" in the order code are equipped with overvoltage protection (see Technical Information in the "Ordering information" section). The overvoltage protection is mounted at the factory on the housing thread for the cable gland and is approx. 70 mm (2.76 in) long (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.

5.4.1 Wiring

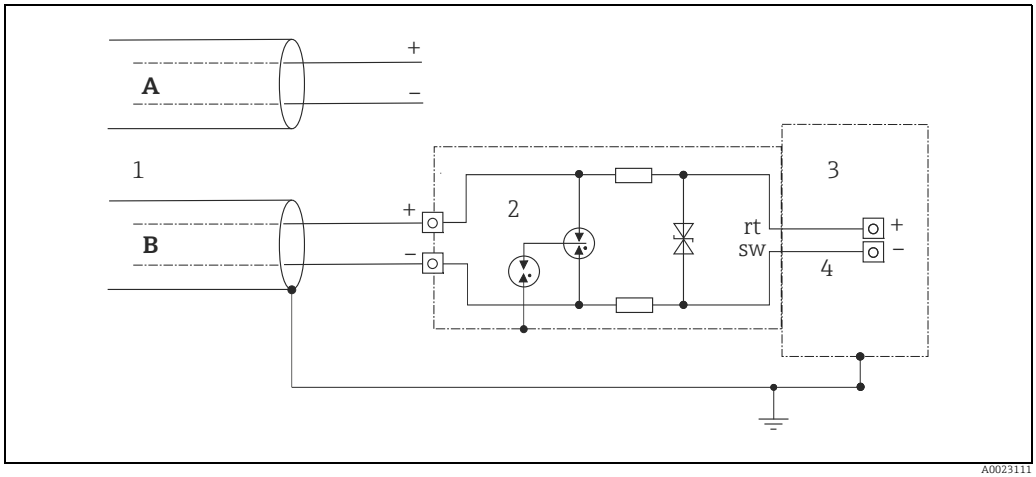


Fig. 11:

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

5.4.2 Installation

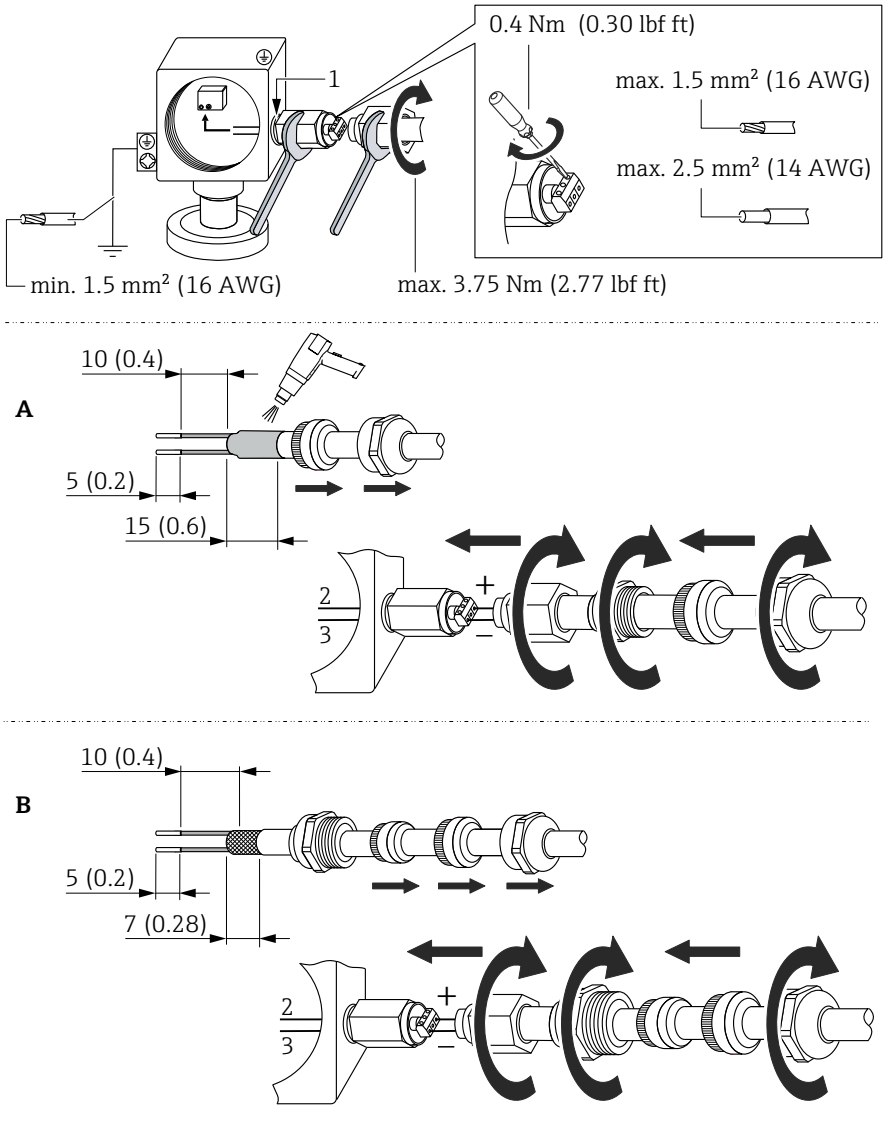


Fig. 12:

A	*Without shield grounding*
B	*With shield grounding*
1	*See NOTICE below*
2	*Red*
3	*Black*

Unit mm (in)

NOTICE

Screw connection glued at factory!

Damage to the device and/or overvoltage protection!

- When releasing/tightening the union nut, use a wrench to hold the screw steady so it does not turn.

5.5 Post-connection check

Perform the following checks after completing the electrical installation of the device:
- Does the supply voltage match the specification on the nameplate?
- Is the device properly connected?
- Are all screws firmly tightened?
- Are the housing covers screwed down tight?

As soon as voltage is applied to the device, the green LED on the electronic insert lights up for a few seconds or the connected onsite display lights up.

6 Operation

6.1 Position of operating elements

The operating keys and the DIP switch are located on the electronic insert in the measuring instrument.

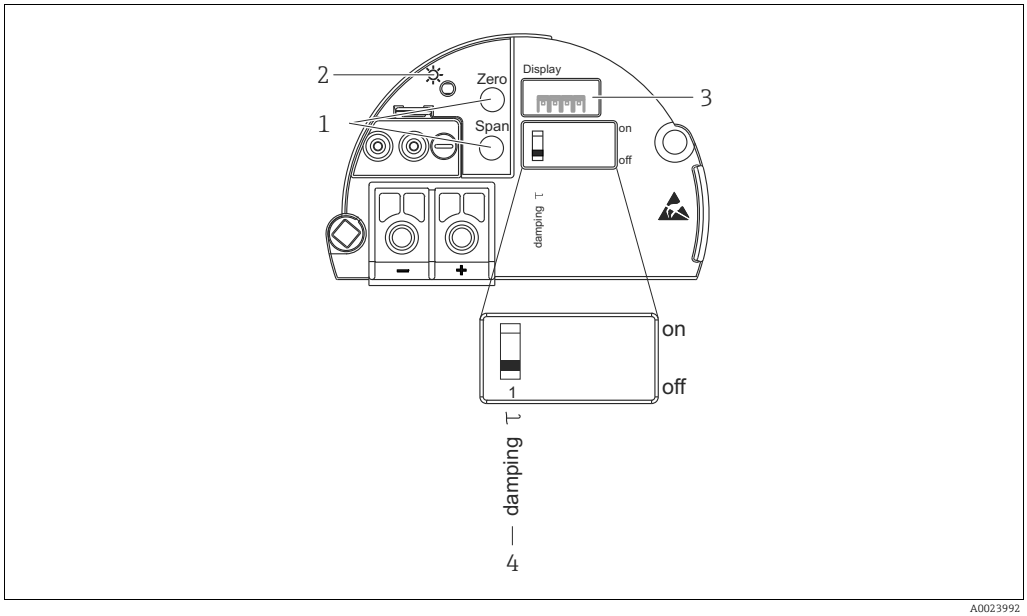


Fig. 13: Electronic insert

1 Operating keys for lower range value (zero) and upper range value (span)
2 Green LED to indicate successful operation
3 Slot for optional onsite display
4 DIP switch for damping on/off

6.1.1 Function of the DIP switch

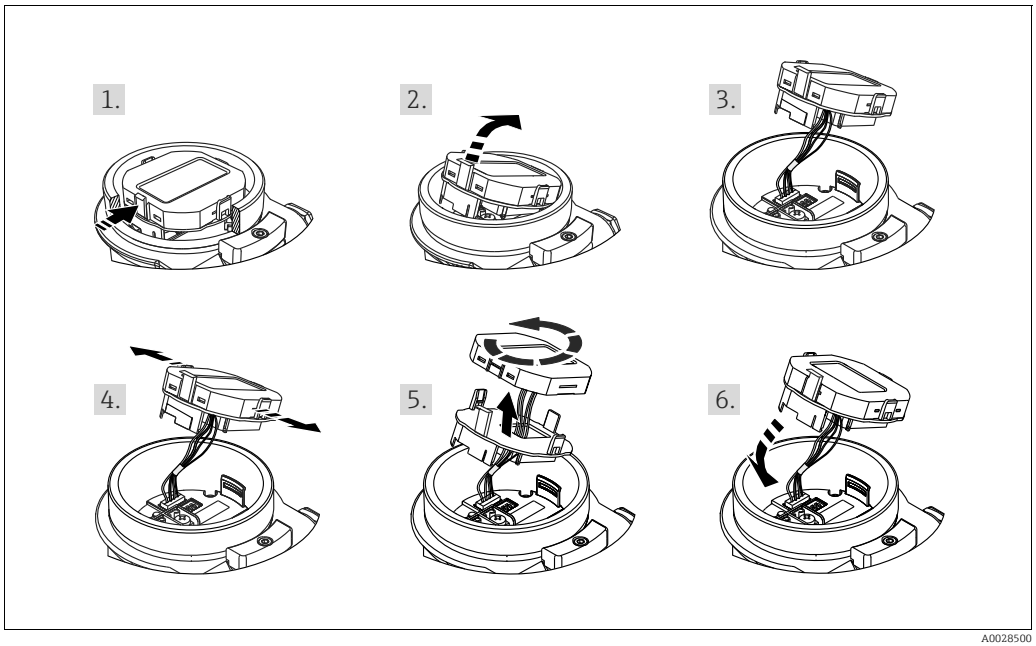
Switch position	
"Off"	**"On"**
Damping is switched off. The output signal follows measured value changes without any delay.	Damping is switched on. The output signal follows measured value changes with the delay time t (Factory setting: t = 2 s or as per order specifications).

6.1.2 Function of the operating elements

Button(s)	Meaning
"Zero" Pressed briefly	**Display lower range value**
"Zero" Pressed for at least 3 seconds	**Get lower range value** The pressure present is accepted as the lower range value (LRV).
"Span" Pressed briefly	**Display upper range value**
"Span" Pressed for at least 3 seconds	**Get upper range value** The pressure present is accepted as the upper range value (LRV).
"Zero" and **"Span"** pressed together briefly	**Display position adjustment**
"Zero" and **"Span"** pressed simultaneously for at least 3 seconds	**Position adjustment** The sensor characteristic curve is shifted parallel to itself, so that the pressure present becomes the zero value.
"Zero" and **"Span"** pressed simultaneously for at least 12 seconds	**Reset** All parameters are reset to the order configuration.

6.2 Using the device display (optional)

A four-line liquid crystal display (LCD) is used. The onsite display shows measured values, fault messages and notice messages.
For easy operation the display can be taken out of the housing (see figure steps 1 to 3). It is connected to the device through a 90 mm (3.54 in) cable.
The display of the device can be turned in 90° stages (see figure steps 4 to 6).
Depending on the orientation of the device, it is therefore easy to read the measured values.



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Functions:
- Eight-digit measured value display including sign and decimal point, bar graph for 4 to 20 mA as current display.
- Diagnostic functions (fault and warning message, etc.)

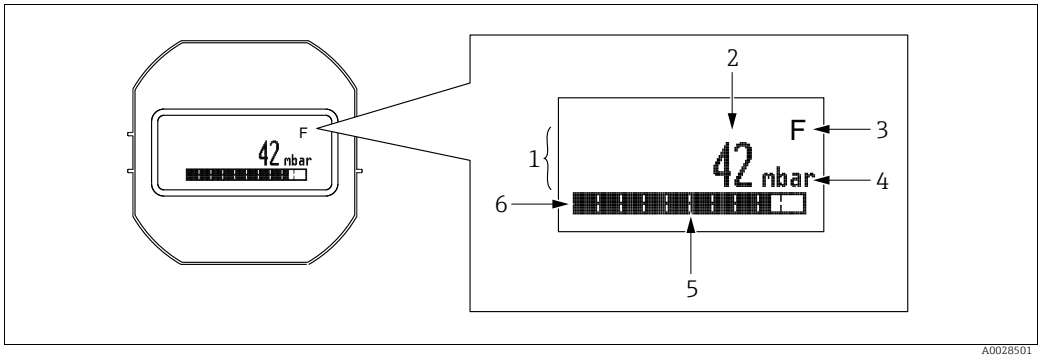


Fig. 14: Display

1 Main line
2 Value
3 Symbol
4 Unit
5 Bar graph
6 Information line

The following table illustrates the symbols that can appear on the onsite display. Four symbols may appear at the same time.

Symbol	Meaning
S	**Error message "Out of specification"** The device is being operated outside its technical specifications (e.g. during warmup or cleaning processes).
C	**Error message "Service mode"** The device is in service mode (during a simulation, for example).
M	**Error message "Maintenance required"** Maintenance is required. The measured value remains valid.
F	**Error message "Failure detected"** An operating error has occurred. The measured value is no longer valid.

7 Commissioning

The device is configured for the "Pressure" mode of operation at the factory. The measuring range and the unit in which the measured value is transmitted correspond to the data on the nameplate.

⚠ WARNING

The permitted process pressure is exceeded!

Risk of injury due to bursting of parts! Warning messages are generated if pressure is too high.

▶ If a pressure greater than the maximum permitted pressure is present at the device, the messages "S" and "Warning" alternate on the display. Only use the device within the sensor range limits!

NOTICE

The permitted process pressure is undershot!

Output of messages if pressure is too low.

▶ If a pressure lower than the minimum permitted pressure is present at the device, the messages "S" and "Warning" alternate on the display. Only use the device within the sensor range limits!

7.1 Installation and function check

Carry out a post-installation and a post-connection check as per the checklist before commissioning the device.

- Checklist for "Post-installation check" → 18
- Checklist for "Post-connection check" → 25

7.2 Commissioning

The following functions are possible by means of the buttons on the electronic insert:

- Position adjustment (zero point correction). The pressure resulting from the orientation of the measuring instrument can be corrected here.
- Setting the lower range value and upper range value
- Device reset
- The pressure applied must be within the nominal pressure limits of the sensor. See information on the nameplate.

1.) Perform position adjustment	
Pressure is present at the device.	
↓	
Press the "Zero" and "Span" buttons simultaneously for at least 3 s.	
↓	
Does the LED on the electronic insert light up briefly?	
Yes	No
↓	↓
Pressure present for position adjustment has been accepted.	Pressure present for position adjustment has not been accepted. Observe the input limits.

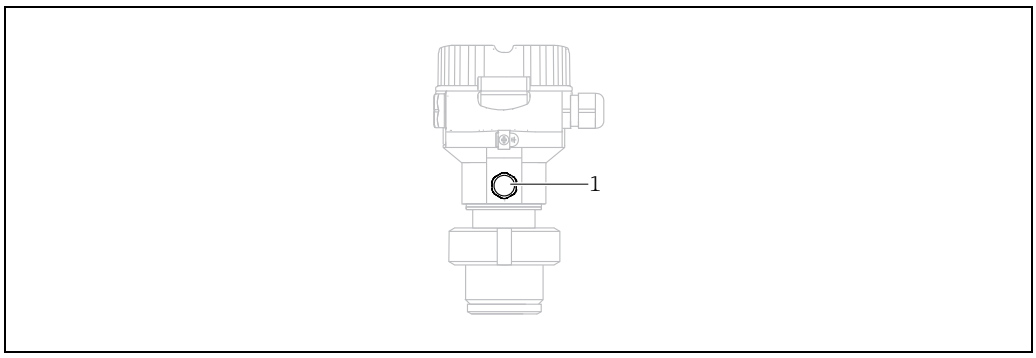
2.) Set lower range value	
The desired pressure for the lower range value is present at the device.	
↓	
Press the "Zero" button for at least 3 s.	
↓	
Does the LED on the electronic insert light up briefly?	
Yes	No
↓	↓
Pressure present for lower range value has been accepted.	Pressure present for lower range value has not been accepted. Observe the input limits.

3.) Set upper range value	
The desired pressure for the upper range value is present at the device.	
↓	
Press the "Span" button for at least 3 s.	
↓	
Does the LED on the electronic insert light up briefly?	
Yes	No
↓	↓
Pressure present for upper range value has been accepted.	Pressure present for upper range value has not been accepted. Observe the input limits.

4.) Check settings
Press the "Zero" button briefly to display the lower range value.
↓
Press the "Span" button briefly to display the upper range value.
↓
Briefly press the "Zero" and "Span" buttons simultaneously to display the position offset.

8 Maintenance

Keep the pressure compensation and GORE-TEX® filter (1) free from dirt.



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8.1 Cleaning instructions

Endress+Hauser provides flushing rings as an accessory to enable cleaning of the process membrane without removing the transmitter from the process.
For further information, please contact your local Endress+Hauser Sales Center.

8.1.1 Cerabar M PMP55

We recommend you perform CIP (cleaning in place (hot water)) before SIP (sterilization in place (steam)) for inline seals. Frequent use of SIP cleaning increases the stress and strain on the process membrane. Under unfavorable conditions, frequent changes of temperature can lead to process membrane material fatigue and potentially leaks over the long term.

8.2 Exterior cleaning

Please note the following points when cleaning the measuring instrument:
- The cleaning agents used should not corrode the surface and the seals.
- Mechanical damage to the membrane, e.g. due to pointed objects, must be avoided.
- Observe the degree of protection of the device. See the nameplate if necessary (→ 8 ff).

9 Troubleshooting

9.1 Messages

The following is a list of the messages that can occur. The device has four different status information codes according to NE107:

- F = failure
- M (warning) = maintenance required
- C (warning) = function check
- S (warning) = out of specification (deviations from the permitted ambient or process conditions determined by the device with the self-monitoring function or errors in the device itself indicate that the measurement uncertainty is greater than what would be expected under normal operating conditions).

9.2 Measures

If a message is displayed, you can take the following measures:
- Check the cable/pressure value
- Restart the device
- Perform a reset

If these steps do not correct the error, please contact your Endress+Hauser subsidiary.

9.3 Response of output to errors

In the event of an error, the current output adopts a value of 3.6 mA.

9.4 Repair

The Endress+Hauser repair concept provides for measuring instruments to have a modular design and that the customer can also carry out repairs (→ 32 "Spare parts").

- For certified devices, please consult the "Repair of Ex-certified devices" section.
- For more information on service and spare parts contact Endress+Hauser Service.
  → See www.endress.com/worldwide.

9.5 Spare parts

- Some replaceable measuring instrument components are identified by means of a spare part nameplate. This contains information about the spare part.
- All the spare parts for the measuring instrument, along with the order code, are listed in the W@M Device Viewer (www.endress.com/deviceviewer) and can be ordered here. If available, users can also download the associated Installation Instructions.

Measuring instrument serial number:
- Located on the device and spare part nameplate.
- Can be read out via the "DEVICE SERIAL No." parameter in the "TRANSMITTER DATA" submenu.

9.6 Return

The measuring instrument must be returned if it is in need of repair or a factory calibration, or if the wrong measuring instrument has been delivered or ordered. Legal specifications require Endress+Hauser, as an ISO-certified company, to follow certain procedures when handling products that are in contact with the medium.
To ensure the safe, professional and swift return of your device, please refer to the procedure and conditions for returning equipment on the
Endress+Hauser website at www.services.endress.com/return-material.

9.7 Disposal

When disposing, ensure that the materials of the device components are separated and processed accordingly.

9.8 Software history

Date	Software version	Changes to the software
10/2009	01.00.zz	Original software.

10 Technical data

See Technical Information TI00436P

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