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Brief Operating Instructions **Cerabar S PMC71, PMP71, PMP75**

Process pressure measurement

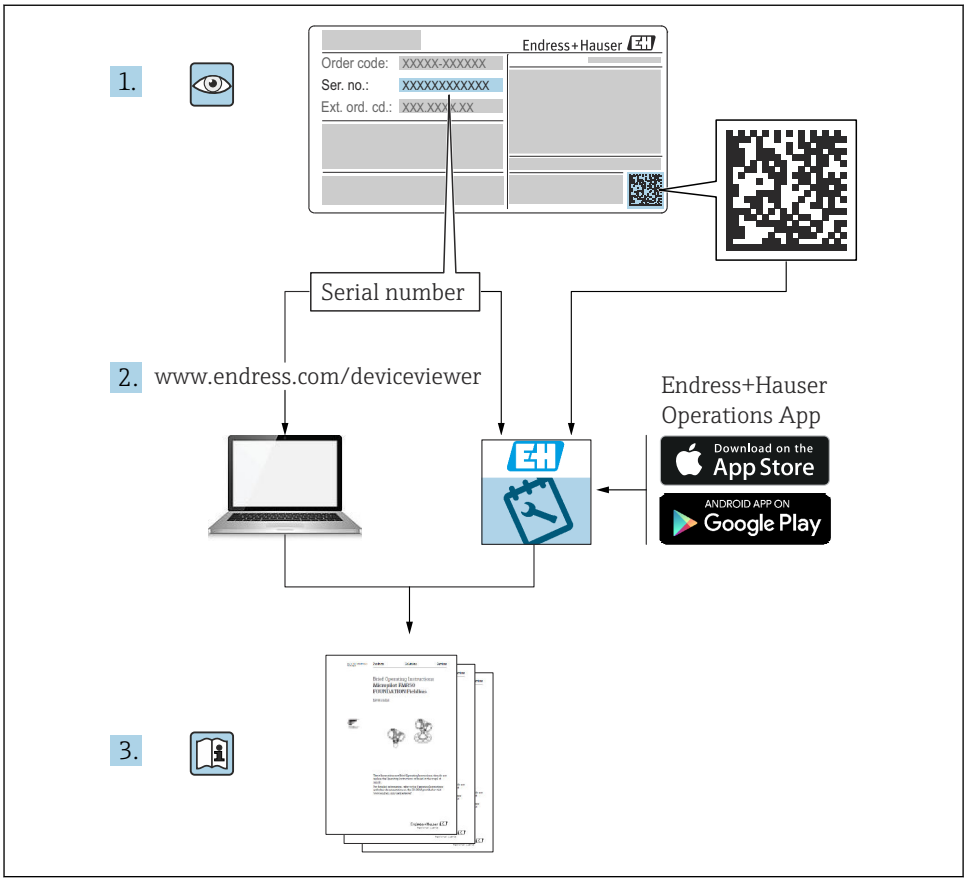
These Brief Operating Instructions are not a substitute for the Operating Instructions pertaining to the device.

Detailed information about the device can be found in the Operating Instructions and the additional documentation.

Available for all device versions via
- Internet: www.endress.com/deviceviewer
- Smartphone/tablet: *Endress+Hauser Operations app*

Endress+Hauser
People for Process Automation

1 Associated documentation



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2 About this document

2.1 Document function

The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

2.2 Symbols used

2.2.1 Safety symbols

⚠ DANGER
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

⚠ WARNING
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠ CAUTION
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE
This symbol contains information on procedures and other facts which do not result in personal injury.

2.2.2 Electrical symbols

⏚ Protective earth (PE)

Ground terminals that must be connected to ground prior to establishing any other connections.

The ground terminals are located on the interior and exterior of the device:
- Interior ground terminal: protective earth is connected to the mains supply.
- Exterior ground terminal: device is connected to the plant grounding system.

2.3 Symbols for certain types of information and graphics

✓✓ Preferred
Procedures, processes or actions that are preferred

✗ Forbidden
Procedures, processes or actions that are forbidden

ℹ Tip
Indicates additional information

📖
Reference to documentation

📄
Reference to page

▶
Notice or individual step to be observed

1., 2., 3.
Series of steps

👁
Visual inspection

1, 2, 3, ...
Item numbers

2.4 Registered trademarks

KALREZ®

Trademark of E.I. Du Pont de Nemours & Co., Wilmington, USA

TRI-CLAMP®

Trademark of Ladish & Co., Inc., Kenosha, USA

HART®

Registered trademark of the FieldComm Group, Austin, USA

GORE-TEX®

Trademark of W.L. Gore & Associates, Inc., USA

3 Basic safety instructions

3.1 Requirements for the personnel

Personnel must meet the following requirements for their tasks:
- Trained, qualified specialists must be suitably qualified to perform this function and task
- Are authorized by the plant owner/operator
- Are familiar with federal/national regulations
- Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application)
- Follow instructions and comply with basic conditions

3.2 Intended use

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

3.2.1 Foreseeable incorrect use

The manufacturer is not liable for damage caused by improper or non-intended 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.

3.3 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.

3.4 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.

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.

3.5 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.

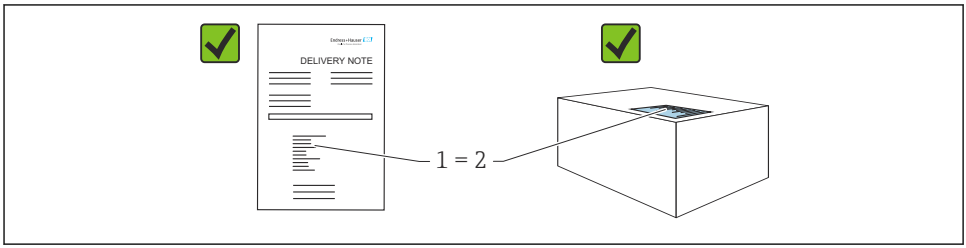
It fulfills general safety requirements and legal requirements. It also conforms to the EC directives listed in the device-specific EC declaration of conformity. Endress+Hauser confirms this fact by applying the CE mark.

3.6 Functional safety SIL3 (optional)

The Functional Safety Manual must be strictly observed for devices that are used in functional safety applications.

4 Incoming acceptance and product identification

4.1 Incoming acceptance



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- Is the order code on the delivery note (1) identical to the order code on the product sticker (2)?
- Are the goods undamaged?
- Do the data on the nameplate correspond to the order specifications and the delivery note?
- Is the documentation available?
- If required (see nameplate): Are the safety instructions (XA) present?

If one of these conditions is not fulfilled, please contact your Endress+Hauser sales office.

4.2 Product identification

Check the nameplate, see the Operating Instructions.

4.3 Storage and transport

4.3.1 Storage conditions

Use original packaging.

Store the measuring device in clean and dry conditions and protect from damage caused by shocks (EN 837-2).

5 Mounting

5.1 Mounting requirements

5.1.1 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. Max. tightening 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 "1A" or "1B")
  - Thread DIN13 M20 x 1.5 (order option "1N" or "1P")

5.1.2 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!

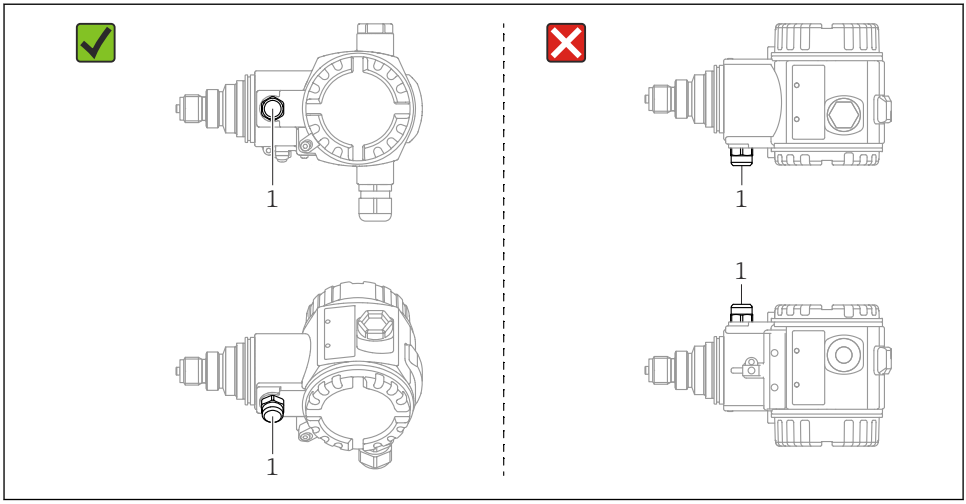
⚠ WARNING

Material fatigue from pressure and temperature!
Risk of injury if parts burst! The thread can become loose if exposed to high pressure and temperature loads.
► The integrity of the thread must be checked regularly and the thread may need to be retightened with the maximum tightening torque of 7 Nm (5.16 lbf ft). Teflon tape is recommended for sealing the ½" NPT thread.

5.2 Installation instructions for devices without diaphragm seals - PMP71, PMC71

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, and as a result, moisture can enter the sensor through the pressure compensation (1).
► Mount the device as follows.



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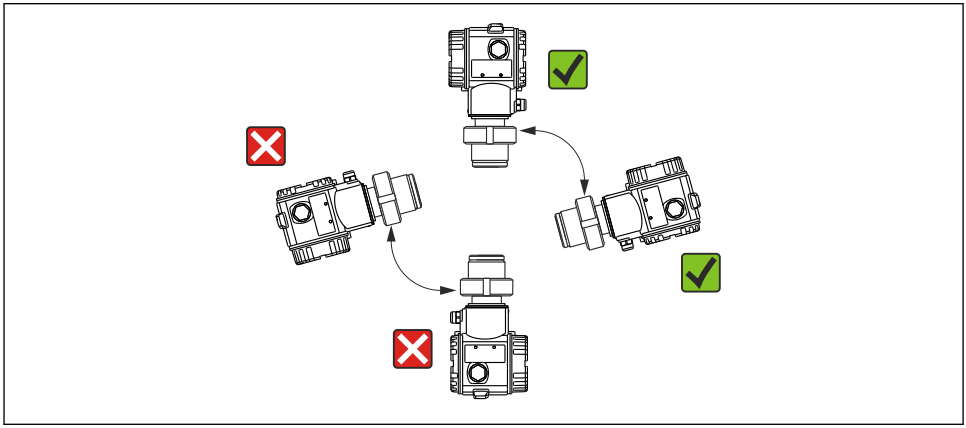
- Keep the pressure compensation and GORE-TEX® filter (1) free from contamination and water.
- Cerabar S devices without diaphragm seals are mounted in accordance with the same guidelines as a manometer (DIN EN 837-2). We recommend the use of shutoff devices and water pocket pipes. The orientation depends on the measuring application.
- Do not clean or touch process membranes with hard or pointed objects.
- The device must be installed as follows in order to comply with the cleanability requirements of the ASME-BPE (Part SD Cleanability):



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5.2.1 Pressure measurement in gases

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

5.2.2 Pressure measurement in vapors

For pressure measurement in vapors, use water pocket pipes. The water pocket pipe reduces the temperature to almost ambient temperature. Preferably mount the device with the water pocket pipe below the tapping point.

Advantages:
- defined water column only causes minimal/negligible measured errors
- only minor/negligible heat effects on the device.

Mounting above the tapping point is also permitted. Observe the max. permitted ambient temperature of the transmitter.

5.2.3 Pressure measurement in liquids

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

5.2.4 Level measurement

- Always install the Cerabar S below the lowest measuring point.
- Do not mount the device in the filling curtain 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 calibration and functional test can be carried out more easily if you mount the device downstream from a shutoff device.

5.3 Installation instructions for devices with diaphragm seals – PMP75

- Cerabar S devices with diaphragm seals are screwed in, flanged or clamped on, 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!

- ▶ A diaphragm seal and the pressure transmitter together form a closed, oil-filled calibrated system. The fill fluid hole is sealed and may not be opened.
- ▶ If a mounting bracket is used, sufficient strain relief must be ensured for the capillaries in order to prevent them from buckling (bending radius >= 100 mm (3.94 in)))
- ▶ Please observe the application limits of the diaphragm seal fill fluid as specified in the Technical Information for Cerabar S TI00383P, "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 as follows:

- ▶ Mount 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
- ▶ Mount with a bending radius >= 100 mm (3.94 in)
- ▶ Do not use the capillaries as a carrying aid for the diaphragm seals!

6 Electrical connection

6.1 Connecting requirements

⚠ WARNING

Risk of electric shock!

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

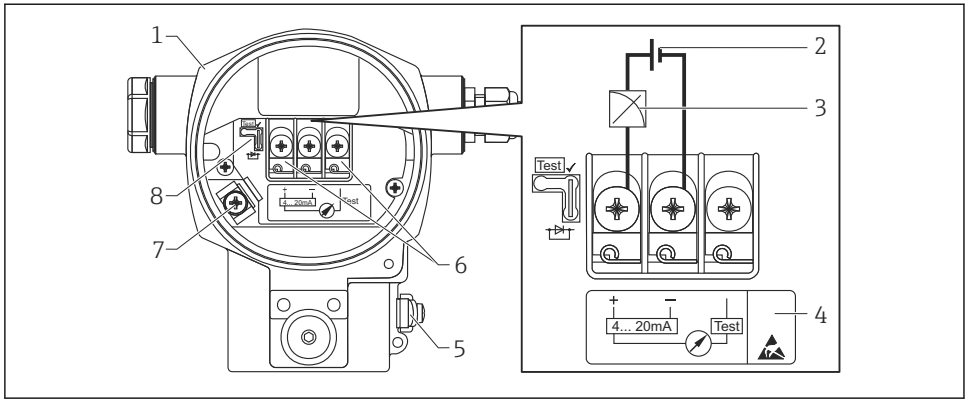
- ▶ In a wet environment, do not open the cover if voltage is present.

⚠ WARNING

An incorrect connection compromises electrical safety!

- ▶

- Risk of electric shock and/or explosion! Switch off the supply voltage before connecting the device.
- When using the measuring device in hazardous areas, installation must also comply with the applicable 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 power supply on the nameplate, see Operating Instructions → 🖹 2.
- Switch off the supply voltage before connecting.
- Remove the housing cover of the terminal compartment.
- Guide the cable through the gland. Preferably use a twisted, shielded two-wire cable.
- Connect the device as indicated in the diagram.
- Screw down the housing cover.
- Switch on the supply voltage.



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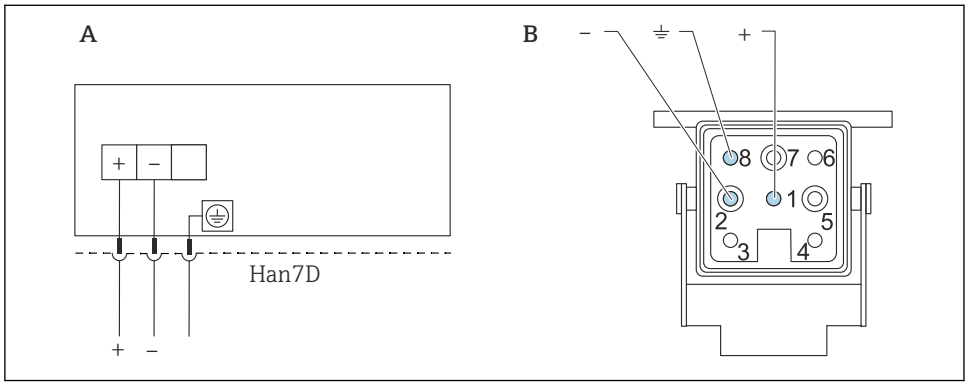
1 Housing
2 Minimum supply voltage = 10.5 V DC, jumper is set as illustrated in the diagram.
2 Minimum supply voltage = 11.5 V DC, jumper is set to the "Test" position.
3 4 to 20 mA
4 Devices with integrated overvoltage protection are labeled "OVP" (overvoltage protection) here.
5 External ground terminal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

6.1.1 Connection of devices with Harting plug Han7D



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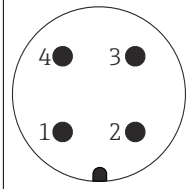
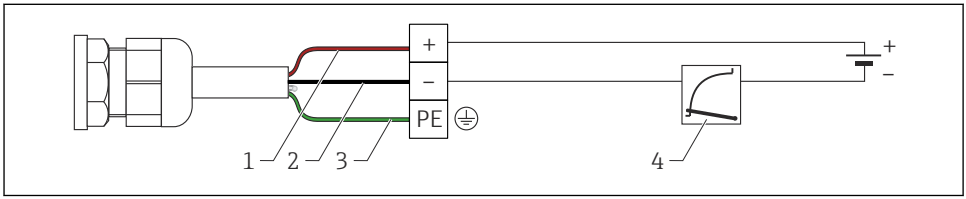
A Electrical connection for devices with Harting plug Han7D
B View of the plug-in connection on the device
- Brown
⏚ Green/yellow
+ Blue

6.1.2 Connection of devices with M12 plug (p. 21)

	PIN	
	1	Signal +
	2	Not assigned
	3	Signal -
	4	Ground

6.1.3 Connection of cable version (p. 21)



1 *rd = red, bk = black, gnye = green/yellow*

6.1.4 Shielding/potential equalization

- Optimum shielding against disturbances is achieved if the shielding is connected on both sides (in the cabinet and on the device). If potential equalization currents must be expected in the plant, only ground shielding on one side, preferably at the transmitter.
- When using in hazardous areas, observe the applicable regulations.

Separate Ex documentation with additional technical data and instructions is included with all Ex systems as standard.

6.2 Connecting the measuring unit

6.2.1 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 also comply with the applicable national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- ▶ All explosion protection data are given in separate Ex 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 (as-delivered state)	Jumper for 4 to 20 mA test signal in "Non-Test" position
4 to 20 mA HART, version for non-hazardous area	11.5 to 45 V DC	10.5 to 45 V DC

Measuring the 4 to 20 mA test signal

A 4 to 20 mA test signal can be measured via the positive and test terminal without interruption. The minimum supply voltage of the measuring device can be reduced by changing the position of the jumper. As a result, operation with lower supply voltages is also possible.

To keep the measured error below 0.1 %, the ammeter should have an internal resistance of < 0.7 Ω. Observe the position of the jumper according to the following table.

Jumper position for test signal	Description
	▪ Measure 4 to 20 mA test signal via positive and test terminal: possible. (Thus, the output current can be measured without interruption via the diode.) ▪ As-delivered state ▪ Minimum supply voltage: 11.5 V DC
	▪ Measure 4 to 20 mA test signal via positive and test terminal: not possible ▪ Minimum supply voltage: 10.5 V DC

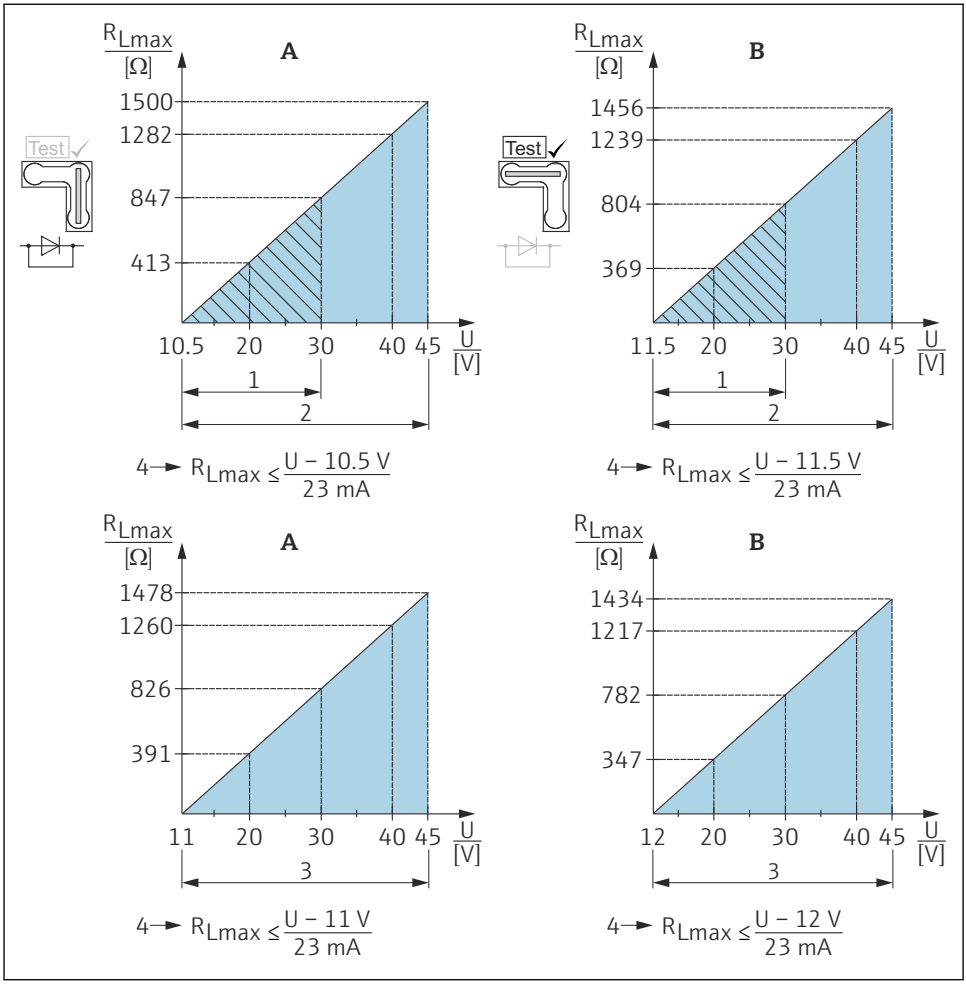
6.2.2 Terminals

- 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)

6.2.3 Cable specification

- Endress+Hauser recommends using twisted, shielded two-wire cables.
- Cable diameter: 5 to 9 mm (0.2 to 0.35 in)

6.2.4 Load



A Jumper for 4 to 20 mA test signal set to "Non-Test" position
B Jumper for 4 to 20 mA test signal set to "Test" position

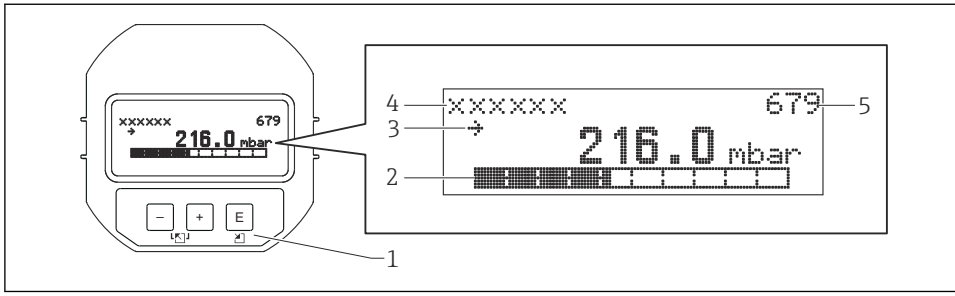
7 Operation options

7.1 Local display (optional)

A 4-line liquid crystal display (LCD) is used for display and operation. The local display shows measured values, dialog texts, fault messages and notice messages. The device display can be

turned in 90 ° steps. Depending on the installation position of the device, this makes it easy to operate the device and read the measured values.

Functions:
- 8-digit measured value display including sign and decimal point, unit display, bar graph for displaying current
- Simple and complete menu guidance due to breakdown of parameters into several levels and groups
- Each parameter is assigned a 3-digit ID number for easy navigation
- Possibility of configuring the display according to individual wishes and requirements e.g. language, alternating display, display of other measured values, such as sensor temperature, contrast setting
- Comprehensive diagnostic functions (fault and warning message, maximum/minimum indicators, etc.)
- Rapid and safe commissioning using Quick Setup menus



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

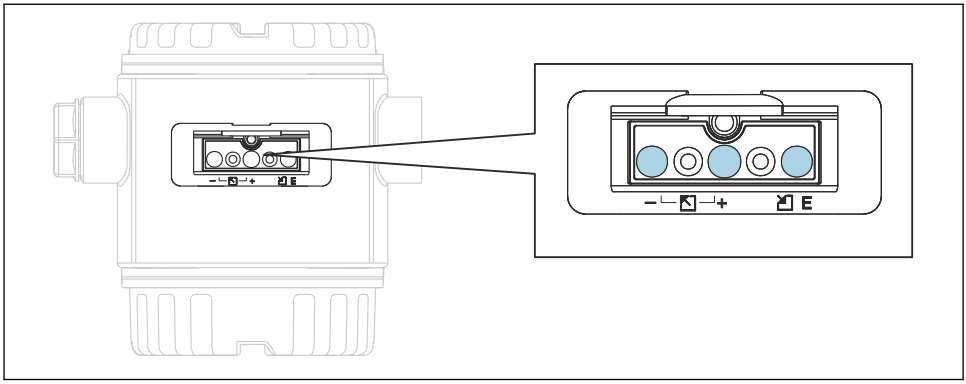
Symbol	Meaning
	**Alarm symbol** ▪ Symbol flashing: warning, device continues measuring ▪ Symbol permanently lit: error, device does not continue measuring *Note:* The alarm symbol may overlie the tendency symbol.
	**Lock symbol** The operation of the device is locked. Unlock the device.
	**Communication symbol** Data transfer via communication.
	**Tendency symbol (increasing)** The measured value increases.

Symbol	Meaning
	**Tendency symbol (decreasing)** The measured value decreases.
	**Tendency symbol (constant)** The measured value has remained constant throughout the last few minutes.

7.2 Operating elements

7.2.1 Position of operating elements

In the case of the aluminum and stainless steel housing (T14), the operating keys are located either under the protective flap on the exterior of the device or inside on the electronic insert. In the case of the hygienic stainless steel housing (T17), the operating keys are always inside on the electronic insert. In addition, there are operating keys on the optional local display.



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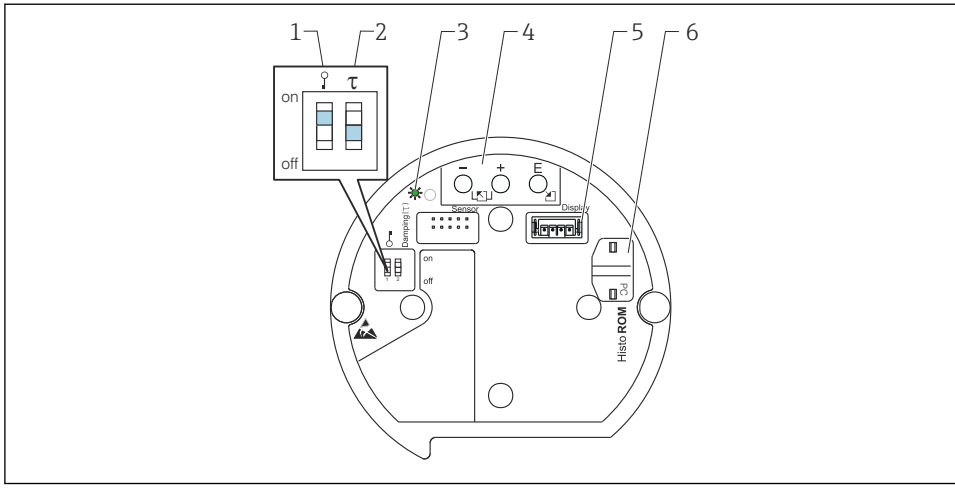
2 Operating keys, outside



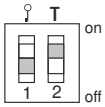
3 Operating keys, inside

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

7.2.2 Function of the operating elements – local display not connected

To perform the corresponding function, press the key or key combination for at least 3 s. Press the key combination for at least 6 s for a reset.

	Meaning
−	Adopt lower range value. A reference pressure is present at the device. For a detailed description, see also the "Pressure measuring mode" or "Level measuring mode" section.
+	Adopt lower range value. A reference pressure is present at the device. For a detailed description, see also the "Pressure measuring mode" or "Level measuring mode" section.
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.

	Meaning
− and E	Copy the configuration data from the device to the optional HistoROM®/M-DAT module.
	▪ DIP switch 1: to lock/unlock parameters relevant to the measured value. Factory setting: off (unlocked) ▪ DIP switch 2: damping on/off, factory setting: on (damping on)

7.2.3 Function of the operating elements – local display connected

Operating key(s)	Meaning
+	▪ Navigate up in the picklist ▪ Edit the numerical values or characters within a function
−	▪ Navigate down in the picklist ▪ Edit the numerical values or characters within a function
E	▪ Confirm entry ▪ Jump to the next item
+ + E	Contrast setting of local display: darker
− + E	Contrast setting of local display: brighter
− + +	**ESC functions:** ▪ Exit the editing mode without saving the modified value ▪ You are in the menu within a function group: the first time you press the keys simultaneously, you go back one parameter in the function group. Every subsequent time you press the keys simultaneously, you go up one level in the menu. ▪ You are in the menu at a selection level: each time you press the keys simultaneously, you go up a level in the menu. *Note:*For the terms function group, level, selection level, see the "Menu structure".

7.3 Local operation – local display not connected

7.3.1 Pressure measuring mode

If no local display is connected, the following functions are possible via the three keys on the electronic insert or externally on the device:
- Position adjustment (zero point correction)
- Setting the lower range value and upper range value
- Device reset

- Operation must be unlocked.
- The device is configured for the "Pressure" measuring mode as standard. The measuring mode can be changed via the "MEASURING MODE" parameter.
- The pressure applied must be within the nominal pressure limits of the sensor, see the Operating Instructions.

⚠ WARNING

Changing the measuring mode can affect the calibration data!
This can result in product overflow.
▶ Check the calibration data if the measuring mode is changed.

8 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 data on the nameplate.

⚠ WARNING

The permitted process pressure is exceeded!
Risk of injury if parts burst! Warnings are displayed if the pressure is too high
▶ If a pressure that is greater than the maximum permitted pressure is present at the device, messages "E115 sensor overpressure" and "E727 sensor pressure error - overrange" are output in succession. Only use the device within the sensor range limits!

NOTICE

The permitted process pressure is undershot!
Messages are displayed if the pressure is too low.
▶ If a pressure that is lower than the minimum permitted pressure is present at the device, messages "E120 sensor low pressure" and "E727 sensor pressure error - overrange" are output in succession. Only use the device within the sensor range limits!

8.1 Configuring messages

- The messages E727, E115 and E120 are "Error"-type messages and can be configured as a "Warning" or an "Alarm". The factory setting for these messages is "Warning". This setting prevents the current output from adopting the configured alarm current value in applications (e.g. cascade measurement) where the user knowingly accepts that the sensor range may be exceeded.
- We recommend setting messages E727, E115 and E120 to "Alarm" in the following instances:
  - It is not necessary to go outside the sensor range for the measuring application.
  - A position adjustment must be carried out that has to correct a large measured error as a result of the orientation of the device (e.g. devices with diaphragm seal).

8.2 Selecting the language and measuring mode

8.2.1 Local operation

The LANGUAGE and MEASURING MODE parameters are on the 1st selection level.

The following measuring modes are available:
- Pressure
- Level

8.2.2 Digital communication

The following measuring modes are available:
- Pressure
- Level

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

8.3 Position adjustment

Due to the orientation of the device, there may be a shift in the measured value, i.e. when the vessel is empty, the measured value does not display zero. There are three ways to perform position adjustment. (Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → POSITION ADJUST).

8.4 Quick Setup menu for the "Pressure" measuring mode

Local operation		Digital communication
Measured value display Switch from the measured value display to the GROUP SELECTION with ⓔ.		**Measured value display** Select the QUICK SETUP menu.
GROUP SELECTION Select the MEASURING MODE parameter.		**MEASURING MODE** Select the "Pressure" option.
MEASURING MODE Select the "Pressure" option.		
GROUP SELECTION Select the QUICK SETUP menu.		
POS. ZERO ADJUST Due to orientation of the device, there may be a shift in the measured value. You correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option, i.e. you assign the value 0.0 to the pressure present.		**POS. ZERO ADJUST** Due to orientation of the device, there may be a shift in the measured value. You correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option, i.e. you assign the value 0.0 to the pressure present.

Local operation		Digital communication
POS. INPUT VALUE Due to orientation of the device, there may be a shift in the measured value. Via 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. Via the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE.
SET LRV Set the measuring range (enter 4 mA value). Enter the pressure value for the lower current value (4 mA value). No reference pressure must be present at the device.		**SET LRV** Set the measuring range (enter 4 mA value). Enter the pressure value for the lower current value (4 mA value). No reference pressure must be present at the device.
SET URV Set the measuring range (enter 20 mA value). Enter the pressure value for the upper current value (20 mA value). No reference pressure must be present at the device.		**SET URV** Set the measuring range (enter 20 mA value). Enter the pressure value for the upper current value (20 mA value). No reference pressure must be present at the device.
DAMPING VALUE Enter the damping time (time constant). The damping affects the speed at which all subsequent elements, such as the local display, measured value and current output, react to a change in the pressure.		**DAMPING VALUE** Enter the damping time (time constant). The damping affects the speed at which all subsequent elements, such as the local display, measured value and current output, react to a change in the pressure.

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