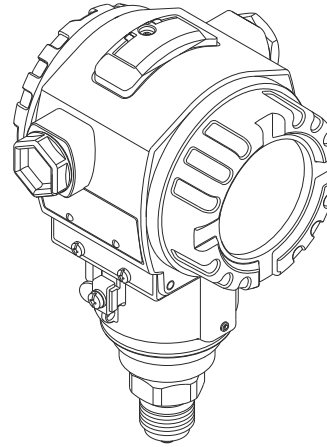
Brief Operating Instructions
Cerabar S PMP71 Low Power 1-5V DC Output

Process pressure measurement
Low power pressure transmitter with metal sensors and 1-5V DC voltage output

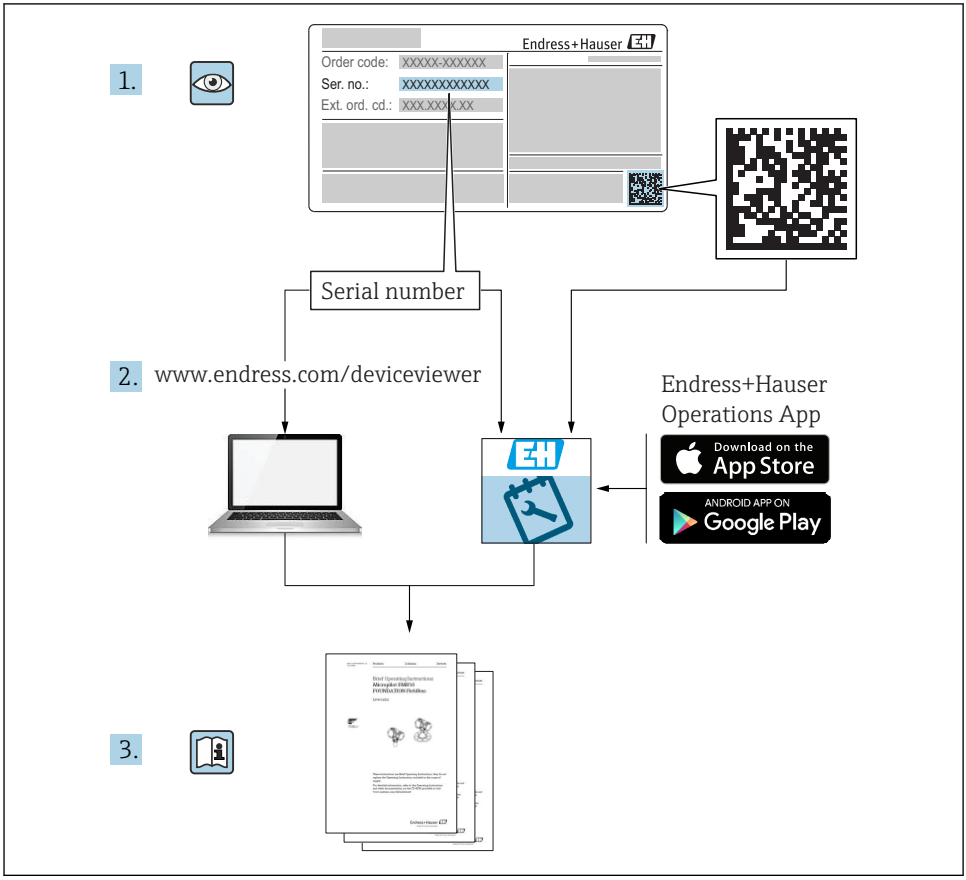


These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

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



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1 About this document

1.1 Document function

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

1.2 Symbols used

1.2.1 Safety symbols

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

1.2.2 Electrical symbols

Symbol	Meaning	Symbol	Meaning
	**Protective ground connection** A terminal which must be connected to ground prior to establishing any other connections.		**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

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
	**Permitted** Procedures, processes or actions that are permitted.
	**Forbidden** Procedures, processes or actions that are forbidden.
	**Tip** Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
	Visual inspection

1.2.5 Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
1. , 2. , 3. ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections

1.3 Documentation

The document types listed are available:
In the Download Area of the Endress+Hauser Internet site: www.endress.com → Download

1.3.1 Technical Information (TI): planning aid for your device

TI00383P:

The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.

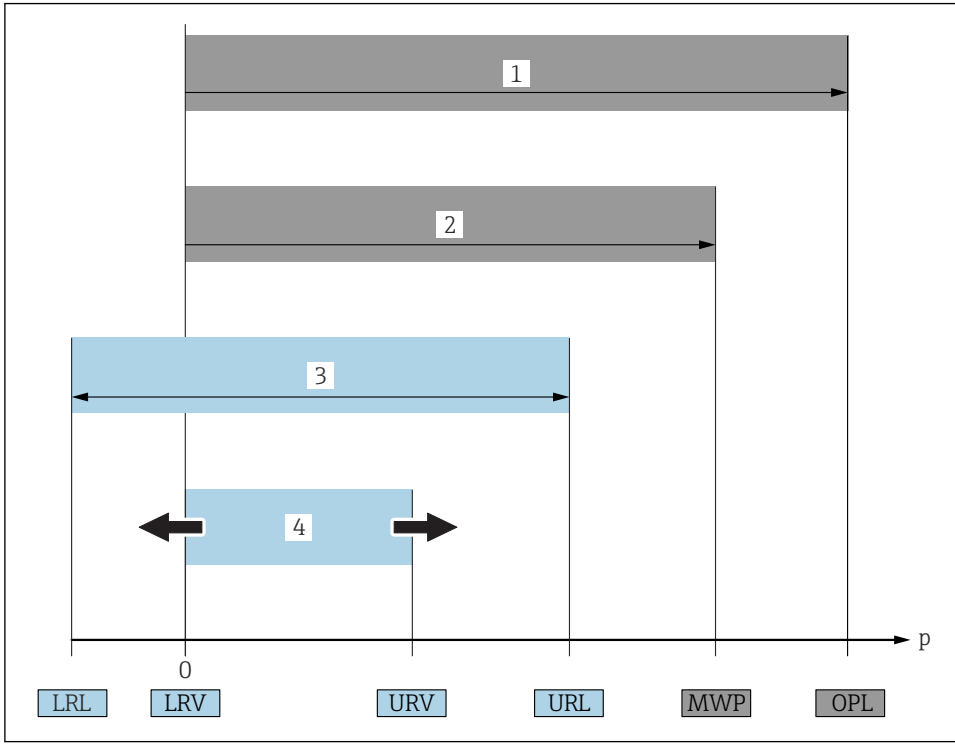
1.3.2 Operating Instructions (BA): your comprehensive reference

BA01633P:

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.

1.4 Terms and abbreviations



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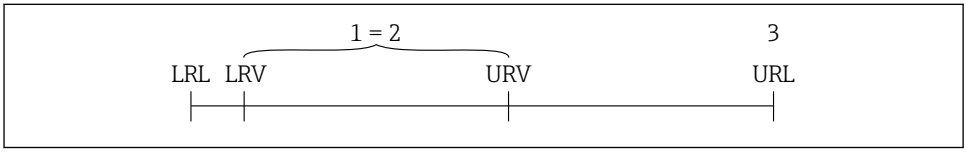
Item	Term/abbreviation	Explanation
1	OPL	The OPL (over pressure limit = sensor overload limit) for the measuring device depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection has to be taken into consideration in addition to the measuring cell. Also observe pressure-temperature dependency. For the relevant standards and additional notes, see the "Pressure specifications" section . The OPL may only be applied for a limited period of time.
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 the "Pressure specifications" section . The MWP may be applied at the device for an unlimited period. The MWP can also be found on the nameplate.
3	Maximum sensor measuring range	Span between LRL and URL This sensor measuring range is equivalent to the maximum calibratable/adjustable span.

Item	Term/abbreviation	Explanation
4	Calibrated/adjusted span	Span between LRV and URV Factory setting: 0 to URL Other calibrated spans can be ordered as customized spans.
p	-	Pressure
-	LRL	Lower range limit
-	URL	Upper range limit
-	LRV	Lower range value
-	URV	Upper range value
-	TD (turn down)	Turn down Example - see the following section.

1.5 Turn down calculation



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1 Calibrated/adjusted span
2 Zero point-based span
3 URL sensor

Example

- Sensor:10 bar (150 psi)
- Upper range value (URL) = 10 bar (150 psi)
- Calibrated/adjusted span: 0 to 5 bar (0 to 75 psi)
- Lower range value (LRV) = 0 bar (0 psi)
- Upper range value (URV) = 5 bar (75 psi)

Turn down (TD):

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

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

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

1.6 Registered trademarks

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

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

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

2 Basic safety instructions

2.1 Requirements concerning the staff

The staff must fulfill the following requirements for their tasks:
- ▶ Trained staff: Must have a qualification which corresponds to their function and tasks.
- ▶ Authorized by the plant operator.
- ▶ Familiar with the national regulations.
- ▶ Before starting their work: Must have read and understood all instructions in the operating manual and supplementary documentation as well as the certificate (depending on the application).
- ▶ Must comply with all instructions and the regulatory framework.

2.2 Designated use

2.2.1 Application and media

The Cerabar S is a pressure transmitter for measuring the pressure. If the limit values specified in the "Technical Data" and the conditions listed in the instructions and additional documentation are observed, the measuring device may be used for the following measurements (process variables):

Measured process variables

- Absolute pressure
- Gauge pressure

Calculated values

Level (level, volume or mass)

2.2.2 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.

2.2.3 Residual risks

Due to heat transfer from the process as well as power loss in the electronics, the temperature of the electronics housing and the assemblies contained therein (e.g. display module, main electronics module and I/O electronics module) may rise up to 80 °C (176 °F). When in operation, the sensor can reach a temperature close to the medium temperature.

Danger of burns from contact with surfaces!
- ▶ For elevated fluid temperature, ensure protection against contact to prevent burns.

2.3 Occupational 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.

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

Hazardous area

To eliminate the risk of danger to persons or the facility when the device is used in the approval-related area (e.g. explosion protection, pressure equipment safety):
- ▶ Check the nameplate to verify if the device ordered can be put to its intended use in the approval-related area.
- ▶ Observe the specifications in the separate supplementary documentation that is an integral part of these Instructions.

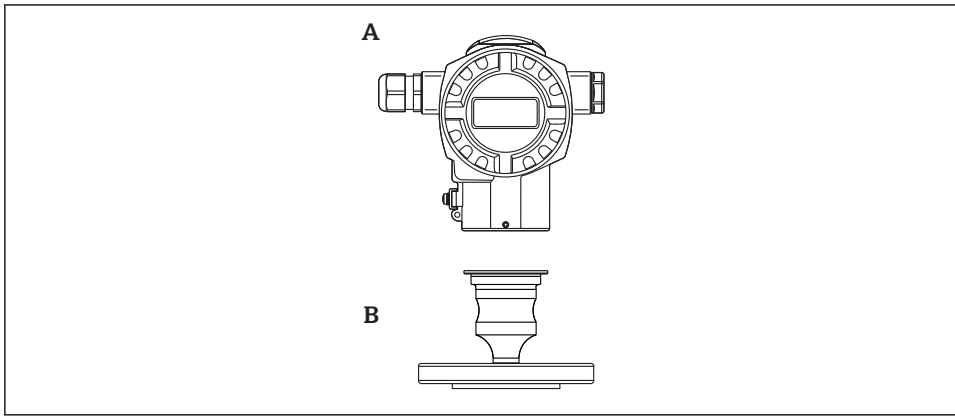
2.5 Product safety

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 it is safe to operate.

It meets general safety standards and legal requirements. It also complies with 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 Product description

3.1 Product design



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A Housing
B Process connection (e.g. flange)

4 Incoming acceptance and product identification

4.1 Incoming acceptance

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

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

4.2 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.

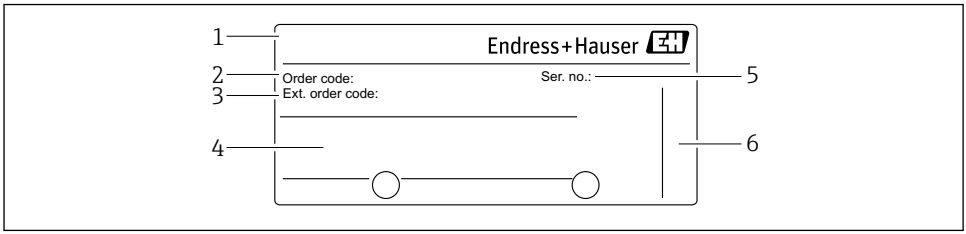
For an overview of the technical documentation provided, enter the serial number from the nameplates in *W@M Device Viewer* (www.endress.com/deviceviewer)

4.2.1 Manufacturer address

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

4.3 Nameplates

4.3.1 T14 aluminum housing



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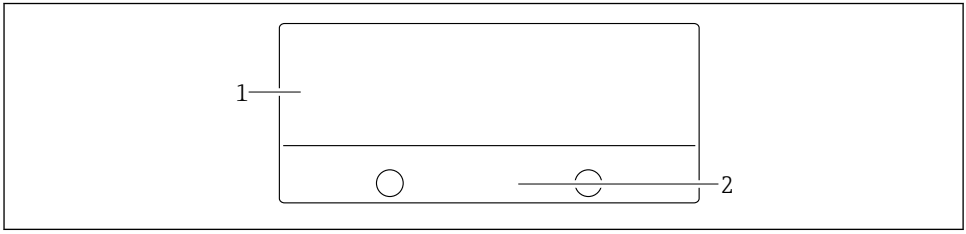
1 Device name
2 Order number (shortened for re-ordering)
3 Extended order number (complete)
4 Technical data
5 Serial number (for clear identification)
6 Manufacturer's address

Additional nameplate for devices with Ex approval



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1 Approval-specific information
2 Document number of Safety Instructions or drawing number

4.4 Identification of sensor type

See the "Sensor measurement type" parameter in the parameter description.

4.5 Storage and transport

4.5.1 Storage conditions

Use original packaging.

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

Storage temperature range

−40 to +80 °C (−40 to +176 °F)

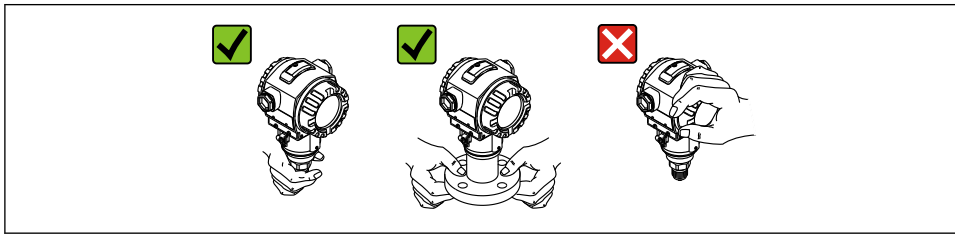
4.5.2 Transporting the product to the measuring point

⚠ WARNING

Incorrect transport!

Housing and diaphragm 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.



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4.6 Scope of delivery

The scope of delivery comprises:
- Device
- Optional accessories

Accompanying documentation:
- Brief Operating Instructions
- Fold-out brochure
- Final inspection report
- Additional safety instructions for devices for hazardous areas
- Optional: factory calibration certificate, test certificates

5 Installation

5.1 Mounting dimensions

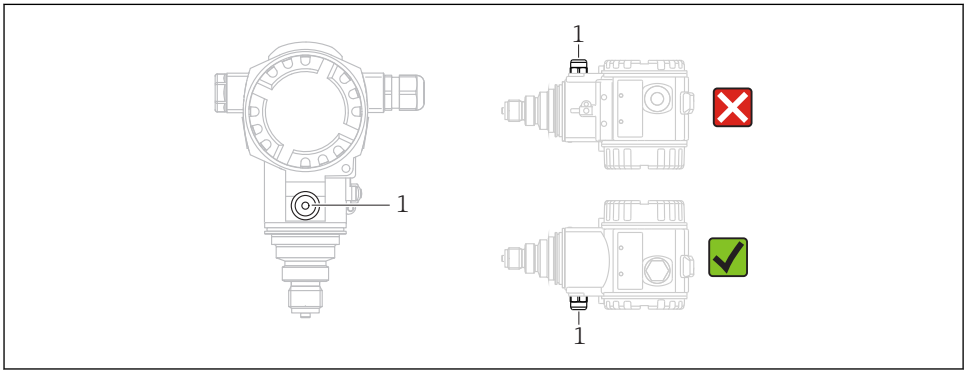
For dimensions, see the "Mechanical construction" section in the Technical Information.

5.2 Orientation

Due to the orientation, there may be a shift in the zero point, i.e. when the vessel is empty or partially full, the measured value does not display zero. This zero point shift can be corrected directly at the device using the E key → 31.

5.3 Installation conditions

- To ensure optimal readability of the onsite display, you can rotate the housing by up to 380° → 17.
- Endress+Hauser offers a mounting bracket for installation on pipes or walls → 15.
- If a heated device 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 device with the pressure compensation (1) pointing downwards.



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- Point the cable and connector downwards where possible to prevent moisture from entering (e.g. rain or condensation water).
- Devices 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 isolating diaphragms with hard or pointed objects.
- When measuring in media containing solids, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.
- Do not remove the protector on the process isolating diaphragm until just before installation.

5.3.1 Pressure measurement in gases

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

5.3.2 Pressure measurement in vapors

Use siphons for pressure measurement in vapors. The siphon reduces the temperature to almost ambient temperature. Preferably mount the device 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

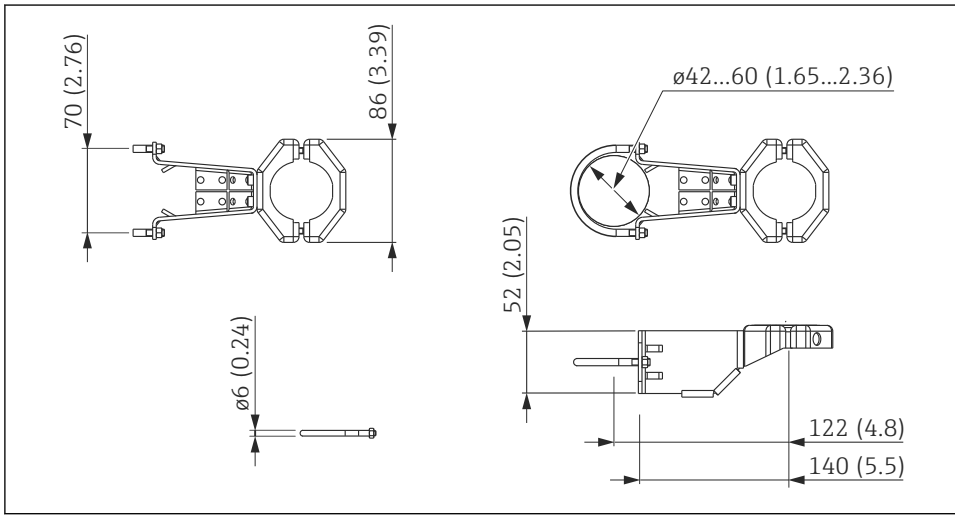
Mounting above the tapping point is also permitted. Note the max. permitted ambient temperature of the transmitter.

5.3.3 Pressure measurement in liquids

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

5.4 Wall and pipe mounting (optional)

Endress+Hauser offers a mounting bracket for installation on pipes or walls.



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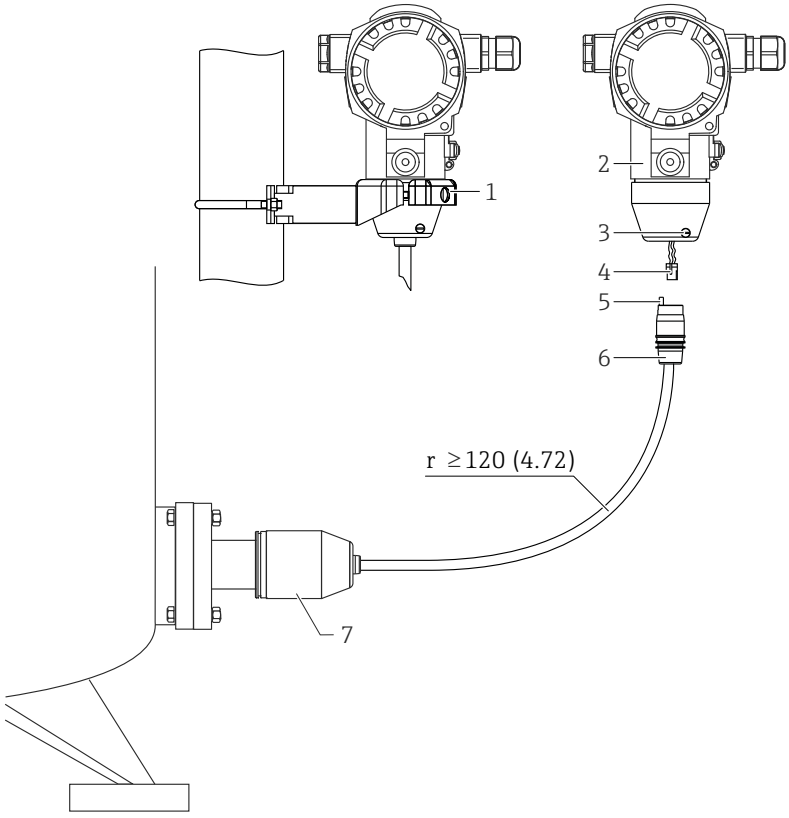
Please note the following when mounting:
- Devices with capillary tubes: mount capillaries with a bending radius ≥ 100 mm (3.94 in)
- When mounting on a pipe, tighten the nuts on the bracket uniformly with a torque of at least 5 Nm (3.69 lbf ft).

5.5 Assembling and mounting the "separate housing" version



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

Engineering unit mm (in)

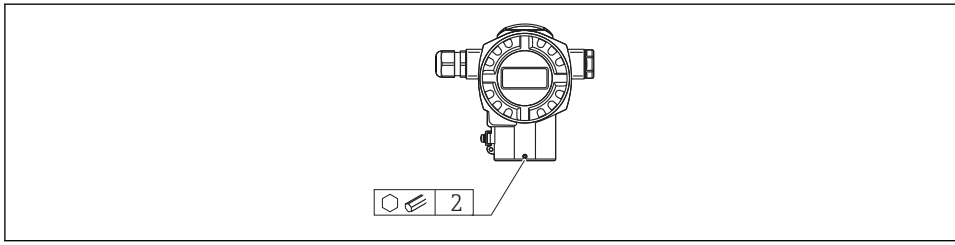
5.5.1 Assembly and mounting

1. Plug the connector (item 4) into the corresponding socket 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 with a torque of at least 5 Nm (3.69 lbf ft). Mount the cable with a bending radius (r) ≥ 120 mm (4.72 in).

5.6 Turning the housing

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



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1. Release the setscrew using a 2 mm (0.08 in) Allen key.
2. Rotate the housing (max. up to 380°).
3. Retighten the setscrew with 1 Nm (0.74 lbf ft).

5.7 Closing the housing covers

NOTICE

Devices with EPDM cover seal - transmitter not airtight!

Lubricants based on mineral oil, vegetable oil or animal fat cause the EPDM cover seal to swell with the result that the transmitter is no longer airtight.

► There is no need to lubricate the thread as the thread is already coated at the factory.

NOTICE

The housing cover can no longer be closed.

Damaged thread!

► When closing the housing covers make sure that the threads on the covers and the housing are free from dirt, such as sand. If you encounter resistance when closing the covers, then check the threads again for dirt or fouling.

5.8 Seal for flange mounting

NOTICE

Distorted 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.

5.9 Post-installation check

❑	Is the device undamaged (visual inspection)?
❑	Does the device conform to the measuring point specifications? For example: ▪ Process temperature ▪ Process pressure ▪ Ambient temperature range ▪ Measuring range
❑	Are the measuring point identification and labeling correct (visual inspection)?
❑	Is the device adequately protected from precipitation and direct sunlight?
❑	Are the securing screw and securing clamp tightened securely?

6 Electrical connection

6.1 Connecting the measuring unit

6.1.1 Terminal assignment

⚠ WARNING

Supply voltage might be connected!

Risk of explosion!

▶ Switch off the supply voltage before connecting the device.

⚠ WARNING

Electrical safety is compromised by an incorrect connection.

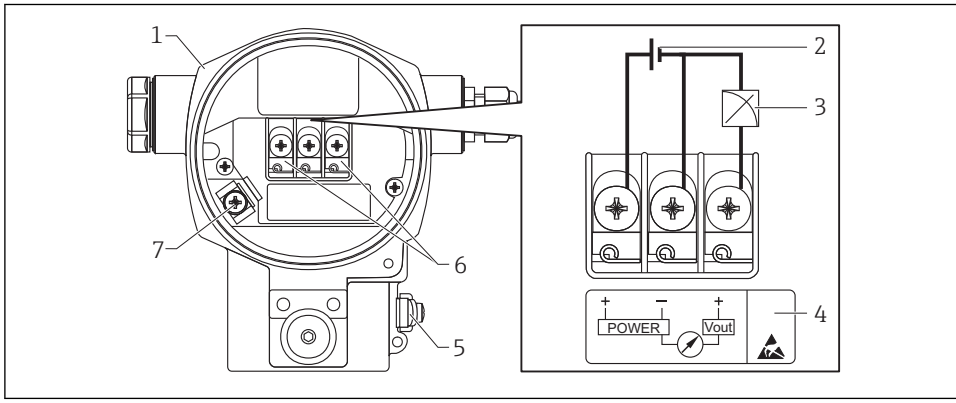
▶ Ensure that no uncontrolled processes are activated in the system.
▶ In accordance with IEC/EN61010 a separate circuit breaker must be provided for the device .
▶ When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and 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.
▶ 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 whether the supply voltage matches the supply voltage indicated on the nameplate.
2. Remove the housing cover.

3. Guide cable through the gland.
4. Connect device in accordance with the following diagram.
5. Screw down housing cover.

Switch on supply voltage.



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1 *Housing*
2 *Supply voltage*
3 *1-5V DC*
4 *Overvoltage protection (OVP) marking*
5 *External ground terminal*
6 *Terminals*
7 *Internal ground terminal*

6.1.2 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)

6.1.3 Supply voltage

⚠ WARNING

Supply voltage might be connected!
Risk of explosion!

- ▶ When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations as well as the Safety Instructions.
- ▶ 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.

- Non-hazardous area: 9 to 35 V DC
- Ex-d: 9 to 35 V DC

6.1.4 Current consumption

9 V = 1.8 mA
35 V = 0.8 mA

6.2 Connection conditions

6.2.1 Maximum cable length

The following table shows the tolerance of the voltage output for a representative cable with a length of up to 100 m (328 ft), a resistance of 18 Ohm/km and specification 18 AWG (cable cross-section 0.8 mm^2).

Tolerance of voltage output at cable end	Length
0.5 mV	25 m (82 ft)
1 mV	50 m (164 ft)
1.5 mV	75 m (246 ft)
2 mV	100 m (328 ft)

6.2.2 Cable specification

- Endress+Hauser recommends using a shielded cable.
- Cable outer diameter: 5 to 9 mm (0.2 to 0.35 in) depending on the cable entry used
  → 20

6.2.3 Cable entries

See Operating Instructions.

The cable entries have a 1/2 FNPT thread. The connection on the customer's side is protected by a plastic connector. A cable gland is not envisaged.

6.2.4 Overvoltage protection

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

NOTICE

Device could be destroyed!

► Devices with integrated overvoltage protection must be grounded.

6.3 Connection data

6.3.1 Load

The load must be at least 100 kΩ.

6.3.2 Shield

See Operating Instructions.

6.4 Post-connection check

❑	Is the device or cable undamaged (visual check)?
❑	Do the cables comply with the requirements ?
❑	Do the cables have adequate strain relief?
❑	Are all cable glands installed, securely tightened and leak-tight?
❑	Does the supply voltage match the specifications on the nameplate?
❑	Is the terminal assignment correct ?
❑	If required: Has protective ground connection been established?
❑	If supply voltage is present, is the device ready for operation and do values appear on the display module?
❑	Are all housing covers installed and securely tightened?
❑	Is the securing clamp tightened correctly?

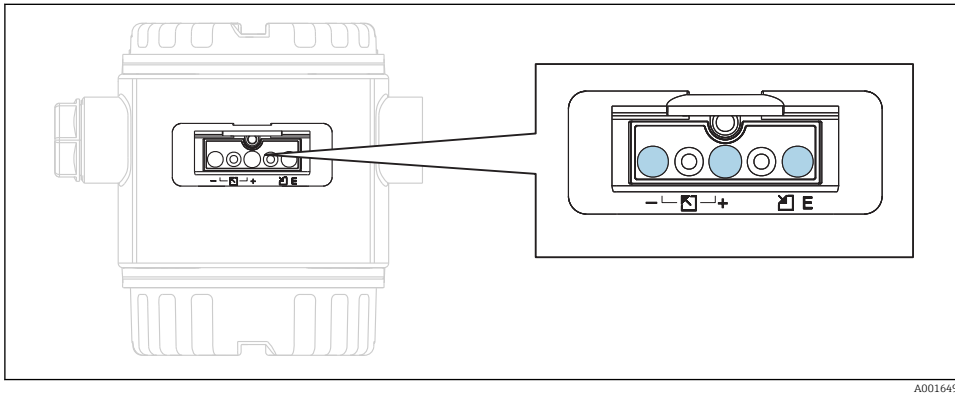
7 Operation options

7.1 Operation without an operating menu

7.1.1 Position of operating elements

Operating keys on the exterior of the device

With the T14 housing, the operating keys are located on the exterior of the device below the protection cap. In addition, there are also operating keys on the onsite display.



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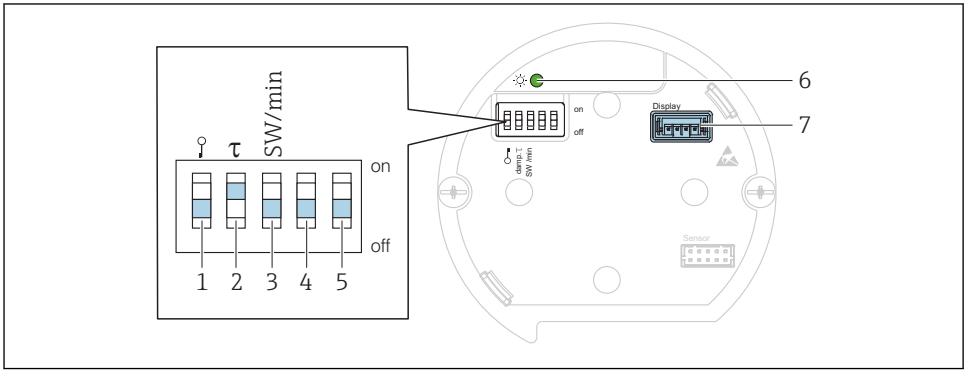
The operating keys on the outside of the device make it unnecessary to open the housing. This guarantees:

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

Operating elements inside on the electronic insert



A0031800

1 DIP switch for locking/unlocking parameters relevant to the measured value
2 DIP switch for switching damping on/off
3 DIP switch for alarm voltage/alarm current SW / alarm min (0.9 V/~3.6 mA)
4…5 Not assigned
6 Green LED to indicate value being accepted
7 Slot for display

Function of the DIP switches

Switch	Symbol/ labeling	Switch position	
		"off"	"on"
1	 A0011978	The device is unlocked. Parameters relevant to the measured value can be modified.	The device is locked. Parameters relevant to the measured value cannot be modified.
2	damping τ	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 τ. [1]
3	SW/Alarm min	The alarm is defined via the setting in the operating menu. ("Setup" → "Extended setup" → "Voltage output" → "Output fail mode") [2]	The alarm voltage is 0.9 V (min), regardless of the setting in the operating menu.

1) The value for the delay time can be configured via the operating menu ("Setup" → "Damping"). Factory setting: τ = 2 s or as per order specifications.
2) can be set from 5.25 to 5.75 V

Function of the operating elements

	Operating key(s)	Meaning
 A0017535	Press for at least 3 seconds	Adopt lower range value. A reference pressure is present at the device. For a detailed description, see also the "Pressure measuring mode" section (see the "Operating Instructions" document).
 A0017536	Press for at least 3 seconds	Adopt upper range value. A reference pressure is present at the device. For a detailed description, see also the "Pressure measuring mode" section (see the "Operating Instructions" document).
 A0017537	Press for at least 3 seconds	Position adjustment
 A0017535 and  A0017536 and  A0017537	Press for at least 6 seconds	Reset all parameters. The reset via operating keys corresponds to the software reset code 7864.

7.2 Operation with an operating menu

7.2.1 Operating concept

Operation with an operating menu is based on an operation concept with "user roles" .

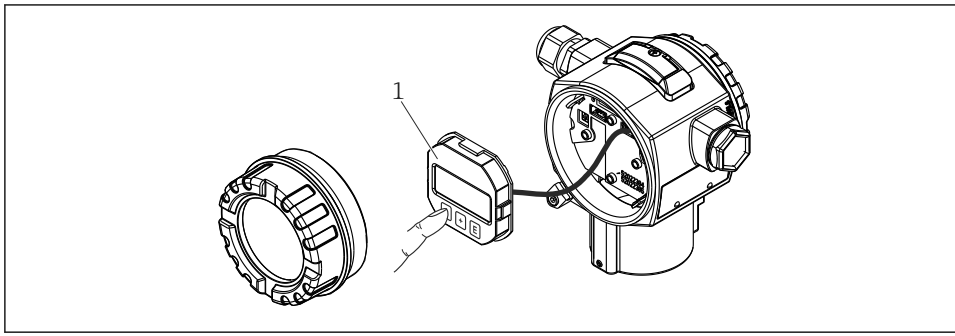
User role	Meaning
Operator	Operators are responsible for the devices during normal "operation". This is usually limited to reading process values either directly at the device or in a control room. If the work with the devices goes beyond reading, it concerns simple, application-specific functions that are used in operation. Should an error occur, these users simply forward the information on the errors but do not intervene themselves.
Maintenance	Service engineers usually work with the devices in the phases following device commissioning. They are primarily involved in maintenance and troubleshooting activities for which simple settings have to be made at the device. Technicians work with the devices over the entire life cycle of the product. Thus, commissioning and advanced settings and configurations are some of the tasks they have to carry out.
Expert	Experts work with the devices over the entire life cycle of the device, but, at times, have high device requirements. Individual parameters/functions from the overall functionality of the devices are required for this purpose time and again. In addition to technical, process-oriented tasks, experts can also perform administrative tasks (e.g. user administration). "Experts" can access the entire parameter set.

7.3 Structure of the operating menu

User role	Submenu	Meaning/use
Operator	Language	Only consists of the "Language" parameter (000) where the operating language for the device is specified. The language can always be changed even if the device is locked.
Operator	Display/ operat.	Contains parameters that are needed to configure the measured value display (selecting the values displayed, display format, etc.). With this submenu, users can change the measured value display without affecting the actual measurement.
Maintenance	Setup	Contains all the parameters that are needed to commission measuring operations. This submenu has the following structure: ▪ **Standard setup parameters** A wide range of parameters, which can be used to configure a typical application, is available at the start. After making settings for all these parameters, the measuring operation should be completely configured in the majority of cases. ▪ **"Extended setup" submenu** The "Extended setup" submenu contains additional parameters for more in-depth configuration of the measurement operation, for conversion of the measured value and for scaling the output signal. This menu is split into additional submenus depending on the measuring mode selected.
Maintenance	Diagnostics	Contains all the parameters that are needed to detect and analyze operating errors. This submenu has the following structure: ▪ **Diagnostic list** contains up to 10 currently pending error messages. ▪ **Event logbook** contains the last 10 error messages (no longer pending). ▪ **Instrument info** contains information for identifying the device. ▪ **Measured values** contains all current measured values. ▪ **Simulation** is used to simulate pressure, voltage and alarm/warning. ▪ **Reset**
Expert	Expert	Contains all the parameters of the device (including those already in one of the submenus). The "Expert" submenu is structured by the function blocks of the device. It thus contains the following submenus: ▪ **System** contains all device parameters that do not affect either measurement or integration into a distributed control system. ▪ **Measurement** contains all parameters for configuring the measurement. ▪ **Output** contains all parameters for configuring the voltage output. ▪ **Diagnostics** contains all parameters required to detect and analyze operating errors.

7.4 Operation options

7.4.1 Local operation



A0017650

1 Display and operating module with push buttons.

7.5 Operation with onsite display

A 4-line liquid crystal display (LCD) is used for display and operation. The onsite display shows measured values, dialog text as well as fault and notice messages in plain text, thereby supporting the user in every stage of operation.

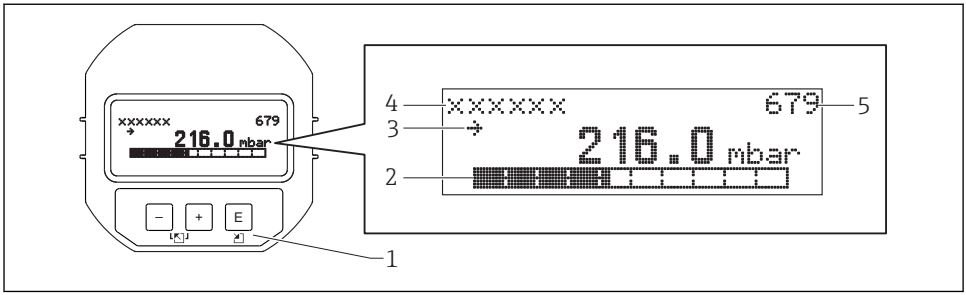
The display can be removed for easy operation.

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 value.

Functions:
- 8-digit measured value display incl. sign and decimal point, bar graph for 1 to 5 V.
- Simple and complete menu guidance due to breakdown of parameters into several levels and groups
- Each parameter is given a 3-digit ID number for easy navigation.
- Option for configuring the display according to individual requirements and preferences, such as language, alternating display, display of other measured values such as sensor temperature, contrast setting.
- Comprehensive diagnostic functions (fault and warning message, peakhold indicators, etc.).
- Quick and safe commissioning

7.5.1 Overview



A0016498

1 Operating keys
2 Bar graph
3 Symbol
4 Header
5 Parameter ID number

7.5.2 Setting the contrast on the display module

- ⊞ and Ⓔ (press simultaneously): increases the contrast.
- ⊟ and Ⓔ (press simultaneously): decreases the contrast.

7.5.3 Symbols on the onsite display

The following tables show the symbols that can be used on the onsite display. Four symbols may appear at the same time.

Error symbols

See Operating Instructions.

Display symbols for locking status

See Operating Instructions.

7.5.4 Navigation and selection from list

The operating keys are used to navigate through the operating menu and to select an option from a picklist.

Operating key(s)	Meaning
 A0017879	▪ Navigate downwards in the picklist ▪ Edit the numerical values and characters within a function
 A0017880	▪ Navigate upwards in the picklist ▪ Edit the numerical values and characters within a function

Operating key(s)	Meaning
E A0017881	▪ Confirm entry ▪ Jump to the next item ▪ Selection of a menu item and activation of edit mode
+ A0017879 and E A0017881	Contrast setting of onsite display: darker
− A0017880 and E A0017881	Contrast setting of onsite display: brighter
+ A0017879 and − A0017880	**ESC functions:** ▪ Exit edit mode for a parameter without saving the changed value. ▪ You are in a menu at a selection level. Each time you press the keys simultaneously, you go up a level in the menu.

7.5.5 Navigation examples

Parameters with a picklist

	Language 000	Operation
1	✔ German Spanish	"English" is set as the menu language (default value). A ✔ in front of the menu text indicates the option that is currently active.
2	German ✔ Spanish	Select the menu language "Spanish" using ⊞ or ⊟.
3	✔ Spanish German	Confirm your selection with Ⓔ. A ✔ in front of the menu text indicates the option that is currently active ("Spanish" is the language selected). Use Ⓔ to exit edit mode for the parameter.

Accepting the pressure present

Example: setting position adjustment.

Menu path: Main menu → Setup → Pos. zero adjust

	Pos. zero adjust 007	Operation
1	✔ Cancel Confirm	The pressure for position adjustment is present at the device.
2	Cancel ✔ Confirm	Use ⊞ or ⊟ to switch to the "Confirm" option. The active option is highlighted in black.

	Pos. zero adjust 007	Operation
3	Adjustment has been accepted!	Use the E key to accept the applied pressure as a position adjustment. The device confirms the adjustment and goes back to the "Pos. zero adjust" parameter.
4	✔ Cancel Confirm	Use E to exit edit mode for the parameter.

User-definable parameters

See Operating Instructions.

7.6 Direct access to parameters

See Operating Instructions.

7.7 Locking/unlocking operation

See Operating Instructions.

7.8 Resetting to factory settings (reset)

See Operating Instructions.

8 Commissioning

The measuring range and the unit in which the measured value is transmitted correspond to the data on the nameplate.

⚠ WARNING

Process pressure above permitted maximum!

Risk of injury if parts burst! Warnings are displayed if the pressure is too high.

- ▶ If a pressure smaller than the minimum permitted pressure or greater than the maximum permitted pressure is present at the device, the following messages are output in succession (depending on the setting in the "Alarm behavior P" (050) parameter): "S140 Working range P" or "F140 Working range P" "S841 Sensor range" or "F841 Sensor range" "S971 Adjustment". Only operate the device within the sensor range limits!

NOTICE

Process pressure below permitted minimum!

Messages are displayed if the pressure is too low.

- ▶ If a pressure smaller than the minimum permitted pressure or greater than the maximum permitted pressure is present at the device, the following messages are output in succession (depending on the setting in the "Alarm behavior P" (050) parameter): "S140 Working range P" or "F140 Working range P" "S841 Sensor range" or "F841 Sensor range" "S971 Adjustment". Only operate the device within the sensor range limits!

8.1 Function check

Before commissioning your measuring point, ensure that the post-installation and post-connection check have been performed:

- "Post-installation check" checklist → 🖹 18
- "Post-connection check" checklist → 🖹 21

8.2 Unlocking/locking configuration

If the device is locked to prevent configuration, it must first be unlocked.

8.2.1 Locking/unlocking software

If the device is locked via the software (device access code), the key symbol appears in the measured value display. If an attempt is made to write to a parameter, a prompt for the device access code appears. To unlock, enter the user-defined device access code.

8.3 Commissioning without an operating menu

The following functions are possible via the keys on the electronic insert:
- Position adjustment (zero point correction)
- Setting lower range value and upper range value
- Device reset → 🖹 28

- Operation must be unlocked → 🖹 28
- The pressure applied must be within the nominal pressure limits of the sensor. See information on the nameplate.

Perform position adjustment (see information at the start of "Commissioning" section)		
1	Pressure is present at the device.	
2	Press the "Zero" and "Span" keys simultaneously for at least 3 s.	
3	Does the LED on the electronic insert light up briefly?	
4	Yes	No
5	Applied pressure for position adjustment has been accepted.	Applied pressure for position adjustment has not been accepted. Observe the input limits.

Setting lower range value		
1	Desired pressure for lower range value is present at device.	
2	Press the "Zero" key for at least 3 s.	
3	Does the LED on the electronic insert light up briefly?	
4	Yes	No
5	Applied pressure for lower range value has been accepted.	Applied pressure for lower range value has not been accepted. Observe the input limits.

Setting upper range value		
1	Desired pressure for upper range value is present at device.	
2	Press the "Span" key for at least 3 s.	
3	Does the LED on the electronic insert light up briefly?	
4	Yes	No
5	Applied pressure for upper range value has been accepted.	Applied pressure for upper range value has not been accepted. Observe the input limits.

8.4 Commissioning with an operating menu

Commissioning comprises the following steps:
- Function check → 29
- Selection of the pressure unit → 30
- Position adjustment → 31
- Configuring measurement:
  Pressure measurement → 34

8.5 Selecting the language

Language (000)

Navigation Main menu → Language

Write permission Operators/Service engineers/Expert

Description Select the menu language for the local display.

Options
- English
- Another language (as selected when ordering the device)
- Possibly a third language (language of the manufacturing plant)

Factory setting English

8.6 For selecting the pressure engineering unit

Press. eng. unit (125)

Navigation Setup → Press. eng. unit

Write permission Operators/Service engineers/Expert

Description Select the pressure engineering unit. If a new pressure engineering unit is selected, all pressure-specific parameters are converted and displayed with the new unit.

Options
- mbar, bar
- mmH2O, mH2O, inH2O
- ftH2O
- Pa, kPa, MPa
- psi
- mmHg, inHg
- kgf/cm^2

Factory setting mbar or bar depending on the nominal measuring range of the sensor module, or as per order specifications.

8.7 Position adjustment

The pressure resulting from the orientation of the device can be corrected here.

Corrected press. (172)

Navigation Setup → Corrected Press.

Write permission Operators/Service engineers/Expert

Description Displays the measured pressure after sensor trim and position adjustment.

Note If this value is not equal to "0", it can be corrected to "0" by the position adjustment.

Pos. zero adjust (007) (gauge pressure sensor)

Navigation Setup → Pos. zero adjust

Write permission Operators/Service engineers/Expert

Description Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known.

Options
- Confirm
- Cancel

Example
- Measured value = 2.2 mbar (0.033 psi)
- You correct the measured value via the "Pos. zero adjust" parameter with the "Confirm" option. This means that you are assigning the value 0.0 to the pressure present.
- Measured value (after pos. zero adjust) = 0.0 mbar
- The value of the voltage output is also corrected.

Factory setting Cancel

Calib. offset (008) (absolute pressure sensors)

Write permission Service engineers/Expert

Description Position adjustment – the pressure difference between the set point and the measured pressure must be known.

Example
- Measured value = 982.2 mbar (14.73 psi)
- You correct the measured value with the value entered (e.g. 2.2 mbar (0.033 psi)) via the "Calib. Offset" parameter. This means that you are assigning the value 980.0 (14.7 psi) to the pressure present.
- Measured value (after pos. zero adjust) = 980.0 mbar (14.7 psi)
- The value of the voltage output is also corrected.

Factory setting 0.0

8.8 Configuring the damping

The output signal follows measured value changes with the delay time. This can be configured via the operating menu.

Damping value (017)

Navigation	Setup → Damping
Write permission	Operators/Service engineers/Expert (if the "Damping" DIP switch is set to "on")
Description	Enter damping time (time constant τ) ("Damping" DIP switch set to "on") Display damping time (time constant τ) ("Damping" DIP switch set to "off"). The damping affects the speed at which the measured value reacts to changes in pressure.
Input range	0.0 to 999.0 s
Factory setting	2.0 sec. or according to order specifications

8.9 Configuring pressure measurement

8.9.1 Calibration without reference pressure (dry calibration)

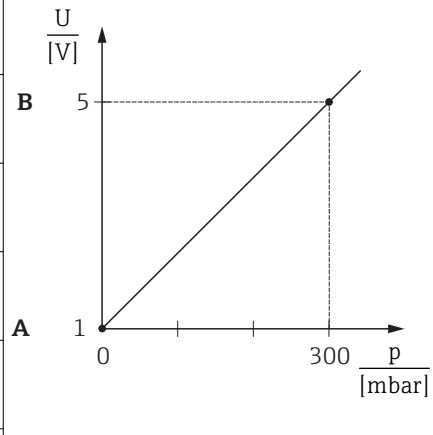
Example:

In this example, a device with a 400 mbar (6 psi)sensor is configured for the 0 to +300 mbar (0 to 4.5 psi) measuring range, i.e. 0 mbar and 300 mbar (4.5 psi) are assigned, respectively, to the 1V value and the 5V value.

Prerequisite:

This is a theoretical calibration, i.e. the pressure values for the lower and upper range are known.

Due to the orientation of the device, there may be pressure shifts in the measured value, i.e. the measured value is not zero in a pressureless condition. For information on how to perform a position adjustment, see → 31.

	Description	
1	Select a pressure unit via the "Press eng. unit" parameter, here "mbar" for example. Menu path: Setup → Press. eng. unit	 A0032272 *A See table, step 2.* *B See table, step 3.*
2	Select the "Set LRV" parameter. Menu path: Setup → Extended Setup → Voltage output→ Set LRV	
	Enter the value for the "Set LRV" parameter (here 0 mbar) and confirm. This pressure value is assigned to the lower voltage value (1V).	
3	Select the "Set URV" parameter. Menu path: Setup → Extended Setup → Voltage output → Set URV	
	Enter the value for the "Set URV" parameter, here 300 mbar (4.5 psi), and confirm. This pressure value is assigned to the upper voltage value (5V).	
4	Result: The measuring range is configured for 0 to +300 mbar (0 to 4.5 psi).	

8.9.2 Calibration with reference pressure (wet calibration)

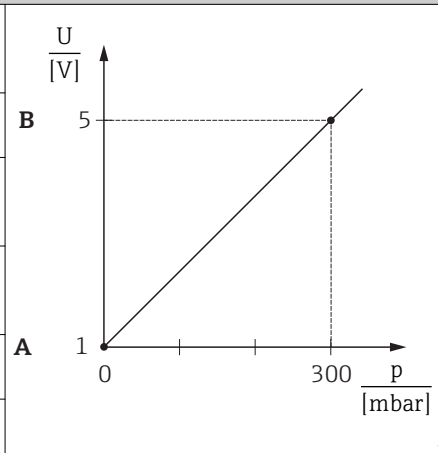
Example:

In this example, a device with a 400 mbar (6 psi)sensor is configured for the 0 to +300 mbar (0 to 4.5 psi) measuring range, i.e. 0 mbar and 300 mbar (4.5 psi) are assigned, respectively, to the 1V value and the 5V value.

Prerequisite:

The pressure values 0 mbar and 300 mbar (4.5 psi) can be specified. For example, the device is already installed.

Due to the orientation of the device, there may be pressure shifts in the measured value, i.e. the measured value is not zero in a pressureless condition. For information on how to perform a position adjustment, see → 31.

	Description	
1	Select a pressure unit via the "Press eng. unit" parameter, here "mbar" for example. Menu path: Setup → Press. eng. unit	 *A See table, step 2.* *B See table, step 3.*
2	The pressure for the LRV (1V value) is present at the device, here 0 mbar for example	
	Select the "Get LRV" parameter. Menu path: Setup → Extended Setup → Voltage output → Get LRV	
	Confirm the present value by selecting "Apply". The pressure value present is assigned to the lower voltage value (1V).	
3	The pressure for the URV (5V value) is present at the device, here 300 mbar (4.5 psi)for example.	
	Select the "Get URV" parameter. Menu path: Setup → Extended Setup → Voltage output → Get URV	
	Confirm the present value by selecting "Apply". The pressure value present is assigned to the upper current value (5V).	
4	Result: The measuring range is configured for 0 to +300 mbar (0 to 4.5 psi).	

9 Diagnostics and troubleshooting

See Operating Instructions.

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