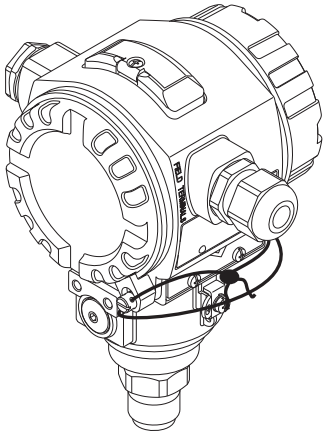
KA01095P/00/EN/13.16
71336225

Brief Operating Instructions
Cerabar S PMP71 with MID Part Certificate

Process pressure measurement



These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.
Detailed information about the device can be found in the Operating Instructions and the other documentation:

Available for all device versions via:
– Internet: www.endress.com/deviceviewer
– Smart phone/tablet: *Endress+Hauser Operations App*

Endress+Hauser
People for Process Automation

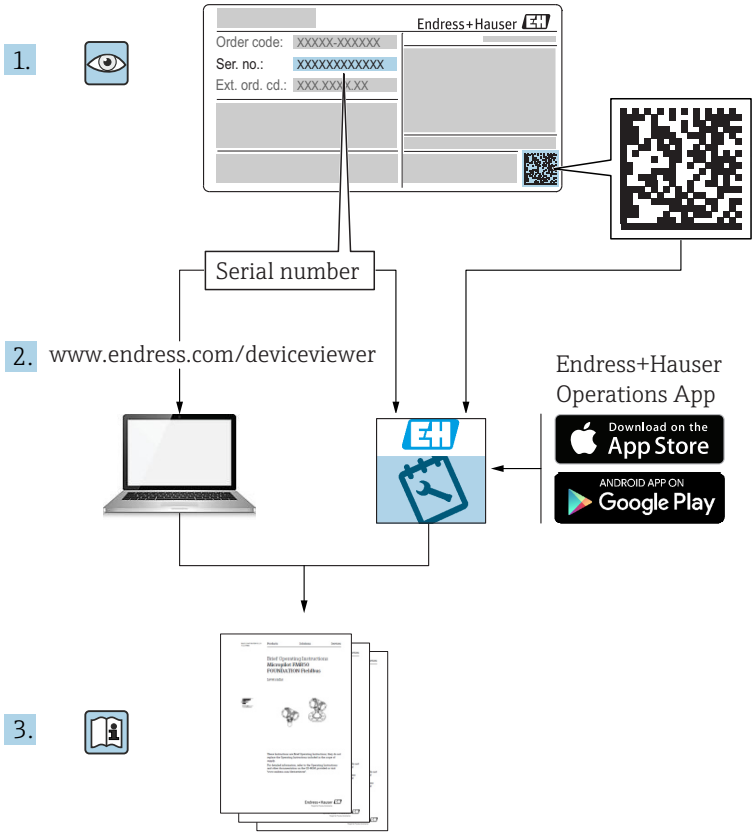

1.
Endress+Hauser
Order code: XXXXX-XXXXXX
Ser. no.: XXXXXXXXXXXX
Ext. ord. cd.: XXX XXX XXX
Serial number
2. www.endress.com/deviceviewer
Endress+Hauser
Operations App
Download on the App Store
ANDROID APP ON Google Play
3.

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Table of contents

1 Document information

1.1 Document function

These Operating Instructions contain all the information that is required in 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 used

1.2.1 Safety symbols

Symbol	Meaning
 A0011189-DE	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in seriousor fatal injury.
 A0011190-DE	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in seriousor fatal injury.
 A0011191-DE	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minoror medium injury.
 A0011192-DE	**NOTICE!** This symbol contains information on procedures and other facts which do not result in personalinjury.

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 which must be connected to 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	Hexagon wrench

1.2.4 Symbols for certain types of information

Symbol	Meaning
 A0011182	**Permitted** Indicates procedures, processes or actions that are permitted.
 A0011184	**Forbidden** Indicates procedures, processes or actions that are forbidden.
 A0011193	**Tip** Indicates additional information.
 A0028658	Reference to documentation
 A0028659	Reference to page
 A0028660	Reference to graphic
1. , 2. , 3. … A0031595	Series of steps
 A0018343	Result of a sequence of actions
 A0028673	Visual inspection

1.2.5 Symbols in graphics

Symbol	Meaning
1, 2, 3, 4, ...	Item numbers
1. , 2. , 3. ... A0031595	Series of steps
A, **B**, **C**, **D**, ...	Views

1.2.6 Symbols at the device

Symbol	Meaning
 A0019159	**Safety instructions** Observe the safety instructions contained in the associated Operating Instructions.

1.3 Registered trademarks

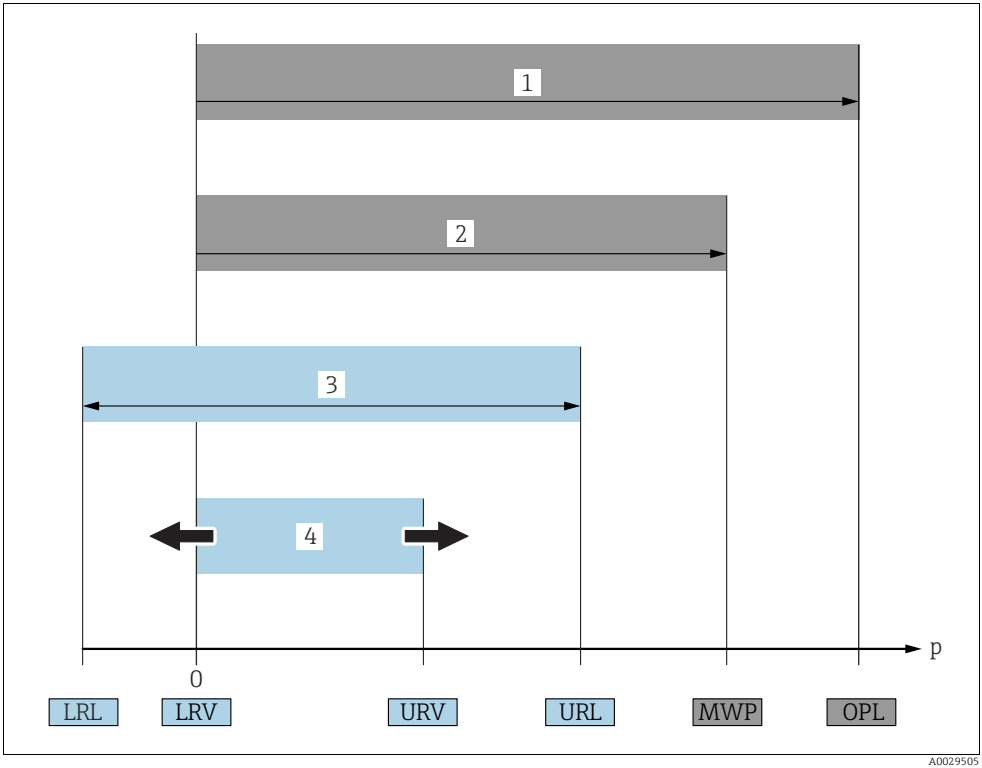
KALREZ, VITON, TEFLON
Registered trademarks of E.I. Du Pont de Nemours & Co., Wilmington, USA

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

HART
Registered trademark of the HART Communication Foundation, Austin, USA.

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

1.4 Terms and abbreviations



Position	Term/Abbreviation	Explanation
1	OPL	The OPL (over pressure limit = sensor overload limit) for the sensors depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection must be taken into consideration in addition to the measuring cell. Also observe pressure-temperature dependency. For the relevant standards and additional notes, see technical information. The OPL may be applied for a limited time period.
2	MWP	The MWP (maximum working pressure) for the sensors depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection has to be taken into consideration in addition to the measuring cell. Also observe pressure-temperature dependency. For the relevant standards and additional notes, see technical information. The MWP may be applied for an unlimited time.
3	Maximum sensor measuring range	Range between LRL and URL This span is the maximum calibratable/adjustable measuring span.

Position	Term/Abbreviation	Explanation
4	Calibrated/Adjusted measuring span	Range between LRV and URV Factory setting: 0...URL Other calibrated spans can be ordered with customised settings.
p	-	Pressure
-	LRL	Lower range limit
-	URL	Upper range limit
-	LRV	Lower range value
-	URV	Upper range value
-	TD	Turn down

1.5 Turn down calculation

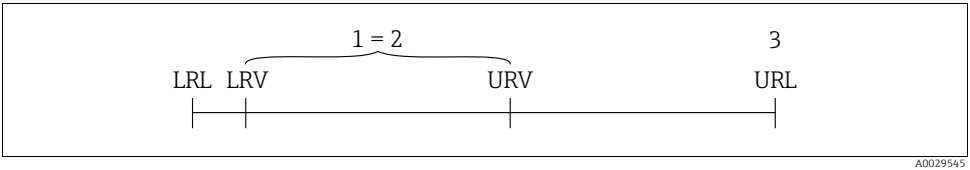


Fig. 1:

1 Calibrated/Adjusted measuring span
2 Zero-based span
3 Upper range limit

Example

- Sensor: 10 bar (150 psi)
- Upper range limit (URL) = 10 bar (150 psi)
- Calibrated/Adjusted measuring span: 0...5 bar (0...75 psi)
- Lower range value (LRV) = 0 bar
- Upper range value (URV) = 5 bar (75 psi)

Turn down (TD):

$$TD = \frac{URL}{|URV - LRV|}$$

$$TD = \frac{10\ bar\ (150\ psi)}{|5\ bar\ (75\ psi) - 0\ bar\ (0\ psi)|} = 2$$

In this example, the TD is thus 2:1.
This span is based on the zero point.

2 Basic safety instructions

2.1 Requirements concerning the staff

The personnel 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
- Are authorized by the plant owner/operator
- Are familiar with federal/national regulations
- Before beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- Following instructions and basic conditions

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

2.2 Designated use

The Cerabar S is a pressure transmitter for measuring pressure.

2.2.1 Incorrect use

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

2.3 Workplace safety

For work on and with the device:
- Wear the required personal protective equipment according to federal/national regulations.
- Switch off the supply voltage before connecting the device.

2.4 Operational safety

Risk of injury!
- ▶ Operate the device in proper technical condition and fail-safe condition only.
- ▶ The operator is responsible for interference-free operation of the device.

Conversions 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 repair of an electrical device.
- ▶ Use original spare parts and accessories from Endress+Hauser only.

2.5 Hazardous area

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

- Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area.
- Observe the specifications in the separate supplementary documentation that is an integral part of these Instructions.

2.6 Product safety

This measuring device 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 they are safe to operate. It fulfills general safety requirements and legal requirements. It also conforms to the EC directives listed in the device-specific EC declaration of conformity. Endress+Hauser confirms this fact by applying the CE mark.

2.7 Functional Safety SIL3 (optional)

If using devices for applications with safety integrity, the Functional Safety Manual must be observed thoroughly.

3 Identification

3.1 Product identification

The following options are available for identification of the measuring device:
- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter serial numbers from nameplates in W@M Device Viewer (www.endress.com/deviceviewer): All information about the measuring device is displayed.

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

3.2 Device designation

3.2.1 Nameplates

- The MWP (maximum working pressure) is specified on the nameplate. This value refers to a reference temperature of +20 °C (68°F) and may be applied to the device for an unlimited time. Observe temperature dependency of the MWP. The pressure values permitted at higher temperatures can be found in the standards EN 1092-1: 2001 Tab. 18 (With regard to their stability-temperature property, the materials 1.4435 and 1.4404 are grouped together under 13EO in EN 1092-1 Tab. 18. The chemical composition of the two materials can be identical.), ASME B 16.5a – 1998 Tab. 2-2.2 F316, ASME B 16.5a – 1998 Tab. 2.3.8 N10276, JIS B 2220.
- The test pressure corresponds to the over pressure limit (OPL) of the device = MWP x 1.5 [1].
- The Pressure Equipment Directive (2014/68/EU) uses the abbreviation "PS".
  The abbreviation "PS" corresponds to the MWP (maximum working pressure) of the measuring device.

1) The equation does not apply for PMP71 and PMP75 with a 40 bar (600 psi) or a 100 bar (1500 psi) measuring cell.

3.2.2 Identifying the sensor type

See parameter "Sensor Meas.Type" in Operating Instructions BA00413P.

3.3 Scope of delivery

The scope of delivery comprises:
- Cerabar S pressure transmitter
- For devices with the "HistoROM/M-DAT" option:
  CD-ROM with Endress+Hauser operating program
- Optional accessories

Documentation supplied:
- Operating Instructions BA00412P and BA00413P are available via the Internet.
  → See: www.endress.com → Download.
- Brief Operating Instructions KA01095P
- Fold-out flyer KA00298P
- Final inspection report
- Also Safety Instructions with ATEX, IECEx and NEPSI devices
- Optional: factory calibration certificate, inspection certificates

3.4 Certificates and approvals

CE mark, Declaration of Conformity

The device is designed 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. 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, transport and storage

4.1.1 Incoming acceptance

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

4.1.2 Transport

⚠ WARNING

Incorrect transportation

Housing, diaphragm and capillaries may become damaged, and there is a risk of injury!

- ▶ Transport the measuring device to the measuring point in its original packaging or by the process connection (with secure transport protection for the diaphragm).
- ▶ Follow 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.

4.1.3 Storage

The device must be stored in a dry, clean place and protected against damage from impact (EN 837-2).
Storage temperature range:
See Technical Information TI00383P.

4.2 Installation conditions

4.2.1 Dimensions

For dimensions, please refer to the "Mechanical construction" section in TI00383P.

4.3 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 isolating diaphragm, 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. 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 required:
  - Thread ISO228 G1/2 (Order option "1A" or "1B")
  - Thread DIN13 M20 x 1.5 (Order option "1N" or "1P")

4.3.1 Mounting sensor modules with PVDF thread

⚠ WARNING

Risk of damage to process connection!

Risk of injury!

▶ Sensor modules with PVDF thread must be installed with the mounting bracket provided!

⚠ WARNING

Material fatigue from pressure and temperature!

Risk of injury if parts burst! The thread can become loose if exposed to high pressure and temperatures.

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

4.4 Installation instructions

- Due to the orientation of the Cerabar S, there may be a shift in the zero point, i.e. when the container is empty or partially full, the measured value does not display zero. You can correct this zero point shift either directly at the device using the "E" key or by remote operation. See → 27, "Function of the operating elements – onsite display not connected" or
  → 34, "Position adjustment".
- To ensure optimal readability of the onsite display, it is possible to rotate the housing up to 380°. → 16, "Rotating the housing".
- Endress+Hauser offers a mounting bracket for installing on pipes or walls.
  → 16, "Wall and pipe mounting (optional)".

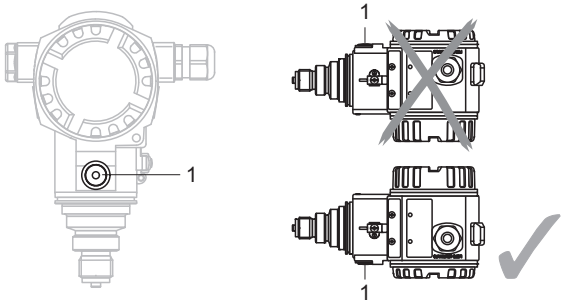
4.4.1 Installation instructions

NOTICE

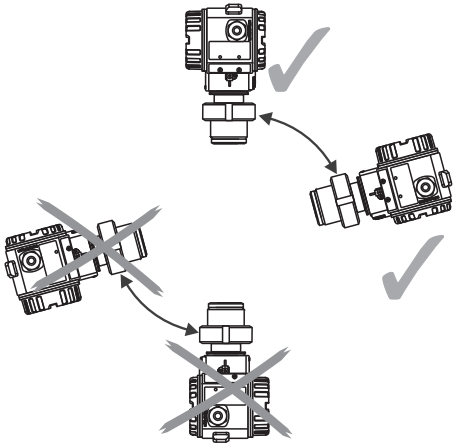
Damage to the device!

If a heated Cerabar S is cooled during the cleaning process (e.g. by cold water), a vacuum develops for a short time, whereby moisture can penetrate the sensor through the pressure compensation (1).

- ▶ If this is the case, mount the Cerabar S with the pressure compensation (1) pointing downwards.



- Keep the pressure compensation and GORE-TEX® filter (1) free from contamination and water.
- Cerabar S devices 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 isolating diaphragms 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

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

Pressure measurement in steam

- Use siphons for pressure measurement in steam. The siphon reduces the temperature to almost ambient temperature. Preferably mount the Cerabar S with the siphon below the tapping point.
  Advantages:
  – defined water column only causes minimal/negligible measured errors
  – only minimal/negligible thermal effects on the device
  Mounting above the tapping point is also possible. Pay attention to the maximum permitted ambient temperature of the transmitter!
- Fill the siphon with liquid before commissioning.

Pressure measurement in liquids

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

4.4.2 Seal for flange mounting

NOTICE

Corrupted measurement results.

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

▶ Ensure that the seal is not touching the process isolating diaphragm.

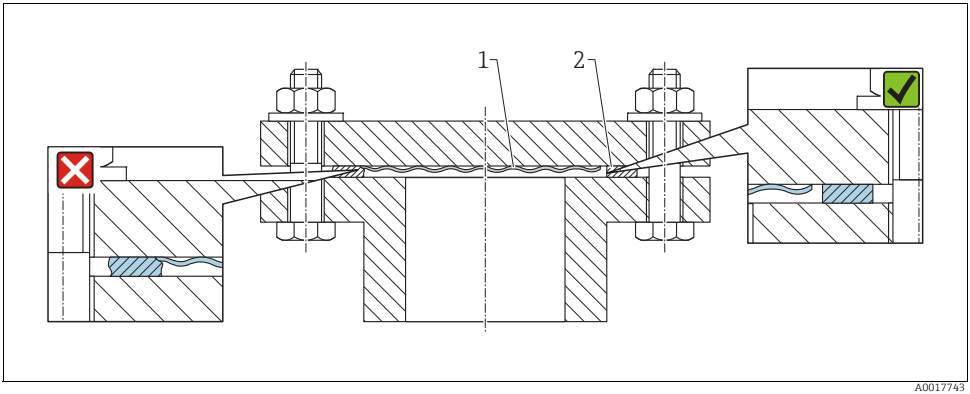


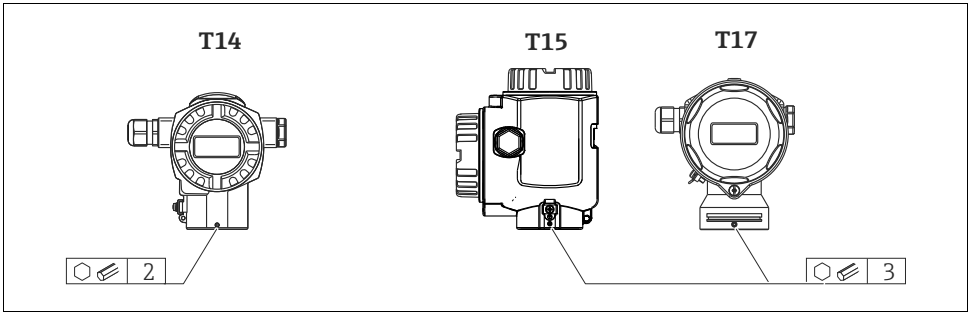
Fig. 2:
1 Process isolating diaphragm
2 Seal

4.4.3 Wall and pipe mounting (optional)

See operating instructions.

4.4.4 Rotating the housing

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



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1. T14 housing: Loosen setscrew with a 2 mm (0.08 in) Allen key.
   T15 andT17 housing: Loosen setscrew with a 3 mm (0.12 in) Allen key.
2. Rotate housing (max. up to 380 °).
3. Retighten setscrew with 1 Nm (0,74 lbf ft.

4.4.5 Closing the housing cover

NOTICE

Devices with EPDM cover seal - transmitter leakiness!

Mineral-based, animal-based or vegetable-based lubricants cause the EPDM cover seal to swell and the transmitter to become leaky.

- The thread is coated at the factory and therefore does not require any lubrication.

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 feel any resistance when closing the cover, check the thread on both again to ensure that they are free from dirt.

Close cover on a hygenic stainless steel housing (T17)

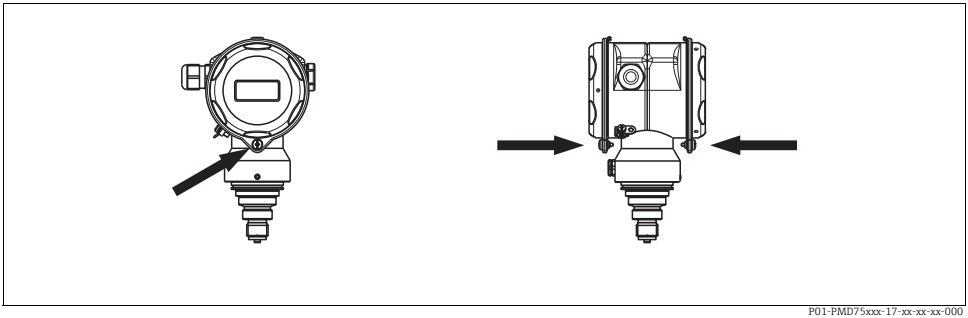

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Fig. 3: Close cover

The covers for the terminal and electronics compartment are hooked into the casing and closed with a screw. These screws should be finger-tightened (2 Nm (1.48 lbf ft)) to the stop to ensure that the covers sit tightly.

4.5 Post-installation check

After installing the device, carry out the following checks:
- Are all the screws firmly tightened?
- Are the housing covers screwed down tight?

5 Wiring

5.1 Connecting the device

⚠ WARNING

Risk of electric shock!

If the operating voltage is > 35 VDC: Dangerous contact voltage at terminals.

▶ In a wet environment, do not open the cover if voltage is present.

⚠ WARNING

Limitation of electrical safety due to incorrect connection!

- 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.
- Devices with integrated overvoltage protection must be grounded.
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are integrated.

- The supply voltage must match the supply voltage on the nameplate (→ 11, "Nameplates").
- Switch off the supply voltage before connecting the device.
- Remove the housing cover of the terminal compartment.
- Guide the cable through the gland. Preferably use twisted, shielded two-wire cables.
- Connect the device in accordance with the following diagram.
- Screw down the housing cover.
- Switch on the supply voltage.

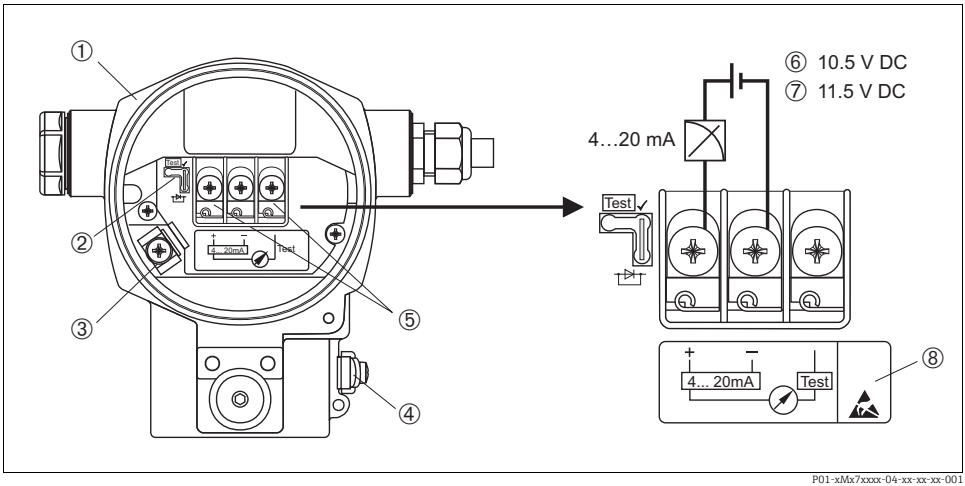


Fig. 4: Electrical connection 4 to 20 mA HART. Please also note → 20, "Supply voltage".

1 Housing
2 Jumper for 4 to 20 mA test signal.
→ 20, Section "Taking 4 to 20 mA test signal".
3 Internal earth terminal
4 External earth terminal
5 4 to 20 mA test signal between plus and test terminal
6 Minimum supply voltage = 10.5 V DC, jumper is inserted in accordance with the illustration.
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.

5.1.1 Connecting devices with Harting plug Han7D

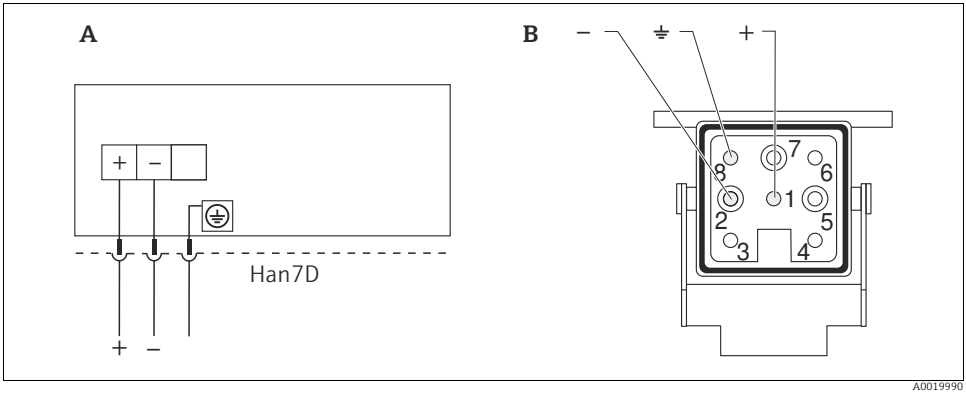
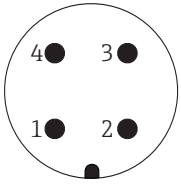


Fig. 5:

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

5.1.2 Connecting devices with an M12 connector

PIN assignment for M12 connector	PIN	Meaning
	1	Signal +
	2	Not assigned
	3	Signal –
	4	Earth

5.1.3 Connecting the cable version

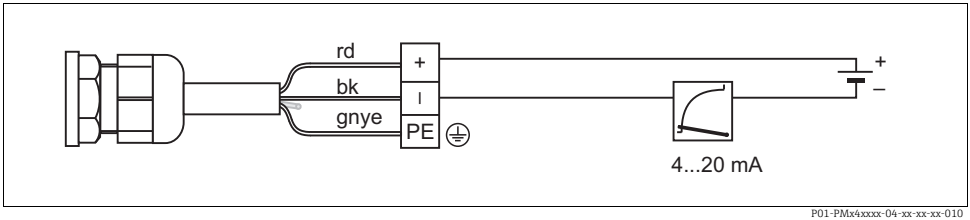


Fig. 6: rd = red, bk = black, gnye = green-yellow

5.2 Connecting the measuring unit

5.2.1 Supply voltage

⚠ WARNING

Supply voltage might be connected!

Risk of electric shock and/or explosion!

- 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.

Electronic version	Jumper for 4 to 20 mA test signal in "Test" position (order configuration)	Jumper for 4 to 20 mA test signal in "Non-Test" position
4 to 20 mA HART, version for non-hazardous areas	11.5 to 45 V DC	10.5 to 45 V DC

Taking 4 to 20 mA test signal

A 4 to 20 mA 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 replugging the jumper. As a result, operation is also possible with lower voltage sources. To keep the measured error below 0.1%, the current measuring device should exhibit an internal resistance of < 0.7 Ω. Observe the position of the jumper in accordance with the following table.

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

5.2.2 Terminals

- Supply voltage and internal ground terminal: 0.5 to 2.5 mm² (20 to 14 AWG)
- External ground terminal: 0.5 to 4 mm² (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)

5.2.4 Load

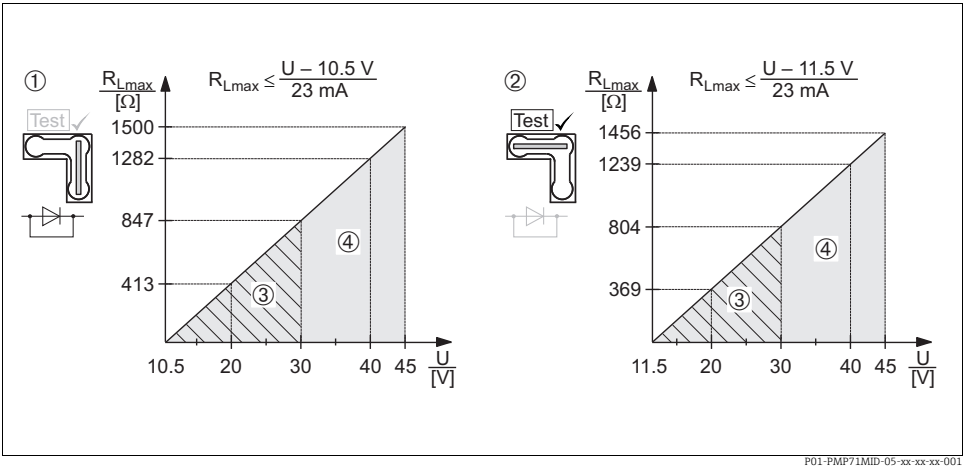


Fig. 7: Load diagram, observe the position of the jumper and the explosion protection. (→ 20, Section "Taking 4 to 20 mA test signal".)

1 Jumper for the 4 to 20 mA test signal inserted in "Non-Test" position
2 Jumper for the 4 to 20 mA test signal inserted in "Test" position
3 Supply voltage 10.5 (11.5) to 30 V DC for 1/2 G, 1 GD, 1/2 GD, FM IS , CSA IS, IECEx ia, NEPSI Ex ia
4 Supply voltage 10.5 (11.5) to 45 V DC for devices for non-hazardous areas, 1/2 D, 1/3 D, 2 G Ex d, 3 G Ex nA, FM XP, FM DIP, FM NI, CSA XP, CSA dust ignition-proof, NEPSI Ex d
R_{Lmax} Maximum load resistance
U Supply voltage

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

5.2.5 Shielding/potential matching

- You achieve optimum shielding against interference influences if the shielding is connected on both sides (in the cabinet and at the device). If potential equalization currents are expected in the plant, only ground the shielding on one side, preferably at the transmitter.
- When using in hazardous areas, you must observe the applicable regulations.
  Separate Ex documentation with additional technical data and instructions is included with all Ex devices as standard.

5.2.6 Connecting HART handheld terminal

See operating instructions.

5.2.7 Connecting the Commubox FXA195

See operating instructions.

5.2.8 Connecting Commubox FXA291/ToF adapter FXA291 for operation via FieldCare

See operating instructions.

5.3 Potential equalization

Ex applications: Connect all devices to the local potential equalization system.
Observe the applicable regulations.

5.4 Post-connection check

Perform the following checks after completing electrical installation of the device:
- Does the supply voltage match the specifications on the nameplate?
- Is the device connected correctly (→ 17)?
- Are all the 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

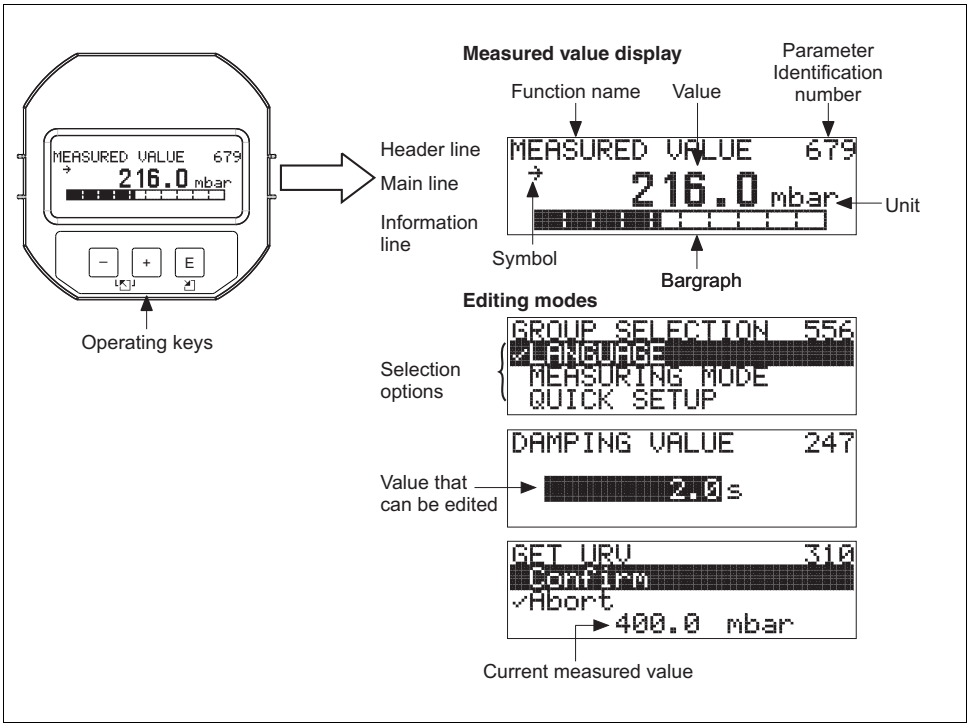
Feature 20 "Output; operation" in the order code provides you with information on the operating options available to you.

Versions in the order code		Operation
A	4 to 20 mA HART; external operation, LCD	Via onsite display and 3 keys on the exterior of the device
B	4 to 20 mA HART; internal operation, LCD	Via onsite display and 3 keys on the inside of the device
C	4 to 20 mA; internal operation	Without onsite display, 3 keys on the inside of the device

6.1 Onsite display (optional)

A 4-line liquid crystal display (LCD) is used for display and operation.
The onsite display shows measured values, dialog texts, fault messages and notice messages. The display of the device can be turned in 90° stages. Depending on the orientation of the device, this makes it easy to operate the device and read the measured values.

Functions:
- 8-digit measured value display including sign and decimal point, unit display and bar graph for current display
- Simple and complete menu guidance as parameters are split into several levels and groups
- Menu guidance in 8 languages (de, en, fr, es it, nl, jp, ch)
- Each parameter is given a 3-digit ID number for easy navigation
- Option for configuring the display according to individual requirements, such as language, alternating display, contrast setting, display of other measured values such as sensor temperature
- Comprehensive diagnostic functions (fault and warning message, maximum indicators, etc.)
- Rapid and safe commissioning with the Quick Setup menus



P01-xMx7xxxx-07-xx-xx-xx-001

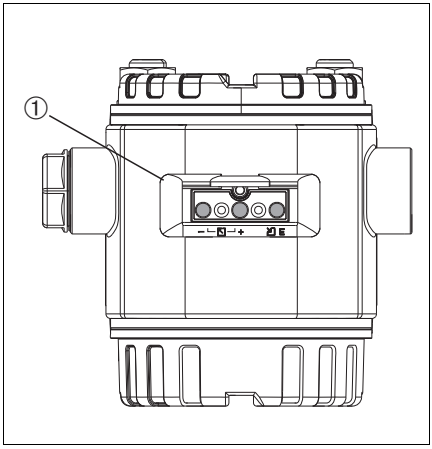
The following table illustrates the symbols that can appear on the onsite display. Four symbols can occur at one time.

Symbol	Meaning
	**Alarm symbol** – Symbol flashing: warning, device continues measuring. – Symbol permanently lit: error, device does not continue measuring. *Note:* The alarm symbol may overlie the tendency symbol.
	**Lock symbol** The operation of the device is locked. To unlock the device → 33.
	**Communication symbol** Data transfer via communication
	**Tendency symbol (increasing)** The measured value is increasing.
	**Tendency symbol (decreasing)** The measured value is decreasing.
	**Tendency symbol (constant)** The measured value has remained constant over the past few minutes.

6.2 Operating elements

6.2.1 Position of operating elements

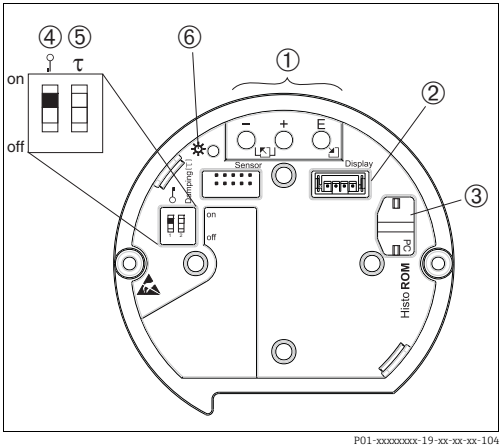
With regard to aluminum or stainless steel housings (T14), the operating keys are located either outside the device under the protection cap or inside on the electronic insert. In hygienic stainless steel housings (T17), the operating keys are always located inside on the electronic insert.
Operating keys are also integrated on the optional onsite display.



P01-PMx7xxxx-19-xx-xx-xx-009

Fig. 8: Operating keys, external

1 Operating keys on the exterior of the device under the protective flap



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

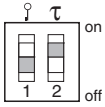
Fig. 9: Operating keys, internal

1 Operating keys
2 Slot for optional display
3 Slot for optional HistoROM®/M-DAT module
4 DIP switch for locking/unlocking measured-value relevant parameters
Lead sealing of the housing cover is provided (→ 37) for use in applications subject to custody transfer regulations. The DIP switch must be used to block access to the electronics and lock configuration of the device.
5 DIP switch for damping on/off
6 Green LED to indicate value being accepted

6.2.2 Function of the operating elements – onsite display not connected

Press and hold the key or the key combination for at least 3 seconds to execute the corresponding function. Press the key combination for at least 6 seconds for a reset.

Operating key(s)	Meaning
−	Adopt lower-range value. Reference pressure is present at the device. For a detailed description, also see → 28, "Pressure measuring mode".
+	Adopt upper-range value. Reference pressure is present at the device. For a detailed description, also see → 28, "Pressure measuring mode".
E	Position adjustment.
+ and − and E	Reset all parameters. The reset via operating keys corresponds to the software reset code 7864.
+ and E	Copy the configuration data from the optional HistoROM®/M-DAT module to the device.

Operating key(s)	Meaning
− and E	Copy the configuration data from the device to the optional HistoROM®/M-DAT module.
 P01-xxxxxxxx-19-xx-xx-xx-057	– DIP switch 1: for locking/unlocking parameters relevant to the measured value Factory setting: off (unlocked) – DIP switch 2: damping on/off, Factory setting: on (damping on)

6.2.3 Function of the operating elements – onsite display connected

Operating key(s)	Meaning
+	– Navigate upwards in the picklist – Edit the numerical values and characters within a function
−	– Navigate downwards in the picklist – Edit the numerical values and characters within a function
E	– Confirm entry – Jump to the next item
+ and E	Contrast setting of onsite display: darker
− and E	Contrast setting of onsite display: brighter
+ and −	ESC functions: – Exit edit mode without saving the changed value. – You are in a menu within a function group. The first time you press the keys simultaneously, you go back a parameter within the function group. Each time you press the keys simultaneously after that, you go up a level in the menu. – You are in a menu at a selection level. Each time you press the keys simultaneously, you go up a level in the menu. *Note:* The terms function group, level and selection level are explained in → 29, "General structure of the operating menu".

6.3 Onsite operation – onsite display not connected

To operate the device with a HistoROM®/M-DAT module, see Page → 32, "HistoROM®/M-DAT (optional)".

6.3.1 Pressure measuring mode

If no onsite display is connected, the following functions are possible by means of the three keys on the electronic insert or on the exterior of the device:

- Position adjustment (zero point correction)
- Setting lower-range value and upper-range value
- Device reset → 26, "Function of the operating elements – onsite display not connected".

- The operation must be unlocked. → 32, "Locking/unlocking operation".
- The device is configured for the "Pressure" measuring mode as standard. You can switch measuring modes by means of the MEASURING MODE parameter. → 34, "Selecting language and measuring mode".
- The pressure applied must be within the nominal pressure limits of the sensor. See information on the nameplate.

⚠ WARNING

Changing the measuring mode affects the span (URV)!

This situation can result in product overflow.

▶ If the measuring mode is changed, the span setting (URV) must be verified in the "CALIBRATION" → "BASIC SETUP" operating menu and, if necessary, reconfigured!

Carrying out position adjustment.[1]	
Pressure is present at device.	
↓	
Press "E" key 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.

Setting lower-range value.	
Desired pressure for lower-range value is present at device.	
↓	
Press "–" key 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.

Setting upper-range value.	
Desired pressure for upper-range value is present at device.	
↓	
Press "+" key 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.

1) Please note warning on Page → 33, "Commissioning".

6.4 Onsite operation – onsite display connected

If the onsite display is connected, the three operating keys are used to navigate through the operating menu → 27, "Function of the operating elements – onsite display connected".

6.4.1 General structure of the operating menu

The menu is split into four levels. The three upper levels are used to navigate while you use the bottom level to enter numerical values, select options and save settings.
The structure of the OPERATING MENU depends on the measuring mode selected, e.g. if the "Pressure" measuring mode is selected, only the functions needed for this mode are displayed.

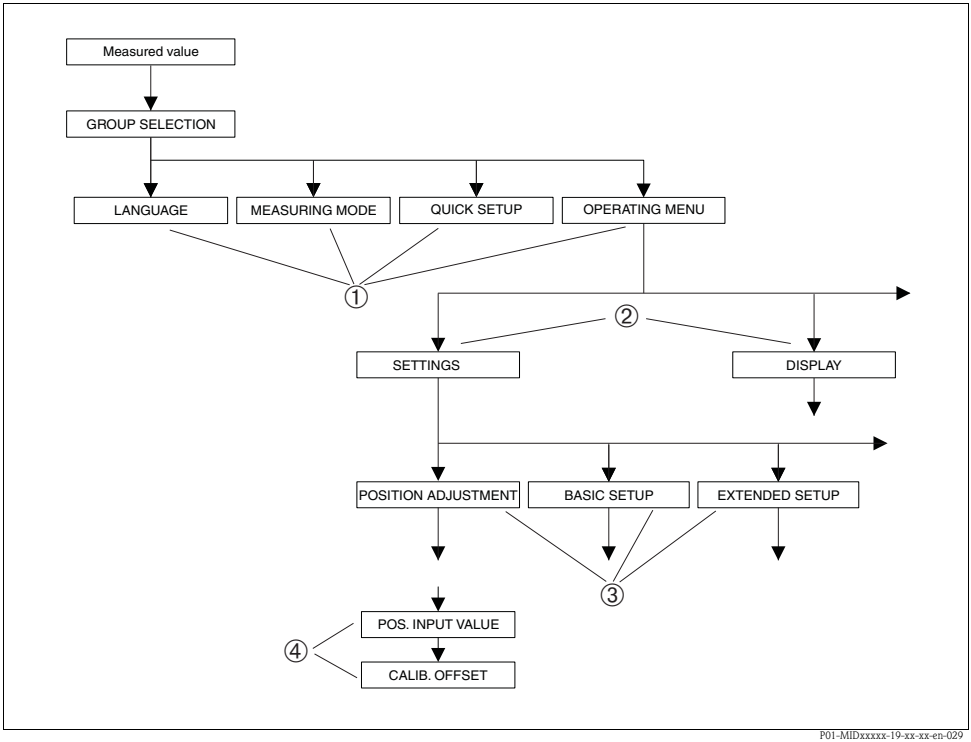


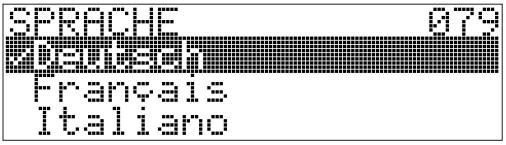
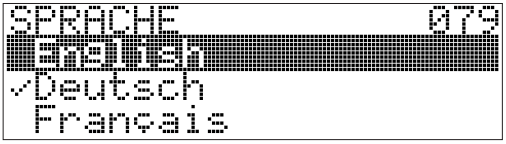
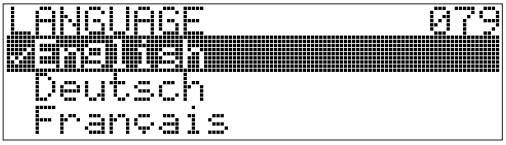
Fig. 10: General structure of the operating menu

1 1. Selection level
2 2. Selection level
3 Function groups
4 Parameters

The LANGUAGE and MEASURING MODE parameters are only displayed via the onsite display on the 1st selection level. In digital communication, the LANGUAGE parameter is displayed in the DISPLAY group and the MEASURING MODE parameter is displayed in the QUICK SETUP menus or in the BASIC SETUP function group.

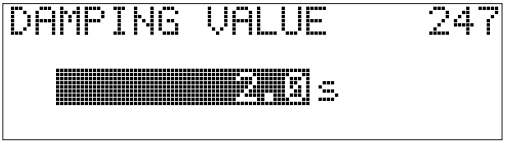
6.4.2 Selecting an option

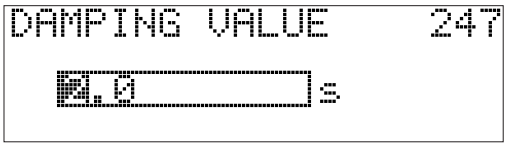
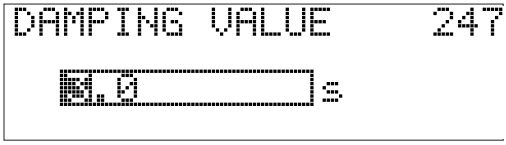
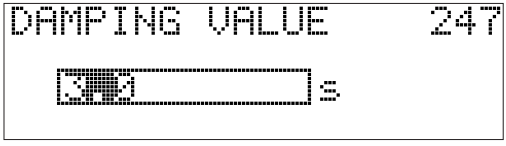
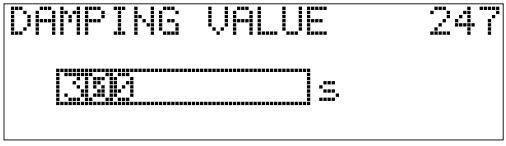
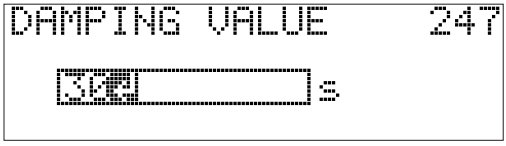
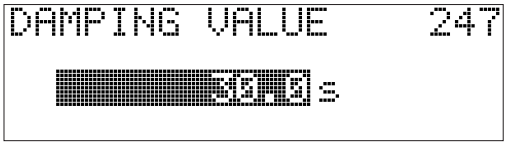
Example: selecting "English" as the language of the menu.

Onsite display	Operation
 P01-xxxxxxxx-19-xx-xx-xx-017	German is selected as the language. A 3in front of the menu text indicates the active option.
 P01-xxxxxxxx-19-xx-xx-xx-033	Select English with "+" or "–".
 P01-xxxxxxxx-19-xx-xx-xx-034	1. Confirm your choice with "E" . A 3in front of the menu text indicates the active option. (English is now selected as the menu language.) 2. Jump to the next item with "E" .

6.4.3 Editing a value

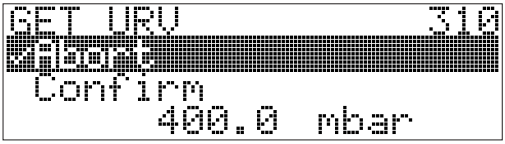
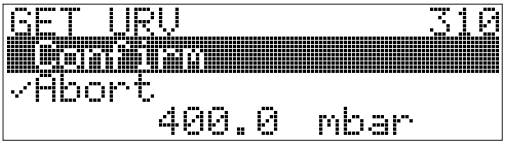
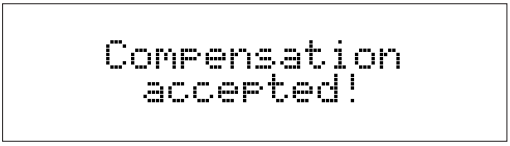
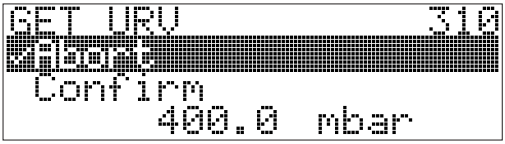
Example: adjusting DAMPING VALUE function from 2.0 s to 30.0 s.
→ 27, "Function of the operating elements – onsite display connected".

Onsite display	Operation
 P01-xxxxxxxx-19-xx-xx-xx-023	The onsite display shows the parameter to be changed. The value highlighted in black can be changed. The "s" unit is fixed and cannot be changed.

Onsite display	Operation
 P01-xxxxxxxx-19-xx-xx-xx-027	1. Press "+" or "–" to get to the editing mode. 2. The first digit is highlighted in black.
 P01-xxxxxxxx-19-xx-xx-xx-028	1. Use "+" to change "2" to "3". 2. Confirm "3" with "E". The cursor jumps to the next position (highlighted in black).
 P01-xxxxxxxx-19-xx-xx-xx-029	The decimal point is highlighted in black, i.e. you can now edit it.
 P01-xxxxxxxx-19-xx-xx-xx-030	1. Keep pressing "+" or "–" until "0" is displayed. 2. Confirm "0" with "E". The cursor goes to the next position. ↵ is displayed and highlighted in black. → See next graphic.
 P01-xxxxxxxx-19-xx-xx-xx-031	Use "E" to save the new value and exit the editing mode. See next graphic.
 P01-xxxxxxxx-19-xx-xx-xx-032	The new value for the damping is now 30.0 s. – Jump to the next parameter with "E" . – You can get back to the editing mode with "+" or "–".

6.4.4 Taking pressure applied at device as value

Example: configuring upper-range value – assigning 20 mA to the pressure value 400 mbar (6 psi).

Onsite display	Operation
 P01-xxxxxxxx-19-xx-xx-xx-035	The bottom line on the onsite display shows the pressure present, here 400 mbar (6 psi).
 P01-xxxxxxxx-19-xx-xx-xx-036	Use "+" or "–" to switch to the "Confirm" option. The active option is highlighted in black.
 P01-xxxxxxxx-19-xx-xx-xx-037	Use "E" to assign the value (400 mbar (6 psi)) to the GET URV parameter. The device confirms the calibration and jumps back to the parameter, here GET URV (see next graphic).
 P01-xxxxxxxx-19-xx-xx-xx-035	Switch to the next parameter with "E" .

6.5 HistoROM®/M-DAT (optional)

See operating instructions.

6.6 Operation via HART handheld terminal

See operating instructions.

6.7 Endress+Hauser operating program

See operating instructions.

6.8 Locking/unlocking operation

See operating instructions.

6.9 Factory setting (reset)

See operating instructions.

7 Commissioning

The device is configured for the Pressure measuring mode as standard. The measuring range and the unit in which the measured value is transmitted correspond to the specifications on the nameplate.

⚠ WARNING

Exceeding the maximum allowable working pressure!

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 "E115 Sensor overpressure" and "E727 Sensor pressure error - overrange" are output in succession! Use the device only within the sensor range limits

NOTICE

Shortfall of the allowable working pressure!

Output of messages if pressure is too low.

- ▶ If a pressure smaller than the minimum permitted pressure is present at the device, the messages "E120 Sensor low pressure" and "E727 Sensor pressure error - overrange" are output in succession! Use the device only within the sensor range limits

7.1 Configuring messages

- Messages E727, E115 and E120 are "Error"-type messages and can be configured as a "Warning" or an "Alarm". These messages are configured as "Warning" messages at the factory. This setting prevents the current output from assuming the set alarm current value for applications (e.g. cascade measurement) where the user is consciously aware of the fact that the sensor range can be exceeded
- We recommend setting messages E727, E115 and E120 to "Alarm" in the following instances:
  - The sensor range does not have to be exceeded for the measuring application.
  - Position adjustment has to be carried out that has to correct a large measured error as a result of the orientation of the device.

7.2 Function check

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

- "Post-installation check" checklist → 17.
- "Post-connection check" checklist → 22 .

7.3 Selecting language and measuring mode

7.3.1 Onsite operation

The LANGUAGE and MEASURING MODE parameters are located on the top selection level. See also → 29, "General structure of the operating menu".

The following measuring modes are available:
- Pressure

7.3.2 Digital communication

In digital communication, the MEASURING MODE parameter is displayed in the QUICK SETUP menus and in the BASIC SETUP function group (OPERATING MENU → SETTINGS → BASIC SETUP).

The following measuring modes are available:
- Pressure

The LANGUAGE parameter is arranged in the DISPLAY group (OPERATING MENU → DISPLAY).
- Use the LANGUAGE parameter to select the menu language for the onsite display.
- Select the menu language for FieldCare by means of the "Language Button" in the configuration window. Select the menu language for the FieldCare frame via the "Extra" menu → "Options" → "Display" → "Language".

7.4 Position adjustment

Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partially filled, the measured value does not display zero. There are three options to choose from when performing position adjustment.
(Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → POSITION ADJUSTMENT)

Parameter name	Description
POS. INPUT VALUE (563) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. To correct the pressure difference, you need a reference measured value (e. g. from a reference device). **Example:** – MEASURED VALUE = 0.5 mbar (0.0073 psi) – For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE, e.g. 2.0 mbar (0.029 psi). (MEASURED VALUE$_{new}$ = POS. INPUT VALUE) – MEASURED VALUE (after entry for POS. INPUT VALUE) = 2.0 mbar (0.029 psi) – The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. The following applies: CALIB. OFFSET = MEASURED VALUE$_{old}$ – POS. INPUT VALUE, here: CALIB. OFFSET = 0.5 mbar (0.0073 psi) – 2.0 mbar (0.029 psi) = – 1.5 mbar (0.022 psi) – The current value is also corrected. **Factory setting:** 0.0
CALIB. OFFSET (319) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure is known. **Example:** – MEASURED VALUE = 2.2 mbar (0.032 psi) – Via the CALIB. OFFSET parameter, enter the value by which the MEASURED VALUE should be corrected. To correct the MEASURED VALUE to 0.0 mbar, you must enter the value 2.2 here. (MEASURED VALUE $_{new}$ = MEASURED VALUE$_{old}$ – CALIB. OFFSET) – MEASURED VALUE (after entry for calib. offset) = 0.0 mbar – The current value is also corrected. **Factory setting:** 0.0

7.5 Pressure measurement

7.5.1 Information on pressure measurement

- There is a Quick Setup menu for the measuring mode Pressure which guides you through the most important basic functions. With the setting in the MEASURING MODE parameter, you specify which Quick Setup menu should be displayed. See also → 34, "Selecting language and measuring mode".
- For a detailed description of the parameters, see Operating Instructions BA00413P "Description of device functions"
  - Table 6, POSITION ADJUSTMENT
  - Table 7, BASIC SETUP
  - Table 15, EXTENDED SETUP
- For differential pressure measurement, select the "Pressure" option by means of the MEASURING MODE parameter. The operating menu is structured accordingly.

⚠ WARNING

Changing the measuring mode affects the span (URV)!

This situation can result in product overflow.

- If the measuring mode is changed, the span setting (URV) must be verified in the "CALIBRATION" → "BASIC SETUP" operating menu and, if necessary, reconfigured!

7.5.2 Quick Setup menu for Pressure measuring mode

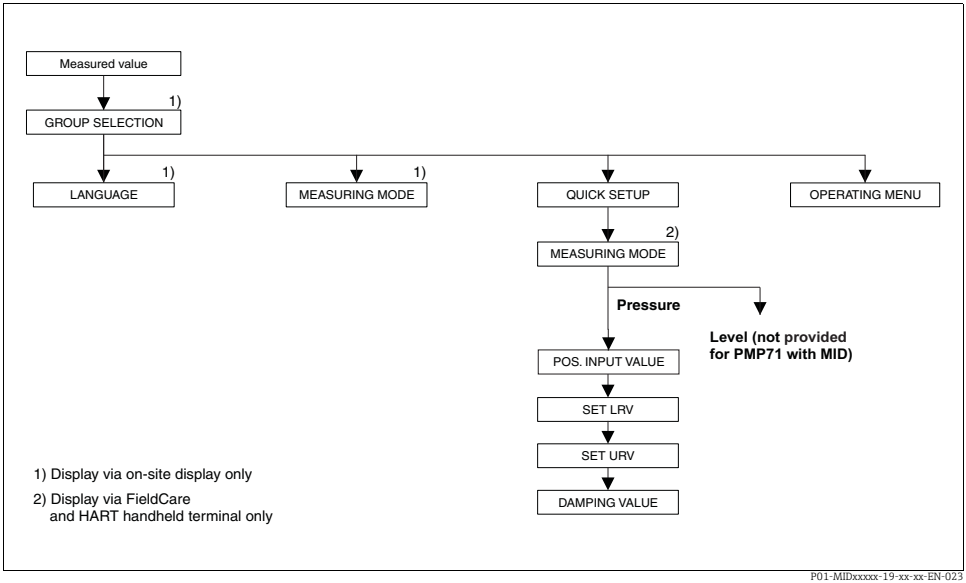


Fig. 11: Quick Setup menu for Pressure measuring mode

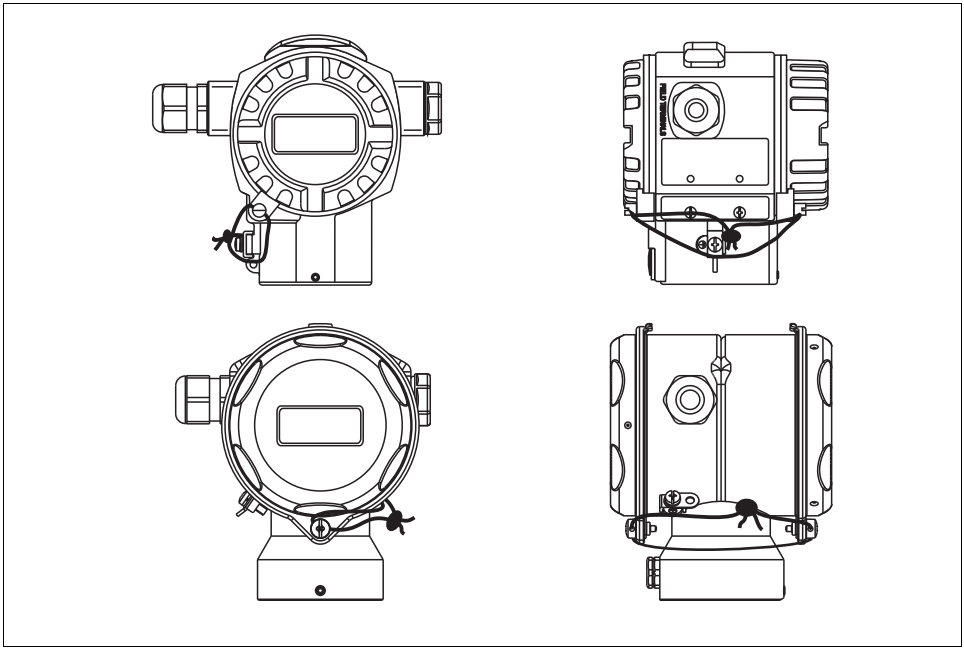
Onsite operation	Digital communication
Measured value display Switch from the measured value display to GROUP SELECTION with F.	**Measured value display** Select QUICK SETUP menu.
GROUP SELECTION Select MEASURING MODE parameter.	**MEASURING MODE** Select "Pressure" option.
MEASURING MODE Select "Pressure" option.	
GROUP SELECTION Select QUICK SETUP menu.	

Onsite operation	Digital communication
POS. INPUT VALUE Due to orientation of the device, there may be a shift in the measured value. For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE.	**POS. INPUT VALUE** Due to orientation of the device, there may be a shift in the measured value. For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE.
SET LRV Set the measuring range (enter 4 mA value). Specify a pressure value for the lower current value (4 mA value). A reference pressure does not have to be present at the device.	**SET LRV** Set the measuring range (enter 4 mA value). Specify a pressure value for the lower current value (4 mA value). A reference pressure does not have to be present at the device.
SET URV Set the measuring range (enter 20 mA value). Specify a pressure value for the upper current value (20 mA value). A reference pressure does not have to be present at the device.	**SET URV** Set the measuring range (enter 20 mA value). Specify a pressure value for the upper current value (20 mA value). A reference pressure does not have to be present at the device.
DAMPING TIME Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the onsite display, measured value and current output react to a change in the pressure.	**DAMPING TIME** Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the onsite display, measured value and current output react to a change in the pressure.

For onsite operation, see also:
→ 27, "Function of the operating elements – onsite display connected" and
→ 29, "Onsite operation – onsite display connected".

7.6 Lead sealing plan

Lead sealing of the housing cover is provided for use in applications subject to custody transfer regulations:



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