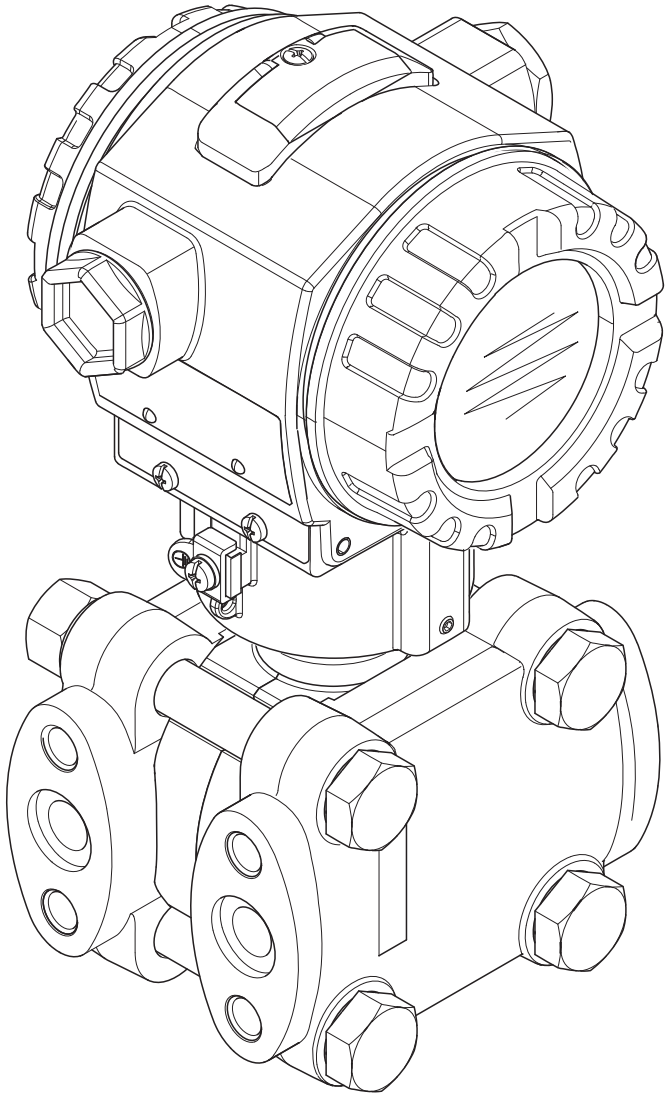
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Operating Instructions

Deltabar S FMD76/77/78, PMD70/75

Differential pressure measurement

FOUNDATION



BA00301P/00/EN/14.12
71161885

valid from Software version:
03.00.zz

Endress+Hauser

People for Process Automation

Overview of documentation

Device	Documentation	Content	Remarks
Deltabar S FOUNDATION Fieldbus	Technical Information TI00382P	Technical data	– The documentation can be found on the documentation CD supplied. – The documentation is also available on the Internet. → See: www.endress.com → Download
	Operating Instructions BA00301P	– Identification – Installation – Wiring – Operation – Commissioning, description of Quick Setup menus – Maintenance – Troubleshooting and spare parts – Appendix: illustration of menus	
	Operating Instructions BA00303P	– Examples of configuration for pressure, level and flow measurement – Description of parameters – Troubleshooting – Appendix: illustration of menus	
	Brief Operating Instructions KA01024P	– Installation – Wiring – Local operation – Commissioning – Description of Quick Setup menus	– The documentation is supplied with the device. – The documentation can also be found on the documentation CD supplied. – The documentation is also available on the Internet. → See: www.endress.com → Download
	Fold-out brochure KA00252P	– Wiring – Operation without display – Description of Quick Setup menus – Operation HistoROM®/M-DAT	– The documentation is supplied with the device. See cover of the terminal compartment. – The documentation can also be found on the documentation CD supplied.

Table of contents

1 Safety instructions

1.1 Designated use

The Deltabar S is a differential pressure transmitter for measuring differential pressure, flow 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 is designed to meet state-of-the-art safety requirements and complies with applicable standards and EC regulations. If installed incorrectly or used for applications for which it is not intended, however, it is possible that application-related dangers may arise, e.g. product overflow due to incorrect installation or configuration. For this reason, installation, connection to the electricity supply, commissioning, operation and maintenance of the measuring system must only be carried out by trained, qualified specialists authorized to perform such work by the facility's owner-operator. The specialist staff must have read and understood these Operating Instructions and must follow the instructions they contain. Modifications and repairs to the device are permissible only if they are expressly approved in the Operating Instructions. Pay particular attention to the technical data on the nameplate.

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.

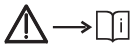
1.3.1 Hazardous areas (optional)

Devices for use in hazardous areas are fitted with an additional nameplate (→ 🖹 6). If using the measuring system in hazardous areas, the appropriate national standards and regulations must be observed. The device is accompanied by separate "Ex documentation", which is an integral part of these 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.

- Ensure that all personnel are suitably qualified.

1.4 Notes on safety conventions and icons

In order to highlight safety-relevant or alternative operating procedures in the manual, the following conventions have been used, each indicated by a corresponding icon in the margin.

Safety conventions	
	**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.
	**Device certified for use in explosion hazardous area** If the device has this symbol embossed on its nameplate, it can be installed in an explosion hazardous area or a non-explosion hazardous area, according to the approval.
	**Explosion hazardous area** Symbol used in drawings to indicate explosion hazardous areas. – Devices used in hazardous areas must possess an appropriate type of protection.
	**Safe area (non-explosion hazardous area)** Symbol used in drawings to indicate, if necessary, non-explosion hazardous areas. – Devices used in hazardous areas must possess an appropriate type of protection. Lines used in hazardous areas must meet the necessary safety-related characteristic quantities.
	**Direct voltage** A terminal to which or from which a direct current or voltage may be applied or supplied.
	Alternating voltage A terminal to which or from which an alternating (sine-wave) current or voltage may be applied or supplied.
	**Grounded terminal** A grounded terminal, which as far as the operator is concerned, is already grounded by means of an earth grounding system.
	**Protective grounding (earth) terminal** A terminal which must be connected to earth ground prior to making any other connection to the equipment.
	**Equipotential connection (earth bonding)** A connection made to the plant grounding system which may be of type e.g. neutral star or equipotential line according to national or company practice.
	**Temperature resistance of the connection cables** States, that the connection cables must be resistant to a temperature of at least 85 °C (185 °F).
	**Safety instruction** For safety instructions refer to the manual for the appropriate instrument version.

2 Identification

2.1 Device designation

2.1.1 Nameplates

Note!

- The MWP (maximum working pressure) is specified on the nameplate. This value refers to a reference temperature of 20°C (68°F) or 100°F for ANSI flanges.
- The pressure values permitted at higher temperatures can be found in the following standards:
  – EN 1092-1: 2001 Tab. 18 [1)]
  – ASME B 16.5a – 1998 Tab. 2-2.2 F316
  – ASME B 16.5a – 1998 Tab. 2.3.8 N10276
  – JIS B 2220
- For PMD70 and PMD75, the MWP applies for the temperature ranges specified in Technical Information TI00382P in the "Ambient temperature range" and "Process temperature limits" sections.
- The test pressure corresponds to the overpressure limit (OPL) of the device = MWP x 1.5.
- The Pressure Equipment Directive (EC Directive 97/23/EC) uses the abbreviation "PS". The abbreviation "PS" corresponds to the MWP (maximum working pressure) of the measuring device.

1) With regard to their stability-temperature property, the materials 1.4435 and 1.4404 are grouped together under 13EO in EN 1092-1 Tab. 18. The chemical composition of the two materials can be identical.

Aluminum housing (T14/T15) and stainless steel housing (T14)

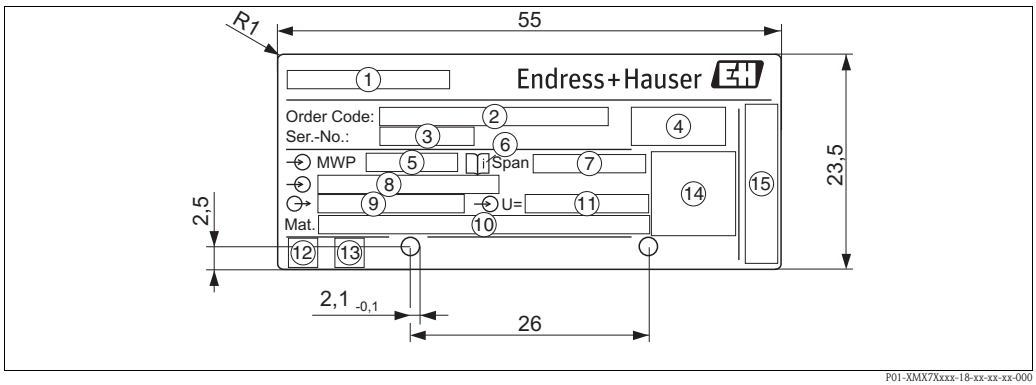


Fig. 1: Nameplate

1 Device name
2 Order code
See the specifications on the order confirmation for the meanings of the individual letters and digits.
3 Serial number
4 Degree of protection
5 MWP (Maximum working pressure)
6 Symbol: Note: pay particular attention to the data in the "Technical Information"!
7 Minimum/maximum span
8 Nominal measuring range
9 Electronic version (output signal)
10 Wetted materials
11 Supply voltage
12 GL-symbol for GL marine certificate (optional)
13 SIL-symbol for devices with SIL3/IEC 61508 Declaration of conformity (optional)
14 Approval ID and ID numbers
15 Address of manufacturer

Devices for use in hazardous areas are fitted with an additional nameplate.

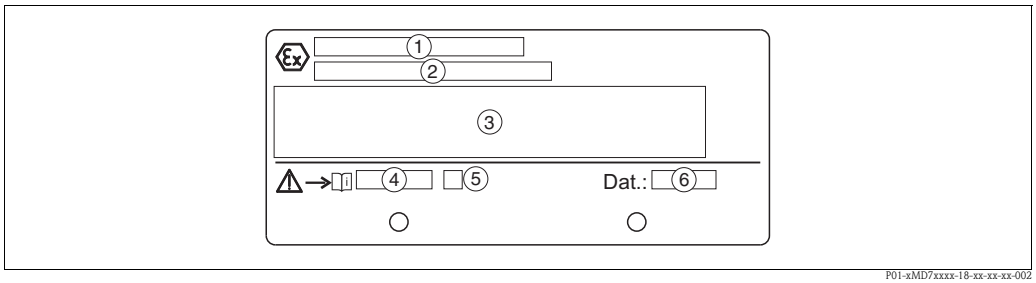


Fig. 2: Additional nameplate for devices for hazardous areas

1 EC type-examination certificate number
2 Type of protection e.g. II 1/2 G Ex ia IIC T4/T6
3 Electrical data
4 Safety Instructions number e.g. XA00235P
5 Safety Instructions index e.g. A
6 Date of device manufacture

Devices suitable for oxygen applications are fitted with an additional nameplate.

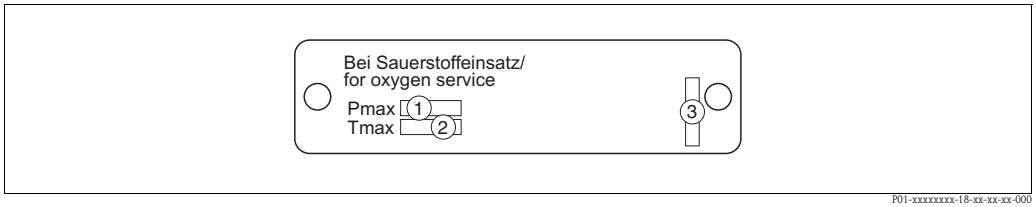


Fig. 3: Additional nameplate for devices suitable for oxygen applications

1 Maximum pressure for oxygen applications
2 Maximum temperature for oxygen applications
3 Layout identification of the nameplate

Hygenic stainless steel housing (T17)

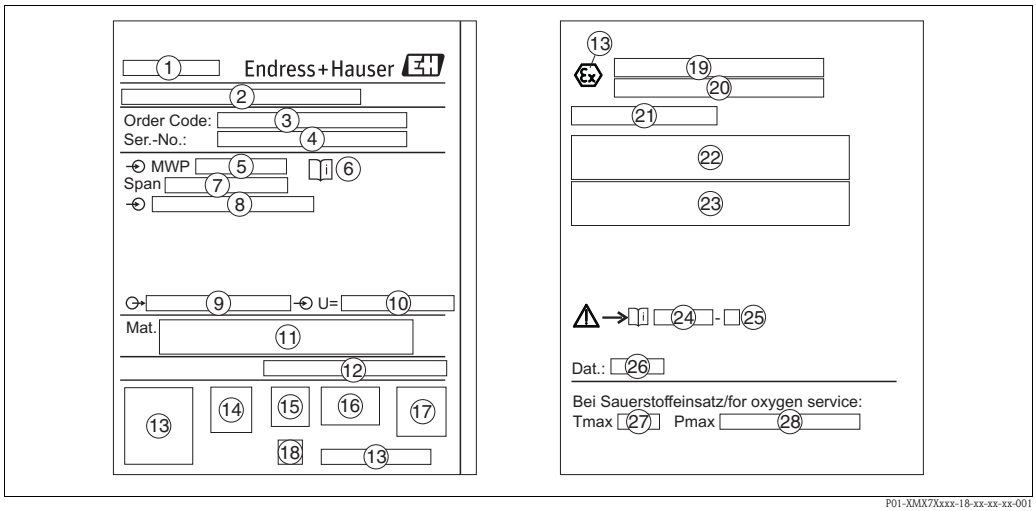


Fig. 4: Nameplate

1 Device name
2 Address of manufacturer
3 Order code
See the specifications on the order confirmation for the meanings of the individual letters and digits.
4 Serial number
5 MWP (Maximum working pressure)
6 Symbol: Note: pay particular attention to the data in the "Technical Information"!
7 Minimum/Maximum span
8 Nominal measuring range
9 Electronic version (output signal)
10 Supply voltage
11 Wetted materials
12 Degree of protection

Optional:
13 Approval ID and ID numbers
14 3A-symbol
15 CSA-symbol
16 FM-symbol
17 SIL-symbol for devices with SIL3/IEC 61508 Declaration of conformity
18 GL-symbol for GL marine certificate
19 EC type examination certificate
20 Type of protection
21 Approval number for WHG overspill protection
22 Temperature operating range for devices for use in hazardous areas
23 Electrical data for devices for use in hazardous areas
24 Safety Instructions number
25 Safety Instructions index
26 Device manufacture data
27 Maximum temperature for devices suitable for oxygen applications
28 Maximum pressure for devices suitable for oxygen applications

2.1.2 Identifying the sensor type

See parameter "Sensor Meas.Type" in Operating Instruction BA00303P. The Operating Instruction BA00303P can be found on the supplied documentation CD.

2.2 Scope of delivery

The scope of delivery comprises:
- Deltabar S differential pressure transmitter
- For PMD70 and PMD75 with side flanges made of AISI 316L or C22.8: additionally 2 vent valves, AISI 316L
- PMD75 with side flanges made of AISI 316L or C22.8 and side vent: additionally 4 locking screws, AISI 316L
- For devices with the "HistoROM/M-DAT" option: CD-ROM with Endress+Hauser operating program and documentation
- Optional accessories

Documentation supplied:
- Operating Instructions BA00301P and BA00303P, Technical Information TI00383P and the Safety Instructions, Functional Safety Manual and brochures can be found on the documentation CD supplied. → 🖹 2, "Overview of documentation" section.
- Brief Operating Instructions KA01024P
- Fold-out brochure KA00252P
- Final inspection report
- Additional Safety Instructions with ATEX, IECEx and NEPSI devices
- Optional: factory calibration form, test certificates

2.3 CE mark, Declaration of Conformity

The devices are designed to meet state-of-the-art safety requirements, have been tested and left the factory in a condition in which they are safe to operate. The devices comply with the applicable standards and regulations as listed in the EC Declaration of Conformity and thus comply with the statutory requirements of the EC Directives. Endress+Hauser confirms the conformity of the device by affixing to it the CE mark.

2.4 Registered trademarks

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

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

FOUNDATION™ Fieldbus
Registered trademark of the Fieldbus Foundation Austin, Texas, USA

3 Installation

3.1 Incoming acceptance and storage

3.1.1 Incoming acceptance

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

3.1.2 Transport

Caution!
Follow the safety instructions and transport conditions for devices of more than 18 kg (39.69 lbs). Transport the measuring device to the measuring point in its original packaging or at the process connection.

3.1.3 Storage

The device must be stored in a dry, clean area and protected against impact (EN 837-2).

Storage temperature range:
- –40 to +90°C (–40 to +212°F)
- Onsite display: –40 to +85°C (–40 to +185°F)
- Separate housing: –40 to +60°C (–40 to +140°F)

3.2 Installation conditions

3.2.1 Dimensions

→ For dimensions, please refer to the Technical Information for Deltabar S TI00382P, "Mechanical construction" section. → 2 "Overview of documentation".

3.3 Installation instructions

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 or partially full, the measured value does not display zero. You can correct this zero point shift using the "Zero" key on the electronic insert or externally on the device or via the onsite display. → 28, Section 5.2.1 "Position of the operating elements", → 31, Section 5.2.3 "Function of the operating elements – onsite display connected" and → 58, Section 6.4 "Position adjustment".
- For FMD77 and FMD78, please refer to Section 3.3.4 "Installation instructions for devices with diaphragm seals (FMD78)", → 18.
- General recommendations for routing the pressure 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-way or five-way valve manifold allows for easy commissioning, installation and maintenance without interrupting the process.
- When routing the pressure piping outdoors, ensure that sufficient antifreeze protection is used, e.g. by using pipe heat tracing.
- Install the pressure 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°.
  → 📄 23, Section 3.3.9 "Rotating the housing".
- Endress+Hauser offers a mounting bracket for installing on pipes or walls.
  → 📄 21, Section 3.3.7 "Wall and pipe-mounting (optional)".

3.3.1 Installation for flow measurement

Note!
For more information about flow measurement with the Deltabar S differential pressure transmitter
- Deltabar S with orifice plate (TI00422P, Deltatop DO6x)
- Deltabar S with Pitot tube (TI00425P, Deltatop DP6x)

Flow measurement in gases with PMD70/PMD75

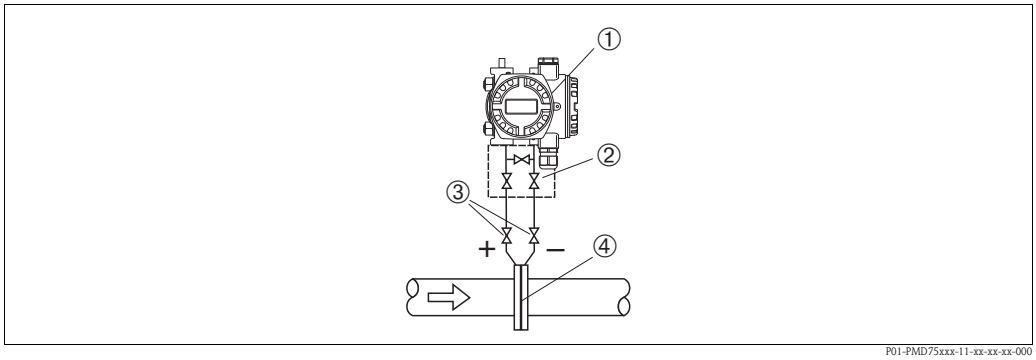


Fig. 5: Measuring arrangement for flow measurement in gases with PMD75

1 Deltabar S, here PMD75
2 Three-way valve manifold
3 Shutoff valves
4 Orifice plate or Pitot tube

- Mount the Deltabar S above the measuring point so that the condensate can run off into the process piping.

Flow measurement in steam with PMD70/PMD75

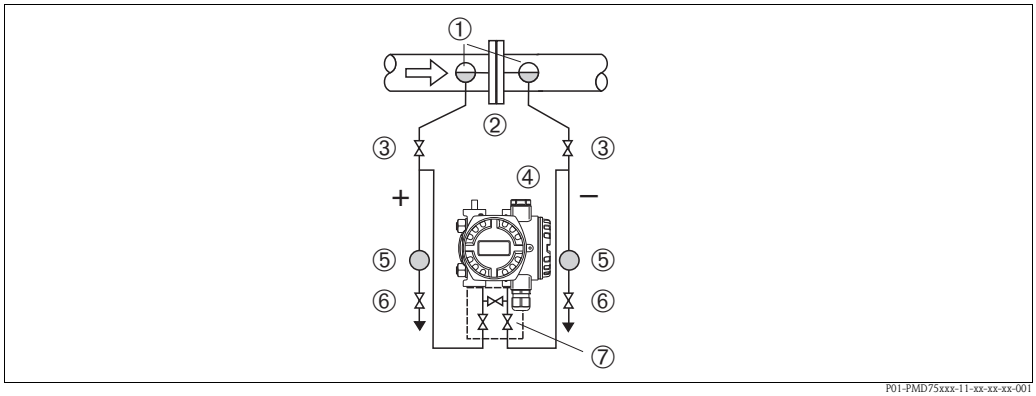


Fig. 6: Measuring arrangement for flow measurement in steam with PMD75

1 Condensate traps
2 Orifice plate or Pitot tube
3 Shutoff valves
4 Deltabar S, here PMD75
5 Separator
6 Drain valves
7 Three-way valve manifold

- Mount the Deltabar S below the measuring point.
- Mount the condensate traps at the same level as the tapping points and at the same distance to the Deltabar S.
- Prior to commissioning, fill the pressure piping to the level of the condensate traps.

Flow measurement in liquids with PMD70/PMD75

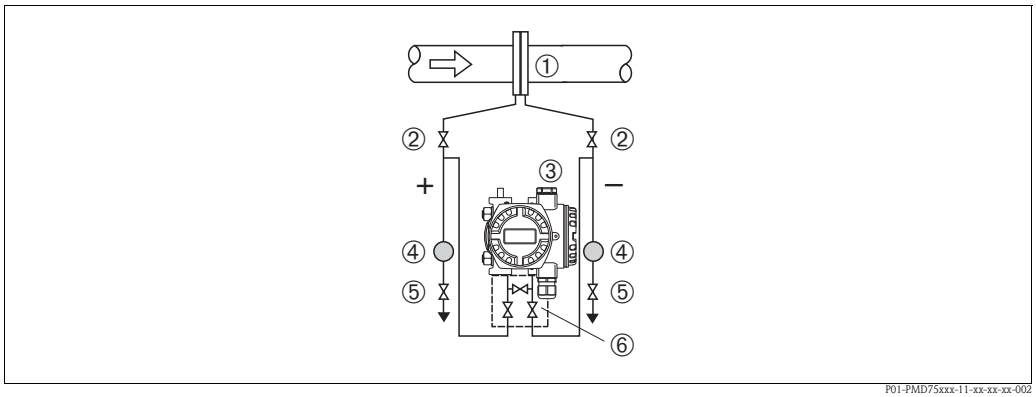


Fig. 7: Measuring arrangement for flow measurement in liquids with PMD75

1 Orifice plate or Pitot tube
2 Shutoff valves
3 Deltabar S, here PMD75
4 Separator
5 Drain valves
6 Three-way valve manifold

- Mount the Deltabar S below the measuring point so that the pressure piping is always filled with liquid and gas bubbles can run back into the process piping.
- When measuring in media with solid parts, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.

3.3.2 Installation for level measurement

Level measurement in an open container with PMD70/PMD75

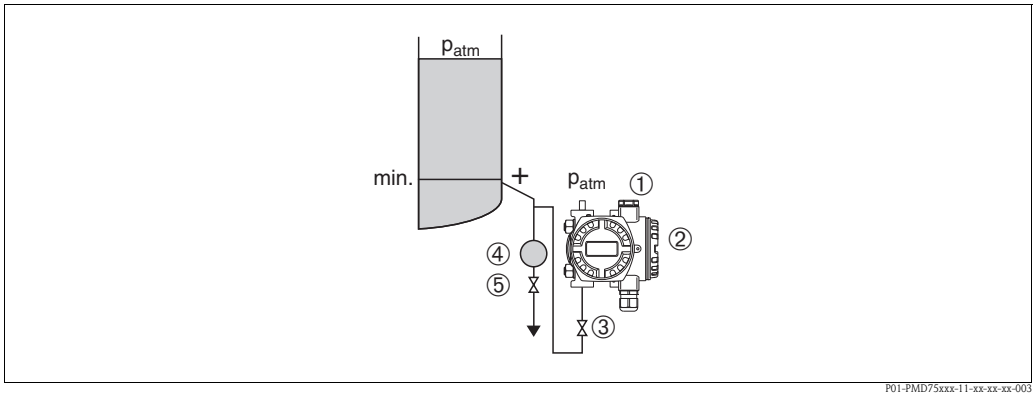


Fig. 8: Measuring arrangement for level measurement in an open container with PMD75

1 The negative side is open to atmospheric pressure
2 Deltabar S, here PMD75
3 Shutoff valve
4 Separator
5 Drain valve

- Mount the Deltabar S below the lower measuring connection so that the pressure piping is always filled with liquid.
- The negative side is open to atmospheric pressure.
- When measuring in media with solid parts, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.

Level measurement in an open container with FMD76/FMD77

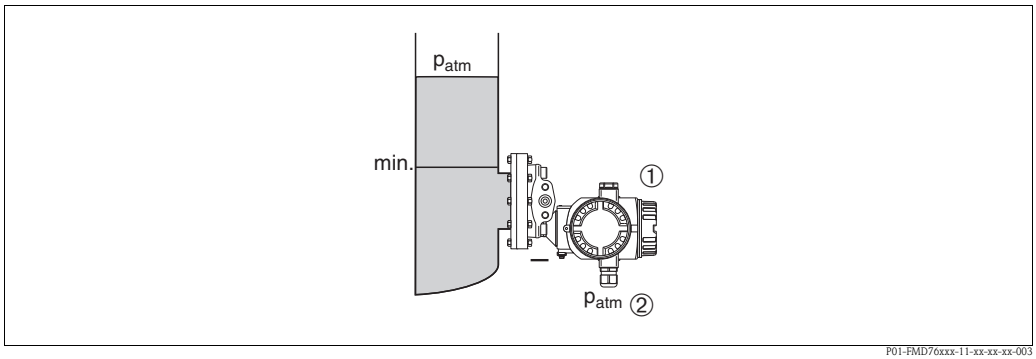


Fig. 9: Measuring arrangement for level measurement in an open container with FMD76

1 Deltabar S, here FMD76
2 The negative side is open to atmospheric pressure

- Mount the Deltabar S directly on the container. → 20, Section 3.3.5 "Seal for flange mounting".
- The negative side is open to atmospheric pressure.

Level measurement in a closed container with PMD70/PMD75

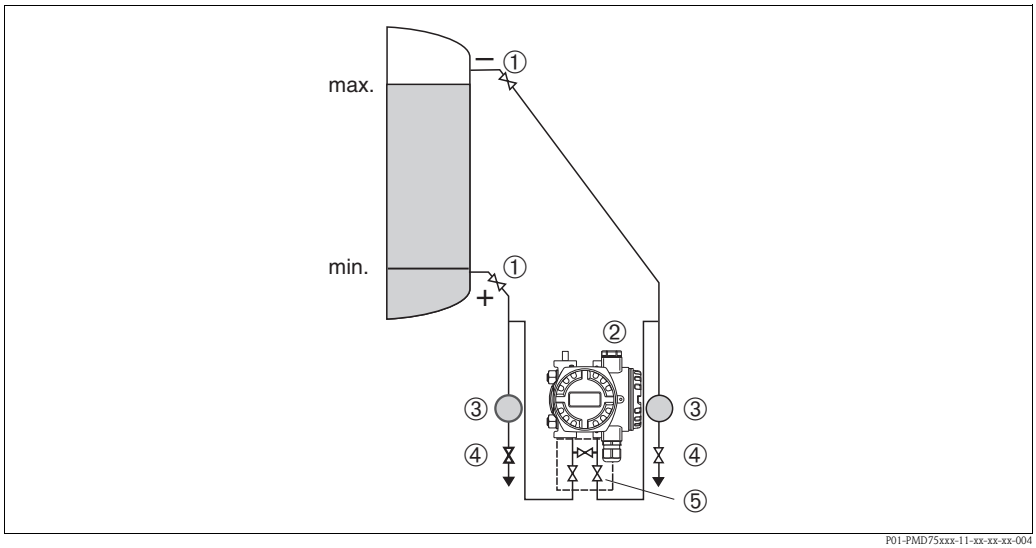


Fig. 10: Measuring arrangement for level measurement in a closed container with PMD75

1 Shutoff valves
2 Deltabar S, PMD75
3 Separator
4 Drain valves
5 Three-way valve manifold

- Mount the Deltabar S below the lower measuring connection so that the pressure piping is always filled with liquid.
- Always connect the impulse piping of negative side above the maximum level.
- When measuring in media with solid parts, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.

Level measurement in a closed container with FMD76/FMD77

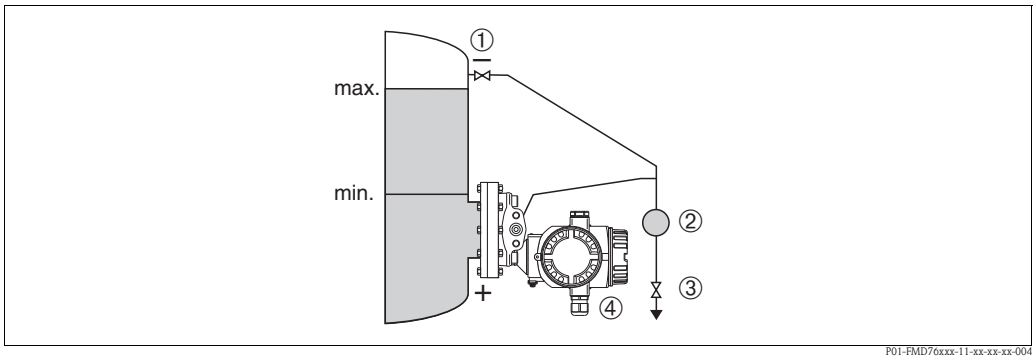


Fig. 11: Measuring arrangement for level measurement in a closed container with FMD76

1 Shutoff valve
2 Separator
3 Drain valve
4 Deltabar S, here FMD76

- Mount the Deltabar S directly on the container. → 📄 20, Section 3.3.5 "Seal for flange mounting".
- Always connect the impulse piping of negative side above the maximum level.
- When measuring in media with solid parts, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.

Level measurement in a closed container with FMD78

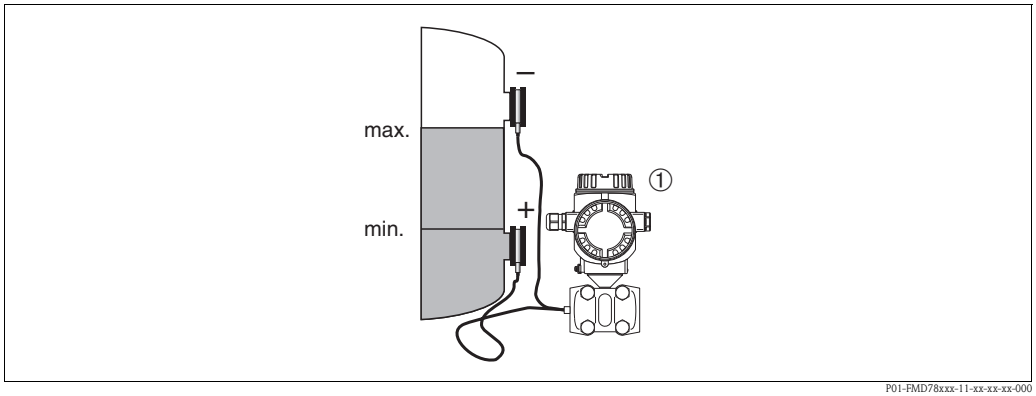


Fig. 12: Measuring arrangement for level measurement in a closed container with FMD78

1 Deltabar S, here FMD78

- Mount the Deltabar S below the lower diaphragm seal. → 📄 18, Section 3.3.4 "Installation instructions for devices with diaphragm seals (FMD78)".
- The ambient temperature should be the same for both capillaries.

Note!
Level measurement is only ensured between the upper edge of the lower diaphragm seal and the lower edge of the upper diaphragm seal.

Level measurement in a closed container with superimposed steam with PMD70/ PMD75

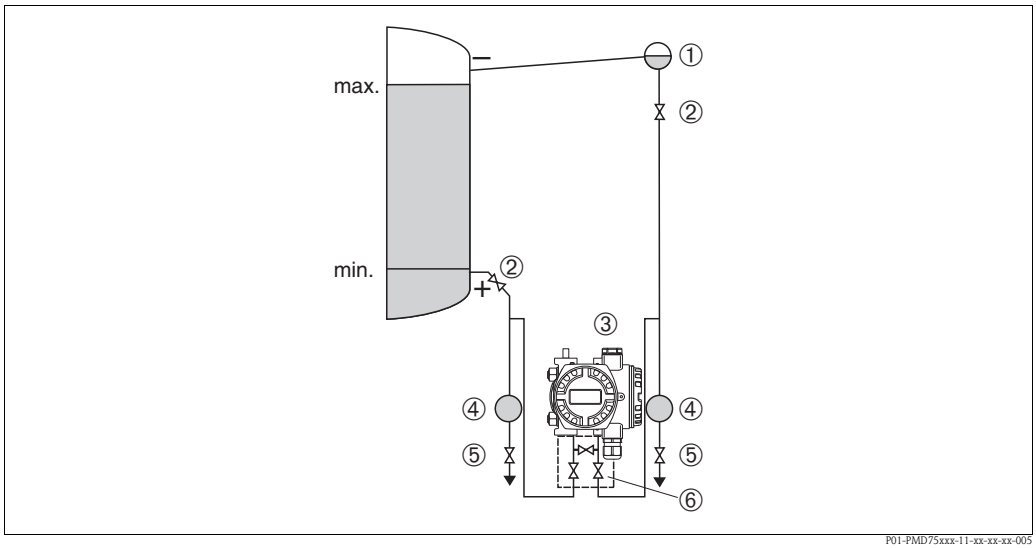


Fig. 13: Measuring arrangement for level measurement in a container with superimposed steam with PMD75

1 Condensate trap
2 Shutoff valves
3 Deltabar S, here PMD75
4 Separator
5 Drain valves
6 Three-way valve manifold

- Mount the Deltabar S below the lower measuring connection so that the pressure piping is always filled with liquid.
- Always connect the impulse piping of negative side above the maximum level.
- A condensate trap ensures constant pressure on the negative side.
- When measuring in media with solid parts, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.

Level measurement in a closed container with superimposed steam with FMD 76/ FMD77

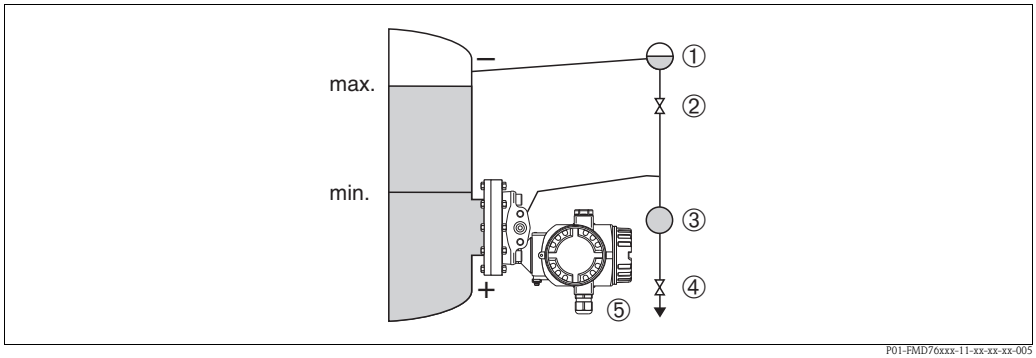


Fig. 14: Measuring arrangement for level measurement in a container with superimposed steam with FMD76

1 Condensate trap
2 Shutoff valve
3 Separator
4 Drain valve
5 Deltabar S, here FMD76

- Mount the Deltabar S directly on the container. → 20, Section 3.3.5 "Seal for flange mounting".

- Always connect the impulse piping of negative side above the maximum level.
- A condensate trap ensures constant pressure on the negative side.
- When measuring in media with solid parts, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.

3.3.3 Installation for differential pressure measurement

Differential pressure measurement in gases and steam with PMD70/PMD75

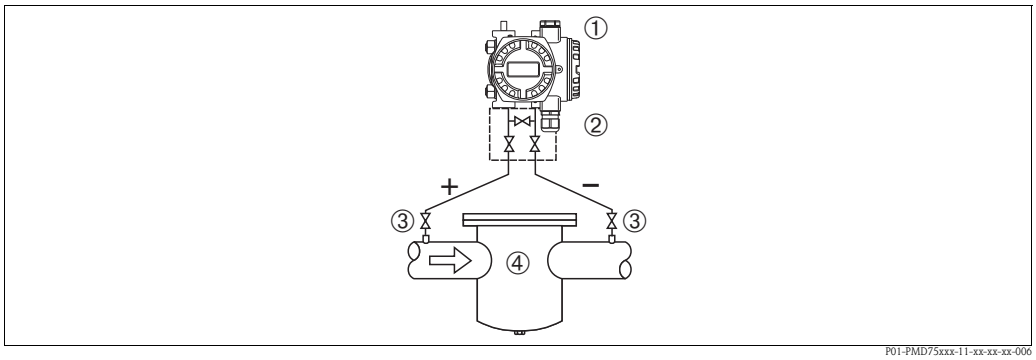


Fig. 15: Measuring arrangement for differential pressure measurement in gases and steam with PMD75

1 Deltabar S, here PMD75
2 Three-way valve manifold
3 Shutoff valves
4 e.g. filter

- Mount the Deltabar S above the measuring point so that the condensate can run off into the process piping.

Differential pressure measurement in liquids with PMD70/PMD75

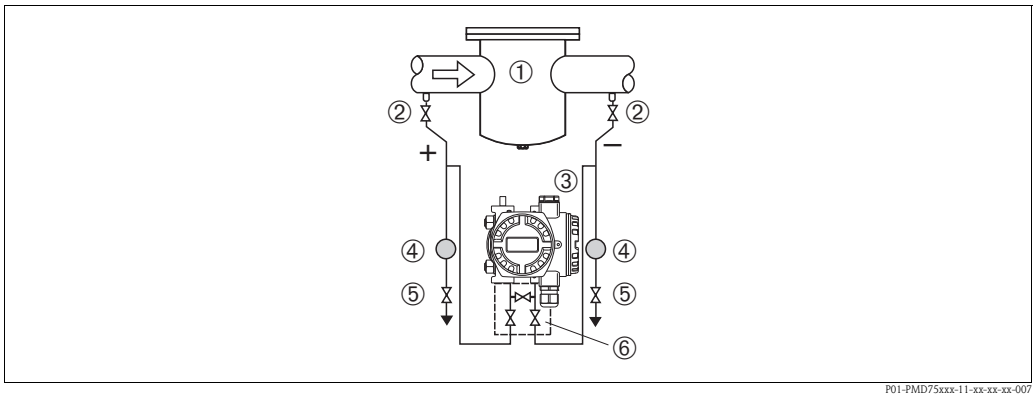


Fig. 16: Measuring arrangement for differential pressure measurement in liquids with PMD75

1 e.g. filter
2 Shutoff valves
3 Deltabar S, here PMD75
4 Separator
5 Drain valves
6 Three-way valve manifold

- Mount the Deltabar S below the measuring point so that the pressure piping is always filled with liquid and gas bubbles can run back into the process piping.
- When measuring in media with solid parts, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.

Differential pressure measurement in gases, steam and liquids with FMD78

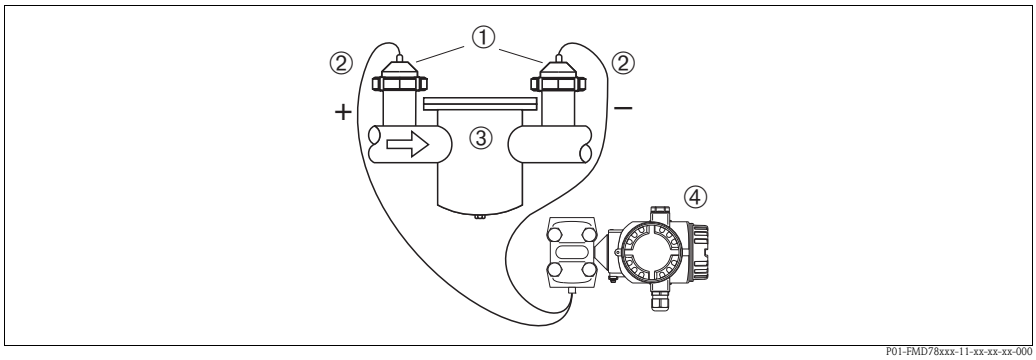


Fig. 17: Measuring arrangement for differential pressure measurement in gases, steam and liquids with FMD78

1 Diaphragm seal
2 Capillary
3 e.g. filter
4 Deltabar S, here FMD78

- Mount the diaphragm seal with capillaries at the top or on the side on the piping.
- For vacuum applications: mount the Deltabar S below the measuring point. → 19, Section 3.3.4, "Vacuum application (FMD78)".
- The ambient temperature should be the same for both capillaries.

3.3.4 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 clean or touch diaphragm seals with hard or pointed objects.
- 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 (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. → 58, Section 6.4 "Position adjustment".
- Please note the application limits of the diaphragm seal filling oil as detailed in the Technical Information for Deltabar S TI00382P, "Planning instructions for diaphragm seal systems" section. → 2, "Overview of documentation".

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 ≥100 mm (3.94 in).
- 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).

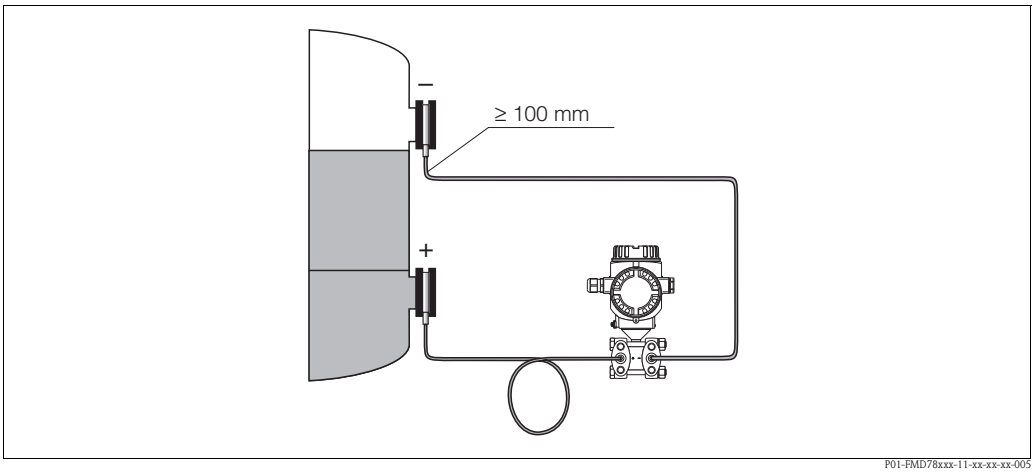


Fig. 18: Mounting Deltabar S, FMD78 with diaphragm seals and capillaries, recommended mounting for vacuum applications: mount pressure transmitter below the lowest diaphragm seal!

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 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 on the positive side (empty container), see illustration below right.

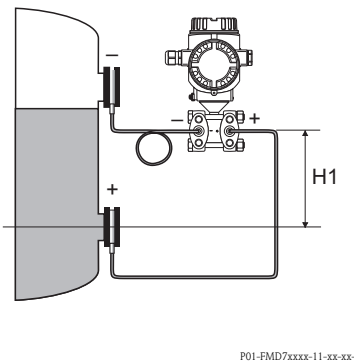


Fig. 19: Installation above the lower diaphragm seal

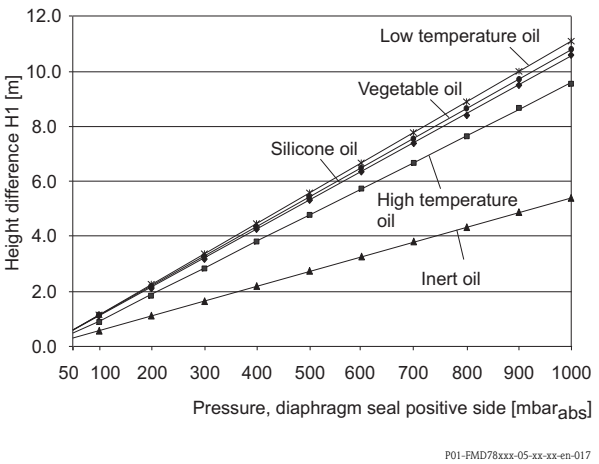


Fig. 20: Diagram of maximum installation height above the lower diaphragm seal for vacuum applications depending on the pressure at the diaphragm seal on the positive side

3.3.5 Seal for flange mounting

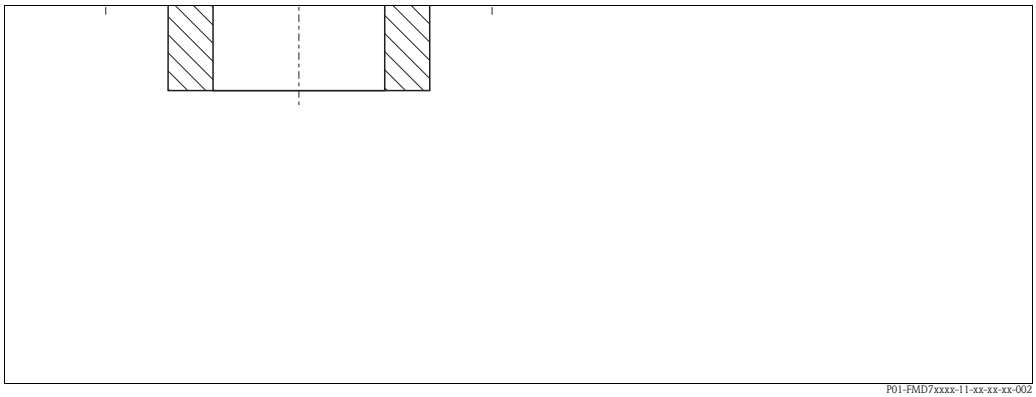


Fig. 21: Mounting the versions with flange or diaphragm seal

1 Process isolating diaphragm
2 Seal

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

3.3.6 Heat insulation – FMD77

The FMD77 must only be insulated up to a certain height. The maximum permitted insulation height is indicated on the devices and applies to an insulation material with a heat conductivity ≤ 0.04 W/(m x K) and to the maximum permitted ambient and process temperature (→ see table below). The data were determined under the most critical application "quiescent air".

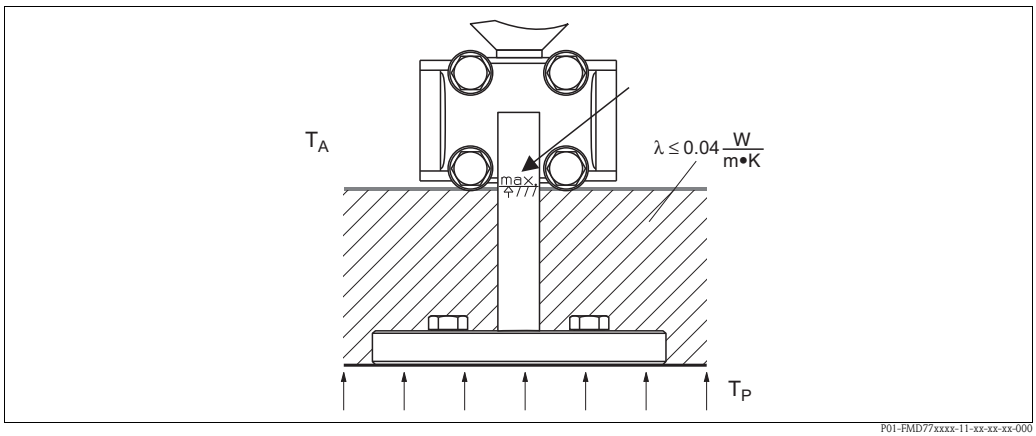


Fig. 22: Maximum permitted insulation height

	FMD77
Ambient temperature (T_A)	≤ 70°C (158°F)
Process temperature (T_P)	Max. 400°C (752°F), depending on the diaphragm seal filling oil used (→ see Technical Information TI00382P Deltabar S)

3.3.7 Wall and pipe-mounting (optional)

Endress+Hauser offers a mounting bracket for installing the device on pipes or walls. A holder with mounting accessories for pipe mounting is included with the device.

Note!
When using a valve block, the block's dimensions must be taken into account.

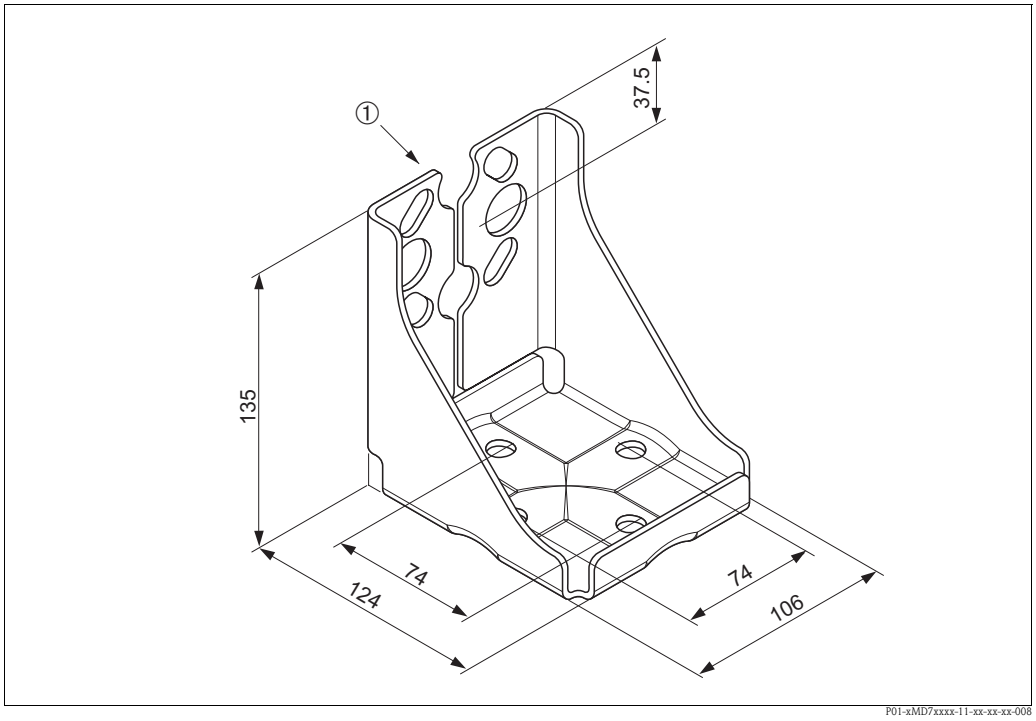


Fig. 23: Mounting bracket for wall and pipe mounting

1 Device mounting

Please note the following when mounting:
- Devices with capillary lines: mount capillaries with a bending radius ≥ 100 mm (3.94 in).
- To prevent the mounting screws from scoring, lubricate them with a multipurpose grease prior to mounting.
- When mounting on a pipe, tighten the nuts on the bracket uniformly with a torque of at least 30 Nm (22.13 lbf ft).

3.3.8 Assembling and mounting the "separate housing" version

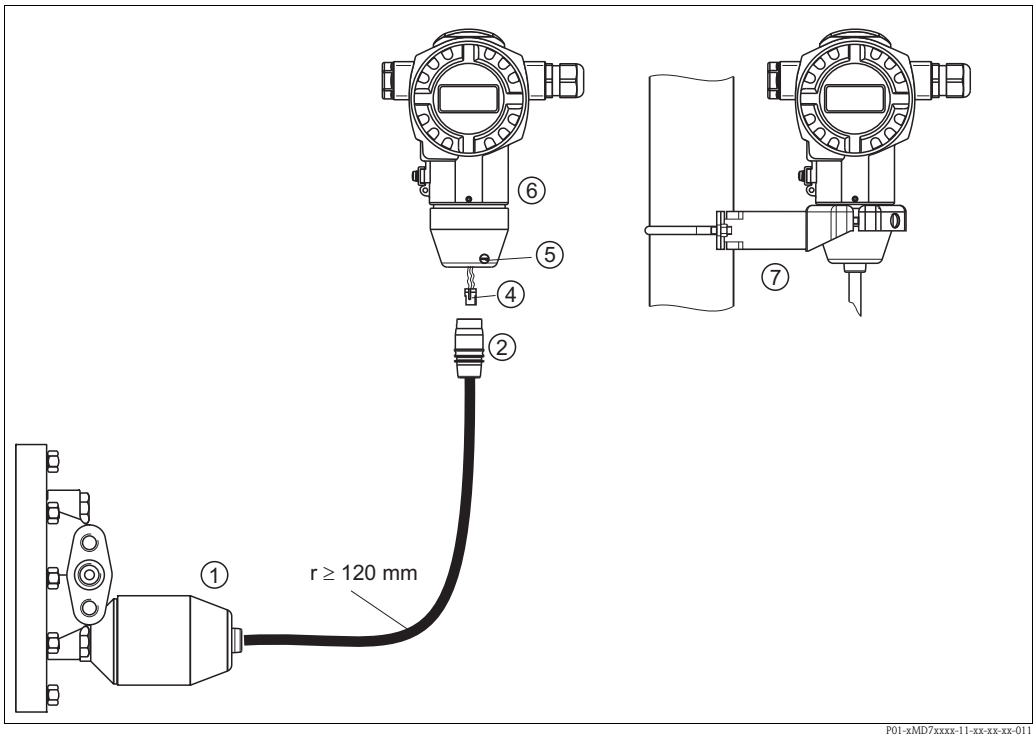


Fig. 24: "Separate housing" version

1 In the "separate housing" version, the sensor is supplied with the process connection and cable ready-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. Insert the 10-pin 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 6).
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) ≥ 120 mm (4.72 in).

3.3.9 Rotating the housing

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

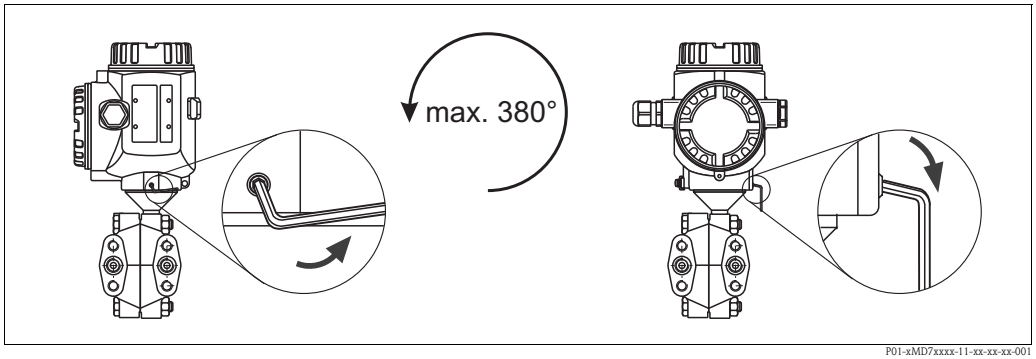


Fig. 25: Aligning the housing

– T14 and T15 housing: loosen setscrew with a 2 mm (0.08 in) Allen key.
Hygenic T17 housing: loosen setscrew with a 3 mm (0.12 in) Allen key.
– Rotate housing (max. up to 380°).
– Retighten setscrew with 1 Nm (0,74 lbf ft).

3.3.10 Closing the covers on the hygenic stainless steel housing (T17)

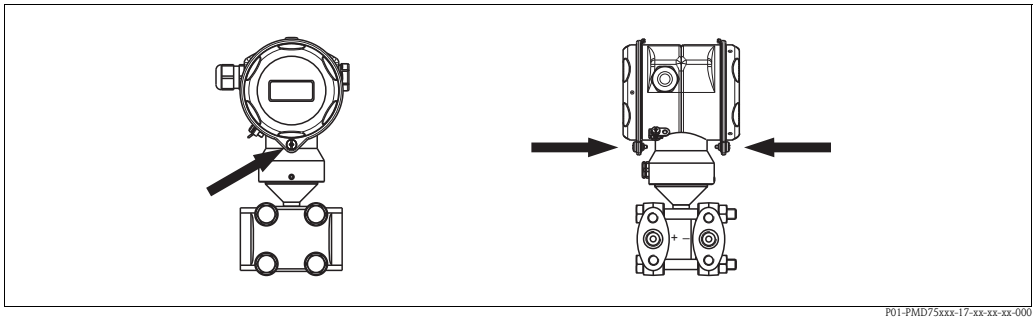


Fig. 26: Closing the covers

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

3.4 Post-installation check

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

4 Wiring

4.1 Connecting the device

Note!
- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- Devices with integrated overvoltage protection must be grounded.
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.

- The supply voltage must match the power supply on the nameplate. (→ 🖹 6, Section 2.1.1 "Nameplates".)
- Switch off the supply voltage before connecting the device.
- Remove the housing cover of the terminal compartment.
- Guide the cable through the gland. → For cable specifications, → 🖹 25, Section 4.2.3.
- Connect the device in accordance with the following diagram.
- Screw down the housing cover.
- Switch on the supply voltage.

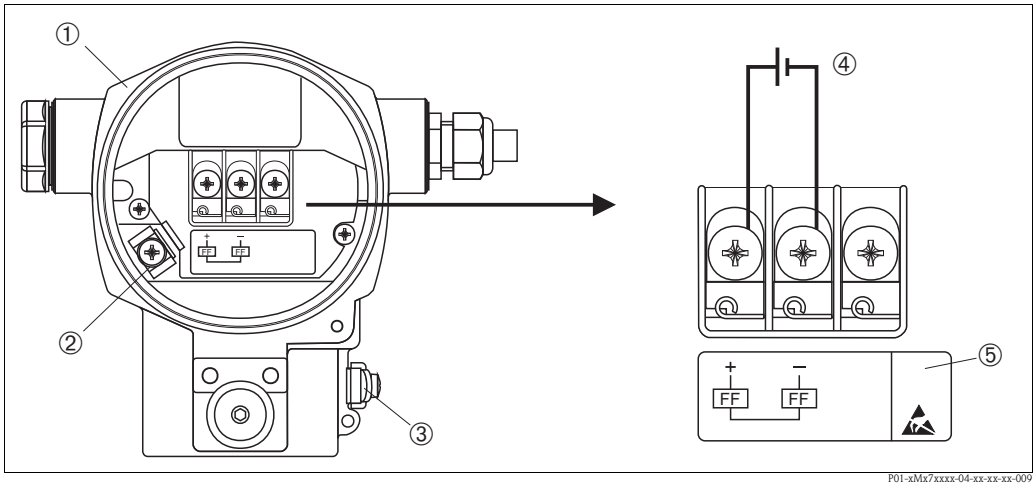
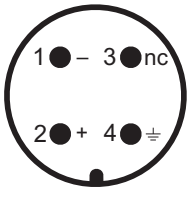


Fig. 27: Electrical connection of FOUNDATION Fieldbus
→ Please refer also to Section 4.2.1 "Supply voltage", → 🖹 25.

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

4.1.1 Devices with 7/8" plug

PIN assignment for 7/8" connector



PIN	Meaning
1	Signal –
2	Signal +
3	Not assigned
4	Earth

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 to 32 V DC

Note!
- 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 a separate documentation which is available upon request. The Ex documentation is available as standard with all devices approved for use in explosion hazardous areas.

4.2.2 Current consumption

15 mA ±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 to 2.5 mm^2 (20 to 14 AWG)
- Outer cable diameter: 5 to 9 mm (0.2 to 0.35 in)

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

4.3 Overvoltage protection (optional)

Devices showing version "M" in feature 100 "Additional options 1" or feature 110 "Additional options 2" in the order code are equipped with overvoltage protection (see also Technical Information TI00382P "Ordering information".
- Overvoltage protection:
  - Nominal functioning DC voltage: 600 V
  - Nominal discharge current: 10 kA
- Surge current check $\hat{i}$ = 20 kA as per DIN EN 60079-14: 8/20 µs satisfied
- Arrester AC current check I = 10 A satisfied

Warning!
Devices with integrated overvoltage protection must be grounded.

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 4.1?
- 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 onsite display lights up.

5 Operation

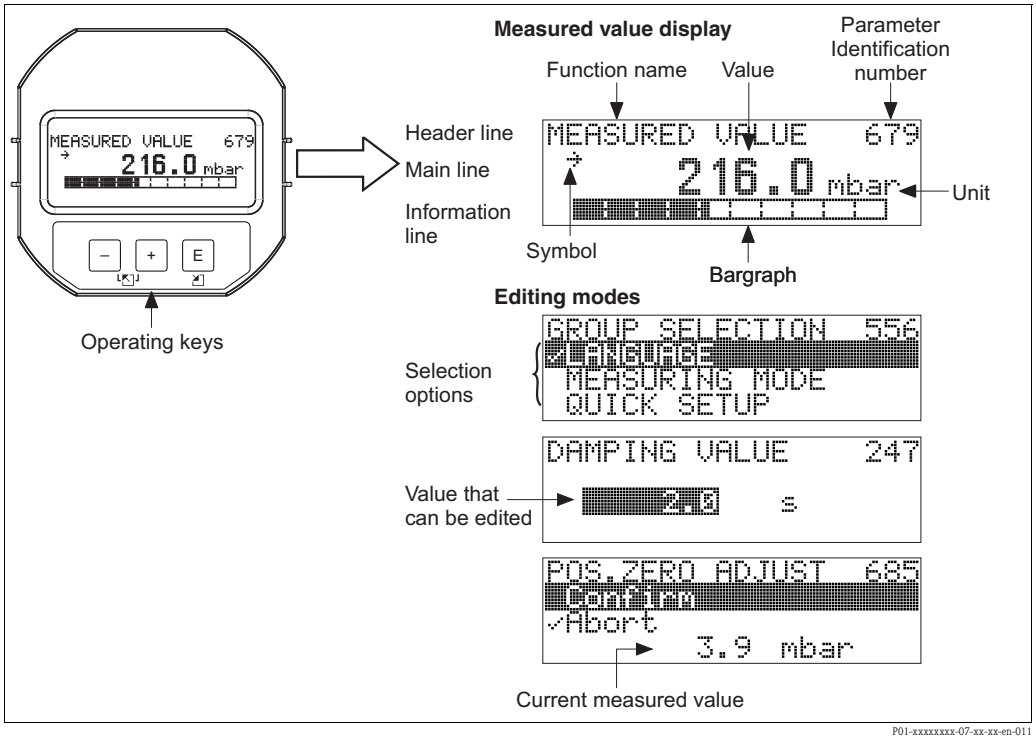
Feature 20 "Output; operation" in the order code provides you with information on the operating options available to you.

Versions in the order code		Operation
P	FOUNDATION Fieldbus; external operation, LCD	Via onsite display and 1 key on the exterior of the device
Q	FOUNDATION Fieldbus; internal operation, LCD	Via onsite display and 1 key on the inside of the device
R	FOUNDATION Fieldbus; internal operation	Without onsite display, 1 key on the inside of the device

5.1 Onsite display (optional)

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

Functions:
- 8-digit measured value display including sign and decimal point, unit display
- Bar graph as graphic display of the current pressure measured value in relation to the set pressure range in the Pressure Transducer Block. The pressure range is set by means of the SCALE_IN parameter.
- Easy and complete menu guidance by dividing the parameters into several levels and groups
- Menu guidance in 6 languages (de, en, fr, es, jp, ch)
- Each parameter has a 3-digit ID to aid navigation
- Option of configuring the display according to individual requirements and preferences, such as language, alternating display, contrast setting, display of other measured values such as sensor temperature
- Comprehensive diagnostic functions (fault and warning message, maximum indicator, etc.)
- Rapid and safe commissioning using Quick Setup menus



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

Symbol	Meaning
	**Alarm symbol** – Symbol flashing: warning, device continues measuring. – Symbol permanently lit: error, device does not continue measuring. *Note:* The alarm symbol may overlie the tendency symbol.
	**Lock symbol** The operation of the device is locked. Unlock device, → 50, Section 5.7 "Locking/ unlocking operation".
	**Communication symbol** Data transfer via communication
	**Square root symbol** Active measuring mode "Flow measurement"
	**Simulation symbol** Simulation mode is activated. DIP switch 2 for simulation is set to "On". → See also Section 5.2.1 "Position of the operating elements" and → 52, Section 5.8 "Simulation".
	**Tendency symbol (increasing)** The primary value of the Pressure Transducer Block is increasing.
	**Tendency symbol (decreasing)** The primary value of the Pressure Transducer Block is decreasing.
	**Tendency symbol (constant)** The primary value of the Pressure Transducer Block has remained constant over the past few minutes.

5.2 Operating elements

5.2.1 Position of the operating elements

On the aluminum housing (T14/T15), the operating key is located either under the protective flap on the exterior of the device or inside on the electronic insert. In the case of the hygenic stainless steel housing (T17), the operating key is always inside on the electronic insert. In addition, there are three operating keys on the optional onsite display.

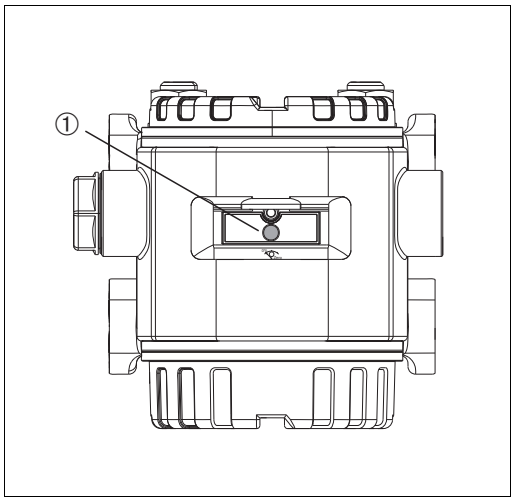


Fig. 28: Operating key external, under the protective flap

1 Operating key for position adjustment (zero point correction) and total reset

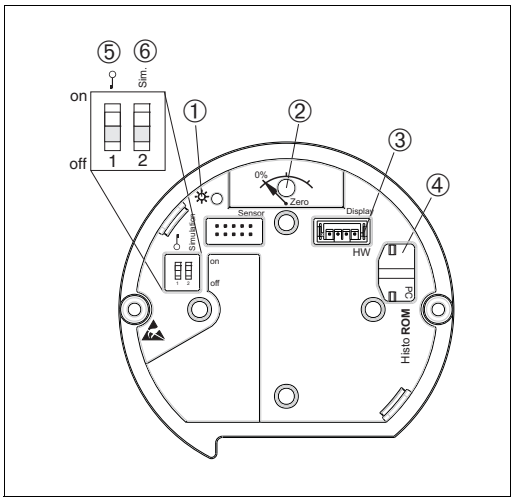
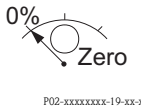
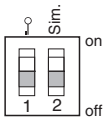


Fig. 29: Operating keys, internal

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

5.2.2 Function of operating elements

Key(s)	Meaning
 P02-xxxxxxxx-19-xx-xx-xx-107	– 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 the following Section "Performing position adjustment on site." – Total reset: press key for at least 12 seconds. The LED on the electronic insert lights up briefly if a reset is being carried out.
 P01-xxxxxxxx-19-xx-xx-xx-134	– DIP switch 1: for locking/unlocking parameters relevant to the measured value. Factory setting: off (unlocked) → 📄 50, Section 5.7 "Locking/unlocking operation". – DIP switch 2: for simulation mode Factory setting: off (simulation mode off) → 📄 52, Section 5.8 "Simulation"

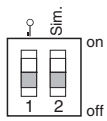
Performing position adjustment on site

Note!
- Operation must be unlocked. → 📄 50, Section 5.7 "Locking/unlocking operation".
- The device is configured for the Pressure measuring mode as standard.
  – Operation via FF configuration program: In the Pressure Transducer Block, change the measuring mode by means of the PRIMARY_VALUE_TYPE and LINEARIZATION parameters.
  – Operation via digital communication: change the measuring mode by means of the MEASURING MODE parameter.
  – You can change the measuring mode by means of the MEASURING MODE parameter. → 📄 57, Section 6.3 "Selecting the language and measuring mode".
- The pressure applied must be within the nominal pressure limits of the sensor. See information on the nameplate.

Perform position adjustment:

1. Pressure is present at device.
2. Press key for at least 3 seconds.
3. If the LED on the electronic insert lights up briefly, the pressure applied has been accepted for position adjustment.
   If the LED does not light up, the pressure applied was not accepted. Observe the input limits.
   For error messages, → 📄 72, Section 8.1 "Messages".

5.2.3 Function of the operating elements – onsite display connected

Key(s)	Meaning
+	– Navigate upwards in the picklist – Edit numerical values or characters within a function
−	– Navigate downwards in the picklist – Edit numerical values or characters within a function
E	– Confirm entry – Go to next item
+ and E	Contrast setting of onsite display: increase
− and E	Contrast setting of onsite display: reduce
+ and −	ESC functions: – Exit the editing mode without saving the altered value – You are in the menu within a function group: the first time you press the keys simultaneously, you go back one parameter in the function group. Every subsequent time you press the keys simultaneously, you go up one level in the menu. – You are in the menu on a selection level: every time you press the keys simultaneously, you go up one level in the menu. *Note:* For the terms function group, level, selection level, → 📄 45, Section 5.4.1
 P01-xxxxxxxx-19-xx-xx-xx-134	– DIP switch 1: for locking/unlocking parameters relevant to the measured value. Factory setting: off (unlocked) – DIP switch 2: for the simulation mode Factory setting: off (simulation mode off)

5.3 FOUNDATION Fieldbus interface

5.3.1 System architecture

The following diagram shows two typical examples of a FOUNDATION Fieldbus network with the associated components.

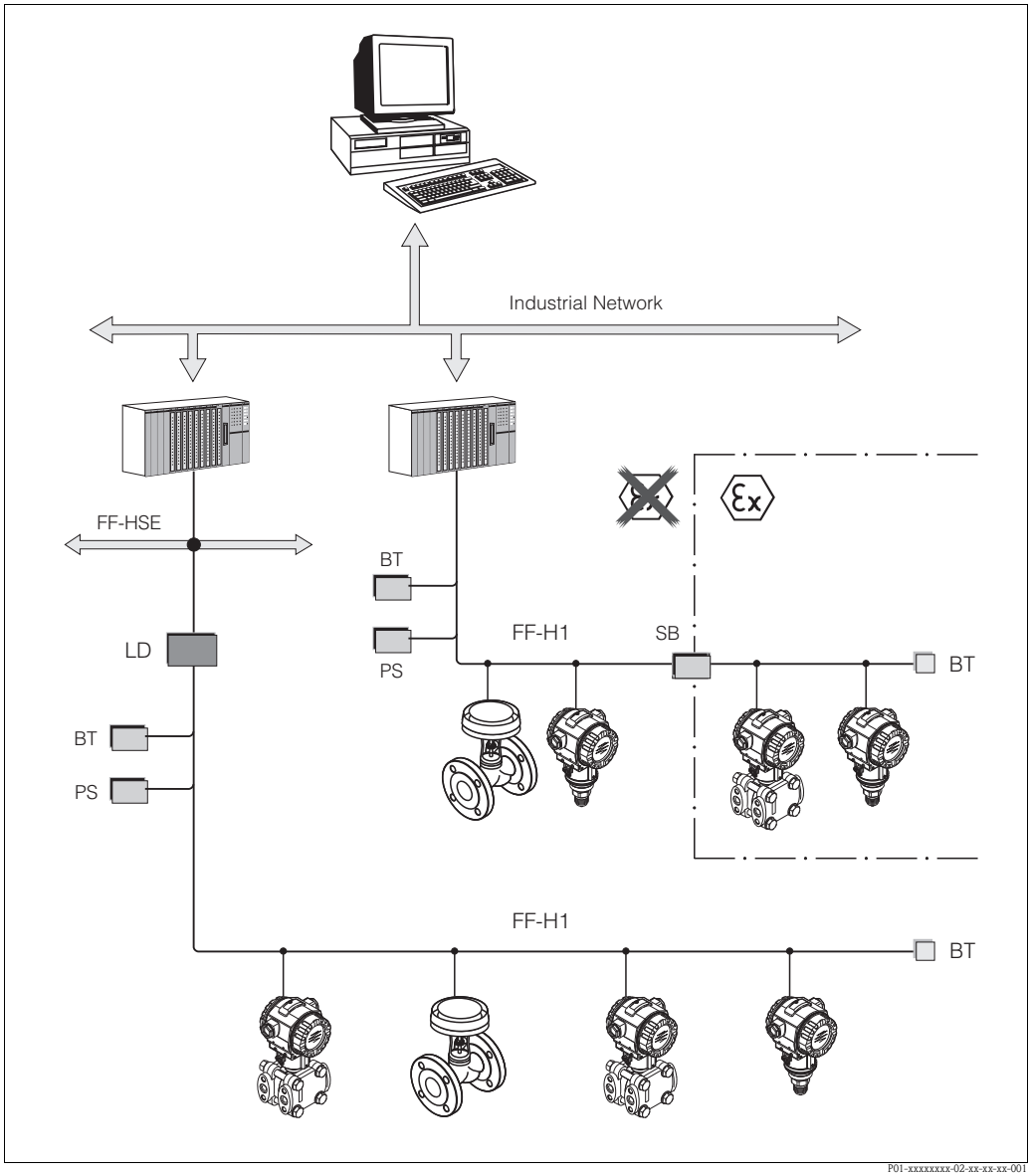


Fig. 30: FOUNDATION Fieldbus system architecture with associated components

FF-HSE: High Speed Ethernet, FF-H1: FOUNDATION Fieldbus-H1, LD: Linking Device FF-HSE/FF-H1, PS: Bus Power Supply, SB: Safety Barrier, BT: Bus Terminator

The system can be connected in the following ways:
– A linking device makes the connection to higher-order fieldbus levels (e.g. High Speed Ethernet (HSE)) possible.
– An FF-H1 connecting card is needed for direct connection to a process control system.

Note!
Further information on FOUNDATION Fieldbus can be found in Operating Instructions BA00013S "FOUNDATION Fieldbus Overview, Installation and Commissioning Guidelines", the FOUNDATION Fieldbus Specification or on the Internet at "http://www. fieldbus.org".

5.3.2 Number of devices

- Endress+Hauser Deltabar S devices meet the requirements specified by the FISCO model.
- Due to the low current consumption, the following can be operated at one bus segment when installation is performed
  according to FISCO:

  Up to HW version 1.10:
  – Up to 7 Deltabar S devices for Ex ia, CSA and FM IS applications
  – Up to 25 Deltabar S devices in all other applications, e.g. in non-hazardous areas, Ex nA etc.

  As of HW version 02.00:
  – Up to 6 Deltabar S devices for Ex ia, CSA and FM IS applications
  – Up to 24 Deltabar S devices in all other applications, e.g. in non-hazardous areas, Ex nA etc.

  The maximum number of measuring devices at one bus segment is defined by their current consumption, the performance of the bus coupler, and the required bus length.

  As of hardware version 1.10, you will find a label in the device on the electronic insert.

5.3.3 Operation

You can obtain special configuration and operating programs from various manufacturers for the configuration, such as the FieldCare operating program from Endress+Hauser → 🖹 48, Section 5.5 "FieldCare". These configuration programs make it possible to configure FF functions and all the device-specific parameters. The predefined function blocks allow uniform access to all the network and device data.

5.3.4 Network configuration

You require the following to configure a device and integrate it into an FF network:
- An FF configuration program
- The Cff file (Common File Format: *.cff, *.fhx)
- The device description (DD: *.sym, *.ffo)

Pre-defined standard DDs, which can be obtained from FOUNDATION Fieldbus, are available for the basic functions of measuring devices. You require the device-specific DD to be able to access all the functions.

The files for Deltabar S can be acquired as follows:
- Internet Endress+Hauser: http://www.de.endresss.com → Search for FOUNDATION Fieldbus
- Internet FOUNDATION Fieldbus: http://www.fieldbus.org
- On CD-ROM from Endress+Hauser, order number: 56003896

The device is integrated into the FF network as follows:
- Start the FF configuration program.
- Download the Cff and device description files (ffo, *.sym, *.cff or *.fhx files) to the system.
- Configure the interface, see Note.
- Configure the device for the measuring task and for the FF system.

Note!
- For more in-depth information on integrating the device into the FF system, see the description for the configuration software used.
- When integrating the field devices into the FF system, make sure you are using the right files. You can read out the required version by means of the DEV_REV and DD_REV parameters in the Resource Block.

5.3.5 Device identification and addressing

FOUNDATION Fieldbus identifies the device using its ID code and automatically assigns it a suitable field address. The i9dentity code cannot be changed.

The device appears in the network display once you have started the FF configuration program and integrated the device into the network. The blocks available are displayed under the device name.

If the device description has not yet been loaded, the blocks report "Unknown" or "(UNK)".

Deltabar S reports as follows:

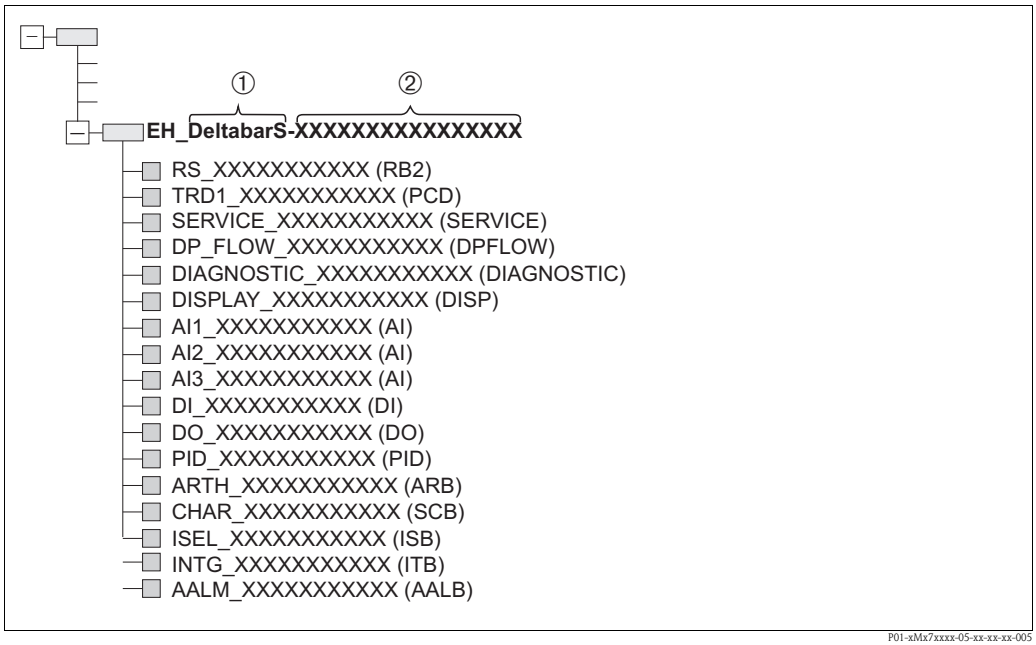


Fig. 31: Typical Deltabar S display in a configuration program after the connection has been established

1 Device name
2 Serial number

5.3.6 Deltabar S block model

With FOUNDATION Fieldbus, all the device parameters are categorized according to their functional properties and task and are generally assigned to three different blocks.

A FOUNDATION Fieldbus device has the following block types:
- A Resource Block (device block):
  This block contains all the device-specific features of the device.
- One or more Transducer Blocks
  A Transducer Block contains all the measuring and device-specific parameters of the device. The measuring principles, such as pressure or totalizers, are mapped in the Transducer Blocks.
- One or more function blocks:
  Function blocks contain the automation functions of the device. A distinction is made between different function blocks such as the Analog Input Block or PID Block. Each of these function blocks is used to execute different application functions.

The function blocks can be connected by means of an FF configuration program, depending on the automation task. The device thus takes on simple control functions, thereby relieving the workload on the higher-order process control system.

Deltabar S has the following blocks:
- Resource Block (device block)
- 5 Transducer Blocks
  – Pressure Transducer Block
    This Block supplies the output variables PRIMARY_VALUE and SECONDARY_VALUE. It contains all the parameters to configure the measuring device for the measuring task such as measuring mode selection, linearization function and unit selection.
  – Service Transducer Block

This Block supplies the output variables COUNTER P_PMAX, PRESSURE_1_ MAX_ RESETTABLE and PRESSURE_1_AFTER_DAMPING. It also includes all the counters for measuring range overshoot/undershoot for pressure and temperature, minimum and maximum measured values for pressure and temperature and the HistoROM function.
  - DP Flow Block
    This Block supplies the output variable TOTALIZER_1_VALUE/TOTALIZER 1. It contains all the parameters that are needed to configure this totalizer.
  - Display Transducer Block
    This Block does not return any output variables. It contains all the parameters for configuring the onsite display such as DISPLAY_LANGUAGE and DISPLAY_CONTRAST.
  - Diagnostic Transducer Block
    This Block does not return any output variables. It contains the simulation function for the Pressure Transducer Block, parameters to configure the alarm response and the user limits for pressure and temperature.
- 9 function blocks
  - 3 Analog Input Blocks (AI)
  - Discrete Output Block (DO)
  - Discrete Input Block (DI)
  - PID Block (PID)
  - Arithmetic Block (ARB)
  - Signal Characterizer Block (SCB)
  - Input Selector Block (ISB)
  - Analog Alarm Block (AALB)
  - Integrator Block (IT)

In addition to the pre-instantiated blocks already mentioned, the following blocks can also be instantiated:
- 3 Analog Input Blocks (AI)
- 1 Discrete Output Block (DO)
- 1 PID Block (PID)
- 1 Arithmetic Block (ARB)
- 1 Signal Characterizer Block (SCB)
- 1 Input Selector Block (ISB)
- 1 Analog Alarm Block (AALB)
- 1 Integrator Block (IT)

A total of 20 blocks can be instantiated in Deltabar S altogether, including the blocks already instantiated. For instantiating blocks, see the appropriate Operating Instructions of the configuration program used.

Note!
Endress+Hauser Guideline BA00062S.
The guideline provides an overview of the standard function blocks that are described in FOUNDATION Fieldbus Specifications FF 890 - 894.
It is designed to help operators use the blocks implemented in the Endress+Hauser field devices.

Block configuration when device is delivered

The block model shown below illustrates the block configuration when the device is delivered.

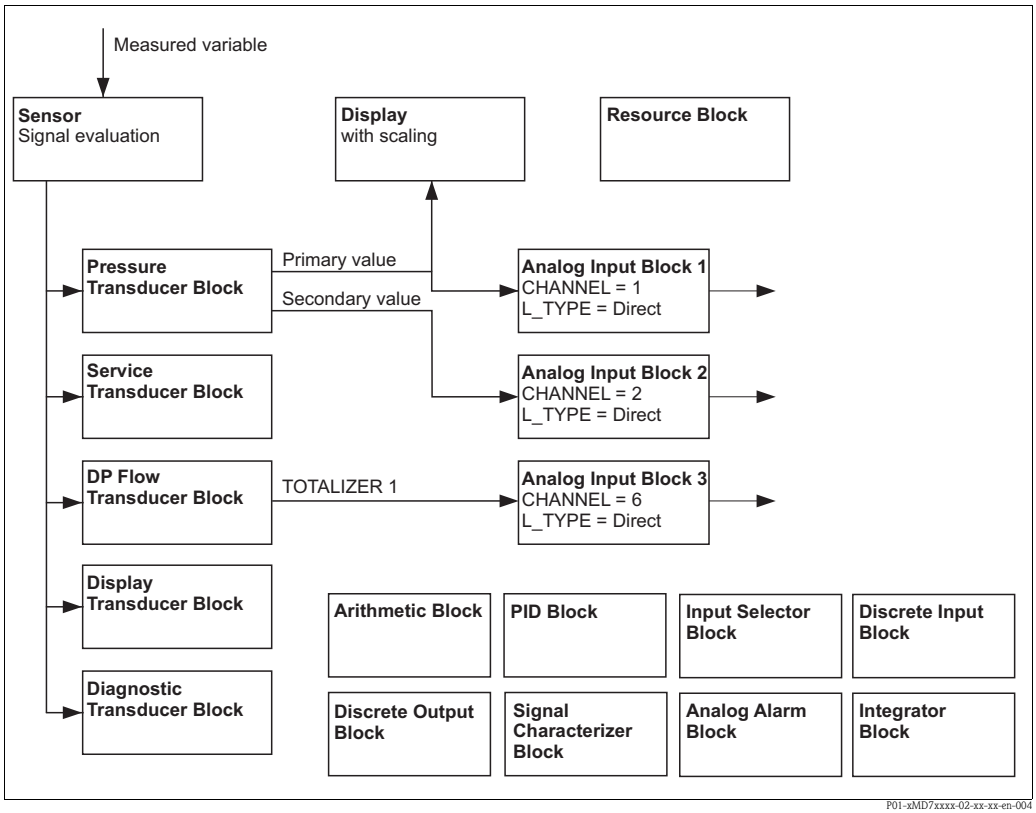


Fig. 32: Block configuration when delivered

The Pressure Transducer Block returns the Primary Value (pressure measured value) and the Secondary Value (sensor temperature). In the DP Flow Transducer Block, the flow is totalized in the "Flow" measuring mode and output by means of the TOTALIZER_1_VALUE/TOTALIZER 1 parameter. The Primary Value, Secondary Value and TOTALIZER_1_VALUE are each transferred to one Analog Input Block by means of the CHANNEL parameter (→ see also the following section). The Discrete Output, PID, Arithmetic, Signal Characterizer, Input Selector and Analog Alarm Block are not connected in the as-delivered state (IT, DI).

Note!
Please note that the links between the blocks are deleted and the FF parameters are reset to the default values following a reset by means of the RESTART parameter in the Resource Block, "Default" option.

5.3.7 Assignment of Transducer Blocks (CHANNEL)

Settings for the Analog Input Block

Process variable	Transducer Block	Parameter name	CHANNEL parameter in the Analog Input Block
Primary Value, a pressure, level or flow value depending on the measuring mode[1)]	Pressure Transducer Block	PRIMARY_VALUE	1
Secondary Value (sensor temperature)[2)]		SECONDARY_VALUE (TEMP. SENSOR)	2
Totalizer ("Flow" measuring mode)[3)]	DP Flow Block	TOTALIZER_1_VALUE/ TOTALIZER 1	6
Pressure after damping	Service Transducer Block	PRESSURE_1_AFTER_ DAMPING/PRESSURE	3
Maximum measured pressure		PRESSURE_1_MAX_ RESTABLE/ MAX. MEAS. PRESS.	4
Overshoot counter for maximum set user limit for pressure		COUNTER: P > Pmax	5

1) Factory setting for Analog Input Block 1

2) Factory setting for Analog Input Block 2

3) Factory setting for Analog Input Block 3

Settings for the Discrete Output Block

Process variable	Transducer Block	Parameter name	CHANNEL parameter in the Discrete Output Block
Totalizer ("Flow" measuring mode)	DP Flow Block	TOTALIZER_1_VALUE/ TOTALIZER 1	2
Overshoot counter for maximum set user limit for pressure[1)]	Service Transducer Block	COUNTER: P > Pmax	1

1) Factory setting

Discrete Input Block settings

Alarm conditions	Transducer Block	Parameter name	Parameter CHANNEL, Discrete Input Block
General device error	Diagnostic TRD	DIAGNOSTIC_CODE	1
Configuration error			2
Sensor overpressure			3
Sensor underpressure			4
Sensor overtemperature			5
Sensor undertemperature			6
Process isolating diaphragm broken			7
Electronic overtemperature			8
Electronic undertemperature			9
Temperature transmitter override			10
Pressure transmitter override			11
Pmin PROCESS underrun			12
Pmax PROCESS overrun			13
Tmin PROCESS underrun			14
Tmax PROCESS overrun			15

5.3.8 Index tables of Endress+Hauser parameters

The following tables list the manufacturer-specific device parameters for the Resource Block, the Transducer Blocks and the Analog Input Blocks. For the FF parameters, see either the FF specification or Operating Instructions BA00303P "Description of Device Functions, Cerabar S/ Deltabar S" (→ 2).

General explanatory remarks

Data type
- DS: data structure, contains data types such as Unsigned8, Octet String etc.
- Float: IEEE 754 format
- Visible String: ASCII coded
- Unsigned:
  - Unsigned8: value range = 0 to 255
  - Unsigned16: value range = 0 to 65535
  - Unsigned32: value range = 0 to 4294967295

Storage Class
- Cst: constant parameter
- D: dynamic parameter
- N: nonvolatile parameter
- S: static parameter

If this is a write parameter, the MODE_BLK column indicates the block mode in which the parameter can be written. Some parameters can only be written in the OOS block mode.
The "Reset codes" column indicates which reset codes reset the parameter.

Resource Block

Parameter name as per DD	Parameter name, "Label parameter" option and display in FieldCare	Index	Data type	Size (Byte)	Storage Class	Read	Write	MODE_BLK	Reset codes
DEVICE_DIALOG	DEVICE DIALOG	42	Unsigned8	1	D	x			
SW_LOCK	INSERT PIN NO	43	Unsigned16	2	S	x	x	AUTO, OOS	7864, 333
STATUS_LOCKING	DD= STATUS LOCKING FieldCare= LOCKSTATE	44	Unsigned8	1	D	x			
HARDWARE_REVISION	HARDWARE REV.	45	Visible String	8	S	x			
ELECTRONIC_SERIAL_NUMBER	ELECTR. SERIAL NO.	46	Visible String	16	D	x			
PROCESS_CONNECTION_TYPE	PROC. CONN. TYPE	47	Unsigned16	2	S	x	x	AUTO, OOS	
MAT_PROC_CONN_POS	MAT. PROC. CONN. +	48	Unsigned16	2	S	x	x	AUTO, OOS	
MAT_PROC_CONN_NEG	MAT. PROC. CONN. -	49	Unsigned16	2	S	x	x	AUTO, OOS	
SEAL_TYPE	SEAL TYPE	50	Unsigned16	2	S	x	x	AUTO, OOS	
UP_DOWN_FEATURE_SUPPORTED	DD= UP DOWN FEATURE SUPPORTED FieldCare= not supported.	51	Unsigned8	1	S	x			
UP_DOWN_CTRL	DD= UP DOWN CTRL FieldCare= not supported.	52	Unsigned8	1	D	x	x		
UP_DOWN_PARAMETER	DD= UP DOWN PARAMETER FieldCare= not supported.	53	Visible String	32	D	x	x		
SCI_OCTET_STRING	DD= SCI_OCTET_STRING FieldCare= not supported.	54	Visible String	40	S	x	x		
CAPABILITY_LEVEL	DD= CAPABILITY LEVEL FieldCare= not supported.	55	Unsigned8	1	S	x			
ENP_VERSION	DD= ENP VERSION FieldCare= not supported.	56	Visible String	32	S	x			
DEVICE_TAG	DD= DEVICE TAG FieldCare= PD TAG	57	Visible String	32	S	x	x		
SERIAL_NUMBER	DD= DEVICE SERIAL NUMBER FieldCare= DEVICE SERIAL No	58	Visible String	16	S	x	x		
ORDER_CODE	DD= ORDER NUMBER FieldCare= DEVICE DESIGN.	59	Visible String	32	S	x	x		
FIRMWARE_VERSION	DD= FIRMWARE VERSION FieldCare= SOFTWARE VERSION	60	Visible String	32	S	x			
RESSOURCE_DIR	DD= RESOURCE DIRECTORY FieldCare= not supported.	61	Unsigned8	10	S	x			

Pressure Transducer Block

Parameter name as per DD	Parameter name, "Label parameter" option and display in FieldCare	Index	Data type	Size (Byte)	Storage Class	Read	Write	MODE_BLK	Reset codes
DEVICE_DIALOG	DEVICE DIALOG	31	Unsigned8	1	D	x			
SW_LOCK	INSERT PIN NO	32	Unsigned16	2	S	x	x	AUTO, OOS	7864, 333
STATUS_LOCKING	DD= STATUS LOCKING FieldCare= LOCKSTATE	33	Unsigned8	1	D	x			
LINEARIZATION	LINEARIZATION	34	Unsigned8	2	S	x	x	OOS	7864, 333
SCALE_IN	SCALE IN	35	DS-68	11	S	x	x	AUTO, OOS	7864, 333
SCALE_OUT	SCALE OUT	36	DS-68	11	S	x	x	OOS	7864, 333
DAMPING_VALUE	DAMPING VALUE	37	Float	4	S	x	x	AUTO, OOS	7864, 333
ZERO_POSITION_ADJUST	POS. ZERO ADJUST	38	Unsigned8	1	D	x	x	AUTO, OOS	
POSITION_INPUT_VALUE	POS. INPUT VALUE	39	Float	4	S	x	x	AUTO, OOS	7864, 333, 2509
CALIBRATION_OFFSET	CALIB. OFFSET	40	Float	4	S	x	x	AUTO, OOS	7864, 333, 2509
CUSTOMER_UNIT_PRESSURE	CUSTOMER UNIT P	41	Visible String	8	S	x	x	AUTO, OOS	7864
CUSTOMER_FACTOR_UNIT_PRESS	CUST. UNIT. FACT. P	42	Float	4	S	x	x	AUTO, OOS	7864
LOW_TRIM_MEASURED	LO TRIM MEASURED	43	Float	4	S	x			2509
HIGH_TRIM_MEASURED	HI TRIM MEASURED[2]	44	Float	4	S	x			2509
LEVEL_MODE	LEVEL MODE	45	Unsigned8	1	S	x	x	OOS	7864, 333
LINEAR_MEASURAND	LIN. MEASURAND	46	Unsigned8	1	S	x	x	OOS	7864, 333
LINEARIZED_MEASURAND	LINd. MEASURAND	47	Unsigned8	1	S	x	x	OOS	7864, 333
COMBINED_MEASURAND	COMB. MEASURAND	48	Unsigned8	1	S	x	x	OOS	7864, 333
DENSITY_UNIT	DENSITY UNIT	49	Unsigned16	2	S	x	x	AUTO, OOS	7864, 333
HEIGHT_UNIT	HEIGHT UNIT	50	Unsigned16	2	S	x	x	AUTO, OOS	7864, 333
CUSTOMER_HEIGHT_UNIT	CUSTOMER UNIT H	51	Visible String	8	S	x	x	AUTO, OOS	7864
CUSTOMER_UNIT_FACTOR_HEIGHT	CUST. UNIT. FACT. H	52	Float	4	S	x	x	AUTO, OOS	7864
VOLUME_UNIT	UNIT VOLUME	53	Unsigned16	2	S	x	x	AUTO, OOS	7864, 333
CUSTOMER_UNIT_VOLUME	CUSTOMER UNIT V	54	Visible String	8	S	x	x	AUTO, OOS	7864
CUSTOMER_UNIT_FACTOR_VOLUME	CUST. UNIT. FACT. V	55	Float	4	S	x	x	AUTO, OOS	7864
MASS_UNIT	MASS UNIT	56	Unsigned16	2	S	x	x	AUTO, OOS	7864, 333
CUSTOMER_UNIT_MASS	CUSTOMER UNIT M	57	Visible String	8	S	x	x	AUTO, OOS	7864
CUSTOMER_UNIT_FACTOR_MASS	CUST. UNIT. FACT. M	58	Float	8	S	x	x	AUTO, OOS	7864
CALIBRATION_MODE	CALIBRATION MODE	59	Unsigned8	1	S	x	x	AUTO, OOS	7864, 333
ADJUST_DENSITY	ADJUST DENSITY	60	Float	4	S	x	x	AUTO, OOS	7864, 333
ZERO_POSITION	ZERO POSITION	61	Float	4	S	x	x	AUTO, OOS	7864, 333
EMPTY_CALIBRATION	EMPTY CALIB.	62	Float	4	S	x	x	AUTO, OOS	7864, 333
FULL_CALIBRATION	FULL CALIB.	63	Float	4	S	x	x	AUTO, OOS	7864, 333
TANK_VOLUME	TANK VOLUME	64	Float	4	S	x	x	AUTO, OOS	7864, 333
TANK_HEIGHT	TANK HEIGHT	65	Float	4	S	x	x	AUTO, OOS	7864, 333
HUNDRED_PERCENT_VALUE	100% POINT	66	Float	4	S	x	x	AUTO, OOS	7864, 333
LEVEL_MIN	LEVEL MIN.	67	Float	4	S	x	x	AUTO, OOS	7864, 333
LEVEL_MAX	LEVEL MAX.	68	Float	4	S	x	x	AUTO, OOS	7864, 333
PROCESS_DENSITY	PROCESS DENSITY	69	Float	4	S	x	x	AUTO, OOS	7864, 333
LINEARIZATION_TABLE_SELECTION	TABLE SELECTION	70	Unsigned8	1	S	x	x	AUTO, OOS	7864, 333
LINEARIZATION_EDIT_MODE	LIN. EDIT MODE	71	Unsigned8	1	S	x	x	AUTO, OOS	7864
LINEARIZATION_TABLE_PRE_EDIT	EDITOR TABLE	72	Unsigned8	1	D	x	x		
LINEARIZATION_TABLE_INDEX	LINE-NUMB:	73	Unsigned8	1	D	x	x		
LINEARIZATION_TABLE_X_VALUE	X-VAL:	74	Float	4	S	x	x		7864, 333
LINEARIZATION_TABLE_Y_VALUE	Y-VAL:	75	Float	4	S	x	x		7864, 333
LINEARIZATION_TABLE_POST_EDIT	EDITOR TABLE	76	Unsigned8	1	D	x	x	OOS	
LINEARIZATION_TABLE_POST_VIEW	MEASURING TABLE	77	Unsigned8	1	D	x	x		
LEVEL_TANK_DESCRIPTION	TANK DESCRIPTION	78	Visible String	32	S	x	x	AUTO, OOS	7864
SENSOR_PRESSURE	SENSOR PRESSURE	79	Float	4	D	x			
PRESSURE	PRESSURE	80	Float	4	D	x			
LEVEL_BEFORE_LINEARISATION	LEVEL BEFORE LIN	81	Float	4	D	x			
SENSOR_MEAS_TYPE	SENSOR MEAS. TYPE	82	Unsigned16	2	D	x			
LEVEL_SELECTION	LEVEL SELECTION	83	Unsigned8	1	S	x	x	OOS	
HEIGHT_UNIT_EASY	HEIGHT UNIT	84	Unsigned16	2	S	x	x	OOS	
OUTPUT_UNIT_EASY	OUTPUT UNIT	85	Unsigned16	2	S	x	x		
CALIBRATION_MODE_EASY	CALIBRATION MODE	86	Unsigned8	1	S	x	x	OOS	
DENSITY_UNIT_EASY	DENSITY UNIT	87	Unsigned16	2	S	x	x	OOS	
ADJUST_DENSITY_EASY	ADJUST DENSITY	88	Float	4	S	x	x	OOS	7864, 333
EMPTY_HEIGHT_EASY	EMPTY HEIGHT	89	Float	4	S	x	x	OOS	7864, 333
FULL_HEIGHT_EASY	FULL HEIGHT	90	Float	4	S	x	x	OOS	7864, 333
PROCESS_DENSITY_EASY	PROCESS DENSITY	91	Float	4	S	x	x	OOS	7864, 333

Parameter name as per DD	Parameter name, "Label parameter" option and display in FieldCare	Index	Data type	Size (Byte)	Storage Class	Read	Write	MODE_BLK	Reset codes
MEASURED_LEVEL_EASY	MEAS. LEVEL EASY	92	Float	4	D	x			
FULL_CALIBRATION_EASY	FULL CALIB.	93	Float	4	S	x	x	OOS	7864, 333
EMPTY_CALIBRATION_EASY	EMPTY CALIB.	94	Float	4	S	x	x	OOS	7864, 333
FULL_PRESSURE_EASY	FULL PRESSURE	95	Float	4	S	x	x	OOS	7864, 333
EMPTY_PRESSURE_EASY	EMPTY PRESSURE	96	Float	4	S	x	x	OOS	7864, 333

Service Transducer Block

Parameter name as per DD	Parameter name, "Label parameter" option and display in FieldCare	Index	Data type	Size (Byte)	Storage Class	Read	Write	MODE_BLK	Reset codes
DEVICE_DIALOG	DEVICE DIALOG	11	Unsigned8	1	D	x			
SW_LOCK	INSERT PIN NO	12	Unsigned16	2	S	x	x		7864, 333
STATUS_LOCKING	STATUS LOCKING	13	Unsigned8	1	D	x			
CONFIGURATION_COUNTER	CONFIG RECORDER	14	Unsigned16	2	S	x			
ELECTRONICS_TEMPERATURE	PCB TEMPERATURE	15	Float	4	D	x			
ELECTRONICS_TEMP_LOW_LIMIT	Allowed Min. TEMP	16	Float	4	S	x			
ELECTRONICS_TEMP_HIGH_LIMIT	Pmax ELECTRONICS	17	Float	4	S	x			
PMAX_PROC_CONN	Pmax PROC. CONN.	18	Float	4	S	x	x	AUTO, OOS	
SENSOR_MEAS_TYPE	SENSOR MEAS. TYPE	19	Unsigned16	2	S	x			
SENSOR_MIN_ABSOLUTE_LIMIT	Pmin SENSOR. DAMAGE	20	Float	4	S	x			
SENSOR_MAX_ABSOLUTE_LIMIT	Pmax SENS. DAMAGE	21	Float	4	S	x			
SENSOR_TEMP_LOW_LIMIT	Tmin SENSOR	22	Float	4	S	x			
SENSOR_TEMP_HIGH_LIMIT	Tmax SENSOR	23	Float	4	S	x			
SENSOR_HARDWARE_REV	SENS H/WARE REV	24	Unsigned8	1	S	x			
COUNTER P_MAX	COUNTER: P > Pmax	25	DS-65	5	S	x			
MAX_MEASURED_PRESSURE	MAX. MEAS. PRESS.	26	DS-65	5	S	x			
COUNTER_PMIN	COUNTER: P < Pmin	27	Unsigned16	2	S	x			
MIN_MEASURED_PRESSURE	MIN. MEAS. PRESS.	28	Float	4	S	x			
COUNTER_TMAX	COUNTER: T > Tmax	29	Unsigned16	2	S	x			
MAX_MEASURED_TEMP	MAX. MEAS. TEMP.	30	Float	4	S	x			
COUNTER_TMIN	COUNTER: T < Tmin	31	Unsigned16	2	S	x			
MIN_MEASURED_TEMP	MIN. MEAS. TEMP.	32	Float	4	S	x			
ELECTRONIC_OVER_TEMP_COUNTER	PCB COUNT: T > Tmax	33	Unsigned16	2	S	x			
ELECTRONIC_OVER_TEMPERATURE	PCB MAX. TEMP	34	Float	4	S	x			
ELECTRONIC_UNDER_TEMP_COUNTER	PCB COUNT: T < Tmin	35	Unsigned16	2	S	x			
ELECTRONIC_UNDER_TEMPERATURE	PCB MIN. TEMP.	36	Float	4	S	x			
RESET_PEAK_HOLD	RESET PEAKHOLD	37	Unsigned8	1	D	x	x	AUTO, OOS	
PRESSURE	PRESSURE	38	DS-65	5	D	x			
CORRECTED_PRESSURE	CORRECTED PRESS.	39	Float	4	D	x			
MEASURED_VALUE_TREND	MEAS. VAL. TREND	40	Unsigned8	1	D	x			
MAX_TURNDOWN	MAX TURNDOWN1	41	Float	4	S	x	x		
SENSOR_CHANGES	SENSOR CHANGES	42	Unsigned16	2	S	x	x		
PRESSURE_PEAK_HOLD_STEP	P. PEAKHOLD. STEP	43	Float	4	S	x	x		
TEMP_PEAK_HOLD_STEP	T. PEAKHOLD. STEP	44	Float	4	S	x	x		
ACCELERATION_OF_GRAVITY	ACC. OF GRAVITY	45	Float	4	S	x	x	OOS	
CREEP_FLOW_HYST	CREEP FLOW HYST.	46	Float	4	S	x	x	OOS	
HISTOROM_SAVING_CYCLE_TIME	HIST. SAVING CYCL	47	Unsigned8	1	S	x	x		
HISTOROM_AVAIBLE	HistoROM AVAIL.	48	Unsigned8	1	S	x			
DOWNLOAD_SELECTION	DOWNLOAD SELECT.	49	Unsigned8	1	D	x	x		
HISTOROM_CONTROL	HistoROM CONTROL	50	Unsigned8	1	D	x	x		
PRESSURE_UNIT	PRESS. ENG. UNIT	51	Unsigned16	2	S	x			
TEMPERATURE_UNIT	TEMP. ENG. UNIT	52	Unsigned16	2	S	x			
INPUT_PRESSURE_INVERSION	INP.PRESS INVERS	53	Unsigned8	1	S	x	x		

Display Transducer Block

Parameter name as per DD	Parameter name, "Label parameter" option and display in FieldCare	Index	Data type	Size (Byte)	Storage Class	Read	Write	BLK_MODE	Reset codes
DEVICE DIALOG	DEVICE DIALOG	10	Unsigned8	1	D	x			
DISPLAY_MAINLINE_CONTENT	MAIN LINE CONT.	11	Unsigned8	1	S	x	x	AUTO, OOS	1864
DISPLAY_MAINLINE_FORMAT	MAIN DATA FORMAT	12	Unsigned8	1	S	x	x	AUTO, OOS	1864
DISPLAY_ALTERNATING_VALUES	ALTERNATE DATA	13	Unsigned8	1	S	x	x	AUTO, OOS	1864

Parameter name as per DD	Parameter name, "Label parameter" option and display in FieldCare	Index	Data type	Size (Byte)	Storage Class	Read	Write	BLK_MODE	Reset codes
DISPLAY_CONTRAST	DISPLAY CONTRAST	14	Unsigned8	1	S	x	x	AUTO, OOS	1864
DISPLAY_LANGUAGE	LANGUAGE	15	Unsigned8	1	S	x	x	AUTO, OOS	1864
SIL_DIGITS_TEST_STRING	DIGITS SET	16	Visible String	16	D	x			

Diagnostic Transducer Block

Parameter name as per DD	Parameter name, "Label parameter" option and display in FieldCare	Index	Data type	Size (Byte)	Storage Class	Read	Write	BLK_MODE	Reset codes
DEVICE_DIALOG	DEVICE DIALOG	10	Unsigned8	1	D	x			
SW_LOCK	INSERT PIN NO	11	Unsigned16	2	S	x	x		7864, 333
STATUS_LOCKING	DD= STATUS LOCKING FieldCare= LOCKSTATE	12	Unsigned8	1	D	x			
SIMULATION_MODE	SIMULATION MODE	13	Unsigned8	1	D	x	x		
SCALE_OUT_UNITS_INDEX	UNITS_INDEX	14	Unsigned16	2	S	x			7864
SIMULATED_VALUE	SIMULATED VALUE	15	Float	4	D	x	x		
SIMULATION_ERROR_NUMBER	SIM. ERROR NO.	16	Unsigned16	2	D	x	x		
ALARM_STATUS	ALARM STATUS	17	Unsigned16	2	D	x			
LAST_DIAGNOSTIC_CODE	LAST DIAG. CODE	18	Unsigned16	2	D	x			
ACKNOWLEDGE_ALARM_MODE	ACK. ALARM MODE	19	Unsigned8	1	S	x	x		7864
ACKNOWLEDGE_ALARM	ACK. ALARM	20	Unsigned8	1	D	x	x		
RESET_ALL_ALARMS	RESET ALL ALARMS	21	Unsigned8	1	D	x	x		
ERROR_NUMBER	ERROR NO.	22	Unsigned16	2	D	x	x		
SELECT_ALARM_TYPE	SELECT ALARMTYPE	23	Unsigned8	1	D	x	x		
ALARM_DELAY	ALARM DELAY	24	Float	4	S	x	x		7864
ALARM_DISPLAY_TIME	ALARM DISPL. TIME	25	Float	4	S	x	x		7864
PRESSURE_UNIT	PRESS. ENG. UNIT	26	Unsigned16	2	S	x			7864, 333
PMIN_ALARM_WINDOW	Pmin ALARM WINDOW	27	Float	4	S	x	x		7864
PMAX_ALARM_WINDOW	Pmax ALARM WINDOW	28	Float	4	S	x	x		7864
TEMPERATURE_UNIT	TEMP. ENG. UNIT	29	Unsigned16	2	S	x			7864, 333
TMIN_ALARM_WINDOW	Tmin. ALARM WINDOW	30	Float	4	S	x	x		7864
TMAX_ALARM_WINDOW	Tmax. ALARM WINDOW	31	Float	4	S	x	x		7864
ENTER_RESET_CODE	ENTER RESET CODE	32	Unsigned16	2	D	x	x		
OPERATING_HOURS	OPERATING HOURS	33	Unsigned32	4	S	x			
STATUS_HISTORY	STATUS HISTORY	34	Visible String	18	D	x			

Analog Input Blocks

Parameter name as per DD	Parameter name, "Label parameter" option and display in FieldCare	Index	Data type	Size (Byte)	Storage Class	Read	Write	BLK_MODE	Reset codes
FSAFE_TYPE	FAIL SAFE TYPE	37	Unsigned8	1	S	x	x	OOS, MAN	
FSAFE_VALUE	DD= FAIL SAFE VALUE FieldCare= not supported.	38	Float	4	S	x	x	AUTO, OOS, MAN	
HIHI_ALM_OUT_D	DD= High High Alarm Output Discete FieldCare= not supported.	39	DS66	2	D	x	x	AUTO, OOS, MAN	
HI_ALM_OUT_D	DD= High Alarm Output Discrete FieldCare= not supported.	40	DS66	2	D	x	x	AUTO, OOS, MAN	
LO_ALM_OUT_D	DD= Low Alarm Output Discrete FieldCare= not supported.	41	DS66	2	D	x	x	AUTO, OOS, MAN	
LOLO_ALM_OUT_D	DD= Low Low Alarm Output Discrete FieldCare= not supported.	42	DS66	2	D	x	x	AUTO, OOS, MAN	
ALARM_MODE	DD= Select Alarm Mode FieldCare= not supported.	43	Unsigned8	1	S	x	x	AUTO, OOS, MAN	
ALARM_OUT_D	DD= Alarm Output Discrete FieldCare= not supported.	44	DS66	2	D	x	x	AUTO, OOS, MAN	
BLOCK_ERR_DESC_1	DD= Block Error Description FieldCare= not supported.	45	Unsigned32	4	D	x		AUTO, OOS, MAN	

DP Flow Block

Parameter name as per DD	Parameter name, "Label parameter" option and display in FieldCare	Index	Data type	Size (Byte)	Storage Class	Read	Write	BLK_MODE	Reset codes
DEVICE DIALOG	DEVICE DIALOG	11	Unsigned8	1	D	x			
SW_LOCK	INSERT PIN NO	12	Unsigned16	2	S	x	x		
STATUS_LOCKING	"DD=STATUS LOCKING FieldCare=LOCKSTATE"	13	Unsigned8	1	D	x			
FLOW_MEAS_TYPE	FLOW-MEAS. TYPE	14	Unsigned8	1	S	x	x	OOS	
SUPPRESSED_FLOW	SUPPRESSED FLOW	15	Float	4	D	x			
STD_FLOW_UNIT	UNIT FLOW	16	Unsigned16	2	S	x	x	OOS	7864 , 333
CUSTOMER_UNIT_FLOW	CUSTOMER UNIT F	17	Visible String	8	S	x	x		7864 , 333
CUSTOMER_UNIT_FACTOR_FLOW	CUST. UNIT FACT. F	18	Float	4	S	x	x		7864 , 333
LOW_FLOW_CUT_OFF	LOW FLOW CUT-OFF	19	Unsigned8	1	S	x	x	OOS	7864 , 333
SET_LOW_FLOW_CUT_OFF	SET. L. FL. CUT-OFF	20	Float	4	S	x	x	OOS	7864 , 333
FLOW_MAX	MAX. FLOW	21	Float	4	S	x	x	OOS	
PRESSURE	PRESSURE	22	Float	4	D	x			
MAX_PRESS_FLOW	MAX PRESS. FLOW	23	Float	4	S	x	x		7864 , 333
PRESSURE_UNIT	PRESS. ENG. UNIT	24	Unsigned16	2	S	x	x		
TOTALIZER_1_VALUE	TOTALIZER 1	25	DS-65	5	D	x			
TOTALIZER_1_UNIT	TOTAL. 1 ENG. UNIT	26	Unsigned16	2	S	x	x	OOS	7864 , 333
TOTALIZER_1_MODE	NEG. FLOW TOT. 1	27	Unsigned8	1	S	x	x	OOS	
TOTALIZER_1_FAIL_SAFE_MODE	"FAIL SAFE MODE FieldCare=Not supported"	28	Unsigned8	1	S	x	x		
TOTALIZER_1_RESET	RESET TOTALIZER 1	29	Unsigned8	1	D	x	x	OOS	
CUSTOMER_UNIT_TOT_1	TOT. 1 USER UNIT	30	Visible String	8	S	x	x		7864 , 333
CUSTOMER_UNIT_FACTOR_TOT_1	FACT. U. U. TOTAL. 1	31	Float	4	S	x	x		
TOTALIZER_2_VALUE	TOTALIZER 2	32	Float	4	D	x			
TOTALIZER_2_UNIT	TOTAL. 2 ENG. UNIT	33	Unsigned16	2	S	x	x		7864 , 333
TOTALIZER_2_MODE	NEG. FLOW TOT. 2	34	Unsigned8	1	S	x	x	OOS	7864 , 333
CUSTOMER_UNIT_TOT_2	TOT. 2 UNIT TEXT	35	Visible String	8	S	x	x		7864 , 333
CUSTOMER_UNIT_FACTOR_TOT_2	FACT.U.U.TOTAL.2	36	Float	4	S	x	x		

5.3.9 Methods

The FOUNDATION Fieldbus Specification includes the use of methods to make device operation easier. A method is a sequence of interactive steps to be carried out in the specified order so as to configure certain device functions.

Für den Deltabar S stehen folgende Methoden zur Verfügung:
- Transmitter Data, Process Connection (Resource Block)
- Language, Display (Display Block)
- Operation, Diagnostic, Alarm Table (Diagnostiv Block)
- Quick setup, Basic setup, Extended setup, Totalizer setup, Process values (DP Flow Block)
- Transmitter Data, Process Connection, Sensor Data, Process Values, Peak Hold Indicator, Operation, System1 (Service Block)
- Quick Setup, Basic Setup, Settings, Sensor Data, Process Values, Sensor Trim (TRD Block)

Note!
For further information on accessing methods, see the description of the FF configuration program used.

5.4 Local operation – on-site display connected

If the onsite display is connected, the three operating keys are used to navigate through the operating menu, → 31, Section 5.2.3 "Function of the operating elements – onsite display connected".

5.4.1 Menu structure

The menu is split into four levels. The three upper levels are used to navigate while you use the lowest level to enter numerical values, and select and save options. The entire menu is illustrated in Section 10.1 "Menu".
The structure of the MEASURING MENU depends on the measuring mode selected, e.g. if "Pressure" is selected as the measuring mode, only the functions needed for this measuring mode are displayed.

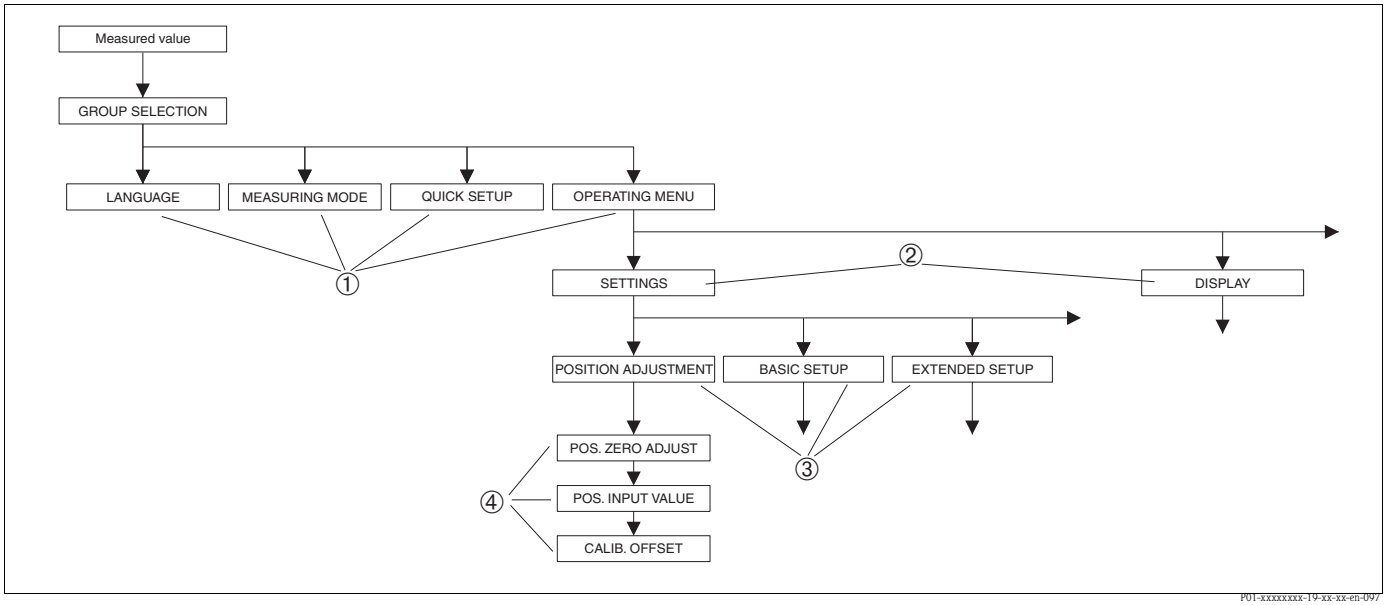


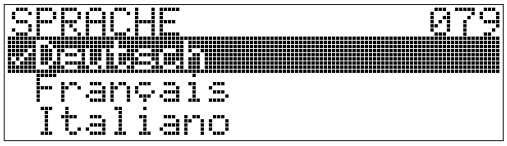
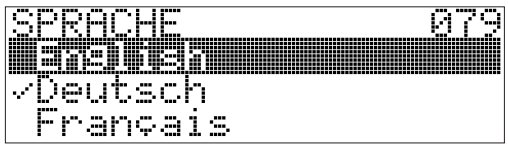
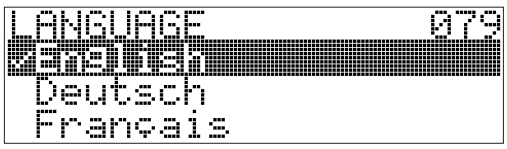
Fig. 33: Menu structure

1 1st selection level
2 2nd selection level
3 Function groups
4 Parameters

Note!
The LANGUAGE and MEASURING MODE parameters are only displayed via the onsite display on the 1st selection level. In FieldCare, the LANGUAGE parameter is displayed in the DISPLAY group and the MEASURING MODE parameter in the QUICK SETUP menus or in the BASIC SETUP function group. → See also Section 10.1 "Menu".

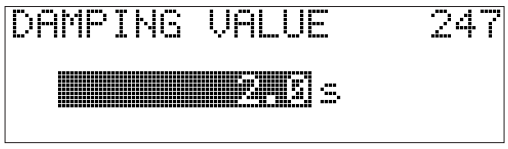
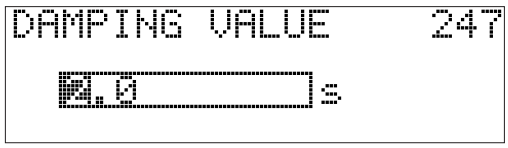
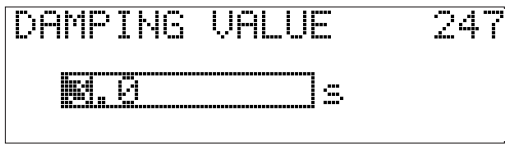
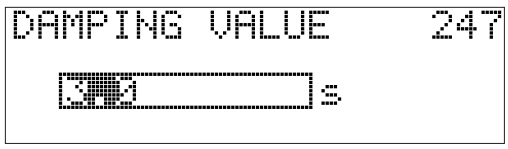
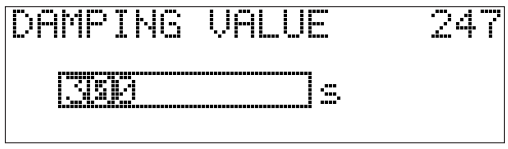
5.4.2 Selecting an option

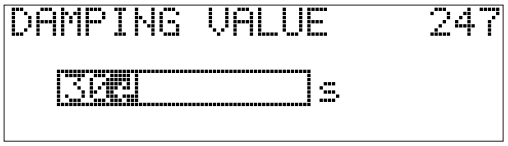
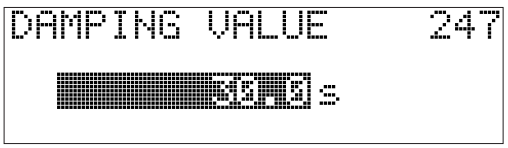
Example: selecting "English" as the menu language.

Onsite display	Operation
 P01-xxxxxxxx-19-xx-xx-en-017	"German" has been selected as the menu language. The option currently active is indicated by a ✓ in front of the menu text.
 P01-xxxxxxxx-19-xx-xx-en-033	Use "+" or "–" to select "English" as the menu language.
 P01-xxxxxxxx-19-xx-xx-en-034	1. Press "E" to confirm your choice. The option currently active is indicated by a ✓ in front of the menu text. (English is the language selected.) 2. Go to the next menu item with "E" .

5.4.3 Editing a value

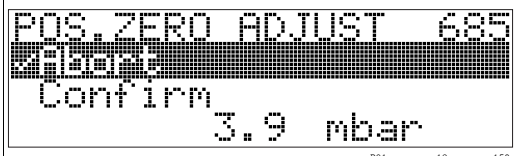
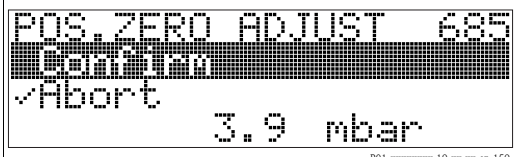
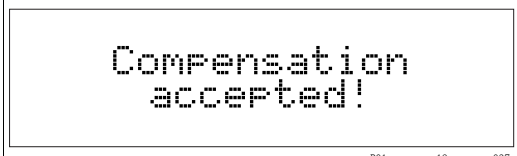
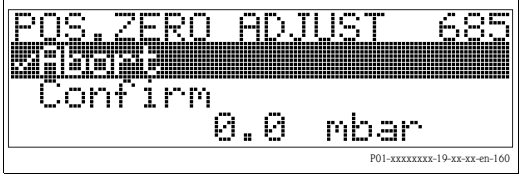
Example: changing the DAMPING VALUE function from 2.0 s to 30.0 s. → 31, Section 5.2.3 "Function of the operating elements – onsite display connected".

Onsite display	Operation
 P01-xxxxxxxx-19-xx-xx-en-023	The onsite display indicates the parameter to be modified. The value highlighted in black can be modified. The unit "s" is prespecified and cannot be changed.
 P01-xxxxxxxx-19-xx-xx-en-027	1. Press "+" or "–" to enter the editing mode. 2. The first digit is highlighted in black.
 P01-xxxxxxxx-19-xx-xx-en-028	1. Use the "+" key to change the digit "2" to "3". 2. Press the "E" key to confirm "3". The cursor goes to the next position (highlighted in black).
 P01-xxxxxxxx-19-xx-xx-en-029	The decimal point is highlighted in black. This means you can now edit this digit.
 P01-xxxxxxxx-19-xx-xx-en-030	1. Press "+" or "–" until "0" is displayed. 2. Press the "E" key to confirm "0". The cursor goes to the next position. ↵ is displayed and highlighted in black. → See next graphic.

Onsite display	Operation
 P01-xxxxxxxx-19-xx-xx-en-031	Press "E" to save the new value and exit the editing mode. → See next graphic.
 P01-xxxxxxxx-19-xx-xx-en-032	The new value for the damping is 30.0 s. – Go to the next parameter with "E" . – Press "+" or "–" to go back to the editing mode.

5.4.4 Accepting pressure present at device as value

Example: performing position adjustment.

Onsite display	Operation
 P01-xxxxxxxx-19-xx-xx-en-158	The bottom line on the onsite display displays the pressure present, 3.9 mbar in this example.
 P01-xxxxxxxx-19-xx-xx-en-159	Use "+" or "–" to switch to the "Confirm" option. The active option is highlighted in black.
 P01-xxxxxxxx-19-xx-xx-en-037	Using the "E" key, assign the value (3.9 mbar) to the POS. ZERO ADJUST parameter. The device confirms the adjustment and goes back to the parameter, here POS. ZERO ADJUST (see next graphic).
 P01-xxxxxxxx-19-xx-xx-en-160	Go to the next parameter with "E" .

5.5 FieldCare

FieldCare is Endress+Hauser's plant asset management tool based on FDT technology. You can use FieldCare to configure all Endress+Hauser devices as well as third-party devices which support the FDT standard. Hardware and software requirements you can find on the internet:
www.endress.com → select your country → Search: FieldCare → FieldCare → Technical Data.

FieldCare supports the following functions:
- Configuration of transmitters in offline and online mode
- Loading and saving device data (upload/download)
- HistoROM®/M-DAT analysis
- Documentation of the measuring point

Connection options:
- Service interface with Commubox FXA291 and ToF adapter FXA291 (USB).

For further information, see → www.endress.com

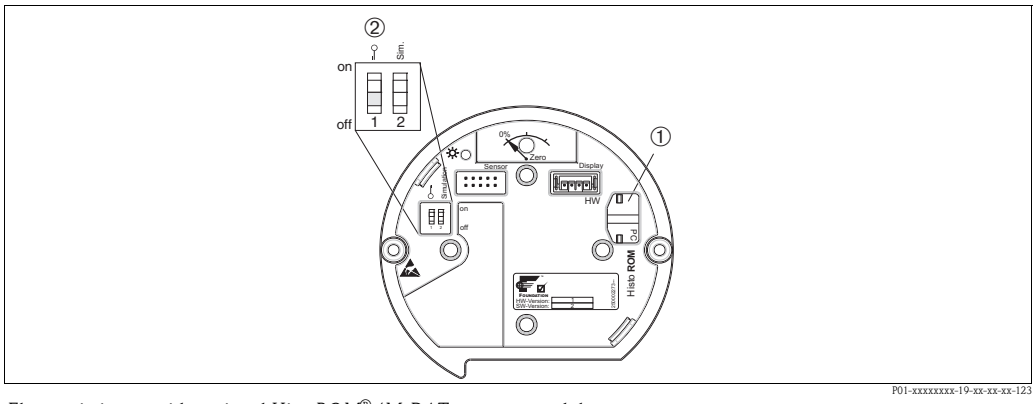
5.6 HistoROM®/M-DAT (optional)

HistoROM®/M-DAT is a memory module, which is attached to the electronic insert and fulfills the following functions:
- Back-up copy of configuration data
- Copying configuration data from one transmitter to another transmitter
- Cyclic recording of pressure and sensor-temperature measured values
- Recording diverse events, such as alarms, configuration changes, counters for measuring range undershoot and overshoot for pressure and temperature, overshooting and undershooting user limits for pressure and temperature, etc.

Warning!
Detach HistoROM®/M-DAT from the electronic insert or attach it to the insert in a deenergized state only.

Note!
- The HistoROM®/M-DAT can be retrofitted at any time (Order No.: 52027785).
- To analyze and evaluate the data and events saved in the HistoROM®/M-DAT, you require the Endress+Hauser FieldCare operating program. A CD with the operating program and documentation is provided for devices that were ordered with the "HistoROM/M-DAT" option. → 48, Section 5.5 "FieldCare". It is also possible to copy configuration data from one transmitter to another transmitter with an FF configuration program.
- The HistoROM data and the data in the device are analyzed once a HistoROM®/M-DAT is attached to the electronic insert and power is reestablished to the device. During the analysis, the messages "W702, HistoROM data not consistent" and "W706, Configuration in HistoROM and device not identical" can occur. For remedial measures, → 72, Section 8.1 "Messages".

5.6.1 Copying configuration data



Electronic insert with optional HistoROM®/M-DAT memory module

1 Optional HistoROM®/M-DAT
2 To copy configuration data from the HistoROM/®M-DAT to a device or from a device to a HistoROM®/M-DAT module, operation must be unlocked (DIP switch 1, position "Off", parameter INSERT PIN No = 100). Please refer also → 📄 50, Section 5.7 "Locking/unlocking operation".

Local operation via onsite display (optional) or remote operation

Copying configuration data from a device to a HistoROM®/M-DAT:

Note!
Operation must be unlocked.

1. Disconnect the device from the supply voltage.
2. Remove the protection cap, attach the HistoROM®/M-DAT to the electronic insert.
3. Reestablish supply voltage to the device.
4. The option selected for the DOWNLOAD SELECT. parameter (OPERATION menu) does not affect uploading from the device to the HistoROM.
5. Operation via an FF configuration program: using the DAT_HANDLING/ HistoROM CONTROL parameter in the Service Transducer Block, select the "Device → HistoROM" option for the data transfer direction.
   Operation via FieldCare: using the HistoROM CONTROL parameter, select the "Device → HistoROM" option for the data transfer direction. (Menu path: OPERATING MENU → + ⏚ el + fi → v + E ⏚)
   Using the DOWNLOAD SELECT. parameter (OPERATION menu), select which parameters should be overwritten.
   The following parameters are overwritten depending on the option selected:
   – **Configuration copy**:
     All the parameters apart from the TRANSMITTER SERIAL NO., DEVICE DESIGNATION and the parameters of the POSITION ADJUSTMENT and PROCESS CONNECTION group.
   – **Device replacement:**
     All the parameters apart from the TRANSMITTER SERIAL NO., DEVICE DESIGNATION and the parameters of the POSITION ADJUSTMENT and PROCESS CONNECTION group.
   – **Electronics replace:**
     All parameters apart from the parameters of the POSITION ADJUSTMENT group
   Factory setting: Configuration copy
6. Using the HistoROM CONTROL parameter, select the "Device → HistoROM" option for the data transfer direction.
7. Wait approx. 40 seconds. Configuration data are uploaded from the device to the HistoROM®/M-DAT. The device is not restarted.
8. Disconnect the device from the supply voltage again.
9. Detach the memory module.

10. Reestablish supply voltage to the device.

Copying configuration data from a HistoROM®/M-DAT to a device:

Note!
Operation must be unlocked.

1. Disconnect the device from the supply voltage.
2. Attach the HistoROM®/M-DAT to the electronic insert. Configuration data from another device are stored in the HistoROM®/M-DAT.
3. Reestablish supply voltage to the device.
4. Operation via an FF configuration program: using the DAT_HANDLING/ HistoROM CONTROL parameter in the Service Transducer Block, select the "HistoROM → Device" option for the data transfer direction.
   Operation via FieldCare: using the HistoROM CONTROL parameter, select the "HistoROM → Device" option for the data transfer direction (menu path: OPERATING MENU → OPERATION).
   Using the DOWNLOAD SELECT. parameter (OPERATION menu), select which parameters should be overwritten.
   The following parameters are overwritten depending on the option selected:
   – **Configuration copy (factory setting)**
     All the parameters apart from the DEVICE SERIAL No., DEVICE DESIGN, PD-TAG, DESCRIPTOR, DESCRIPTION, DEVICE ID, DEVICE ADDRESS and the parameters in the POSITION ADJUSTMENT, PROCESS CONNECTION, SENSOR TRIM and SENSOR DATA group.
   – **Device replacement**
     All the parameters apart from the DEVICE SERIAL No., DEVICE ID, DEVICE DESIGN and the parameters in the POSITION ADJUSTMENT, PROCESS CONNECTION, SENSOR TRIM and SENSOR DATA group.
   – **Electronics replace**
     All parameters apart from the parameters of the SENSOR DATA group
   Factory setting: Configuration copy
5. Operation via FF configuration program: using the DAT_HANDLING/ HistoROM CONTROL parameter in the Service Transducer Block, select the "HistoROM → Device" option for the data transfer direction.
   Operation via FieldCare: using the HistoROM CONTROL parameter, select the "HistoROM → Device" option for the data transfer direction. (Menu path: OPERATING MENU → OPERATION).
6. Using the HistoROM CONTROL parameter (OPERATION menu), select the "HistoROM → Device" option for the data transfer direction.
7. Wait approx. 40 seconds. Configuration data are loaded from the HistoROM®/M-DAT to the device. The device is restarted.
8. Before removing the HistoROM®/M-DAT again from the electronic insert, disconnect the device from the supply voltage.

5.7 Locking/unlocking operation

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

The operation can be locked/unlocked in the following ways:
- Via a DIP switch on the electronic insert, locally on the display.
- Via communication e.g. FieldCare.

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	
			DIP switch	Remote operation
DIP switch	Yes	No	Yes	No
Remote operation	Yes	No	No	Yes

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

5.7.1 Locking/unlocking operation locally via DIP switch

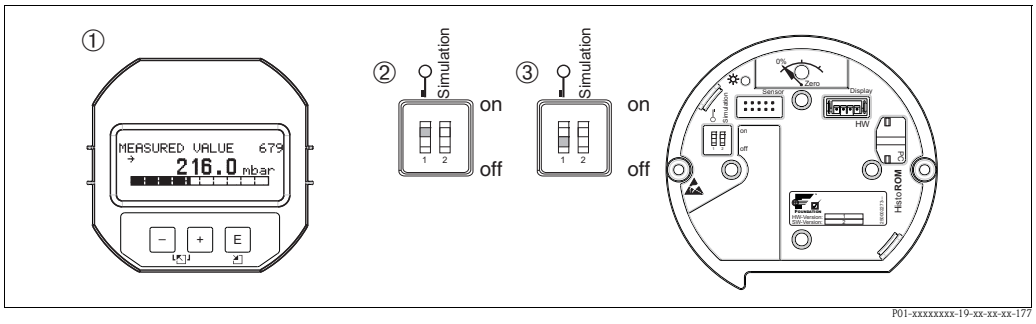


Fig. 34: "Hardware locking" DIP switch position on the electronic insert

1 If necessary, remove onsite display (optional)
2 DIP switch is set to "On": operation is locked.
3 DIP switch is set to "Off": operation is unlocked (operation possible)

5.7.2 Locking/unlocking operation via remote operation

	Description
Locking operation	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	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.

5.8 Simulation

The function of the Analog Input Block, such as input and output scaling, can be simulated as follows:

1. Set the "Simulation" DIP switch on the electronic insert to "On".
2. In the Analog Input Block, select the "Active" option by means of the SIMULATION parameter, ENABLE_DISABLE element.
3. Set the Analog Input Block to the AUTO block mode.
4. Enter the value and status for the SIMULATION_VALUE and SIMULATION_STATUS elements. During the simulation, the output value and status of the Pressure Transducer Block are replaced by the simulated value and status. The OUT parameter shows the result.
5. End simulation (SIMULATION parameter, ENABLE_DISABLE element, "Disabled" option).

Note!
You can check your adjustment for the transmitter by means of the SIMULATION_MODE and SIMULATION_VALUE parameters in the Diagnostic Transducer Block. → See Operating Instructions BA303 "Description of Device Functions Cerabar S/Deltabar S/Deltapilot S", SIMULATION_MODE and SIMULATION_VALUE parameter descriptions.

5.9 Factory setting (reset)

- Total reset: Press zero-key for at least 12 seconds. If the LED on the electronic insert lights up briefly, the reset is being carried out.
- By entering a certain code, you can completely, or partially, reset the entries for the parameters to the factory settings. (→ For the factory settings, see Operating Instructions BA00303P "Cerabar S/Deltabar S/Deltapilot S, Description of Device Functions"). → 📄 2, "Overview of documentation").
  Enter the code by means of the ENTER RESET CODE parameter (OPERATION menu).
  There are various reset codes for the device. The following table illustrates which parameters are reset by the particular reset codes. Operation has to be unlocked to be able to perform a reset (→ 📄 50, Section 5.7).

Note!
- Any customer-specific configuration carried out by the factory is not affected by a reset (customer-specific configuration remains). If, after a reset, you wish the parameters to be reset to the factory settings, please contact Endress+Hauser Service.
- The OUT Value parameter may have to be rescaled after resetting with code 7864. → 📄 71, Section 6.8 "Scaling the OUT parameter".

5.9.1 Performing reset via an FF configuration program

If operating via an FF configuration program, enter the code by means of the RESET_INPUT_VALUE/ENTER RESET CODE parameter in the Diagnostic Transducer Block. The index tables on → 📄 39 ff. indicate which parameters are reset by the particular reset code.

Note!
- The RESET FF parameter gives you the option of deleting links between function blocks and resetting FF parameters to default values and manufacturer-specific parameters to the factory setting. → See also Operating Instructions BA00303P, RESTART parameter description.

5.9.2 Performing reset via the FieldCare operating program

If operating via FieldCare, enter the code via the ENTER RESET CODE parameter (menu path: OPERATING MENU → OPERATION).
The following table illustrates which parameters are reset by the particular reset codes.

Reset code	Description and effect [1]
7864	**Total reset** – This reset resets the following parameters: – POSITION ADJUSTMENT function group – BASIC SETUP function group – EXTENDED SETUP function group – LINEARIZATION function group (an existing linearization table is deleted) – TOTALIZER SETUP function group – OUTPUT group – INFO function group, TAG_DESC parameter – MESSAGES function group – All configurable messages ("Error" type) are set to "Warning". → 📄 72, Section 8.1 "Messages" and → 📄 81, Section 8.2 "Response of outputs to errors". – USER LIMITS function group – Any simulation which may be running is ended. – The device is restarted.
333	**User reset** – This reset resets the following parameters: – POSITION ADJUSTMENT function group – BASIC SETUP function group, apart from customer-specific units – EXTENDED SETUP function group – TOTALIZER SETUP function group – OUTPUT group – Any simulation which may be running is ended. – The device is restarted.
2710	**Reset Level measuring mode** – Depending on the settings for the LEVEL MODE, LIN MEASURAND, LINd MEASURAND or COMB. MEASURAND parameters, the parameters needed for this measuring task will be reset. – Any simulation which may be running is ended. – The device is restarted. Example LEVEL MODE = linear and LIN. MEASURAND = level ■ HEIGHT UNIT = m ■ CALIBRATION MODE = wet ■ EMPTY CALIB. = 0 ■ FULL CALIB. = sensor end value converted to mH_2O, e.g. for a 500 mbar (7.5 psi) sensor : 50.99 mH_2O
2509	**Sensor adaption reset** – This reset resets the upper and lower sensor calibration limit and the value for position adjustment. – POSITION ADJUSTMENT function group – PRESSURE_1_LOWER_CAL/LO_TRIM_MEASURED and PRESSURE_1_HIGHER_TRIM_MEASURED/HI_TRIM_MEASURED parameters These parameters are not available by means of the FieldCare operating program. – Any simulation which may be running is ended. – The device is restarted.
1846	**Display reset** – This reset resets all parameters which have to do with how the display appears (DISPLAY group). – Any simulation which may be running is ended. – The device is restarted.
8888	**HistoROM reset** The measured value and event buffers are deleted. During the reset, the HistoROM has to be attached to the electronic insert.

Reset code	Description and effect [1]
62	**PowerUp reset (warm start)** – This reset resets all the parameters in the RAM. Data are read back anew from the EEPROM (processor is initialized again). – Any simulation which may be running is ended. – The device is restarted.

1) The table uses the group and parameter names as they appear in FieldCare. See → 39, Section 5.3.8 "Index tables of Endress+Hauser parameters" for the assignment of the FieldCare parameter names and the FF configuration program.

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 overshot.
- 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 Function check

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

- "Post-installation check" checklist → see Section 3.4
- "Post-connection check" checklist → see Section 4.4

6.2 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 (→ 📄 71, Section 6.8 "Scaling the OUT parameter").
- The standard order configuration is illustrated on → 📄 34, Kap. 5.3.6 "Deltabar S block model".

1. Switch on the device.
2. Note the DEVICE_ID. → 📄 33, Section 5.3.5 "Device identification and addressing" and → 📄 6, Section 2.1.1 "Nameplates" for the device serial number.
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 (→ see Point 2). 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. → 📄 50, Section 5.7 "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 Operating Instructions Section 6.3 to Section 6.8 and → 2 "Overview of documentation".
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. → 71, Section 6.8 "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" or → 🖹 2 "Overview of documentation".
2. Link the function blocks and output blocks.
3. After specifying the active LAS, download all the data and parameters to the field device.

6.3 Selecting the language and measuring mode

6.3.1 Local operation

The LANGUAGE and MEASURING MODE parameters are on the 1st selection level. → 🖹 45, Section 5.4.1 "Menu structure".

The following languages are available:
- Deutsch
- English
- Français
- Italiano
- Español
- Chinese (CHS)
- Japanese (JPN)

The following measuring modes are available:
- Pressure
- Level

6.3.2 Selecting the language and measuring mode by means of the FieldCare operating program

Selecting the measuring mode

In FieldCare, the MEASURING MODE parameter is displayed in the QUICK SETUP menus and in the BASIC SETUP function group (menu path: OPERATING MENU → SETTINGS → BASIC SETUP).

The following measuring modes are available:
- Pressure
- Level
- Flow

Selecting the language

The LANGUAGE parameter is arranged in the DISPLAY group (OPERATING MENU → DISPLAY).
- Use the LANGUAGE parameter to select the menu language for the onsite display.
- Select the menu language for FieldCare 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
- Italiano
- Español
- Chinese
- Japanese

6.4 Position adjustment

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

In addition, the "Position adjust" method is available if operating by means of a configuration program.

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

6.5 Flow measurement

6.5.1 Preparatory steps

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

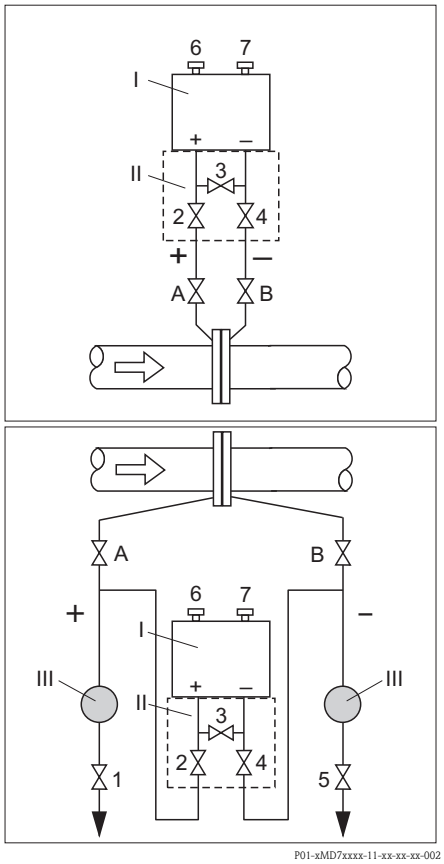
	Valves	Meaning	Preferred installation
1	Close 3.		
2	Fill measuring system with fluid.		
	Open A, B, 2, 4.	Fluid flows in.	
3	Clean pressure piping if necessary[1]: – by blowing out with compressed air in the case of gases – by rinsing out in the case of liquids.		
	Close 2 and 4.	Block off device.	
	Open 1 and 5.[1]	Blow out/rinse out pressure 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. → 61, Section 6.5.3 and → 58, Section 6.4. Conditions: – The process cannot be blocked off. – The tapping points (A and B) are at the same geodetic height.		
6	Set measuring point to 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 are open (if present).		
7	Carry out pos. zero adjustment if the flow can be blocked off. In this case, step 5 is not applicable. → 61, Section 6.5.3 and → 58, Section 6.4.		
8	Carry out calibration. → 60, Section 6.5.2		

Fig. 35: Above: preferred installation for gases Below: preferred installation for liquids

I Deltabar S, PMD70 or PMD75
II Three-way 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

6.5.2 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 flow 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.

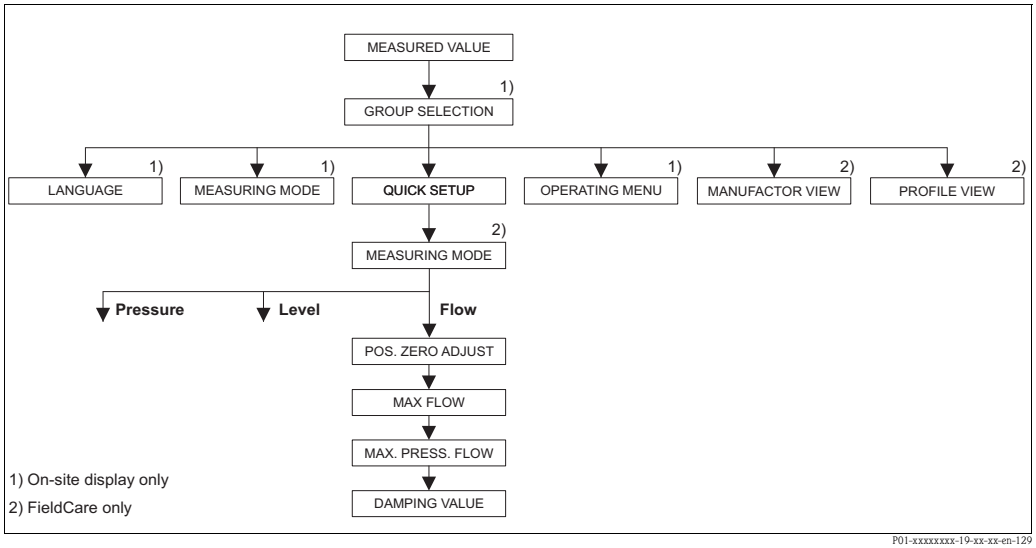
In addition, the Deltabar S software is equipped with two totalizers as standard. The totalizers add up the volume or the mass flow. The counting function and the unit can be set separately for both totalizers. The first totalizer (totalizer 1) can be reset to zero at any time while the second (totalizer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

Note!

- By means of the FieldCare operating program, a Quick Setup menu is available 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. → 57, Section 6.3 "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, Pressure Transducer Block Table
  – FF, DP Flow Block Table
  – FieldCare, POSITION ADJUSTMENT Table
  – FieldCare, BASIC SETUP Table
  – FieldCare, EXTENDED SETUP Table
  – FieldCare, TOTALIZER SETUP Table
  → 2, "Overview of documentation" section.

6.5.3 Quick Setup menu for the Flow measuring mode (FieldCare)

Note!
This operating menu is only available by means of the FieldCare operating program. → 48, Section 5.5 "FieldCare".



On-site operation	FieldCare
Measured value display On-site display: Switch from the measured value display to GROUP SELECTION with E.	**Measured value display** Select QUICK SETUP menu.
GROUP SELECTION Select MEASURING MODE.	**MEASURING MODE** Select "Flow" option.
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.	**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. 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).	**MAX. PRESS FLOW** Enter maximum pressure of primary device. (→ See also layout sheet of primary device).
DAMPING TIME Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and the OUT Value of the Analog Input Block react to a change in the pressure.	**DAMPING TIME** Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and the OUT Value of the Analog Input Block react to a change in the pressure.

Note!
For on-site operation see also → 31, Section 5.2.3 "Function of the operating elements – onsite display connected" and → 45, Section 5.4 "Local operation – on-site display connected".

6.6 Level measurement

6.6.1 Preparatory steps

Open container

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

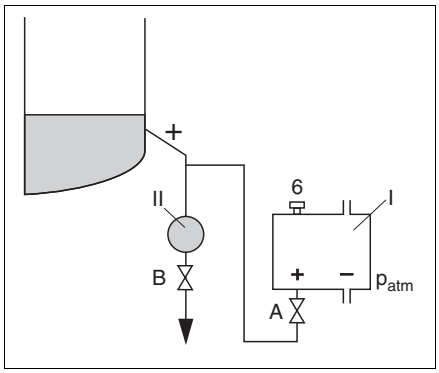
	Valves	Meaning	Installation
1	Fill container to a level above the lower tap.		
2	Fill measuring system with fluid.		
	Open A.	Open shutoff valve.	
3	Vent device.		
	Open 6 briefly, then close it again.	Fill device completely with fluid and remove air.	
4	Set measuring point to operation.		
	Now – B and 6 are closed. – Axis open.		
5	Carry out calibration. → 📄 65, Section 6.6.2.		

Fig. 36: Open container

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 pressure 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 to operation.		
	Now – 3, 6 and 7 are closed. – 2, 4, A and B are open.		
5	Carry out calibration. → 📄 65, Section 6.6.2.		

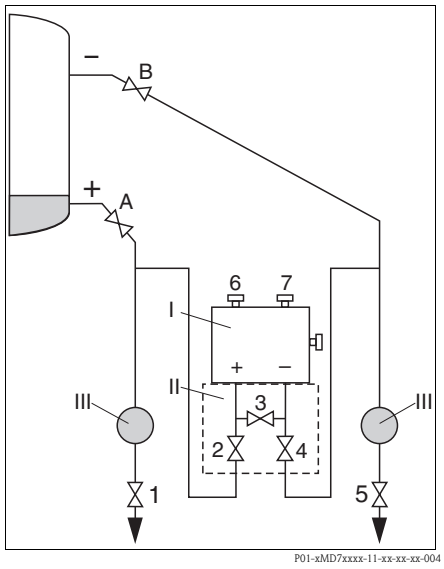


Fig. 37: Closed container

I Deltabar S, PMD70 and PMD75
II Three-way 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 container 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 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 pressure piping must be cleaned and filled with fluid. → See the following table.

	Valves	Meaning
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 pressure 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 to 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. → 📄 65, Section 6.6.2.	

Installation

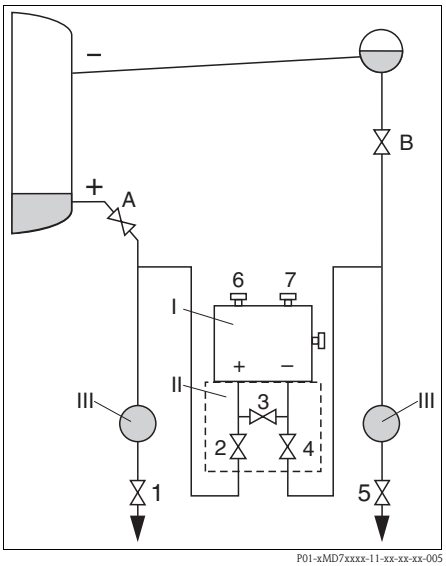


Fig. 38: Closed container with superimposed steam

I Deltabar S, PMD70 and PMD75
II Three-way 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

6.6.2 Information on level measurement

Note!

- A Quick Setup menu is available for each of the measuring modes Pressure and Level which guides you through the most important basic functions. For the "Level" Quick Setup menu, → 67
- Furthermore, three level modes are available for the level measurement, namely "Level easy pressure", "Level easy height" and "Level standard". For the "Level standard" level mode, you can choose between the "Linear", "Pressure linearized" and "Height linearized" level types. The table in the "Overview of level measurement" section that follows provides you with an overview of the various measuring tasks.
  - With regard to 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. In the "Level easy pressure" and "Level easy height" level modes, the values entered for EMPTY CALIBRATION/FULL CALIBRATION, EMPTY PRESSURE/FULL PRESSURE and EMPTY HEIGHT/FULL HEIGHT have to be at least 1% apart. 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 tast so that the measuring device can measured correctly.
  - The "Level easy pressure" and "Level easy heigth" level modes comprise fewer parameters than the "Level standard" mode and are not used to quickly and easily configure a level application.
  - Customer-specific units of level, volume and mass, or a linearization table, can 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", → 2, "Overview of documentation".

6.6.3 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.	– Calibration with reference pressure- wet calibration, see Operating Instructions BA00303P. – Calibration without reference pressure - dry calibration, see Operating Instructions BA00303P.	– Incorrect entries are possible – Customised 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.	– Calibration with reference pressure - wet calibration, see Operating Instructions BA00303P. – Calibration without reference pressure - dry calibration, see Operating Instructions BA00303P.	– Incorrect entries are possible – Customised 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	– Calibration with reference pressure - wet calibration, see Operating Instrucations BA00303P. – Calibration without reference pressure - dry calibration, see Operating Instructions BA00303P.	– Incorrect entries are rejected by the device – Customised level, volume nd mass units are possible	The measured value display and the LEVEL BEFORE LIN parameter show the measured value.
The measured variable is not in direct proportionto the measured pressure as, for example, with containers with a conical outlet. A linearisation table must be entered for the calibration.	LEVEL SELECTION: Level standard/ LEVEL MODE: Pressure Linearized	Via LIN. MEASURAND: – Pressure + % – Pressure + Volume – Pressure + Mass	– Calibration with reference pressure: semiautomatic entry of linearisation table, see Operating Instructions BA00303P. – Calibration without reference pressure: manual entry of linearisation table, see Operating Instrucktions BA00303P.	– Incorrect entries are rejected by the device – Customised level, volume and mass units are possible	The measured value display and the TANK CONTENT parameter show the measured value.
– Two measured variables are required or – The container shape is given by value pairs, such as height and volume. 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 linearisation 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.	LEVEL SELECTION: Level standard/ LEVEL MODE: Height Linearized	Via COMB. MEASURAND parameter: – Height + Volume – Height + Mass – Height + % – %-Height + Volume – %-Height + Mass – %-Height + %	– Calibration with reference pressure: wet calibration and semiautomatic entry of linearisation table, see Operating Instructions BA00303P. – Calibration without reference pressure: dry calibration and manual entry of linearisation table, see Operating Instructions BA00303P.	– Incorrect entries are rejected by the device – Customised level, volume and mass units are possible	The measured value display and the TANK CONTENT parameter show the 2nd measurand value (volume, mass or %). The LEVEL BEFORE LIN parameter displays the 1st measured value (%-height or height).

6.6.4 Quick Setup menu for 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 parameter in the BASIC SETTIGNS 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 form "%" to "m", you will have to calibrate using the BASIC SETTINGS group. See Operating Instructions BA00303P or → 2, "Overview of documentation".

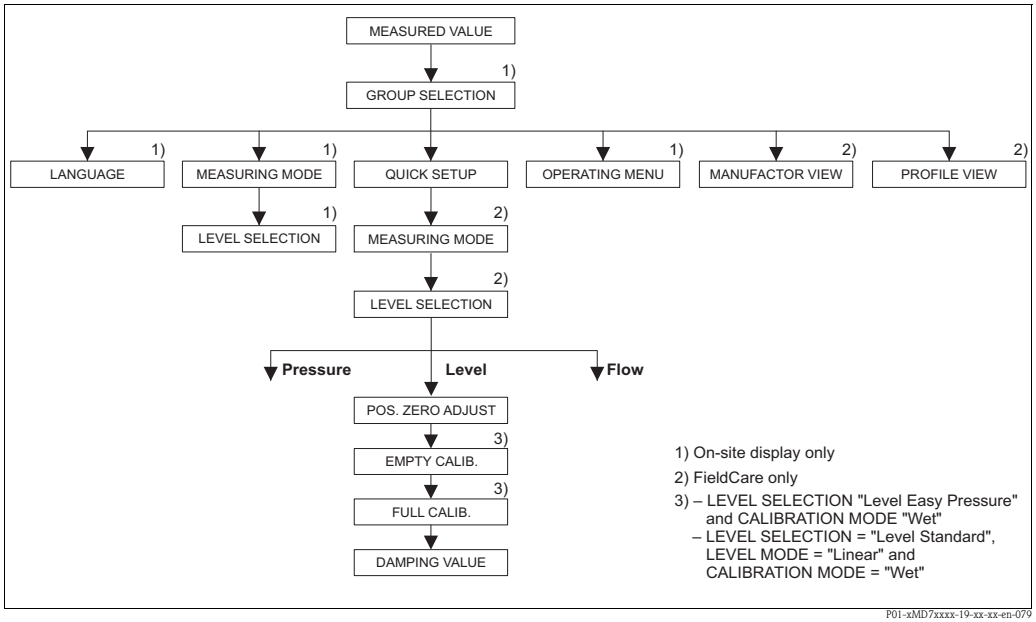


Fig. 39: Quick Setup-Menü für die Betriebsart "Füllstand"

On-site operation
Measured value display On-site display: Switch from the measured value display to GROUP SELECTION with E.
GROUP SELECTION Select MEASURING MODE.
MEASURING MODE Select "Level" option.
LEVEL SELECTION Select level mode. For an overview see → 66.
GROUP SELECTION Select QUICK SETUP menu.

FieldCare
Measured value display Select QUICK SETUP menu.
MEASURING MODE Select "Level" option.
LEVEL SELECTION Select level mode. For an overview see → 66.

On-site operation	FieldCare
POS. ZERO ADJUST Due to orientation of the device, there may be a shift in the measured value. You correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option, i.e. you assign the value 0.0 to the pressure present.	**POS. ZERO ADJUST** BDue 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.	**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.	**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 on-site display, measured value and the OUT Value of the Analog Input Block react to a change in the pressure	**DAMPING TIME** Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and the 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 on-site operation, see also → 31, Section 5.2.3 "Function of the operating elements – onsite display connected" and → 45, Section 5.4 "Local operation – on-site display connected".

6.7 Differential pressure measurement

6.7.1 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 pressure piping must be cleaned and filled with fluid. → See the following table.

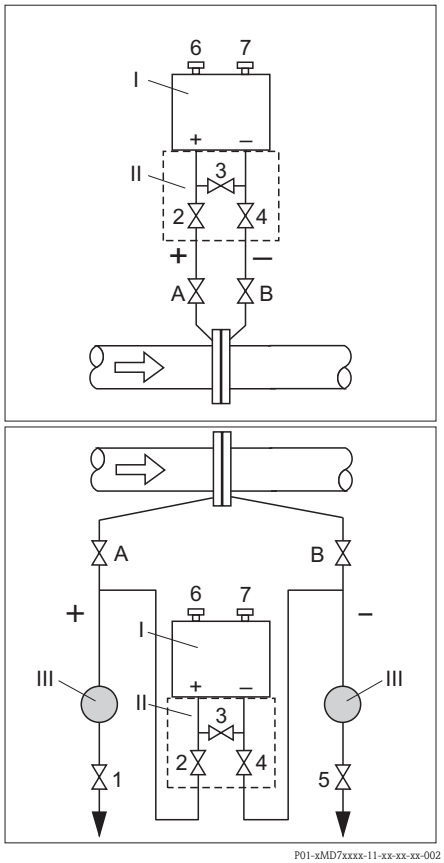
	Valves	Meaning	Preferred installation
1	Close 3.		
2	Fill measuring system with fluid.		
	Open A, B, 2, 4.	Fluid flows in.	
3	Clean pressure piping if necessary:[1)] – by blowing out with compressed air in the case of gases – by rinsing out in the case of liquids.		
	Close 2 and 4.	Block off device.	
	Open 1 and 5.[1]	Blow out/rinse out pressure 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 to 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 are open (if present).		
6	Carry out calibration if necessary. → 🖹 70, Section 6.7.2.		

Fig. 40: Above: preferred installation for gases
Below: preferred installation for liquids

I Deltabar S, PMD70 or PMD75
II Three-way 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

6.7.2 Information on differential pressure measurement

Note!

- By means of the FieldCare operating program, a Quick Setup menu is available 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. → 57, Section 6.3 "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

  → 2, "Overview of documentation" section.

6.7.3 Quick Setup menu for Pressur measuring mode

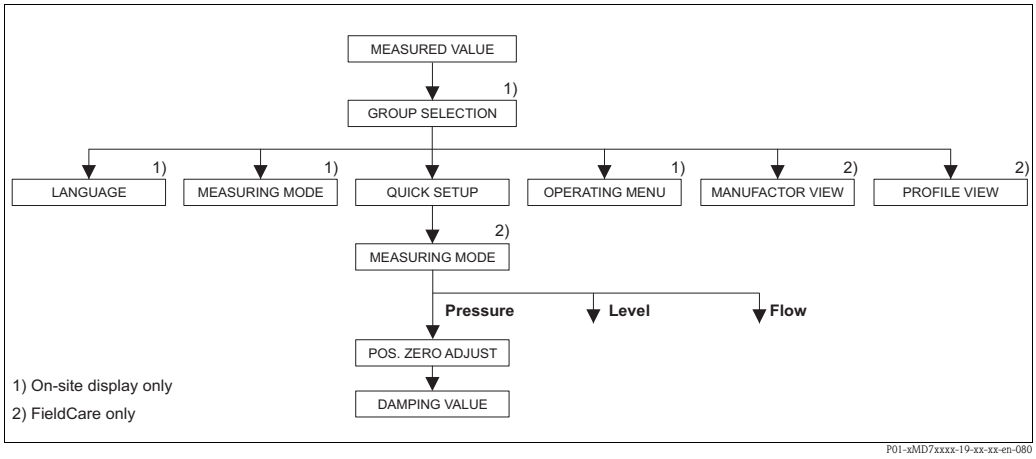


Fig. 41: Quick Setup-Menü für die Betriebsart "Druck"

On-site operation	FieldCare
Measured value display On-site display: Switch from the measured value display to GROUP SELECTION with E.	**Measured value display** Select QUICK SETUP menu.
GROUP SELECTION Select MEASURING MODE.	**BETRIEBSART** Option "Druck" wählen.
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.	**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 on-site display, measured value and the OUT Value of the Analog Input Block react to a change in the pressure.	**DAMPING TIME** Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and the OUT Value of the Analog Input Block react to a change in the pressure.

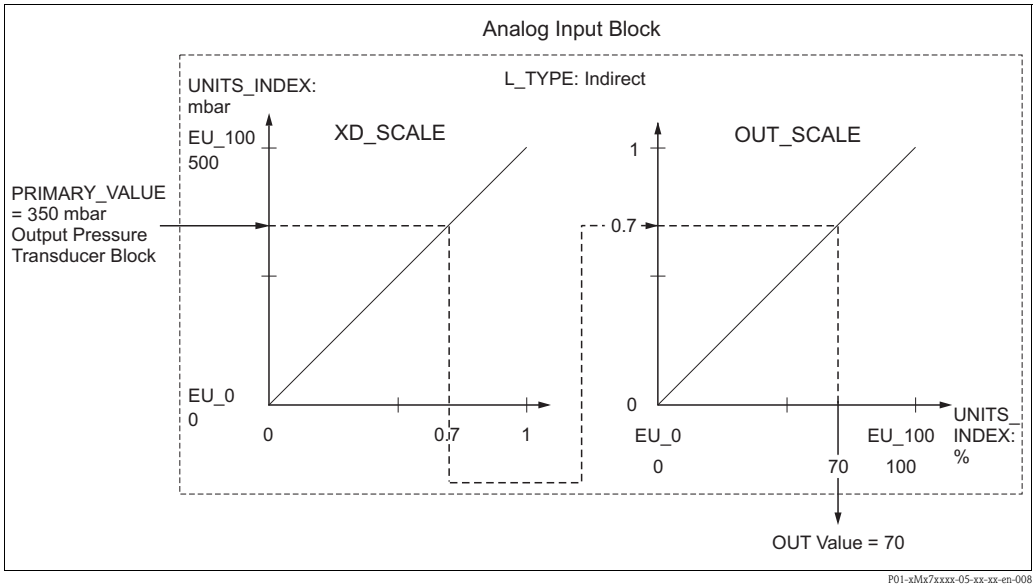
Note!
For on-site operation, see also → 31, Section 5.2.3 "Function of the operating elements – onsite display connected" and → 45, Section 5.4 "Local operation – on-site display connected".

6.8 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 (7.5 psi) 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 (5.25 psi), the value 70 is output to a downstream block or to the PCS as the OUT value.



P01-xMx7xxxx-05-xx-xx-en-008

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.

7 Maintenance

Deltabar S requires no maintenance.

7.1 Exterior cleaning

Please note the following points when cleaning the device:
- The cleaning agents used should not attack the surface and the seals.
- Mechanical damage to the process isolating diaphragm, e.g. due to pointed objects, must be avoided.

8 Troubleshooting

8.1 Messages

The following table lists all the possible messages that can occur.
The device makes a distinction between the message types "Alarm", "Warning" and "Error". All "Error"-type messages are set as "Warning" messages at the factory.
For "Error"-type messages, you can enter whether the device should react as in the event of an alarm or as in the event of a warning. → See "Message type/NA 64" column and Section 8.2 "Response of outputs to errors".

In addition, the "Message type/NA 64" column classifies the messages in accordance with NAMUR Recommendation NA 64:
- Break down: indicated with "B"
- Maintenance need: indicated with "C" (check request)
- Function check: indicated with "I" (in service)

Displaying the messages on the onsite display:
- The measured value display shows the message with the highest priority. → See the "Priority" column.
- The ALARM STATUS parameter shows all the messages present in descending order of priority. You can scroll through all the messages pending using the − or + key.

The DIAGNOSTIC_CODE/DIAGNOSE_CODE parameter displays the message with the highest priority. This parameter is displayed in the MESSAGES group in the Diagnostic Transducer Block or in FieldCare. → See also Section 8.2 "Response of outputs to errors".
Every message is also output as per the FOUNDATION Fieldbus Specification by means of the XD_ERROR and BLOCK_ERROR parameters in the Pressure, Service and DP Flow Block. Numbers are given for these parameters in the following table which are explained on → 80.

Note!
- If the device detects a defect in the onsite display during initialization, special error messages are generated. → For the error messages, see → 80, Section 8.1.1 "Onsite display error messages".
- For support and further information, please contact Endress+Hauser Service.
- → See also Section 8.4, Section 8.5 and Section 8.6.

Code	Error type/ NA 64	Message/description	XD_ ERROR Value	BLOCK_ ERROR Value Bit	Cause	Measure	Prio-rity
101 (A101)	Alarm B	B>Sensor electronic EEPROM error	20	5	– Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) This message normally only appears briefly. – Sensor defect.	– Wait a few minutes. – Restart the device. Perform reset (Code 62). – Block off electromagnetic effects or eliminate source of disturbance. – Replace sensor.	18
102 (W102)	Warning C	C>Checksum error in EEPROM: peakhold segment	23	11	– Main electronics defect. Correct measurement can continue as long as you do not need the peak hold indicator function.	– Replace main electronics.	52
106 (W106)	Warning C	C>Downloading - please wait	17	0	– Downloading.	– Wait for download to complete.	51
110 (A110)	Alarm B	B>Checksum error in EEPROM: configuration segment	23	11	– The supply voltage is disconnected when writing. – Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) – Main electronics defect.	– Reestablish supply voltage. Perform reset if necessary (code 7864) and recalibrate the device. – Block off electromagnetic effects or eliminate sources of disturbance. – Replace main electronics.	6
113 (A113)	Alarm B	B>ROM failure in transmitter electronic	20	9	– Main electronics defect.	– Replace main electronics.	1
115 (E115)	Error C	C>Sensor overpressure	17	0	– Overpressure present. – Sensor defect.	– Reduce pressure until message disappears. – Replace sensor.	30
116 (W116)	Warning C	C>Download error, repeat download	17	0	– The file is defect. – During the download, the data are not correctly transmitted to the processor, e.g. because of open cable connections, spikes (ripple) on the supply voltage or electromagnetic effects.	– Use another file. – Check cable connection PC – transmitter. – Block off electromagnetic effects or eliminate sources of disturbance. – Perform reset (code 7864) and recalibrate the device. – Repeat download.	37
120 (E120)	Error C	C>Sensor low pressure	17	0	– Pressure too low. – Sensor defect.	– Increase pressure until message disappears. – Replace sensor.	31
121 (A121)	Alarm B	B>Checksum error in factory segment of EEPROM	23	11	– Main electronics defect.	– Replace main electronics.	5
122 (A122)	Alarm B	B>Sensor not connected	20	5	– Cable connection sensor –main electronics disconnected. – Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) – Main electronics defect. – Sensor defect.	– Check cable connection and repair if necessary. – Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics. – Replace sensor.	14
130 (A130)	Alarm B	B>EEPROM is defect.	23	11	– Main electronics defect.	– Replace main electronics.	10

Code	Error type/ NA 64	Message/description	XD_ ERROR Value	BLOCK_ ERROR Value Bit	Cause	Measure	Priority
131 (A131)	Alarm B	B>Checksum error in EEPROM: min/max segment	23	11	– Main electronics defect.	– Replace main electronics.	9
132 (A132)	Alarm B	B>Checksum error in totalizer EEPROM	23	11	– Main electronics defect.	– Replace main electronics.	7
133 (A133)	Alarm B	B>Checksum error in History EEPROM	23	11	– An error occurred when writing. – Main electronics defect.	– Perform reset (code 7864) and recalibrate the device. – Replace main electronics.	8
134 (W134)	Warning C	C>EEPROM lifetime WARNING	17	0	– Writing too often to EEPROM.	– Reduce write accessing to EEPROM.	55
135 (A135)	Alarm B	B>Checksum error in EEPROM FF segment	23	11	– Main electronics defect.	– Replace main electronics.	10
602 (W602)	Warning C	C>Linearization curve not monoton	19	7	– The linearization table is not monotonic increasing.	– Add to or correct linearization table. Then accept linearization table again.	57
613 (W613)	Warning I	I>Simulation is active	17	3	– Simulation is switched on, i.e. the device is not measuring at present.	– Switch off simulation.	60
700 (W700)	Warning C	C>Last configuration not stored	23	11	– An error occurred when writing or reading configuration data or the power supply was disconnected. – Main electronics defect.	– Perform reset (code 7864) and recalibrate the device. – Replace main electronics.	53
702 (W702)	Warning C	C>HistoROM data not consistent.	17	11	– Data were not written correctly to the HistoROM, e.g. if the HistoROM was detached during the writing process. – HistoROM does not have any data.	– Repeat upload. – Perform reset (code 7864) and recalibrate the device. – Copy suitable data to the HistoROM. (→ 🖹 49, Section 5.6.1 "Copying configuration data".)	54
703 (A703)	Alarm B	B>Measurement error	20	5	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	23
704 (A704)	Alarm B	B>Measurement error	20	5	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	13
705 (A705)	Alarm B	B>Measurement error	20	5	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	22

Code	Error type/ NA 64	Message/description	XD_ ERROR Value	BLOCK_ ERROR Value Bit	Cause	Measure	Prio-rity
706 (W706)	Warning C	C>Configuration in HistoROM and device not identical	23	11	– Configuration (parameters) in the HistoROM and in the device not identical.	– Copy data from the device to the HistoROM. (→ 🖹 49, Section 5.6.1 "Copying configuration data".) – Copy data from the HistoROM to the device. (→ 🖹 49, Section 5.6.1 "Copying configuration data".) The message remains if the HistoROM and the device have different software versions. The message disappears if you copy the data from the device to the HistoROM. – Device reset codes such as 1 or 40864 do not have any effect on the HistoROM. This means that if you perform a reset, the configurations in the HistoROM and the device can differ.	59
707 (A707)	Alarm B	B>X-VAL. (TAB_XY _VALUE) of lin. table out of edit limits.	18	7	– At least one X-VALUE (TAB_XY_VALUE) in the linearization table is either below the value for SCALE_IN, EU_0/HYDR. PRESS MIN. or LINEAR_ LEVEL_MIN/MIN. LEVEL or above the value for SCALE_IN, EU_100/HYDR. PRESS. MAX. or LINEAR_LEVEL_MAX/LEVEL MAX.	– Carry out calibration again. (→ See also Operating Instructions BA00303P, chapter 5 or these Operating Instructions, → 🖹 2)	38
710 (W710)	Warning C	B>Set span too small. Not allowed.	18	7	– Values for calibration (e.g. lower range value and upper range value) are too close together. – The sensor was replaced and the customer-specific configuration does not suit the sensor. – Unsuitable download carried out.	– Adjust calibration to suit sensor. (→ See also Operating Instructions BA00303P, parameter description for CAL_MIN_SPAN/MINIMUM SPAN or these Operating Instructions, → 🖹 2) – Adjust calibration to suit sensor. – Replace sensor with a suitable sensor. – Check configuration and perform download again.	50
713 (A713)	Alarm B	B>100% POINT (LEVEL_100_PERCENT _VALUE) level out of edit limits	18	7	– The sensor was replaced.	– Carry out calibration again.	39
715 (E715)	Error C	C>Sensor over temperature	17	0	– The temperature measured in the sensor is greater than the upper nominal temperature of the sensor. (→ See also Operating Instructions BA00303P, parameter description for TEMPERATURE_1 _SENSOR_ LIMIT_HIGH/Tmax SENSOR or these Operating Instructions, → 🖹 2) – Unsuitable download carried out.	– Reduce process temperature/ ambient temperature. – Check configuration and perform download again.	33

Code	Error type/ NA 64	Message/description	XD_ ERROR Value	BLOCK_ ERROR Value Bit	Cause	Measure	Prio-rity
716 (A716)	Alarm B	B>Process isolating diaphragm broken	20	5	– Sensor defect. – PMD70, FMD76: Overpressure is present at minus or plus side of the device (on-sided overpressure)	– Replace sensor. – Reduce pressure.	25
717 (E717)	Error C	C>Transmitter over temperature	17	0	– The temperature measured in the electronics is greater than the upper nominal temperature of the electronics (+88 °C). – Unsuitable download carried out.	– Reduce ambient temperature. – Check configuration and perform download again.	35
718 (E718)	Error C	C>Transmitter under temperature	17	0	– The temperature measured in the electronics is smaller than the lower nominal temperature of the electronics (–43 °C). – Unsuitable download carried out.	– Increase ambient temperature. Insulate device if necessary. – Check configuration and perform download again.	36
719 (A719)	Alarm B	B>Y-VAL (TAB_XY_VALUE) of lin. table out of edit limits	19	7	– At least one Y-VALUE (TAB_XY_VALUE) in the linearization table is below the SCALE_OUT, EU_0/TANK CONTENT MIN. or above the SCALE_OUT, EU_100/TANK CONTENT MAX.	– Carry out calibration again. (→ See also Operating Instructions BA00303P, chapter 5 or these Operating Instructions, → 2)	40
720 (E720)	Error C	C>Sensor under temperature	17	0	– The temperature measured in the sensor is smaller than the lower nominal temperature of the sensor. (→ See also Operating Instructions BA00303P, parameter description for TEMPERATURE_1_SENSOR_ LIMIT_LOW/Tmin SENSOR or these Operating Instructions, → 2) – Unsuitable download carried out. – Loose connection at sensor cable.	– Increase process temperature/ ambient temperature. – Check configuration and perform download again. – Wait a short period of time and tighten the connection, or avoid loose connection.	34
721 (A721)	Alarm B	B>ZERO POSITION (LEVEL OFFSET) level out of edit limits	18	7	– LEVEL MIN (LINEAR_LEVEL_ MIN) or LEVEL MAX (LINEAR_LEVEL_MAX) has been changed.	– Perform reset (code 2710) and recalibrate the device.	41
722 (A722)	Alarm B	B>EMPTY CALIB. (SCALE_OUT, EU_0) or FULL CALIB. (SCALE_OUT, EU_100) out of edit limits	18	7	– LINEAR_ LEVEL_MIN/LEVEL MIN or LINEAR_LEVEL_MAX/ LEVEL MAX has been changed.	– Perform reset (code 2710) and recalibrate the device.	42
723 (A723)	Alarm B	B>MAX. FLOW (SCALE_OUT, EU_100) out of edit limits	18	7	– FLOW_TYPE/FLOW-MEAS. TYPE has been changed.	– Carry out calibration again.	43

Code	Error type/ NA 64	Message/description	XD_ ERROR Value	BLOCK_ ERROR Value Bit	Cause	Measure	Prio-rity
725 (A725)	Alarm B	B>Sensor connection error, cycle disturbance	20	5	– Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) – Setscrew loose. – Sensor or main electronics defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Retighten setscrew with 1 Nm (0,74 lbf ft) (see Chap. 3.3.9). – Replace sensor or main electronics.	26
726 (E726)	Error C	C>Sensor temperature error - overrange	20	5	– Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) – Process temperature is outside permitted range. – Sensor defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Check temperature present, reduce or increase if necessary. – If the process temperature is within the permitted range, replace sensor.	32
727 (E727)	Error C	C>Sensor pressure error - overrange	20	5	– Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) – Pressure is outside permitted range. – Sensor defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Check pressure present, reduce or increase if necessary. – If the pressure is within the permitted range, replace sensor.	29
728 (A728)	Alarm B	B>RAM error	20	9	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	2
729 (A729)	Alarm B	B>RAM error	20	9	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	3
730 (E730)	Error C	C>PminALARM WINDOW (PRESSURE_1_USER_ LOW_LIMIT) undershot	19	7	– Pressure measured value has undershot the value specified for the PRESSURE_1_USER_ LOW_LIMIT/Pmin ALARM WINDOW parameter. – Loose connection at sensor cable.	– Check system/pressure measured value. – Change value for PRESSURE_1_USER_ LOW_ LIMIT/Pmin ALARM WINDOW if necessary. (→ See also Operating Instructions BA00303P, parameter description or these Operating Instructions, → 🖹 2) – Wait a short period of time and tighten the connection, or avoid loose connection.	47
731 (E731)	Error C	C>PmaxALARM WINDOW (PRESSURE_1_UER_ HIGH_LIMIT) overshot	19	7	– Pressure measured value has overshot the value specified for the PRESSURE_1_USER_ HIGH_LIMIT/Pmax ALARM WINDOW parameter.	– Check system/pressure measured value. – Change value for PRESSURE_1_USER_ HIGH_ LIMIT/Pmax ALARM WINDOW if necessary. (→ See also Operating Instructions BA00303P, parameter description or these Operating Instructions, → 🖹 2)	46

Code	Error type/ NA 64	Message/description	XD_ ERROR Value	BLOCK_ ERROR Value Bit	Cause	Measure	Prio-rity
732 (E732)	Error C	C>TminALARM WINDOW (TEMPERATURE_1_ USER_LOW_LIMIT) undershot	19	7	– Temperature measured value has undershot the value specified for the TEMPERATURE_1_USER_ LOW_LIMIT/Tmin ALARM WINDOW parameter. – Loose connection at sensor cable.	– Check system/temperature measured value. – Change value for TEMPERATURE_1_USER_ LOW_ LIMIT/Tmin ALARM WINDOW if necessary. (→ See also Operating Instructions BA00303P, parameter description or these Operating Instructions, → 2) – Wait a short period of time and tighten the connection, or avoid loose connection.	49
733 (E733)	Error C	C>TmaxALARM WINDOW (TEMPERATURE_1_ USER_HIGH_LIMIT) overshot	19	7	– Temperature measured value has overshot the value specified for the TEMPERATURE_1_USER_ HIGH_LIMIT/Tmax ALARM WINDOW parameter.	– Check system/temperature measured value. – Change value for TEMPERATURE_1_USER_HIG H_LIMIT/Tmax ALARM WINDOW if necessary. (→ See also Operating Instructions BA00303P, parameter description or these Operating Instructions, → 2)	48
736 (A736)	Alarm B	B>RAM error	20	9	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	4
737 (A737)	Alarm B	B>Measurement error	20	5	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	21
738 (A738)	Alarm B	B>Measurement error	20	5	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	20
739 (A739)	Alarm B	B>Measurement error	20	5	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	24
740 (E740)	Error C	C>Calculation overflow, bad configuration	20	5	– Level measuring mode: the measured pressure has undershot the value for SCALE_IN, EU_0/HYDR. PRESS. MIN. or overshot the value for SCALE_IN, EU_100/ HYDR. PRESS MAX. – Level measuring mode: the measured level has undershot the value for LEVEL MIN or overshot the value for LEVEL MAX – Flow measuring mode: the measured pressure has undershot the value for SCALE_IN, EU_100/MAX. PRESS FLOW.	– Check configuration and recalibrate if necessary. – Select a device with a suitable measuring range. – Check configuration and recalibrate if necessary. (→ See also Operating Instructions BA00303P, parameter description for LEVEL MIN. or these Operating Instructions, → 2) – Check configuration and recalibrate if necessary. – Select a device with a suitable measuring range.	28
741 (A741)	Alarm B	B>TANK HEIGHT (LEVEL_TANK_ HEIGHT) out of edit limits	18	7	– LINEAR_LEVEL_MIN/LEVEL MIN or LINEAR_LEVEL_MAX/ LEVEL MAX has been changed.	– Perform reset (code 2710) and recalibrate the device.	44

Code	Error type/ NA 64	Message/description	XD_ ERROR Value	BLOCK_ ERROR Value Bit	Cause	Measure	Prio-rity
742 (A742)	Alarm B	B>Sensor connection error (upload)	20	5	– Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) This message normally only appears briefly. – Cable connection sensor –main electronics disconnected. – Sensor defect.	– Wait a few minutes. – Perform reset (code 7864) and recalibrate the device. – Check cable connection and repair if necessary. – Replace sensor.	19
743 (E743)	Alarm B	B>Electronic PCB error during initialization	20	5	– Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) This message normally only appears briefly. – Main electronics defect.	– Wait a few minutes. – Restart the device. Perform reset (Code 62). – Replace main electronics.	15
744 (A744)	Alarm B	B>Main electronic PCB error	20	5	– Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) – Main electronics defect.	– Restart the device. Perform reset (Code 62). – Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics.	12
745 (W745)	Warning C	C>Sensor data unknown	17	0	– Sensor does not suit the device (electronic sensor nameplate). Device continues measuring.	– Replace sensor with a suitable sensor.	55
746 (W746)	Warning C	C>Sensor connection error - initializing	20	5	– Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) This message normally only appears briefly. – Overpressure or low pressure present.	– Wait a few minutes. – Restart the device. Perform reset (Code 7864). – Block off electromagnetic effects or eliminate source of disturbance. – Reduce or increase pressure.	27
747 (A747)	Alarm B	B>Sensor software not compatible to electronics	17	0	– Sensor does not suit the device (electronic sensor nameplate).	– Replace sensor with a suitable sensor.	17
748 (A748)	Alarm B	B>Memory failure in signal processor	20	5	– Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) – Main electronics defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics.	16
750 (A750)	Alarm B	B>Configuration not permitted	19	7	– By means of the operation profile, options were selected for the configuration of the device but the options do not suit one another. For example, if the option "1" (linearization table) was selected for LIN_TYPE and the unit "1347 (m^3/s)" was selected for PRIMARY_VALUE_UNIT.	– Check configuration. – Perform reset (code 7864) and recalibrate the device.	45

Explanation of XD_ERROR and BLOCK_ERROR

Error type	Code	XD_ERROR Value	XD_ERROR Text	BLOCK_ ERROR Value Bit	BLOCK_ERROR Text	PV Status
Alarm	747	17	General Error	0	Other	Bad Sensor Failure
	707, 711, 713, 721, 722, 723, 741	18	Calibration Error	7	Output Failure	Uncertain Config Error
	719, 750	19	Configuration Error	7	Output Failure	Uncertain Config Error
	101, 122, 703, 704, 705, 716, 725, 737, 738, 739, 742, 743, 744, 746, 748	20	Electronics Failure	5	Device Fault State Set	Bad Device Failure
	113, 728, 729, 736	20	Electronics Failure	9	Memory Failure	Bad Device Failure
	110, 121, 130, 131, 132, 133, 135	23	Data Integrity Error	11	Lost NV Data	Bad Device Failure
Error	115, 120, 715, 717, 718, 720	17	General Error	0	Other	– Alarm: Bad Non Specific – Warning: Status Uncertain
	730, 731, 732, 733	19	Configuration Error	7	Output Failure	– Alarm: Bad Non Specific – Warning: Status Uncertain
	122, 727, 726, 740	20	Electronics Failure	5	Device Fault State	– Alarm: Bad Non Specific – Warning: Status Uncertain
Warning	106, 116, 134, 745	17	General Error	0	Other	Uncertain Config Error
	613	17	General Error	3	Simulate active	Uncertain Sim
	702	17	General Error	11	Lost NV Data	Status Uncertain
	710	18	Calibration Error	7	Output Failure	Status Uncertain
	602, 604	19	Configuration Error	7	Output Failure	Uncertain Config Error
	746	20	Electronics Failure	5	Device Fault State Set	Status Uncertain
	102, 700, 706	23	Data Integrity Error	11	Lost NV Data	Status Uncertain

8.1.1 Onsite display error messages

If the device detects a defect in the onsite display during initialization, the following error messages can be displayed:

Message	Measure
Initialization, VU Electr. Defect A110	Exchange onsite display.
Initialization, VU Electr. Defect A114	
Initialization, VU Electr. Defect A281	
Initialization, VU Checksum Err. A110	
Initialization, VU Checksum Err. A112	
Initialization, VU Checksum Err. A171	

8.2 Response of outputs to errors

The device makes a distinction between the message types "Alarm", "Warning" and "Error".
→ See the following table and → 📄 72, Section 8.1 "Messages".

Output	A (Alarm)	W (Warning)	E (Error: Alarm/Warning)
FOUNDATION Fieldbus	The process variable in question is transmitted with the status BAD.	Device continues measuring. The process variable in question is transmitted with the status UNCERTAIN.	For this error, you can enter whether the device should react as in the event of an alarm or as in the event of a warning. See corresponding "Alarm" or "Warning" column. (→ See also Operating Instructions BA00303P, REACTION_ON_ALARM_NR/ SELECT ALARM TYPE parameter description or these Operating Instructions, → 📄 2)
Onsite display	– The measured value and message are displayed alternately – Measured value display: ↯ -symbol is permanently displayed. Message display – A + 3-digit number such as A122 and – Description	– The measured value and message are displayed alternately – Measured value display: ↯ -symbol flashes. Message display: – W + 3-digit number such as W613 and – Description	– The measured value and message are displayed alternately – Measured value display: see corresponding "Alarm" or "Warning" column Message display: – E + 3-digit number such as E731 and – Description
Remote operation (FF configuration program/FieldCare)	In the event of an alarm, the DIAGNOSTIC_CODE/ALARM STATUS[1)] parameter displays a 3-digit number such as 122 for "Sensor connection error, incorrect data."	In the case of a warning, the DIAGNOSTIC_CODE/ALARM STATUS[1] parameter displays a 3-digit number such as 613 for "Simulation is active".	In the case of an error, the DIAGNOSTIC_CODE/ALARM STATUS[1] parameter displays a 3-digit number such as 731 for "Pmax ALARM WINDOW undershot".

1) FF configuration program: Diagnostic Transducer Block. Menu path FieldCare: OPERATING MENU → MESSAGES

8.2.1 Analog Input Block

If the Analog Input Block receives an input or simulation value with the status BAD, the Analog Input Block uses the failsafe mode defined in the FSAFE_TYPE[1] parameter.

The following options are available by means of the FSAFE_TYPE parameter:
- Last Good Value
  The last valid value is used for further processing with the status UNCERTAIN.
- Fail SafeValue
  The value specified by means of the FSAFE_VALUE[1] parameter is used for further processing with the status UNCERTAIN.
- Wrong Value
  The current value is used for further processing with the status BAD.

Factory setting:
- FSAFE_TYPE: FsafeValue
- FSAFE_VALUE: 0

✎ Note!
The failsafe mode is also activated if the "Out of service" option was selected by means of the MODE_BLK parameter, "Target" element.

1 These parameters are not available by means of the FieldCare operating program.

8.3 Confirming messages

Depending on the settings for the ALARM_HOLD_ON_TIME/ALARM DISPL. TIME and ACKNOWLEDGE_ALARM_MODE/ACK. ALARM MODE parameters, the following measures should be taken to clear a message:

Settings [1]	Measures
– ALARM_HOLD_ON_TIME// ALARM DISPL. TIME = 0 s – ACKNOWLEDGE_ALARM_MODE/ ACK. ALARM MODE = Off	– Rectify the cause of the message (see also Section 8.1).
– ALARM_HOLD_ON_TIME/ ALARM DISPL. TIME > 0 s – ACKNOWLEDGE_ALARM_MODE/ ACK. ALARM MODE = Off	– Rectify the cause of the message (see also Section 8.1). – Wait for the alarm display time to elapse.
– ALARM_HOLD_ON_TIME/ ALARM DISPL. TIME = 0 s – ACKNOWLEDGE_ALARM_MODE/ ACK. ALARM MODE = On	– Rectify the cause of the message (see also Section 8.1). – Confirm message using ACKNOWLEDGE_ALARM/ACK. ALARM parameter.
– ALARM_HOLD_ON_TIME/ ALARM DISPL. TIME > 0 s – ACKNOWLEDGE_ALARM_MODE/ ACK. ALARM MODE = On	– Rectify the cause of the message (see also Section 8.1). – Confirm message using ACKNOWLEDGE_ALARM/ACK. ALARM parameter. – Wait for the alarm display time to elapse. If a message appears and the alarm display time elapses before the message has been acknowledged, the message is cleared once it has been acknowledged.

1) FF configuration program: The parameters are in the Diagnostic Transducer Blocks.
FieldCare: Menu path for ALARM DISPL. TIME and ACK. ALARM MODE: OPERATING MENU → DIAGNOSTICS → MESSAGES

8.4 Repair

The Endress+Hauser repair concept provides for measuring devices to have a modular design and also that the customer may carry out repairs Section 8.6 "Spare parts" on → 🖹 83).

Note!
- For certified devices, please consult the "Repair of Ex-certified devices" section.
- For more information on service and spare parts contact the Endress+Hauser Service. (→ See www.endress.com/worldwide.)

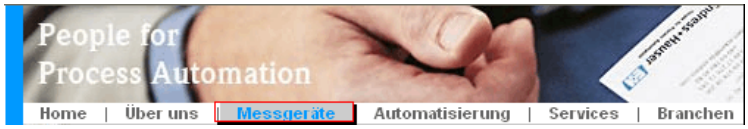
8.5 Repair of Ex-certified devices

Warning!
When repairing Ex-certified devices, please note the following:
- Only specialist personnel or Endress+Hauser may undertake repairs of certified devices.
- Relevant standards, national hazardous area regulations and Safety Instructions and Certificates must be observed.
- Only genuine Endress+Hauser spare parts may be used.
- When ordering spare parts, please check the device designation on the nameplate. Identical parts may only be used as replacements.
- Electronic inserts or sensors already in use in a standard instrument may not be used as spare parts for a certified device.
- Carry out repairs according to the instructions. After repairs, the device must fulfill the requirements of the specified individual tests.
- A certified device may only be converted into another certified variant by Endress+Hauser.
- All repairs and modifications must be documented.

8.6 Spare parts

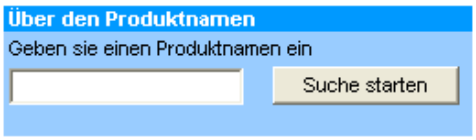
Information on the spare parts that are available for your measuring device is provided on the Internet site "www.endress.com". Proceed as follows here:

1. Select "www.endress.com" and then select the country.
2. Click "Products"

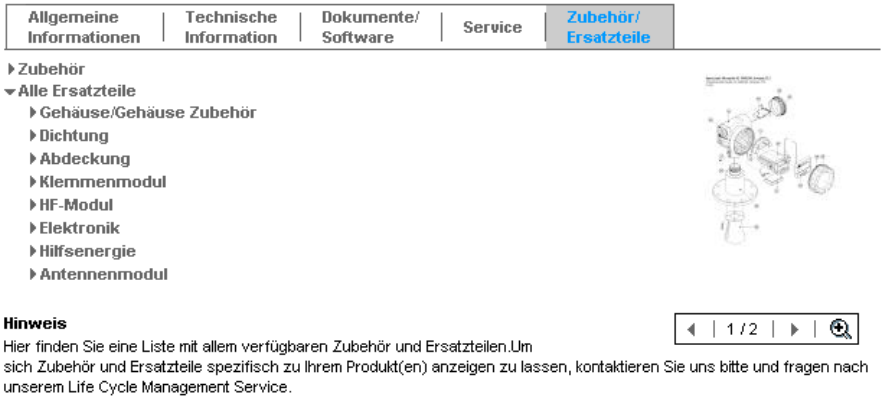


3. Enter the product name in the "Product name" field.

Endress+Hauser Produkt Suche



4. Select the measuring device.
5. Switch to the "Accessories/spare parts" tab



6. Select the spare parts (also use the overview drawings on the right-hand side of the screen).

When ordering a spare part, always indicate the serial number that is indicated on the nameplate. Where necessary, replacement instructions are provided with the spare parts.

8.7 Return

The measuring device must be returned if repairs or a factory calibration are required, or if the wrong measuring device has been ordered or delivered. According to legal regulations, Endress+Hauser, as a ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with process fluids.
To ensure swift, safe and professional device returns, please read the return procedures and conditions on the Endress+Hauser website at www.services.endress.com/return-material.

8.8 Disposal

When disposing, separate and recycle the device components based on the materials.

8.9 Software history

Date	Software version	Changes to the software	Documentation		
			CD-ROM	**Operating Instructions**	**Description of Device Functions**
03.2005	02.00.zz	Original software. Compatible with: – ToF Tool Field Tool Package, version 2.04 or higher	—	BA301P/00/EN/04.05 52027497	BA303P/00/EN/04.05 52027502
			—	BA301P/00/EN/11.05 71009597	BA303P/00/EN/04.05 52027502
			CD506P/00/A2/10.07 71033929	BA301P/00/EN/10.07 71043305	BA303P/00/EN/04.05 52027502
			CD506P/00/A2/12.07 71033929	BA301P/00/EN/12.07 71043305	BA303P/00/EN/04.05 52027502
			CD506P/00/A2/05.08 71071762	BA301P/00/EN/05.08 71071735	BA303P/00/EN/04.05 52027502
08.2008	03.00.zz	Compatible with: – FieldCare version 2.15.00	CD506P/00/A2/08.08 71077542	BA301P/00/EN/08.08 71077522	BA303P/00/EN/08.08 71076564
			CD506P/00/A2/06.09 71095432	BA301P/00/EN/06.09 71095421	BA303P/00/EN/06.09 71095456
			CD506P/00/A2/05.10 71111787	BA301P/00/EN/05.10 71111781	BA303P/00/EN/05.10 71111814
			CD506P/00/A2/13.11 71139775	BA301P/00/EN/13.11 71139766	BA303P/00/EN/13.11 71139808
			CD00506P/00/A2/14.12 71158707	BA00301P/00/EN/14.12 71161885	BA303P/00/EN/13.11 71139808

9 Technical data

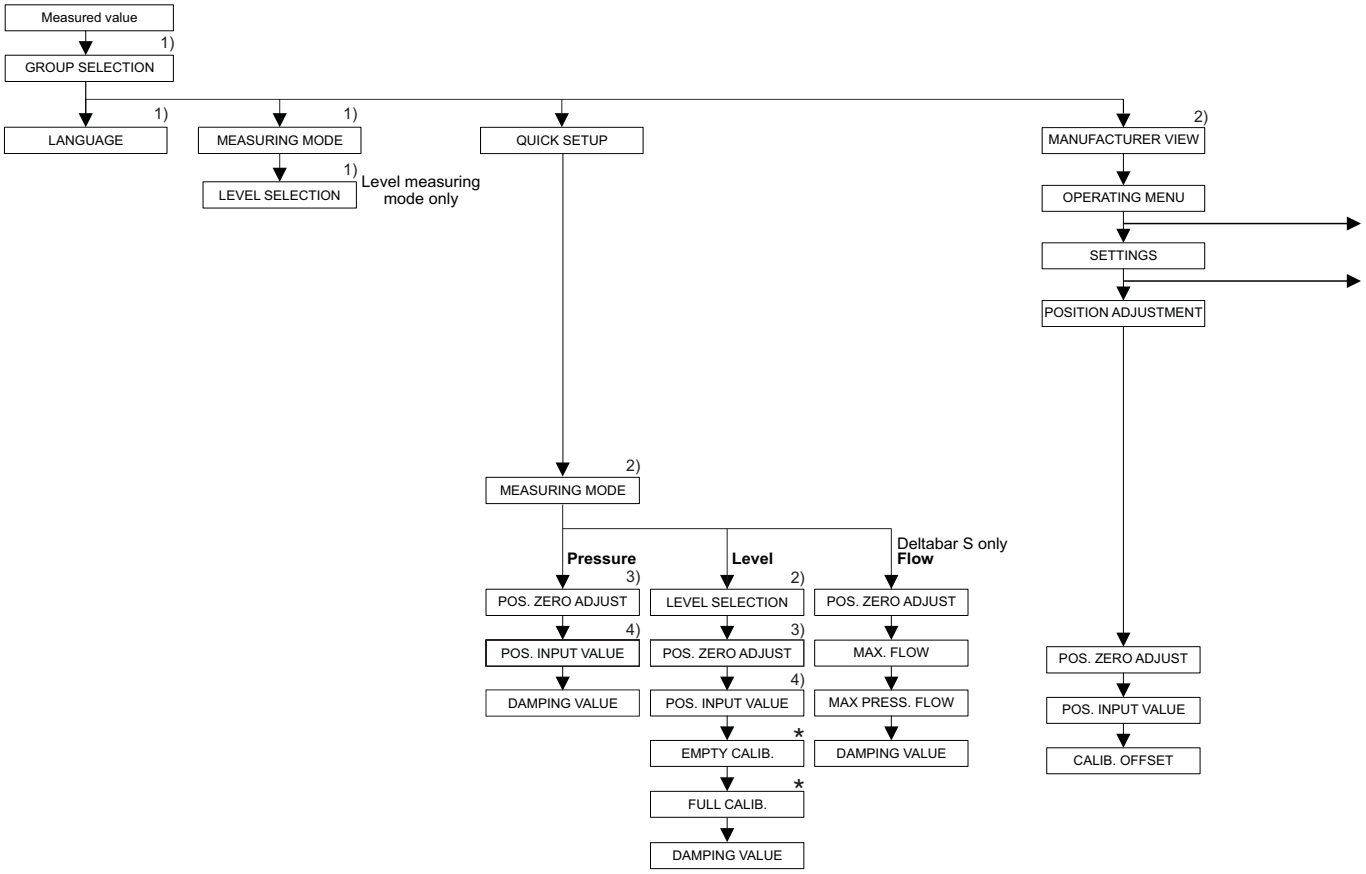
For technical data, please refer to Technical Information TI00382P for Deltabar S. → 2, "Overview of documentation" section.

10 Appendix

10.1 Menu

Note!

- The entire menu of Endress+Hauser parameters is depicted on the following pages. Some Endress+Hauser parameters correspond to FF standard parameters. All other FF parameters can only be configured by means of an FF configuration program. (→ See Operating Instructions BA00303P "Cerabar S/Deltabar S/Deltapilot S, Description of Device Functions").
- The menu has a different structure depending on the measuring mode selected. This means that some function groups are only displayed for one measuring mode, e.g. the "LINEARIZATION" function group for the "Level" measuring mode.
- In addition, there are also parameters that are only displayed if other parameters are appropriately configured. For example the CUSTOMER UNIT P parameter is only displayed if the "User unit" option was selected for the PRESS. ENG. UNIT parameter. These parameters are indicated with a "*".
- For a description of the parameters, please refer to Operating Instructions BA00303P "Cerabar S/ Deltabar S/Deltapilot S Description of Device Functions". The exact dependency of individual parameters on one another is explained here. → 2, "Overview of documentation" section.



1) Display via on-site display only

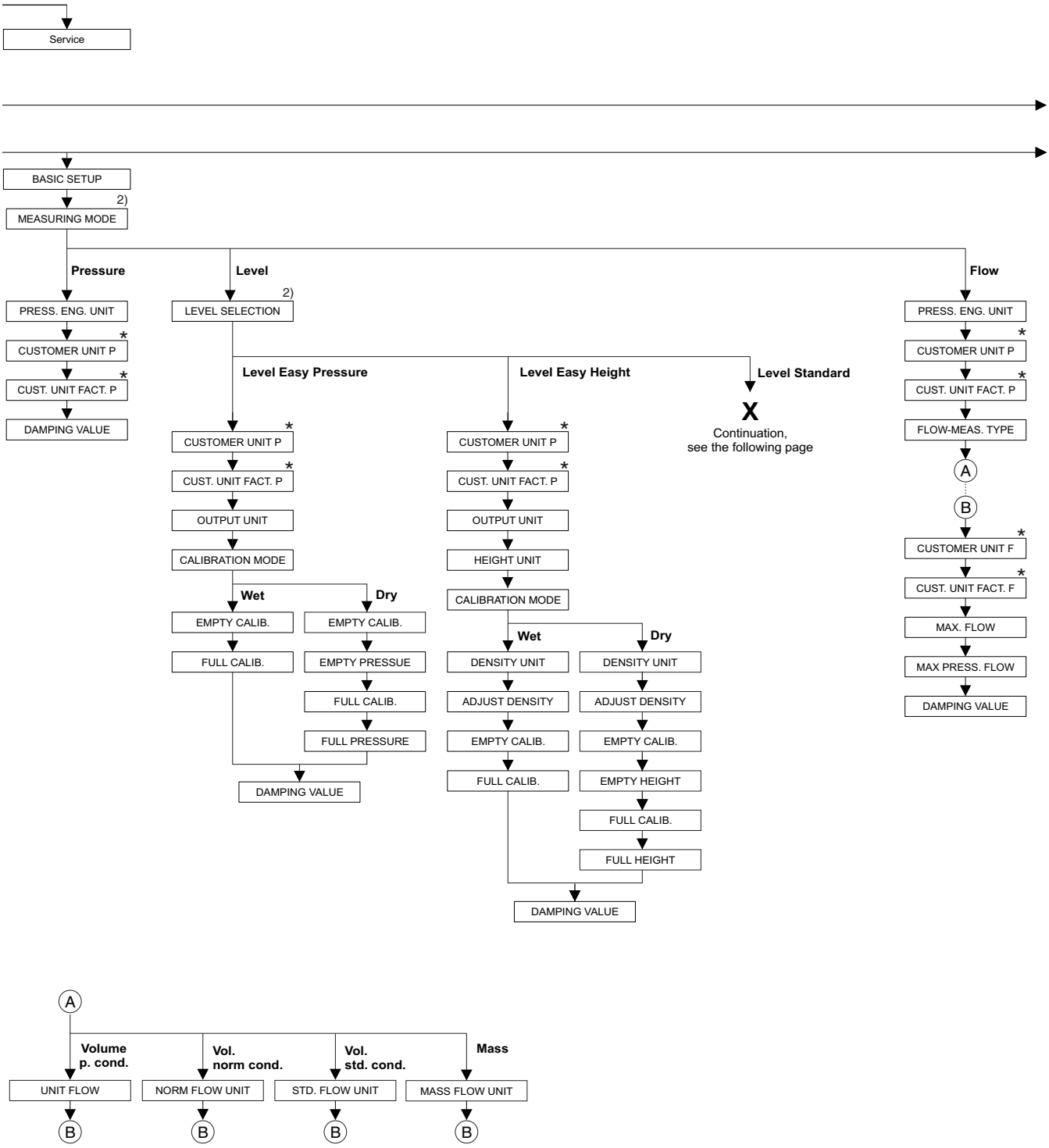
2) Display via FieldCare

3) Cerabar S with gauge pressure sensor, Deltabar S or Deltapilot S

4) Cerabar S with absolute pressure sensor

* There are parameters that are only displayed if other parameters are appropriately configured.
For example the Customer Unit P/CUSTOMER_UNIT_PRESSURE parameter is only displayed if the "User unit" option was selected for the Press. Eng. Unit/PRESSURE UNIT parameter.
These parameters are indicated with a "*".

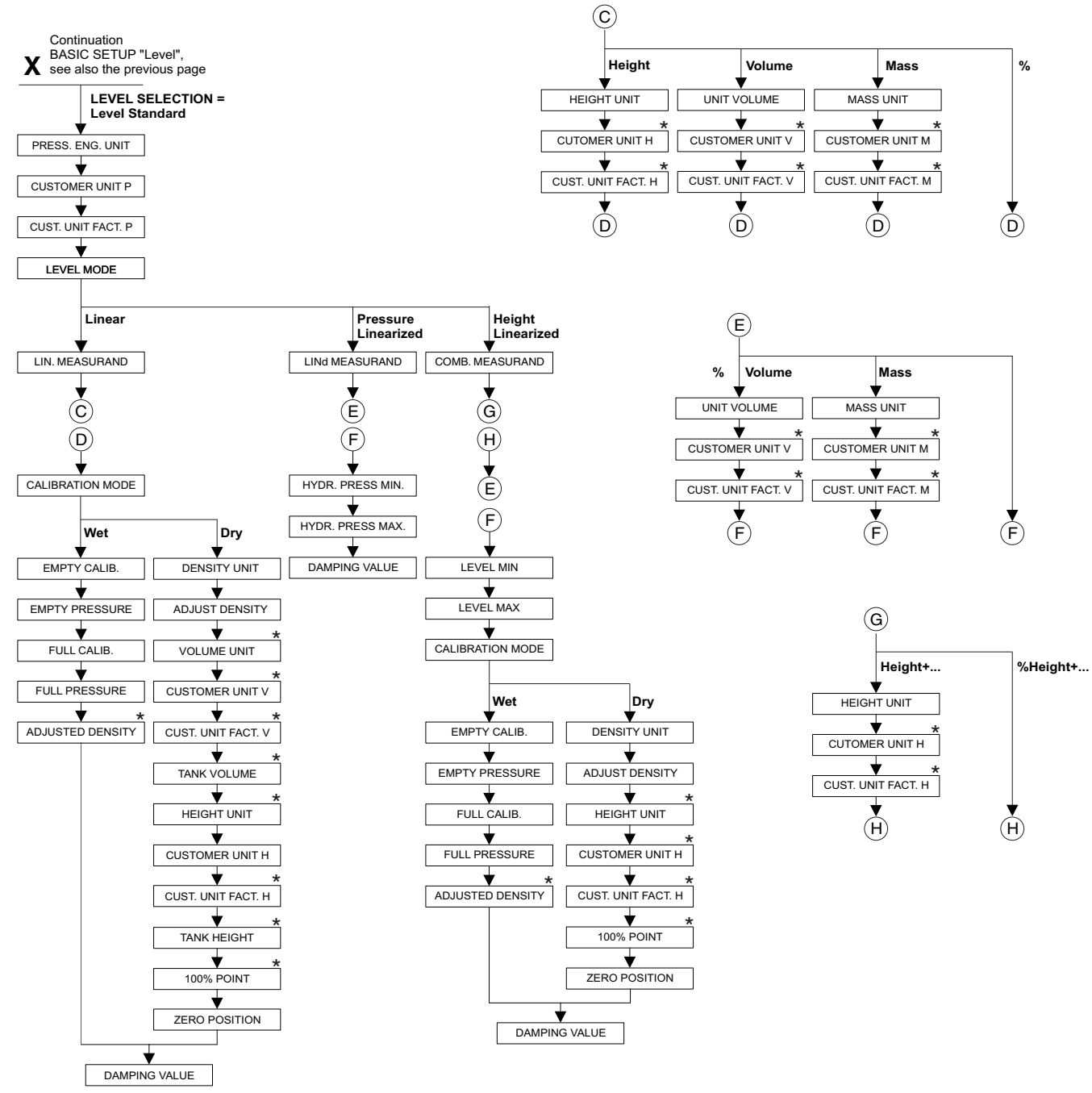
P01-xxxxxxxx-19-xx-xx-en-128



2) Display via FieldCare

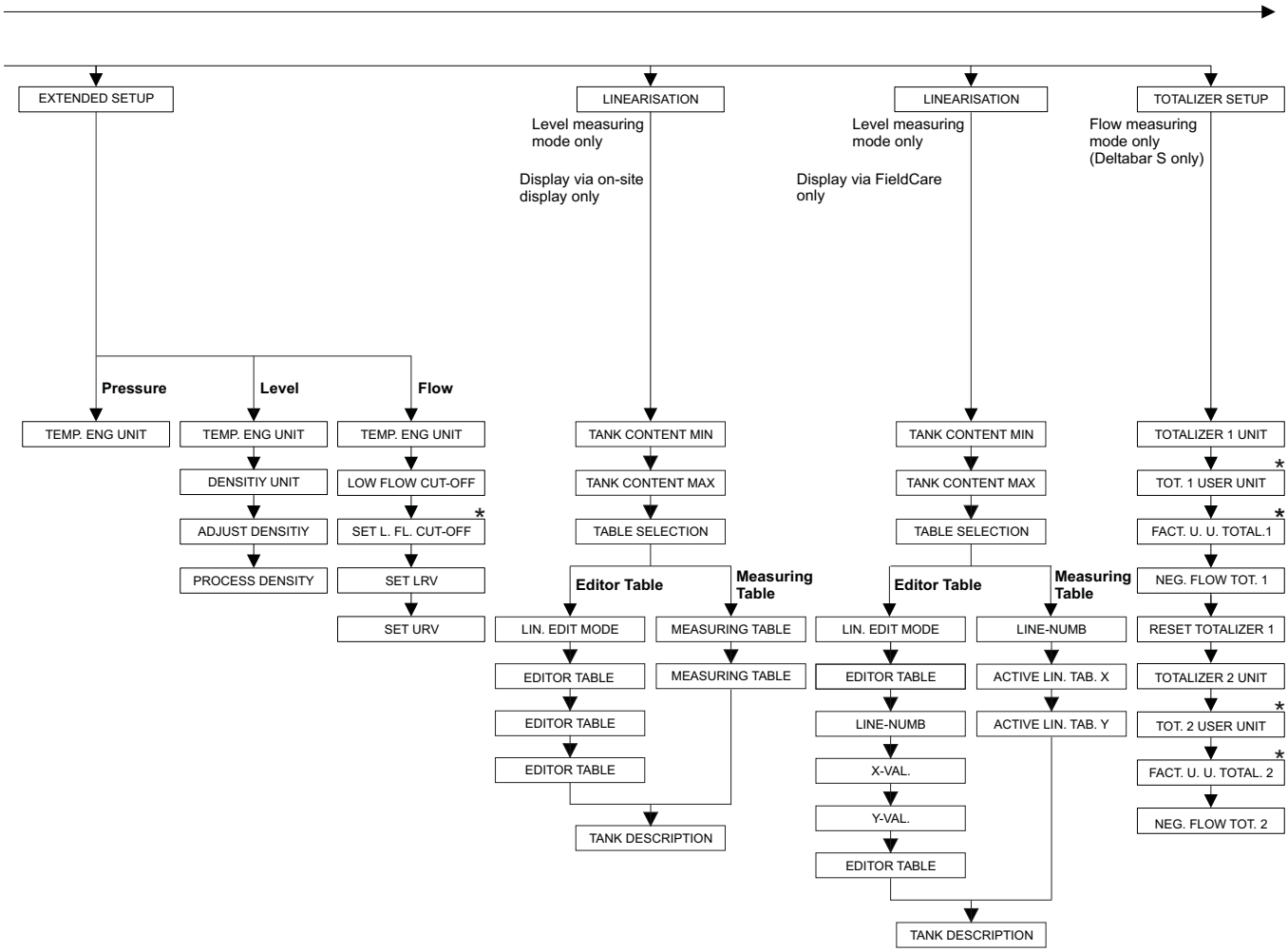
* There are parameters that are only displayed if other parameters are appropriately configured.
For example the Customer Unit P/CUSTOMER_UNIT_PRESSURE parameter is only displayed if the "User unit" option was selected for the Press. Eng. Unit/PRESSURE_UNIT parameter.
These parameters are indicated with a "*".

P01-xxxxxxxx-19-xx-xx-en-127



* There are parameters that are only displayed if other parameters are appropriately configured.
For example the Customer Unit H/CUSTOMER_HEIGHT_UNIT parameter is only displayed if the "User unit" option was selected for the Height Unit/HEIGHT_UNIT parameter.
These parameters are indicated with a "*".

P01-xxxxxxxx-19-xx-xx-en-126



* There are parameters that are only displayed if other parameters are appropriately configured.
For example the Tot. 1 User Unit/CUSTOMER_UNIT_TOT_1 parameter is only displayed if the "User unit" option was selected for the Totalizer 1 Unit/TOTALIZER_1_UNIT parameter.
These parameters are indicated with a "*".

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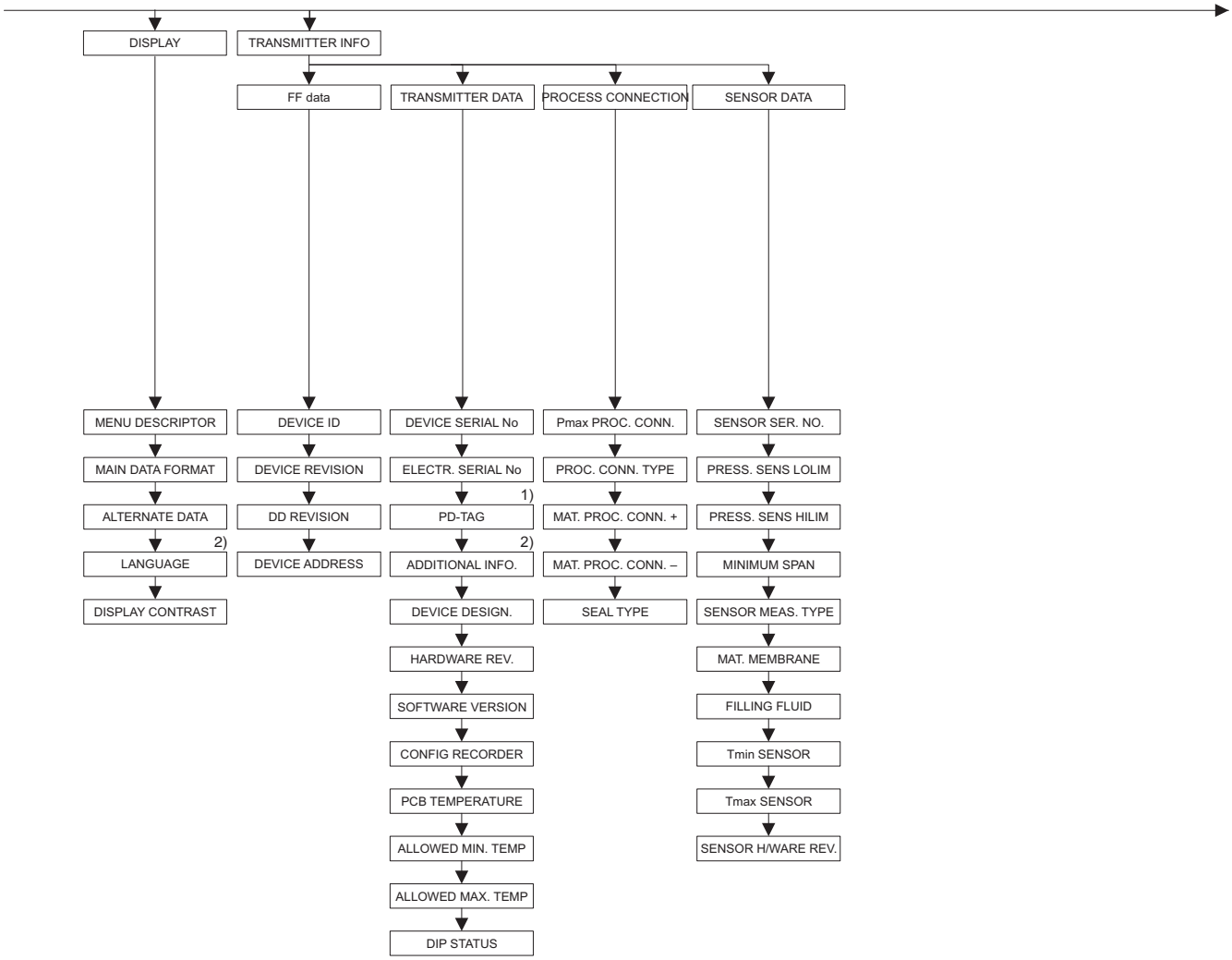

1) Display via on-site display only

2) Display via FieldCare

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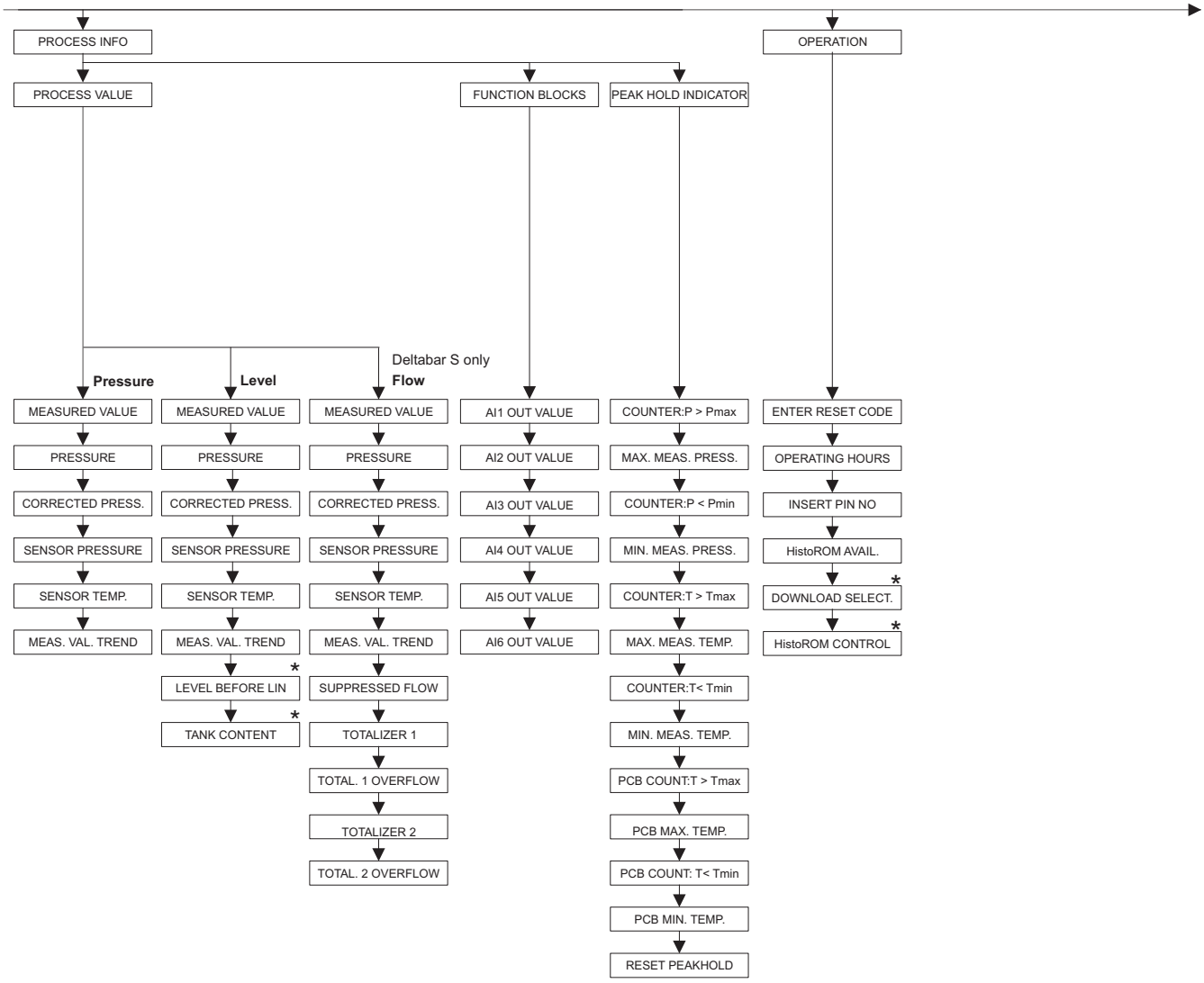

* There are parameters that are only displayed if other parameters are appropriately configured.
These parameters are indicated with a "*".

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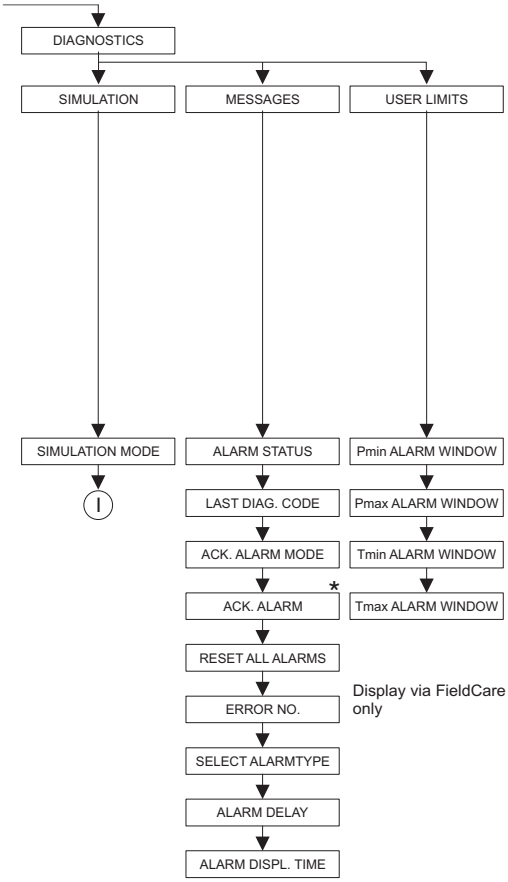

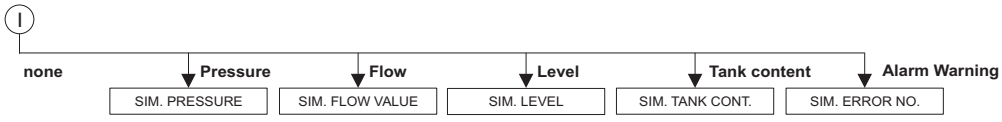

* There are parameters that are only displayed if other parameters are appropriately configured.
These parameters are indicated with a "*".

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