



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



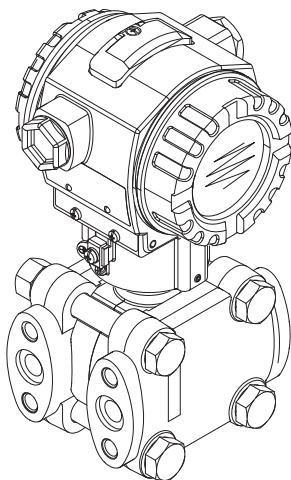
Solutions

Brief Operating Instructions

Deltabar S

PMD70, PMD75, FMD76, FMD77, FMD78

Differential pressure measurement



These Instructions are Brief Operating Instructions; they do not replace the Operating Instructions included in the scope of supply.

For detailed information, refer to the Operating Instructions and other documentation on the CD-ROM provided or visit

"www.endress.com/deviceviewer".

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1 Safety instructions

1.1 Designated use

The Deltabar S is a differential pressure transmitter for measuring differential pressure, level and flow.

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 (on the CD-ROM). 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 (→ see CD-ROM).
- 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.
- Devices for use in hazardous areas are fitted with an additional nameplate. If the device is to be installed in an explosion hazardous area, then the specifications in the certificate as well as all national and local regulations must be observed. The device is accompanied by separate "Ex documentation", which is an integral part of this Operating Instructions. The installation regulations, connection values and Safety Instructions listed in this Ex document must be observed. The documentation number of the related Safety Instructions is also indicated on the additional nameplate.

1.4 Return

Follow the instructions on returning the device as outlined in the Operating Instructions on the CD-ROM provided.

1.5 Safety icons

Symbol	Meaning
	Warning! A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument.
	Caution! Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument.
	Note! 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 Product identification

The following options are available for identification of the measuring device:

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

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

3 Installation

3.1 General installation instructions



Warning!

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



Note!

- Due to the orientation of the Deltabar S, there may be a shift in the measured value, i.e. when the container is empty, the measured value does not display zero. You can correct this zero point shift either via the "zero" key on the electronic insert, or on the outside of the device or via the onsite display. → See Page 15, Section 5.2.1 "Position of operating elements", Page 16, Section 5.2.2 "Function of the operating elements – onsite display not connected" and Page 25, Section 6.3 "Position adjustment".
- For FMD77 and FMD78, please refer to Section 3.3 "Installation instructions for devices with diaphragm seals (FMD78)", Page 7.
- The FMD77 must only be insulated up to a certain height.

- General recommendations for routing the impulse piping can be found in DIN 19210 "Methods for measurement of fluid flow; differential piping for flow measurement devices" or the corresponding national or international standards.
- Using a three-valve or five-valve manifold allows for easy commissioning, installation and maintenance without interrupting the process.
- When routing the impulse piping outdoors, ensure that sufficient anti-freeze protection is used, e.g. by using pipe heat tracing.
- Do not clean or touch diaphragm seals with hard or pointed objects.
- Install the impulse piping with a monotonic gradient of at least 10%.
- To ensure optimal readability of the onsite display, it is possible to rotate the housing up to 380°.
- Endress+Hauser offers a mounting bracket for installing on pipes or walls.

3.2 Measuring arrangement


3.2.1 Pressure measurement

- The PMD70, PMD75 and FMD78 are best suited for differential pressure measurement.
- Measuring arrangement for gases: Mount device above the measuring point.
- Measuring arrangement for liquids and steams: Mount device below tapping point.
- For differential pressure measurement in vapor, mount the condensate traps at the same level as the same the tapping point and at the same distance from Deltabar S.

3.2.2 Level measurement

- All Deltabar S devices are best suited for level measurement in closed tanks.
- PMD70, PMD75, FMD76 and FMD77 are suitable to level measurement in open tanks.

Measuring arrangement level measurement in closed tanks and closed tanks with superimposed vapor

- PMD70, PMD75: Mount device below the lower measuring connection. Always connect the negative side above the maximum level via an impulse piping.
- FMD76, FMD77: Mount device direct on the tank. Always connect the negative side above the maximum level via an impulse piping.
- FMD78 →  7, Section 3.3 and Section 3.4.
- In the case of level measurement in closed tanks with superimposed vapor, a condensate trap ensures pressure which remains constant on the minus side.

Measuring arrangement level measurement in open tanks

- PMD70, PMD75: Mount device below the lower measuring connection. The negative side is open to atmosphere pressure.
- FMD76, FMD77: Mount device direct on the tank. The negative side is open to atmosphere pressure.

3.2.3 Flow measurement

- The PMD70 and PMD75 are best suited for flow measurement.
- Measuring arrangement for gases: Mount device above the measuring point.

- Measuring arrangement for liquids and steams: Mount device below tapping point.
- For flow measurement in vapors, mount the condensate traps at the same level as the same the tapping point and at the same distance from Deltabar S.

3.3 Installation instructions for devices with diaphragm seals (FMD78)

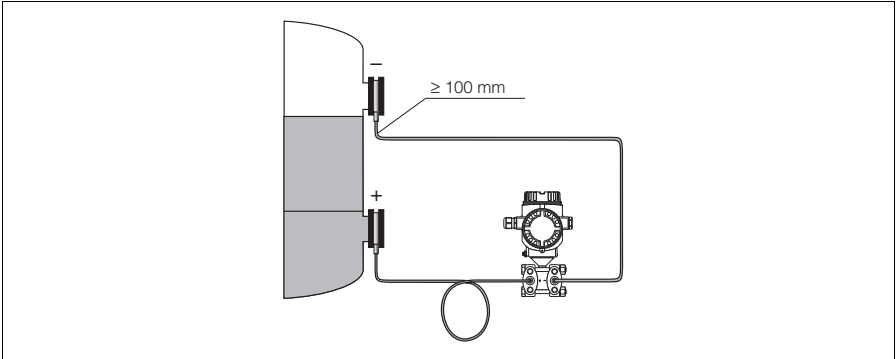


Note!

- The diaphragm seal, together with the pressure transmitter, forms a closed, calibrated system, which is filled through openings in the diaphragm seal and in the measurement system of the pressure transmitter. These openings are sealed and must not be opened.
- Do not remove the protection of the process isolating diaphragm 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 ≥ 100 mm).
- Please note that the hydrostatic pressure of the liquid columns in the capillaries can cause zero point shift. You can correct this zero point shift either via the "zero" key on the electronic insert, or on the outside of the device or via the onsite display. → See Page 15, Section 5.2.1 "Position of operating elements", Page 16, Section 5.2.2 "Function of the operating elements – onsite display not connected" and Page 25, Section 6.3 "Position adjustment".
- Please note the application limits of the diaphragm seal filling oil as detailed in the Technical Information for Deltabar S TI00382P, Section "Planning instructions for diaphragm seal systems" or at www.endress.com/applicator.

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 ≥ 100 mm.
- The ambient temperature and length of both capillaries should be the same when using two-sided diaphragm seal systems.
- Two diaphragm seals which are the same (e.g. with regard to diameter, material, etc.) should always be used for the negative and positive side (standard delivery).



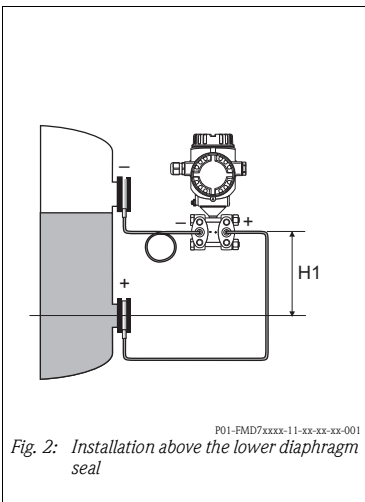
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Fig. 1: Mounting Deltabar S, FMD78 with diaphragm seals and capillary, recommended mounting for vacuum applications: mount pressure transmitter below the lowest diaphragm seal!

3.3.1 Vacuum application (FMD78)

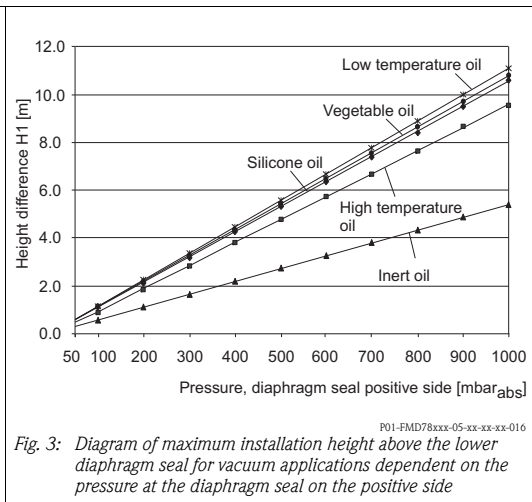
For applications under vacuum, Endress+Hauser recommends mounting the pressure transmitter underneath the lower diaphragm seal. A vacuum load of the diaphragm seal caused by the presence of filling oil in the capillaries is hereby prevented.

When the pressure transmitter is mounted above the lower diaphragm seal, the maximum height difference H1 in accordance with the illustration below on the left must not be exceeded. The maximum height difference is dependent on the density of the filling oil and the smallest ever pressure that is permitted to occur at the diaphragm seal on the positive side (empty container), see illustration below, on the right.



P01-FMD7xxxx-11-xx-xx-xx-001

Fig. 2: Installation above the lower diaphragm seal



P01-FMD78xxx-05-xx-xx-xx-016

Fig. 3: Diagram of maximum installation height above the lower diaphragm seal for vacuum applications dependent on the pressure at the diaphragm seal on the positive side

3.4 Assembling and mounting the "separate housing" version

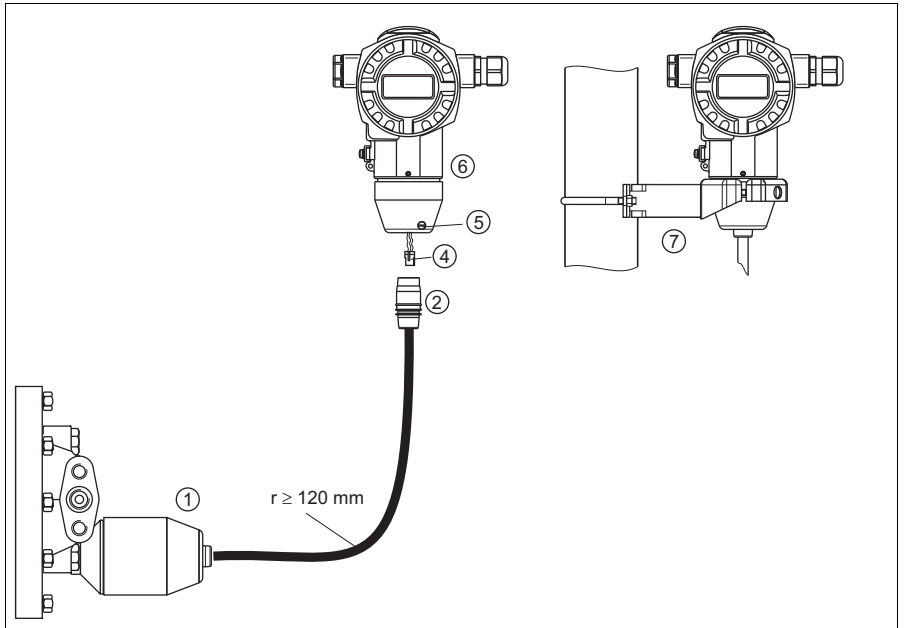


Fig. 4: "Separate housing" version

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- 1 In the "separate housing" version, the sensor is supplied with process connection and cable fitted.
- 2 Cable with connection jack
- 4 Plug
- 5 Locking screw
- 6 Housing fitted with housing adapter, included
- 7 Mounting bracket suitable for wall and pipe mounting, included

Assembly and mounting

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

4 Wiring



Warning!

- If the operating voltage is > 35 VDC: Dangerous contact voltage at terminals.
Risk of electric shock!
In a wet environment, do not open the cover if voltage is present.
- 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 comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.

4.1 Connecting the device



Note!

- Devices with integrated overvoltage protection must be grounded.
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.
- The supply voltage must match the supply voltage on the nameplate.
- Switch off the supply voltage before connecting the device.
- Remove housing cover of the terminal compartment.
- Guide cable through the gland. Preferably use twisted, shielded two-wire cable.
- Connect device in accordance with the following diagram.
- Screw down housing cover.
- Switch on supply voltage.

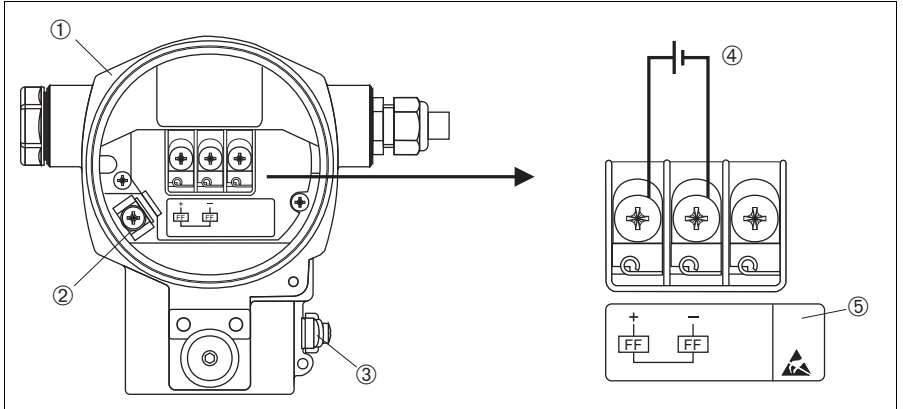


Fig. 5: Electrical connection FOUNDATION Fieldbus, observe also the following section.
For devices with 7/8" plug see Operating Instructions.

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- 1 Housing
- 2 Internal ground terminal
- 3 External ground terminal
- 4 Supply voltage, for version in non-hazardous area = 9...32 V DC
- 5 Devices with integrated overvoltage protection are labeled OVP (overvoltage protection) here.

4.2 Connecting the measuring unit



Note!

For further information on the network structure and grounding and for further bus system components such as bus cables, see the relevant documentation, e.g. Operating Instructions BA00013S "FOUNDATION Fieldbus Overview" and the FOUNDATION Fieldbus Guideline.

4.2.1 Supply voltage


- Version for non-hazardous area: 9...32 V DC

4.2.2 Current consumption

15.5 mA \pm 1 mA, switch-on current corresponds to IEC 61158-2, Clause 21.

4.2.3 Cable specification

- Use a twisted, shielded two-wire cable, preferably cable type A.
- Terminals for wire cross-Sections: 0.5...2.5 mm²
- Outer cable diameter: 5...9 mm

 Note!
For further information on the cable specifications, see Operating Instructions BA00013S "FOUNDATION Fieldbus Overview", FOUNDATION Fieldbus Guideline and IEC 61158-2 (MBP).

4.2.4 Grounding and shielding

Deltabar S must be grounded, for example by means of the external ground terminal.

Different grounding and shielding installation methods are available for FOUNDATION Fieldbus networks such as:

- Isolated installation (see also IEC 61158-2)
- Installation with multiple grounding
- Capacitive installation

5 Operation

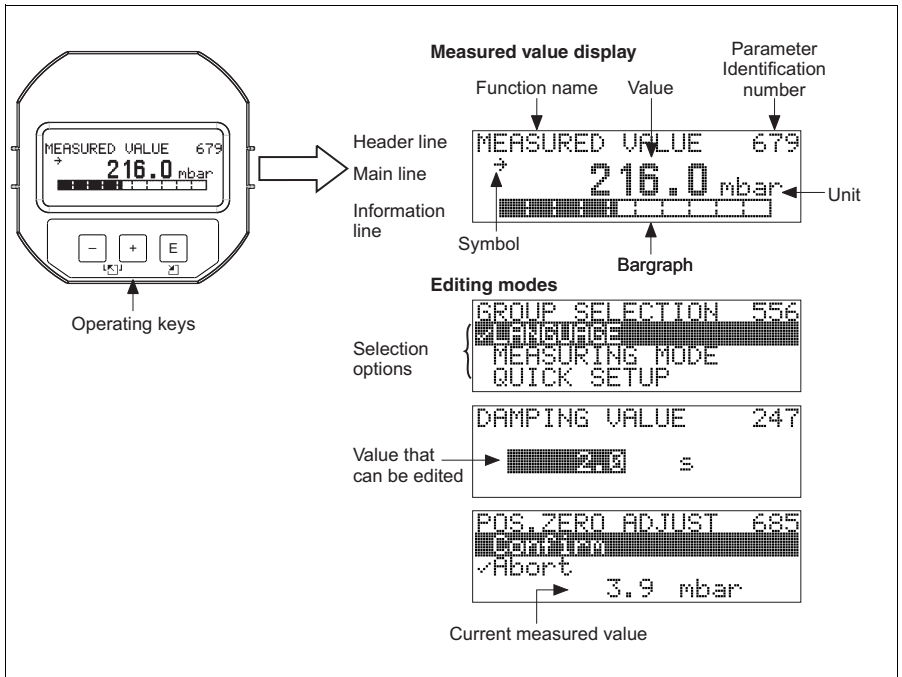
5.1 Onsite display (optional)

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

The display of the device can be turned in 90° steps.








Depending on the installation position of the device, this makes it easy to operate the device and read the measured values.

The onsite display is available in English. The assignment of the English parameter names to the German parameter names is provided in the Operating Instructions. Needless to say, the device can also be operated in 6 languages (de, en, fr, es, jp, ch) via the DTM or EDD. The FieldCare program is an E+H DTM operating tool and can be acquired from endress.com.



P01-xxxxxxx-07-xx-xx-xx-011

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

Symbol	Meaning
	Alarm symbol – Symbol flashing: warning, device continues measuring. – Symbol permanently lit: error, device does not continue measuring. <i>Note:</i> The alarm symbol may overlie the tendency symbol.
	Lock symbol The operation of the device is locked. Unlock device, → see Page 21, Section 5.4.
	Communication symbol Data transfer via communication
	Simulation symbol Simulation mode is activated. DIP switch 2 for simulation is set to "On". → See Page 15, Section 5.2.1 "Position of operating elements".
	Tendency symbol (increasing) The primary value of the Transducer Block is increasing.
	Tendency symbol (decreasing) The primary value of the Transducer Block is decreasing.
	Tendency symbol (constant) The primary value of the Transducer Block has remained constant over the past few minutes.

5.2 Operating elements

5.2.1 Position of operating elements

With regard to aluminum housings and stainless steel housing (T14/T15), the operating key is located either outside the device under the protection cap or inside on the electronic insert. In hygienic stainless housings (T17), the operating key is always located inside on the electronic insert. Additionally, three operating keys are located on the optional onsite display.

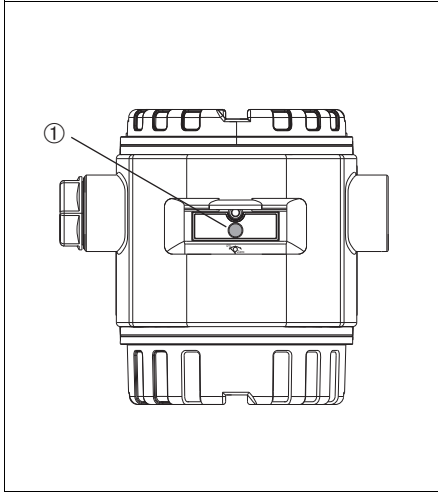


Fig. 6: Operating key, external under the protective flap

- 1 Operating key or position adjustment (zero point-correction) or total reset

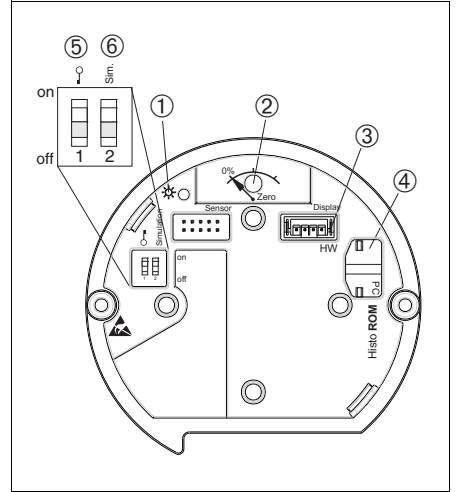

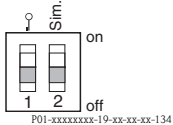





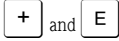
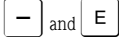
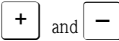
Fig. 7: Operating key and operating elements, internal

- 1 Green LED to indicate value is accepted
- 2 Operating key for position adjustment (zero point-correction)
- 3 Slot for optional display
- 4 Slot for optional HistoROM® /M-DAT
- 5 DIP-switch for locking/unlocking measured-value-relevant parameters
- 6 DIP switch for simulation mode

5.2.2 Function of the operating elements – onsite display not connected

Operating key(s)	Meaning
	<ul style="list-style-type: none"> - Position adjustment (zero point correction): Press key for at least 3 seconds. The LED on the electronic insert lights up briefly if the pressure applied has been accepted for position adjustment. → See also Page 37 ("Level" measuring mode) or Page 41 ("Pressure" measuring mode). - Total reset: Press key for at least 12 seconds. If the LED on the electronic insert lights up briefly, the reset is being carried out.
	<ul style="list-style-type: none"> - DIP-switch 1: for locking/unlocking measured-value-relevant parameters Factory setting: off (unlocked) - DIP switch 2: for simulation mode Factory setting: off (simulation mode off) To carry out a simulation the DIP switch has to be set in the "on" position. → See also Operating Instructions BA00301P, Section "Simulation".

5.2.3 Function of the operating elements – onsite display connected

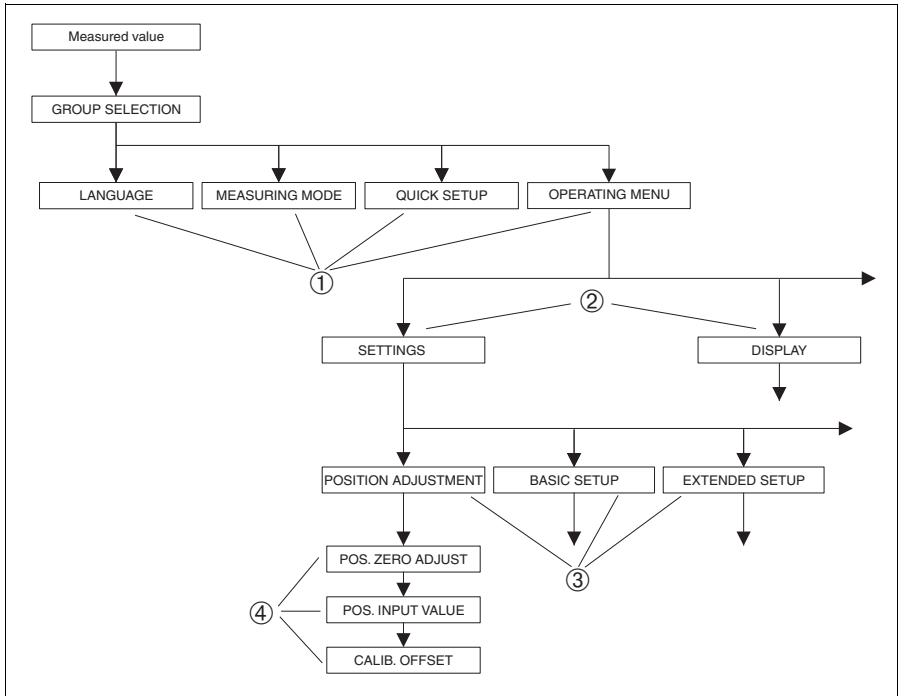
Operating key(s)	Meaning
	<ul style="list-style-type: none"> - Navigate upwards in the picklist - Edit the numerical values and characters within a function
	<ul style="list-style-type: none"> - Navigate downwards in the picklist - Edit the numerical values and characters within a function
	<ul style="list-style-type: none"> - Confirm entry - Jump to the next item
	<p>Contrast setting of onsite display: darker</p>
	<p>Contrast setting of onsite display: brighter</p>
	<p>ESC functions:</p> <ul style="list-style-type: none"> - Exit edit mode without saving the changed value. - You are in a menu within a function group. The first time you press the keys simultaneously, you go back a parameter within the function group. Each time you press the keys simultaneously after that, you go up a level in the menu. - You are in a menu at a selection level. Each time you press the keys simultaneously, you go up a level in the menu. <p><i>Note:</i> The terms function group, level and selection level are explained in Section 5.3.1, Page 17.</p>

5.3 Onsite operation via onsite display

5.3.1 Structure of the operating menu

The menu is split into four levels. The three upper levels are used to navigate while you use the bottom level to enter numerical values, select options and save settings. → For the entire menu see CD-ROM, Operating Instructions BA00301P.

The structure of the OPERATING MENU depends on the measuring mode selected, e.g. if the "Pressure" measuring mode is selected, only the functions necessary for this mode are displayed.



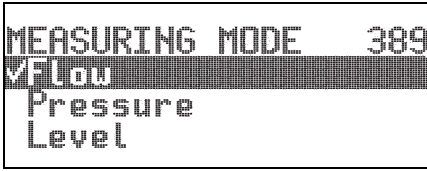

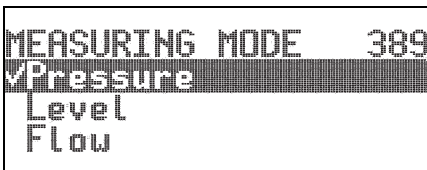
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Fig. 8: Structure of the operating menu


- 1 1. Selection level
- 2 2. Selection level
- 3 Function groups
- 4 Parameter

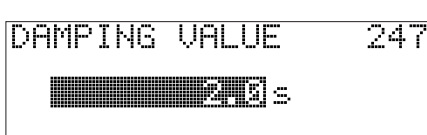
5.3.2 Selecting an option

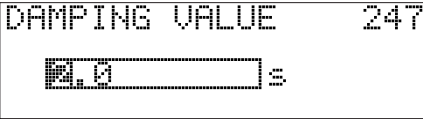
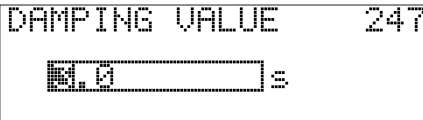
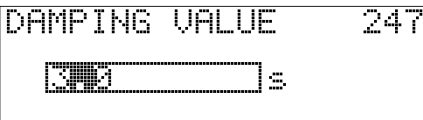
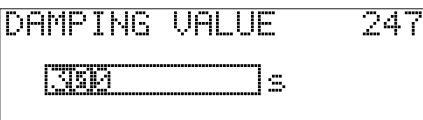
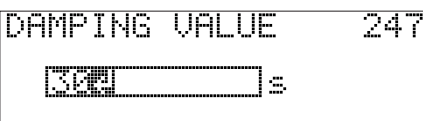
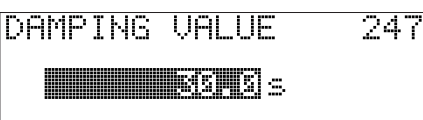
Example: Selecting the "Pressure" measuring mode.

Onsite display	Operation
 <p style="text-align: right; font-size: small;">P01-xxxxxxx-19-xx-xx-en-017</p>	<p>"Flow" has been selected as the measuring mode. A ✓ in front of the menu text indicates the active option.</p>
 <p style="text-align: right; font-size: small;">P01-xxxxxxx-19-xx-xx-en-033</p>	<p>Use "+" or "-" to select "Pressure" as the operating mode.</p>
 <p style="text-align: right; font-size: small;">P01-xxxxxxx-19-xx-xx-en-034</p>	<ol style="list-style-type: none"> 1. Confirm your choice with "E". A ✓ in front of the menu text indicates the active option. (The "Pressure" measuring mode is selected.) 2. Jump to the next item with "E".

5.3.3 Editing a value

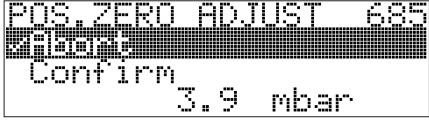
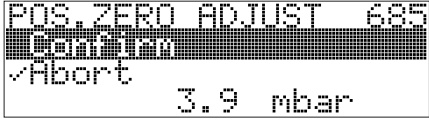
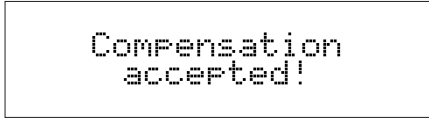
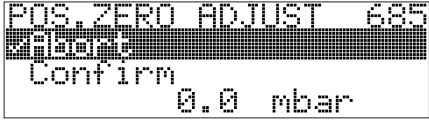
Example: adjusting DAMPING VALUE function from 2.0 s to 30.0 s. →  16, Section 5.2.3 "Function of the operating elements – onsite display connected".

Onsite display	Operation
 <p style="text-align: right; font-size: small;">P01-xxxxxxx-19-xx-xx-en-023</p>	<p>The onsite display shows the parameter to be changed. The value highlighted in black can be changed. The "s" unit is fixed and cannot be changed.</p>

Onsite display	Operation
 <p style="text-align: right; font-size: small;">P01-xxxxxxxx-19-xx-xx-en-027</p>	<ol style="list-style-type: none"> 1. Press "+" or "-" to get to the editing mode. 2. The first digit is highlighted in black.
 <p style="text-align: right; font-size: small;">P01-xxxxxxxx-19-xx-xx-en-028</p>	<ol style="list-style-type: none"> 1. Use "+" to change "2" to "3". 2. Confirm "3" with "E". The cursor jumps to the next position (highlighted in black).
 <p style="text-align: right; font-size: small;">P01-xxxxxxxx-19-xx-xx-en-029</p>	<p>The decimal point is highlighted in black, i.e. you can now edit it.</p>
 <p style="text-align: right; font-size: small;">P01-xxxxxxxx-19-xx-xx-en-030</p>	<ol style="list-style-type: none"> 1. Keep pressing "+" or "-" until "0" is displayed. 2. Confirm "0" with "E". The cursor jumps to the next position. . is displayed and is highlighted in black. → See next graphic.
 <p style="text-align: right; font-size: small;">P01-xxxxxxxx-19-xx-xx-en-031</p>	<p>Use "E" to save the new value and exit the editing mode. → See next graphic.</p>
 <p style="text-align: right; font-size: small;">P01-xxxxxxxx-19-xx-xx-en-032</p>	<p>The new value for the damping is now 30.0 s.</p> <ul style="list-style-type: none"> - Jump to the next parameter with "E". - You can get back to the editing mode with "+" or "-".

5.3.4 Taking pressure applied at device as value

Example: performing position adjustment.


Onsite display	Operation
 <p style="text-align: center; font-size: small;">P01-xxxxxxx-19-xx-xx-en-158</p>	<p>The bottom line on the onsite display displays the pressure present, here 3.9 mbar.</p>
 <p style="text-align: center; font-size: small;">P01-xxxxxxx-19-xx-xx-en-159</p>	<p>Use "+" or "-" to switch to the "Confirm" option. The active selection is highlighted in black.</p>
 <p style="text-align: center; font-size: small;">P01-xxxxxxx-19-xx-xx-en-037</p>	<p>Use "E" to assign the value (3.9 mbar) to the POS. ZERO ADJUST parameter. The device confirms the calibration and jumps back to the parameter, here POS. ZERO ADJUST (see next graphic).</p>
 <p style="text-align: center; font-size: small;">P01-xxxxxxx-19-xx-xx-en-160</p>	<p>Switch to the next parameter with "E".</p>

5.4 Locking/unlocking operation

Once you have entered all the parameters, you can lock your entries against unauthorized and undesired access.

You have the following possibilities for locking/unlocking the operation:

- Via a DIP switch on the electronic insert, locally at the device (→ see Page 15).
- Via the onsite display (optional)
- Via digital communication.

The -symbol on the onsite display indicates that operation is locked. Parameters which refer to how the display appears, e.g. LANGUAGE and DISPLAY CONTRAST can still be altered.



Note!

- If operation is locked by means of the DIP-switch, you can only unlock operation again by means of the DIP-switch. If operation is locked by means of remote operation e.g. FieldCare, you can only unlock operation again by means of remote operation.

The table provides an overview of the locking functions:

Locking via	View/read parameter	Modify/write via ¹⁾		Unlocking via		
		Onsite display	Remote operation	DIP-Switch	Onsite display	Remote operation
DIP-Switch	yes	no	no	yes	no	no
Onsite display	yes	no	no	no	yes	yes
Remote operation	yes	no	no	no	yes	yes

1) Parameters which refer to how the display appears, e.g. LANGUAGE and DISPLAY CONTRAST can still be altered.

	Locking/Unlocking operation via onsite display or remote operation
Locking operation	<ol style="list-style-type: none"> 1. Operation via FF configuration program: select SWLOCK parameter in the Resource Block. Operation via FieldCare: select INSERT PIN No. parameter. Menu path: OPERATING MENU → OPERATION → INSERT PIN No. 2. To lock operation, enter "0" for the parameter.
Unlocking operation	<ol style="list-style-type: none"> 1. Operation via FF configuration program: select SWLOCK parameter in the Resource Block. Operation via FieldCare: select INSERT PIN No. parameter. 2. To unlock operation, enter "100" for the parameter.

6 Commissioning



Warning!

- 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.
- 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.
- 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 BAD status from being transmitted in applications (e.g. cascade measurement) where the user is aware of the risk of the sensor range being overshoot.
- We recommend setting messages E727, E115 and E120 to "Alarm" in the following instances:
 - It is not necessary to violate 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.

6.1 Commissioning via an FF configuration program



Note!

- The device is configured for the Pressure measuring mode as standard. The measuring range and the unit in which the measured value is transmitted, as well as the digital output value of the Analog Input Block OUT, correspond to the data on the nameplate. Following a reset with code 7864, the OUT parameter may have to be rescaled (→ see also Page 42, Section 6.7 "Scaling the OUT parameter").

1. Switch on the device.
2. Note the DEVICE_ID.
3. Open the configuration program.
4. Load Cff and device description files into the host system or the configuration program. Make sure you are using the right system files.
5. Identify the device using the DEVICE_ID. Assign the desired tag name to the device by means of the PD_TAG parameter.

Configuring the Resource Block

1. Open the Resource Block.
2. If necessary, disable the lock for device operation. → See Page 21, Section 5.4 "Locking/unlocking operation". Operating is unlocked as standard.
3. If necessary, change the block name. Factory setting: RS_452B481009-xxxxxxxxxxx
4. If necessary, assign a description to the block by means of the TAG_DESC parameter.
5. If necessary, change other parameters as per the requirements.

Configuring the Transducer Blocks

Deltabar S has the following Transducer Blocks:

- Pressure Transducer Block
- Service Transducer Block
- DP Flow Block
- Display Transducer Block
- Diagnostic Transducer Block

The explanation that follows is an example for the Pressure Transducer Block.

1. If necessary, change the block name. Factory setting: RS_452B481009-xxxxxxxxxxx
2. Set the block mode to OOS using the MODE_BLK parameter, TARGET element.
3. Configure the device in accordance with the measuring task. → See also these Brief Operating Instructions Section 6.2 to Section 6.7.
4. Set the block mode to Auto using the MODE_BLK parameter, TARGET element.



Note!

The block mode must be set to "Auto" for the Pressure, Service and DP Flow Block for the measuring device to function correctly.

Configuring the Analog Input Blocks

Deltabar S has 3 Analog Input Blocks that can be assigned as required to the various process variables.

1. If necessary, change the block name. Factory setting: RS_452B481009-xxxxxxxxxxx
2. Set the block mode to OOS using the MODE_BLK parameter, TARGET element.
3. Use the CHANNEL parameter to select the process variable which should be used as the input value for the Analog Input Block. The following settings are possible:
 - CHANNEL = 1: Primary value, a pressure, level or flow value depending on the measuring mode selected
 - CHANNEL = 2: Secondary value, here the sensor temperature
 - CHANNEL = 6: Totalizer 1
 Factory setting:
 - Analog Input Block 1: CHANNEL = 1: Primary Value (pressure measured value)
 - Analog Input Block 2: CHANNEL = 2: Secondary Value (sensor temperature)
 - Analog Input Block 3: CHANNEL = 3: Totalizer 1

4. Use the XD_SCALE parameter to select the desired unit and the block input range for the process variable. → See also Page 42, Section 6.7 "Scaling the OUT parameter".
Make sure that the unit selected suits the process variable selected. If the process variable does not suit the unit, the BLOCK_ERROR parameter reports "Block Configuration Error" and the block mode cannot be set to "Auto".
5. Use the L_TYPE parameter to select the type of linearization for the input variable (factory setting: Direct).
Make sure that the settings for the XD_SCALE and OUT_SCALE parameters are the same for the "Direct" linearization type. If the process values and units do not match, the BLOCK_ERROR parameter reports "Block Configuration Error" and the block mode cannot be set to "Auto".
6. Enter the alarm and critical alarm messages by means of the HI_HI_LIM, HI_LIM, LO_LO_LIM and LO_LO_LIM parameters. The limit values entered have to be within the value range specified for the OUT_SCALE parameter.
7. Specify the alarm priorities by means of the HI_HI_PRI, HI_PRI, LO_LO_PRI and LO_PRI parameters. Reporting to the field host system only takes place with alarms with a priority greater than 2.
8. Set the block mode to Auto using the MODE_BLK parameter, TARGET element. For this purpose, the Resource Block must also be set to the "Auto" block mode.

Additional configuration

1. Depending on the control or automation task, configure additional function blocks and output blocks. → See also Operating Instructions BA00303P "Description of Device Functions Cerabar S/Deltabar S/Deltapilot S".
2. Link the function blocks and output blocks.
3. After specifying the active LAS, download all the data and parameters to the field device.

6.2 Selecting the language and measuring mode

6.2.1 Local operation

The MEASURING MODE parameter is on the 1st selection level. → See also Page 17, Section 5.3.1 "Structure of the operating menu".

The following measuring modes are available:

- Pressure
- Level
- Flow

6.2.2 Selecting the language and measuring mode via FieldCare

The parameters for setting the measuring mode are displayed in the FieldCare "Measuring mode" menu.

The following measuring modes are available:

- Pressure
- Level
- Flow

The LANGUAGE parameter is arranged in the DISPLAY group.

- Select the menu language for FieldCare using the "Language Button" in the configuration window. Select the menu language for the FieldCare frame by means of the "Extra" menu → "Options" "Display" → "Language".

The following languages are available:

- Deutsch
- English
- Français
- Español
- Chinese
- Japanese

6.3 Position adjustment

Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partly filled, the measured value parameter does not display zero. There are two options to choose from when performing position adjustment.

- Onsite display menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → POSITION ADJUSTMENT
- FieldCare menu path: OPERATING MENU → SETTINGS → POSITION ADJUSTMENT

6.3.1 Performing position adjustment via the onsite display or FieldCare

The parameters listed in the following table can be found in the POSITION ADJUSTMENT group (menu path: OPERATING MENU → SETTINGS → POSITION ADJUSTMENT).

Parameter name	Description
POS. ZERO ADJUST Entry	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known.</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 2.2 mbar – 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 <p>The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected.</p> <p>Factory setting: 0.0</p>

Parameter name	Description
POS. INPUT VALUE Input	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. To correct the pressure difference, you need a reference measurement value (e. g. from a reference device).</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 0.5 mbar – For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE, e.g. 2 mbar. (The following applies: $\text{MEASURED VALUE}_{\text{new}} = \text{POS. INPUT VALUE}$) – MEASURED VALUE (after entry for POS. INPUT VALUE) = 2.0 mbar – The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. The following applies: $\text{CALIB. OFFSET} = \text{MEASURED VALUE}_{\text{old}} - \text{POS. INPUT VALUE}$, here: $\text{CALIB. OFFSET} = 0.5 \text{ mbar} - 2.0 \text{ mbar} = -1.5 \text{ mbar}$) <p>Factory setting: 0.0</p>
CALIB. OFFSET Entry	<p>Position adjustment – the pressure difference between zero (set point) and the measured pressure is known. (A reference pressure is not present at the device.)</p> <p>Example:</p> <ul style="list-style-type: none"> – MEASURED VALUE = 2.2 mbar – Via the CALIB. OFFSET parameter, enter the value by which the MEASURED VALUE should be corrected. To correct the MEASURED VALUE to 0.0 mbar, you must enter the value 2.2 here. (The following applies: $\text{MEASURED VALUE}_{\text{new}} = \text{MEASURED VALUE}_{\text{old}} - \text{CALIB. OFFSET}$) – MEASURED VALUE (after entry for calib. offset) = 0.0 mbar <p>Factory setting: 0.0</p>

6.4 Flow measurement

6.4.1 Preparatory steps



Note!

- The Deltabar S PMD70 or PMD75 is usually used for flow measurement.
- Before calibrating the Deltabar S, the impulse piping must be cleaned and filled with fluid.
→ See the following table.

	Valves	Meaning	Preferred installation
1	Close 3.		
2	Fill measuring system with fluid.		
	Open A, B, 2, 4.	Fluid flows in.	
3	Clean impulse piping if necessary ¹⁾ : - by blowing out with compressed air in the case of gases - by rinsing out in the case of liquids.		
	Close 2 and 4.	Block off device.	
	Open 1 and 5. ¹	Blow out/rinse out impulse piping.	
	Close 1 and 5. ¹	Close valves after cleaning.	
4	Vent device.		
	Open 2 and 4.	Introduce fluid.	
	Close 4.	Close negative side.	
	Open 3.	Balance positive and negative side.	
	Open 6 and 7 briefly, then close them again.	Fill device completely with fluid and remove air.	
5	Carry out pos. zero adjustment if the following conditions are met. If the conditions are not met, then do not carry out the pos. zero adjustment until after step 6. → See Page 29, Section 6.4.3 and 25, Section 6.3. Conditions: - The process cannot be blocked off. - The tapping points (A and B) are at the same geodetic height.		
6	Set measuring point in operation.		
	Close 3.	Shut off positive side from negative side.	
	Open 4.	Connect negative side.	
	Now - 1 ¹ , 3, 5 ¹ , 6 and 7 are closed. - 2 and 4 are open. - A and B open (if present).		
7	Carry out pos. zero adjustment if the flow can be blocked off. In this case, step 5 is not applicable. → See Page 29, Section 6.4.3 and 25, Section 6.3.		
8	Carry out calibration. → See Page 28, Section 6.4.2.		

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Fig. 9: Above: preferred installation for gases
Below: preferred installation for liquids

- I Deltabar S, PMD70 or PMD75
- II Three-valve manifold
- III Separator
- 1, 5 Drain valves
- 2, 4 Inlet valves
- 3 Equalizing valve
- 6, 7 Vent valves on Deltabar S
- A, B Shutoff valves

1) for arrangement with 5 valves

6.4.2 Information on flow measurement

In the "Flow" measuring mode, the device determines a volume or mass flow value from the differential pressure measured. The differential pressure is generated by means of primary devices such as pitot tubes or orifice plates and depends on the volume or mass flow. Four flow measuring modes are available: volume flow, norm volume flow (European norm conditions), standard volume flow (American standard conditions) and mass flow.

In addition, the Deltabar S software is equipped with two totalizers as standard. The totalizers add up the volume or the mass flow. The counting function and the unit can be set separately for both totalizers. The first totalizer (totalizer 1) can be reset to zero at any time while the second (totalizer 2) totalizes the flow from commissioning onwards and cannot be reset.



Note!

- There is a Quick Setup menu for each of the measuring modes Pressure, Level and Flow which guides you through the most important basic functions. With the setting in the MEASURING MODE parameter, you specify which Quick Setup menu should be displayed. → See also Page 24, Section 6.2 "Selecting the language and measuring mode". No Quick Setup menus are available for the FF configuration programs.
- For a detailed description of the parameters see the Operating Instructions BA00303P "Cerabar S/Deltabar S/Deltapilot S, Description of device functions"
 - FF, Table Pressure Transducer Block
 - FF, Table DP Flow Block
 - FieldCare, Table POSITION ADJUSTMENT
 - FieldCare, Table BASIC SETUP
 - FieldCare, Table EXTENDED SETUP
 - FieldCare, Table TOTALIZER SETUP

6.4.3 Quick Setup menu for the Flow measuring mode

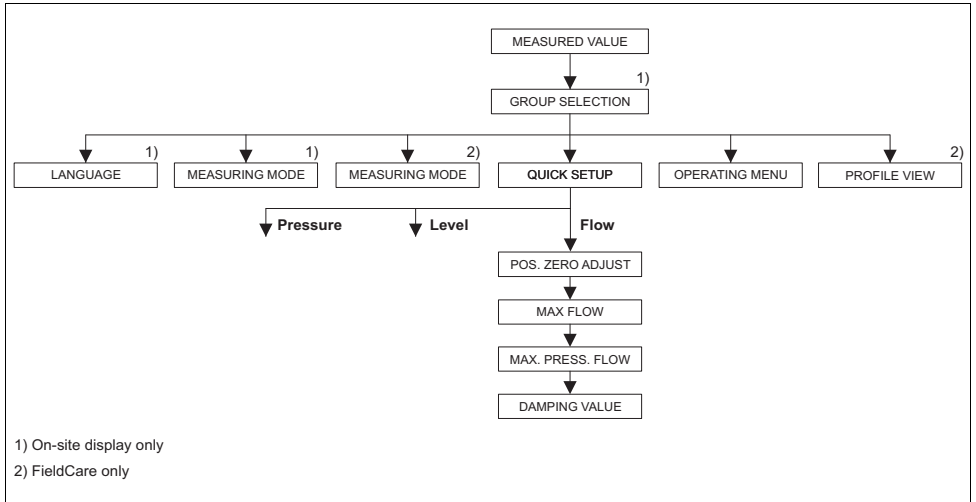


Fig. 10: Quick Setup menu for the Flow measuring mode

Onsite operation
Measured value display Switch from the measured value display to GROUP SELECTION with
GROUP SELECTION Select MEASURING MODE.
MEASURING MODE Select "Flow" option.
GROUP SELECTION Select 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.
MAX. FLOW Enter maximum flow of primary device. (→ See also layout sheet of primary device).
MAX. PRESS FLOW Enter maximum pressure of primary device. (→ See also layout sheet of primary device).

FieldCare
Measured value display Select QUICK SETUP menu.
Measuring Mode Select the Primary Value Type parameter.
Primary Value Type Select "Flow" option.
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.
MAX. FLOW Enter maximum flow of primary device. (→ See also layout sheet of primary device).
MAX. PRESS FLOW Enter maximum pressure of primary device. (→ See also layout sheet of primary device).

Onsite operation**DAMPING TIME**

Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the onsite display, measured value and OUT value of the Analog Input Block react to a change in the pressure.

FieldCare**DAMPING TIME**

Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the onsite display, measured value and OUT value of the Analog Input Block react to a change in the pressure.

**Note!**

For onsite operation, see also Page 16, Section 5.2.3 "Function of the operating elements – onsite display connected" and Page 17, Section 5.3 "Onsite operation via onsite display".

6.5 Level measurement

6.5.1 Preparatory steps

Open container



Note!

- The Deltabar S PMD70, PMD75, FMD76 and FMD77 are suitable for level measurement in an open container.
- FMD76 and FMD77: the device is ready for calibration immediately after opening the shutoff valves (may or may not be present).
- PMD70 and PMD75: before calibrating the device, the impulse piping must be cleaned and filled with fluid. → See the following table.

	Valves	Meaning	Installation
1	Fill container to a level above the lower tap.		
2	Fill measuring system with fluid.		
	Open A.	Open shutoff valve.	
3	Vent device.		
	Open 6 briefly, then close it again.	Fill device completely with fluid and remove air.	
4	Set measuring point in operation.		
	Now – B and 6 are closed. – A is open.		
5	Carry out calibration. → See Page 34, Section 6.5.2.		

Fig. 11: Open container

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- I* Deltabar S, PMD70 or PMD75
- II* Separator
- 6* Vent valves on Deltabar S
- A* Shutoff valve
- B* Drain valve

Closed container



Note!

- All Deltabar S versions are suitable for level measurement in closed containers.
- FMD76 and FMD77: the device is ready for calibration immediately after opening the shutoff valves (may or may not be present).
- FMD78: the device is ready for calibration immediately.
- PMD70 and PMD75: before calibrating the device, the impulse piping must be cleaned and filled with fluid. → See the following table.

	Valves	Meaning	Installation
1		Fill container to a level above the lower tap.	
2		Fill measuring system with fluid.	
	Close 3.	Shut off positive side from negative side.	
	Open A and B.	Open shutoff valves.	
3		Vent positive side (empty negative side if necessary).	
	Open 2 and 4.	Introduce fluid on positive side.	
	Open 6 and 7 briefly, then close them again.	Fill positive side completely with fluid and remove air.	
4		Set measuring point in operation.	
	Now		
	- 3, 6 and 7 are closed.		
	- 2, 4, A and B are open.		
5		Carry out calibration. → See Page 34, Section 6.5.2.	

P01-xMD7xxxx-11-xx-xx-xx-004

Fig. 12: Closed container

- I Deltabar S, PMD70 and PMD75
- II Three-valve manifold
- III Separator
- 1, 2 Drain valves
- 2, 4 Inlet valves
- 3 Equalizing valve
- 6, 7 Vent valve on Deltabar S
- A, B Shutoff valve

Closed containers with superimposed steam



Note!

- All Deltabar S versions are suitable for level measurement in containers with superimposed steam.
- FMD76 and FMD77: the device is ready for calibration immediately after opening a shutoff valve (may or may not be present).
- FMD78: the device is ready for calibration immediately.
- PMD70 and PMD75: before calibrating the device, the impulse piping must be cleaned and filled with fluid. → See the following table.

	Valves	Meaning	Installation
1		Fill container to a level above the lower tap.	
2		Fill measuring system with fluid.	
	Open A and B.	Open shutoff valves.	
		Fill the negative impulse piping to the level of the condensate trap.	
3		Vent device.	
	Open 2 and 4.	Introduce fluid.	
	Close 4.	Close negative side.	
	Open 3.	Balance positive and negative side.	
	Open 6 and 7 briefly, then close them again.	Fill device completely with fluid and remove air.	
4		Set measuring point in operation.	
	Close 3.	Shut off positive side from negative side.	
	Open 4.	Connect negative side.	
	Now		
	- 3, 6 and 7 are closed.		
	- 2, 4, A and B are open.		
5		Carry out calibration. → See Page 34, Section 6.5.2.	

Fig. 13: Closed container with superimposed steam

- I Deltabar S, PMD70 and PMD75
- II Three-valve manifold
- III Separator
- 1, 5 Drain valves
- 2, 4 Inlet valves
- 3 Equalizing valve
- 6, 7 Vent valves on Deltabar S
- A, B Shutoff valves

6.5.2 Information on level measurement



Note!

- The Flow, Level and Pressure operating modes each have a quick setup menu which guides you through the most important basic functions. → See Page 37 for the "Level" quick setup menu.
- Furthermore, the three level modes "Level Easy Pressure", "Level Easy Height" and "Level Standard" are available to you for level measurement. You can select from the "Linear", "Pressure linearized" and "Height linearized" level types for the "Level Standard" level mode. The table in the "Overview of level measurement" section below provides an overview of the various measuring tasks.
 - In the "Level Easy Pressure" and "Level Easy Height" level modes, the values entered are not tested as extensively as in the "Level Standard" level mode. The values entered for EMPTY CALIB./FULL CALIB., EMPTY PRESSURE/FULL PRESSURE and EMPTY HEIGHT/FULL must have a minimum interval of 1% for the "Level Easy Pressure" and "Level Easy Height" level modes. The value will be rejected with a warning message if the values are too close together. Further limit values are not checked; i.e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly.
 - The "Level Easy Pressure" and "Level Easy Height" level modes encompass fewer parameters than the "Level Standard" mode and are used for quick and easy configuration of a level application.
 - Customer-specific units of fill level, volume and mass or a linearization table may only be entered in the "Level Standard" level mode.
- For a detailed description of the parameters and configuration examples, see Operating Instructions BA00303P "Cerabar S/Deltabar S/ Deltapilot S, Description of Device Functions".

6.5.3 Overview of level measurement

Measuring task	LEVEL SELECTION/LEVEL MODE	Measured variable options	Description	Comment	Measured value display
The measured variable is in direct proportion to the measured pressure. Calibration is performed by entering two pressure-level value pairs.	LEVEL SELECTION: Level Easy Pressure	Via OUTPUT UNIT parameter: %, level, volume or mass units.	<ul style="list-style-type: none"> – Calibration with reference pressure – wet calibration, see Operating Instructions BA00303P. – Calibration without reference pressure – dry calibration, see Operating Instructions BA00303P. 	<ul style="list-style-type: none"> – Incorrect entries are possible – Customized units are not possible 	The measured value display and the LEVEL BEFORE LIN. parameter show the measured value.
The measured variable is in direct proportion to the measured pressure. Calibration is performed by entering the density and two height-level value pairs.	LEVEL SELECTION: Level Easy Height	Via OUTPUT UNIT parameter: %, level, volume or mass units.	<ul style="list-style-type: none"> – Calibration with reference pressure – wet calibration, see Operating Instructions BA00303P. – Calibration without reference pressure – dry calibration, see Operating Instructions BA00303P. 	<ul style="list-style-type: none"> – Incorrect entries are possible – Customized units are not possible 	The measured value display and the LEVEL BEFORE LIN. parameter show the measured value.
The measured variable is in direct proportion to the measured pressure.	LEVEL SELECTION: Level standard/ LEVEL MODE: Linear	Via LIN. MEASURAND parameter: – % (level) – Level – Volume – Mass	<ul style="list-style-type: none"> – Calibration with reference pressure – wet calibration, see Operating Instructions BA00303P. – Calibration without reference pressure – dry calibration, see Operating Instructions BA00303P. 	<ul style="list-style-type: none"> – Incorrect entries are rejected by the device – Customized level, volume and mass units are possible 	The measured value display and the LEVEL BEFORE LIN. parameter show the measured value.

Measuring task	LEVEL SELECTION/LEVEL MODE	Measured variable options	Description	Comment	Measured value display
<p>The measured variable is not in direct proportion to the measured pressure as, for example, with containers with a conical outlet. A linearization table must be entered for the calibration.</p>	<p>LEVEL SELECTION: Level standard/ LEVEL MODE: Pressure linearized</p>	<p>Via LINd. MEASURAND parameter: – Pressure + % – Pressure + volume – Pressure + mass</p>	<p>– Calibration with reference pressure: semiautomatic entry of linearization table, see Operating Instructions BA00303P. – Calibration without reference pressure: manual entry of linearization table, see Operating Instructions BA00303P.</p>	<p>– Incorrect entries are rejected by the device – Customized level, volume and mass units are possible</p>	<p>The measured value display and the TANK CONTENT parameter show the measured value.</p>
<p>– Two measured variables are required or – The container shape is given by value pairs, such as height and volume.</p> <p>The 1st measured variable %-height or height must be in direct proportion to the measured pressure. The 2nd measured variable volume, mass or % must not be in direct proportion to the measured pressure. A linearization table must be entered for the 2nd measured variable. The 2nd measured variable is assigned to the 1st measured variable by means of this table.</p>	<p>LEVEL SELECTION: Level standard/ LEVEL MODE: Height linearized</p>	<p>Via COMB. MEASURAND parameter: – Height + mass – Height + % – %-Height + volume – %-Height + mass – %-Height + %</p>	<p>– Calibration with reference pressure: wet calibration and semiautomatic entry of linearization table, see Operating Instructions BA00303P. – Calibration without reference pressure: dry calibration and manual entry of linearization table, see Operating Instructions BA00303P.</p>	<p>– Incorrect entries are rejected by the device – Customized level, volume and mass units are possible</p>	<p>The measured value display and the TANK CONTENT parameter show the 2nd measured value (volume, mass or %).</p> <p>The LEVEL BEFORE LIN parameter displays the 1st measured value (%-height or height).</p>

6.5.4 Quick Setup menu for the Level measuring mode



Note!

- Some parameters are only displayed if other parameters are appropriately configured. For example, the EMPTY CALIB. parameter is only displayed in the following cases:
 - LEVEL SELECTION "Level Easy Pressure" and CALIBRATION MODE "Wet"
 - LEVEL SELECTION "Level Standard", LEVEL MODE "Linear" and CALIBRATION MODE "Wet"

You can find the LEVEL MODE and the CALIBRATION MODE parameters in the BASIC SETTINGS function group.

- The following parameters are set to the following values in the factory:
 - LEVEL SELECTION: Level Easy Pressure
 - CALIBRATION MODE: Wet
 - OUTPUT UNIT or LIN. MEASURAND: %
 - EMPTY CALIB.: 0.0
 - FULL CALIB.: 100.0
- The quick setup is suitable for simple and quick commissioning. If you wish to make more complex settings, e.g. change the unit from "%" to "m", you will have to calibrate using the BASIC SETTINGS group. → See Operating Instructions BA00303P.

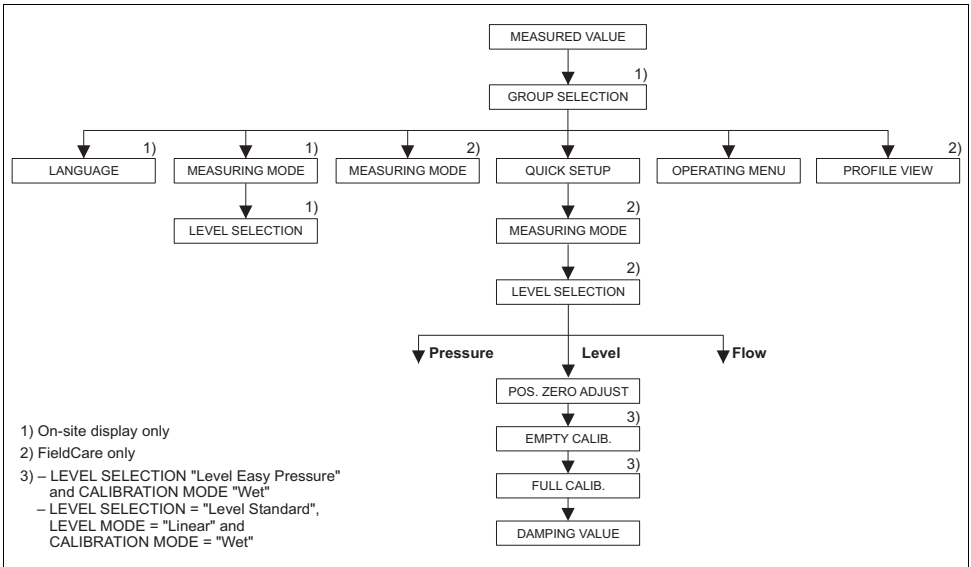



Fig. 14: Quick Setup menu for the "Level" measuring mode"

P01-30MD/xxxx-19-xx-xx-xx-079

Onsite operation
Measured value display Switch from the measured value display to GROUP SELECTION with \square .
GROUP SELECTION Select MEASURING MODE.
MEASURING MODE Select "Level" option.
LEVEL SELECTION Select level mode. For an overview see Page 35.
GROUP SELECTION Select 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.
EMPTY CALIB. ¹⁾ Enter level for the lower calibration point. For this parameter, enter a level value which is assigned to the pressure present at the device.
FULL CALIB. ¹⁾ Enter level for the upper calibration point. For this parameter, enter a level value which is assigned to the pressure present at the device.
DAMPING TIME Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the onsite display, measured value and OUT value of the Analog Input Block react to a change in the pressure.

FieldCare
Measured value display Select QUICK SETUP menu.
Measuring Mode Select the Primary Value Type parameter.
Primary Value Type Select "Level" option.
LEVEL SELECTION / Level Selection Select level mode. For an overview see Page 35.
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.
EMPTY CALIB. ¹⁾ Enter level for the lower calibration point. For this parameter, enter a level value which is assigned to the pressure present at the device.
FULL CALIB. ¹⁾ Enter level for the upper calibration point. For this parameter, enter a level value which is assigned to the pressure present at the device.
DAMPING TIME Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the onsite display, measured value and OUT value of the Analog Input Block react to a change in the pressure.

- 1) – LEVEL SELECTION "Level Easy Pressure" and CALIBRATION MODE "Wet"
– LEVEL SELECTION "Level Standard", LEVEL MODE "Linear" and CALIBRATION MODE "Wet"

 **Note!**
For onsite operation, see also Page 16, Section 5.2.3 "Function of the operating elements – onsite display connected" and Page 17, Section 5.3 "Onsite operation via onsite display".

6.6 Differential pressure measurement

6.6.1 Preparatory steps



Note!

- The Deltabar S PMD70, PMD75 and FMD78 are usually used for differential pressure measurement.
- FMD78: the device is ready for calibration immediately.
- PMD70 and PMD75: before calibrating the device, the impulse piping must be cleaned and filled with fluid. → See the following table.

	Valves	Meaning	Preferred installation	
1	Close 3.			
2	Fill measuring system with fluid.			
	Open A, B, 2, 4.	Fluid flows in.		
3	Clean impulse piping if necessary: ¹⁾ – by blowing out with compressed air in the case of gases – by rinsing out in the case of liquids.			
	Close 2 and 4.	Block off device.		
	Open 1 and 5. ¹	Blow out/rinse out impulse piping.		
	Close 1 and 5. ¹	Close valves after cleaning.		
4	Vent device.			
	Open 2 and 4.	Introduce fluid.		
	Close 4.	Close negative side.		
	Open 3.	Balance positive and negative side.		
	Open 6 and 7 briefly, then close them again.	Fill device completely with fluid and remove air.		
5	Set measuring point in operation.			
	Close 3.	Shut off positive side from negative side.		
	Open 4.	Connect negative side.		
	Now – 1 ¹ , 3, 5 ¹ , 6 and 7 are closed. – 2 and 4 are open. – A and B open (if present).			
6	Carry out calibration if necessary. → See also Page 41, Section 6.6.2.			

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Fig. 15: Above: preferred installation for gases
Below: preferred installation for liquids

- I Deltabar S, PMD70 or PMD75
- II Three-valve manifold
- III Separator
- 1, 5 Drain valves
- 2, 4 Inlet valves
- 3 Equalizing valve
- 6, 7 Vent valves on Deltabar S
- A, B Shutoff valve

1) for arrangement with 5 valves

6.6.2 Information on differential pressure measurement



Note!

- There is a Quick Setup menu for each of the measuring modes Pressure, Level and Flow which guides you through the most important basic functions. With the setting in the MEASURING MODE parameter, you specify which Quick Setup menu should be displayed. → See also Page 24, Section 6.2 "Selecting the language and measuring mode". No Quick Setup menus are available for the FF configuration programs.
- For a detailed description of the parameters, see Operating Instructions BA00303P "Cerabar S/Deltabar S/Deltapilot S, Description of Device Functions"
 - FF, Table, Pressure Transducer Block
 - FieldCare, Table, POSITION ADJUSTMENT
 - FieldCare, Table, BASIC SETUP
 - FieldCare, Table, EXTENDED SETUP

6.6.3 Quick Setup menu for the Pressure measuring mode

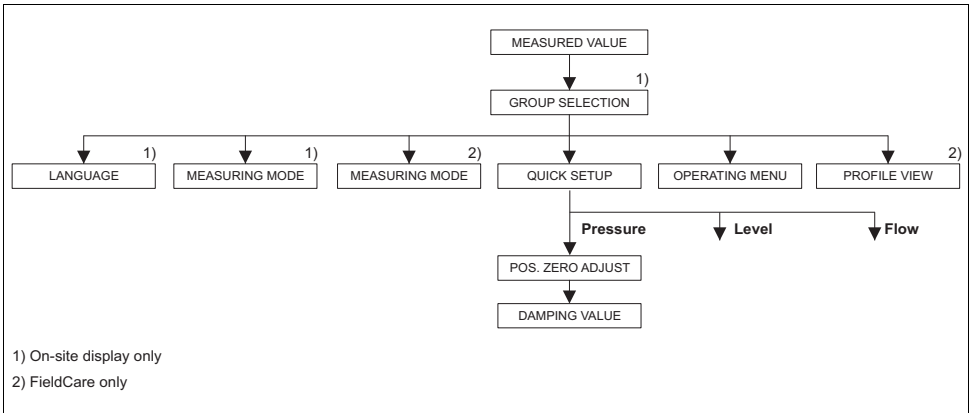


Fig. 16: Quick Setup menu for the "Pressure" measuring mode

PU1-3XMD7/xxxxx-19-xx-xx-xx-080

Onsite operation
Measured value display Switch from the measured value display to GROUP SELECTION with \square .
GROUP SELECTION Select MEASURING MODE.
MEASURING MODE Select "Pressure" option.
GROUP SELECTION Select 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.
DAMPING TIME Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the onsite display, measured value and OUT value of the Analog Input Block react to a change in the pressure.

FieldCare
Measured value display Select QUICK SETUP menu.
Measuring Mode Select the Primary Value Type parameter.
Primary Value Type Select "Pressure" option.
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.
DAMPING TIME Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the onsite display, measured value and OUT value of the Analog Input Block react to a change in the pressure.

**Note!**

For onsite operation, see also Page 16, Section 5.2.3 "Function of the operating elements – onsite display connected" and Page 17, Section 5.3 "Onsite operation via onsite display".

6.7 Scaling the OUT parameter

In the Analog Input Block, the input value or input range can be scaled in accordance with the automation requirements.

Example:

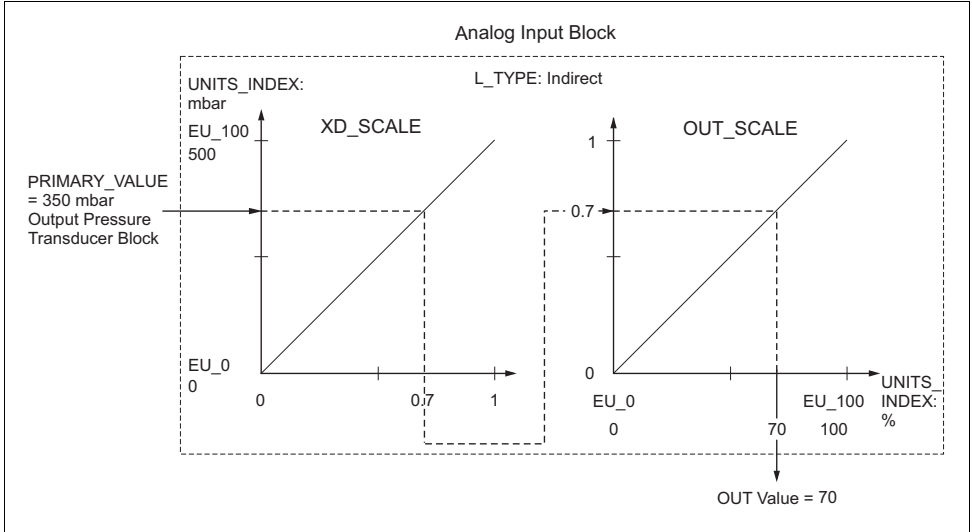
The measuring range 0 to 500 mbar should be rescaled to 0 to 100 %.

- Select XD_SCALE group.
 - For EU_0, enter "0".
 - For EU_100, enter "500".
 - For UNITS_INDEX, enter "mbar".
- Select OUT_SCALE group.
 - For EU_0, enter "0".
 - For EU_100, enter "10000".
 - For UNITS_INDEX, select "%" for example.

The unit selected here does not have any effect on the scaling. This unit is not displayed on the onsite display or in the operating program such as FieldCare.

- Result:

At a pressure of 350 mbar, the value 70 is output to a downstream block or to the PCS as the OUT value.



Note!

- If you have selected the "Direct" mode for the L_TYPE parameter, you cannot change the values and units for XD_SCALE and OUT_SCALE.
- The L_TYPE, XD_SCALE and OUT_SCALE parameters can only be changed in the OOS block mode.
- Make sure that the output scaling of the Pressure Transducer Block SCALE_OUT matches the input scaling of the Analog Input Block XD_SCALE.

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