



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



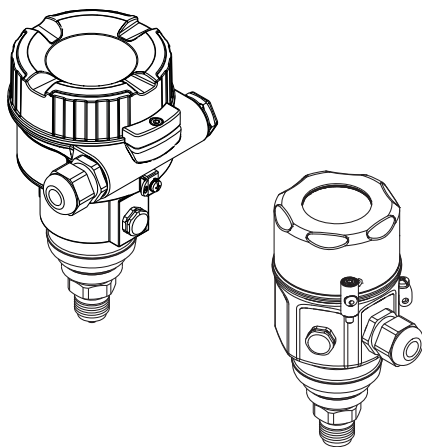
Solutions

## Brief Operating Instructions

# Cerabar M

## PMC51, PMP51, PMP55

### Process pressure measurement



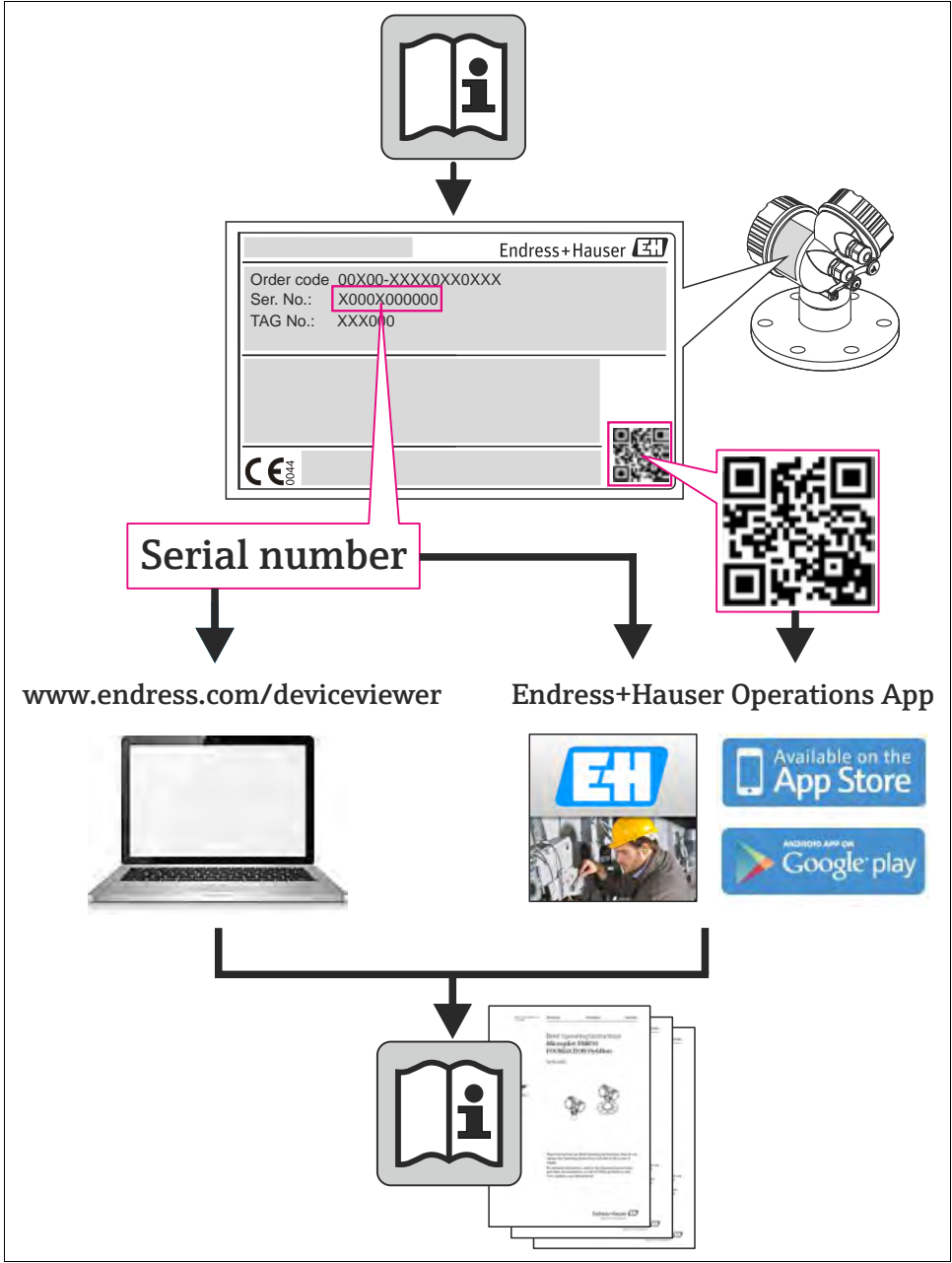
These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

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](http://www.endress.com/deviceviewer)
- Smart phone/tablet: *Endress+Hauser Operations App*

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# 1 Safety instructions

## 1.1 Designated use

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

The manufacturer accepts no liability for damages resulting from incorrect use or use other than that designated.

## 1.2 Installation, commissioning and operation

- The device must only be installed, connected, commissioned and maintained by qualified and authorized specialists (e.g. electrical technicians) in full compliance with the instructions in this manual, the applicable norms, legal regulations and certificates (depending on the application).
- The specialist must have read and understood this manual and must follow the instructions it contains. If you are unclear on anything in these Brief Operating Instructions, you must read the Operating Instructions. The Operating Instructions provide detailed information on the device/measuring system.
- The device may only be modified or repaired if such work is expressly permitted in the Operating Instructions.
- If faults cannot be rectified, the device must be taken out of service and secured against unintentional commissioning.
- Do not operate damaged devices. Mark them as defective.

## 1.3 Operational safety and process safety

- Alternative monitoring measures must be taken to ensure operational safety and process safety during configuration, testing and maintenance work on the device.
- The device is safely built and tested according to state-of-the-art technology and has left the factory in perfect condition as regards technical safety. The applicable regulations and European standards have been taken into account.
- Pay particular attention to the technical data on the nameplate.
- If using devices for applications with safety integrity level, the separate manual on functional safety must be observed thoroughly.






Warning!

Only disassemble the device in pressurless condition!

## 1.4 Return

Follow the instructions on returning the device as outlined in the Operating Instructions.

## 1.5 Safety icons

Symbol	Meaning
	<b>Warning!</b> A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument.
	<b>Caution!</b> Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument.
	<b>Note!</b> A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned.

## 2 Identification


### 2.1 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](http://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](http://www.endress.com/deviceviewer)).


## 3 Mounting

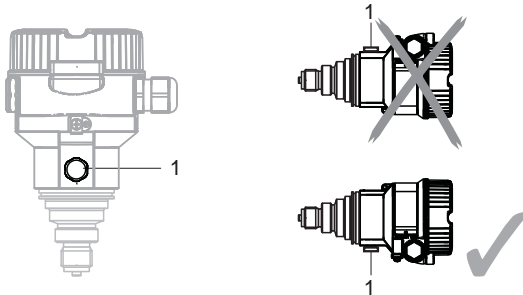
-  **Warning!**  
The seal is not allowed to press against the process isolating diaphragm as this could affect the measurement result.

### 3.1 Installation position

-  **Note!**
- Due to the orientation of the Cerabar M, there may be a shift in the measured value, i.e. when the container is empty, the measured value does not display zero. You may correct this zero point shift → [14](#), "Function of the operating elements".
  - For PMP55, please refer to Section 3.3 "Installation instructions for devices with diaphragm seals – PMP55", → [7](#).
  - Endress+Hauser offers a mounting bracket for installing on pipes or walls (see Operating Instructions BA00385P).

### 3.2 Installation instructions for devices without diaphragm seals – PMP51, PMC51

-  **Note!**
- Keep the pressure compensation and GORE-TEX® filter (1) free from contamination.
  - Cerabar M transmitters without diaphragm seals are mounted as per the norms for a manometer (DIN EN 837-2). We recommend the use of shutoff devices and siphons. The orientation depends on the measuring application.
  - Do not clean or touch process isolating diaphragms with hard or pointed objects.
  - If a heated Cerabar M 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 M with the pressure compensation (1) pointing downwards.



#### 3.2.1 Pressure measurement in gases

- Mount Cerabar M with shutoff device above the tapping point so that condensate which may be present, can flow into the process.

### 3.2.2 Pressure measurement in steams

- Mount Cerabar M with siphon above the tapping point.
- Fill the siphon with liquid before commissioning.  
The siphon reduces the temperature to almost the ambient temperature.

### 3.2.3 Pressure measurement in liquids

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

### 3.2.4 Level measurement

- Always install the Cerabar M 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 of a shutoff device.

## 3.3 Installation instructions for devices with diaphragm seals – PMP55



Note!

- Cerabar M devices with diaphragm seals are screwed in, flanged or clamped, depending on the type of diaphragm seal.
- 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.
- Do not clean or touch the process isolating diaphragm of the diaphragm seal with hard or pointed objects.
- Do not remove process isolating diaphragm protection until shortly before installation.
- When using a mounting bracket, sufficient strain relief must be ensured for the capillaries in order to prevent the capillary bending down (bending radius  $\geq 100$  mm (3.94 in)).
- 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.
- Please observe the application limits of the diaphragm seal filling oil as detailed in the Technical Information for Cerabar M TI00436P, "Planning instructions for diaphragm seal systems" section.

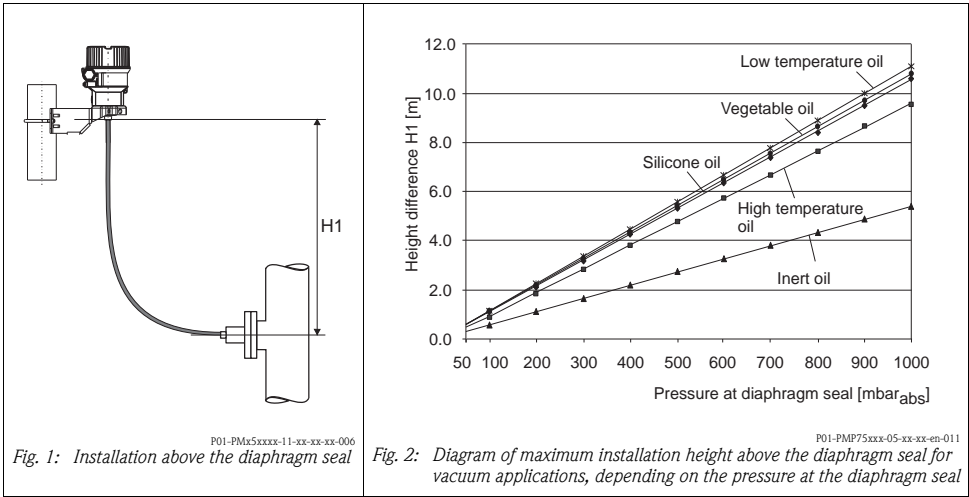
In order to obtain more precise measurement results and to avoid a defect in the device, mount the capillaries as follows:

- Vibration-free (in order to avoid additional pressure fluctuations)
- Not in the vicinity of heating or cooling lines
- Insulate if the ambient temperature is below or above the reference temperature
- With a bending radius of  $\geq 100$  mm (3.94 in).

### 3.3.1 Vacuum application

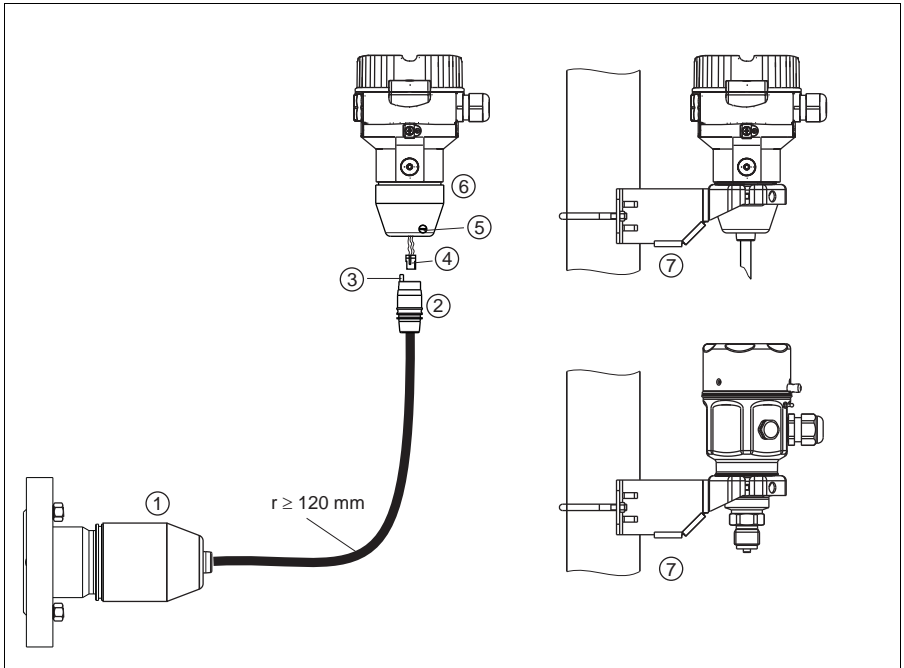
For applications under vacuum, Endress+Hauser recommends mounting the pressure transmitter below the diaphragm seal. This prevents vacuum loading of the diaphragm seal caused by the presence of filling oil in the capillaries.

When the pressure transmitter is mounted above the diaphragm seal, the maximum height difference  $H_1$  in accordance with the illustration below left must not be exceeded. The maximum height difference depends on the density of the filling oil and the smallest ever pressure that is permitted to occur at the diaphragm seal (empty container), see illustration below right.





### 3.4 Assembling and mounting the "separate housing" version



P01-3Mx5xxxx-11-xx-xx-xx-009

Fig. 3: "Separate housing" version

- 1 In the case of the "separate housing" version, the sensor is delivered with the process connection and cable ready mounted.
- 2 Cable with connection jack
- 3 Pressure compensation
- 4 Connector
- 5 Locking screw
- 6 Housing mounted with housing adapter, included
- 7 Mounting bracket provided, suitable for pipe and wall mounting (for pipes from 1 1/4" up to 2" diameter)

#### 3.4.1 Assembly and mounting

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

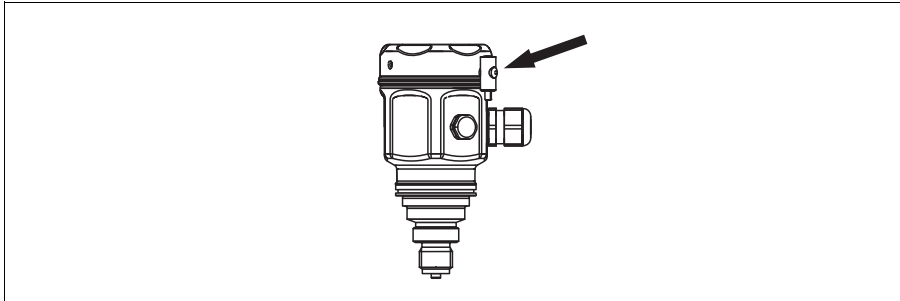
## 3.5 Closing the housing cover



### Note!

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.

### 3.5.1 Closing the cover on the stainless steel housing



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Fig. 4: Closing the cover

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

## 3.6 Post-installation check

After installing the device, carry out the following checks:

- Are all screws firmly tightened?
- Are the housing covers screwed down tight?

## 4 Wiring

### 4.1 Connecting the device

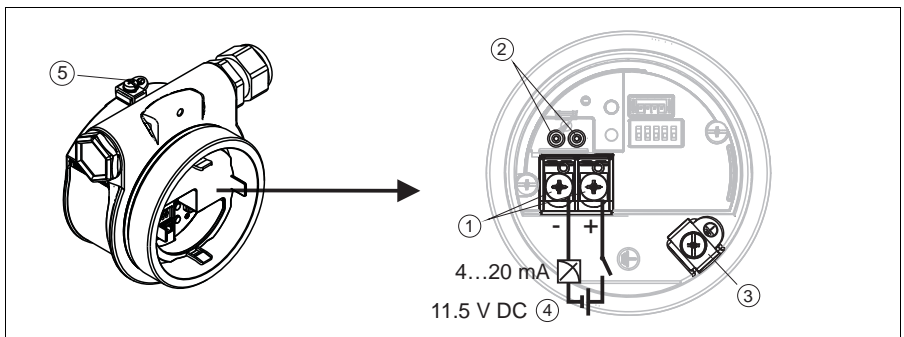


Note!

- A suitable circuit breaker has to be provided for the device in accordance with IEC/EN 61010.
- Devices with integrated overvoltage protection must be earthed.
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are integrated.

#### The procedure

1. Check if the supply voltage matches the specified supply voltage on the nameplate.
2. Switch off the supply voltage before connecting the device.
3. Remove housing cover.
4. Guide cable through the gland. Preferably use twisted, screened two-wire cable.
5. Connect device in accordance with the following diagram.
6. Screw down housing cover.
7. Switch on supply voltage.



P01-PMDS5xxx-04-xx-xx-xx-010

Electrical connection 4...20 mA

- 1 Terminals for supply voltage and signal
- 2 Test terminals
- 3 Grounding terminal
- 4 Supply voltage: 11,5 ... 45 VDC (versions with plug connectors: 35 V DC)
- 5 External ground terminal

## 4.2 Connecting the measuring unit

### 4.2.1 Supply voltage

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

#### Taking 4 to 20 mA test signal

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

### 4.2.2 Cable specification

- Endress+Hauser recommends using twisted, shielded two-wire cables.
- Terminals for wire cross-sections 0.5 to 2.5 mm<sup>2</sup> (20 to 14 AWG)
- Cable outer diameter: 5 to 9 mm (0.2 to 0.35 in) depends on the used cable gland (see technical information)

### 4.2.3 Shielding/potential equalization

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

## 4.3 Potential equalization

Observe the applicable regulations.

## 4.4 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 as per Section 3.1?
- Are all screws firmly tightened?
- Are the housing covers screwed down tight?

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

## 5 Operation

### 5.1 Position of operating elements

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

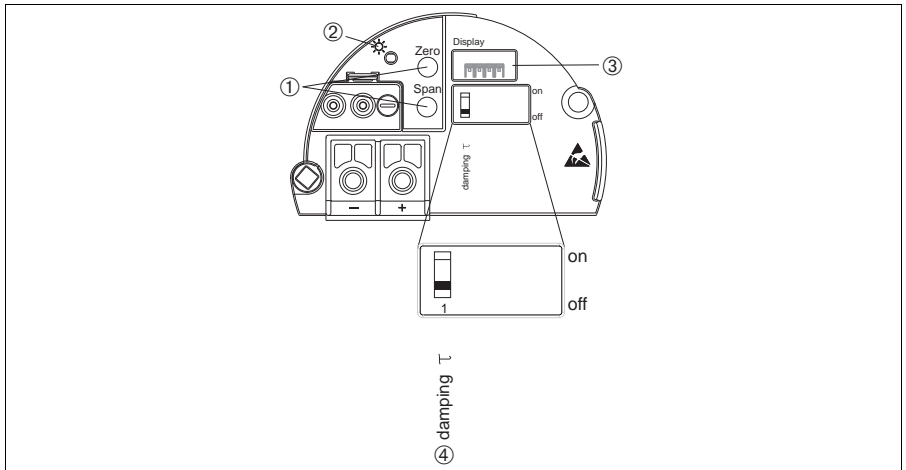


Fig. 5: Electronic insert

P01-Mxxxxxx-19-xx-xx-xx-010

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

#### 5.1.1 Function of the DIP switch

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

### 5.1.2 Function of the operating elements

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

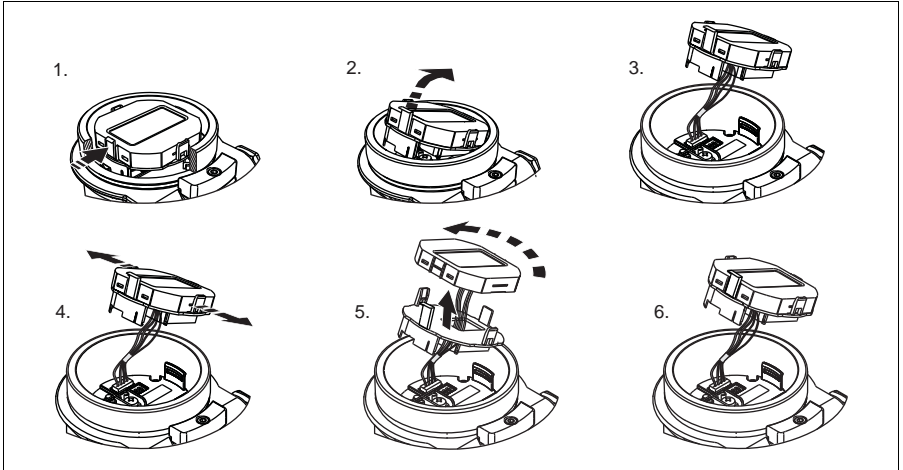
## 5.2 Using the device display (optional)

A 4-line liquid crystal display (LCD) is used. The local display shows measured values, fault messages and notice messages.

The display can be removed for easy operation (see diagram, steps 1 - 3). It is connected to the device via a 90 mm (3.54 in) long cable.

The device display can be rotated in 90 ° stages (see diagram, steps 4 - 6).

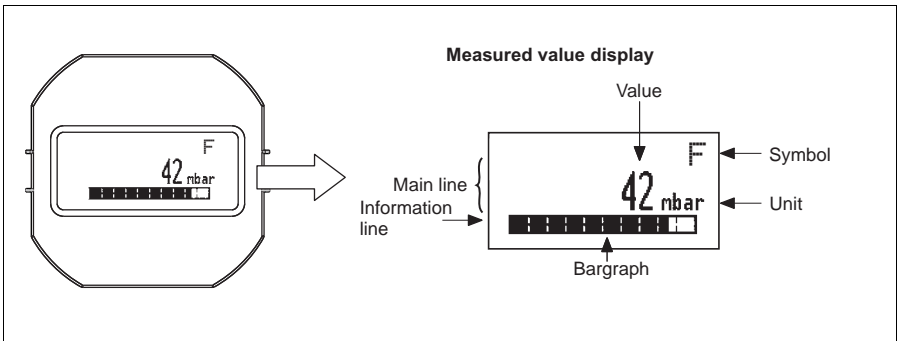
Depending on the orientation of the device, this makes it easy to read the measured values.



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Functions:

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



P01-Mxxxxxxx-07-xx-xx-xx-002

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

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



## 6 Commissioning



Warning!

- If the pressure present at the device is less than the permitted minimum pressure or greater than the permitted maximum pressure, the message "S" and "Warning" are output alternately.



Caution!

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

### 6.1 Function check

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

- "Post-installation check" → 10 checklist
- "Post-connection check" → 12 checklist

### 6.2 The procedure



Note!

- The pressure applied must be within the nominal pressure limits of the sensor. See information on the nameplate.

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

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

3.) Setting upper range value		4.) Check configuration
Desired pressure for upper range value is present at device.		Press "Zero" key briefly to display the lower range value.
↓		↓
Press the "Span" key for at least 3 s.		Press "Span" key briefly to display the upper range value.
↓		↓
Does the LED on the electronic insert light up briefly?		Press "Zero" and "Span" keys together briefly to display the calibration offset.
Yes	No	
↓	↓	
Applied pressure for upper range value has been accepted.	Applied pressure for upper range value has not been accepted. Observe the input limits.	



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