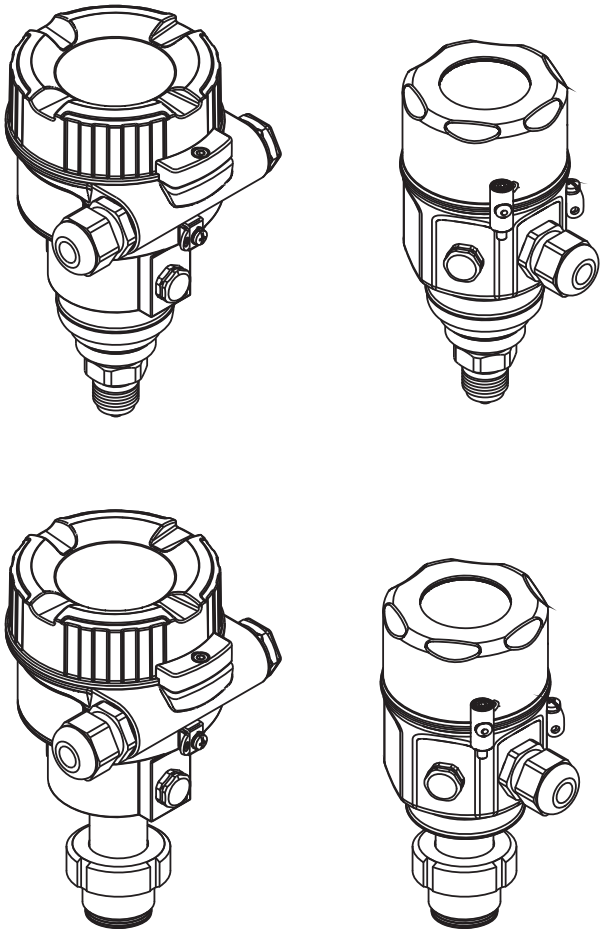
Operating Instructions
BA00383O/98/EN/05.12
71224488

Pressure Transmitter LHC-M51, PPC-M51, LHCR-51, LHCS-51

Process Pressure
Hydrostatic

With PROFIBUS PA



Valid from software version:
01.00.zz

PEPPERL+FUCHS

With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship".

Overview of Documentation

	LHC-M51, PPC-M51	**LHCR-51, LHCS-51**	**Content**	**Remarks**
Technical Information	TI00436O	TI00437O	Technical data	The documentation is available on the Internet. → see: www.peperl-fuchs.com
Operating Instruction	BA00383O		• Identification • Installation • Wiring • Operation • Commissioning • Examples of configuration • Description of parameters • Maintenance • Troubleshooting • Appendix	The documentation is available on the Internet. → see: www.peperl-fuchs.com
Brief Operating Instruction	KA01031O	KA01034O	• Installation • Wiring • Local operation • Commissioning	• The documentation is supplied with the device. • The documentation is also available on the Internet. → see: www.peperl-fuchs.com

TDOCT-3019_ENG 256722 03/2014

TDOCT-3019_ENG 256722 03/2014

1 Safety Instructions

1.1 Designated use

The LHC-M51 and PPC-M51 are pressure transmitters for measuring level and pressure.

The LHCR-51 and LHCS-51 are hydrostatic pressure sensors for measuring level and pressure.

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 EU regulations. If used incorrectly or for applications for which it is not intended, however, it can be a source of application-related danger, 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 devices are permissible only if they are expressly approved in the Operating Instructions. Pay particular attention to the technical data and information on the nameplate.

1.3 Operational and process safety

Alternative monitoring measures have to be taken while configuring, testing or servicing the device to ensure the operational and process safety.

WARNING Only disassemble the device in pressureless condition!

1.3.1 Hazardous areas (optional)

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.

Ensure that all personnel are suitably qualified.

1.3.2 Functional Safety SIL (optional)

If using devices for applications with safety integrity, the Manual "Safety Integrity Level" must be observed thoroughly.

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.

1.4.1 Safety symbols

Symbol	Meaning
DANGER P0011189-EN	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
WARNING P0011190-EN	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
CAUTION P0011191-EN	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE P0011192-EN	**NOTE!** This symbol contains information on procedures and other facts which do not result in personal injury.

TDOCT-3019_ENG 256722 03/2014

1.4.2 Electrical symbols

Symbol	Meaning
	**Explosion-protected, type-examined equipment** If the device has this symbol embossed on its nameplate, it can be used in a hazardous area or a non-hazardous area, depending on the approval.
	**Hazardous area** This symbol is used in the drawings of these Operating Instructions to indicate hazardous areas. • Devices used in hazardous areas must possess an appropriate type of protection.
	**Safe area (non-hazardous area)** This symbol is used in the drawings of these Operating Instructions to indicate non-hazardous areas. • Devices used in hazardous areas must possess an appropriate type of protection. Cables used in hazardous areas must meet the necessary safety-related characteristic quantities.

Symbol	Meaning
 P0011197	**Direct current** A terminal to which DC voltage is applied or through which direct current flows.
 P0011198	**Alternating current** A terminal to which alternating voltage (sine-wave) is applied or through which alternating current flows.
 P0011200	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
 P0011199	**Protective ground connection** A terminal which must be connected to ground prior to establishing any other connections.
 P0011201	**Equipotential connection** A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice
	**Connecting cable immunity to temperature change** Indicates that the connecting cables have to withstand a temperature of 85 °C at least.

1.4.3 Symbols for certain types of information

Symbol	Meaning
 P0011194	**Reference to documentation** Refers to the corresponding device documentation.
 P0011195	**Reference to page** Refers to the corresponding page number.
 P0011196	**Reference to graphic** Refers to the corresponding graphic number and page number.
	**Series of steps**
1., 2., 3. ...	**Several steps**
	Result of a sequence of actions
 P0013562	**Help in the event of a problem**

2 Identification

2.1 Device designation

2.1.1 Nameplate

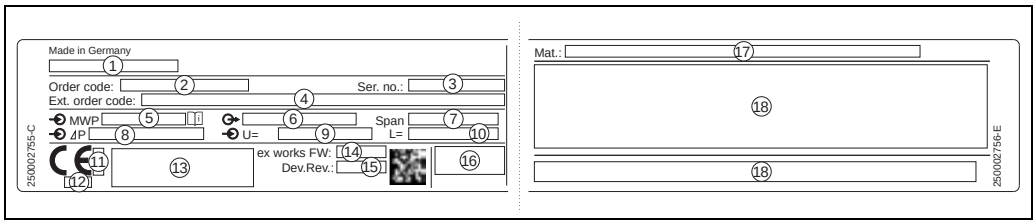
NOTICE

- 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 (38 °C) 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
- The test pressure corresponds to the over pressure limit (OPL) of the device = MWP x 1.5 [2].
- 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.

2 The equation does not apply for LHC-M51 with a 40 bar (600 psi) or a 100 bar (1500 psi) measuring cell.

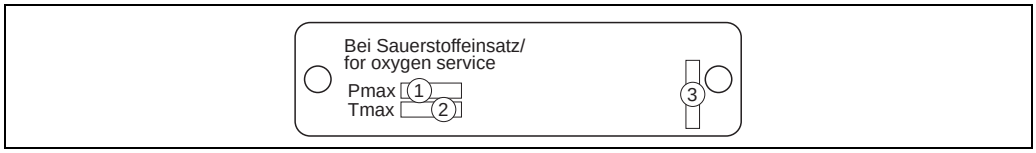
Aluminium housing



1 Nameplate

1 Device name
2 Order code (for re-orders)
3 Serial number (for identification)
4 Extended order code (complete)
5 MWP (maximum working pressure)
6 Electronic version (output signal)
7 Min./max. span
8 Nominal measuring range
9 Supply voltage
10 Unit of length
11 ID number of notified body with regard to ATEX (optional)
12 ID number of notified body with regard to Pressure Equipment Directive (optional)
13 Approvals
14 Software version
15 Device version
16 Degree of protection
17 Wetted materials
18 Approval-specific information

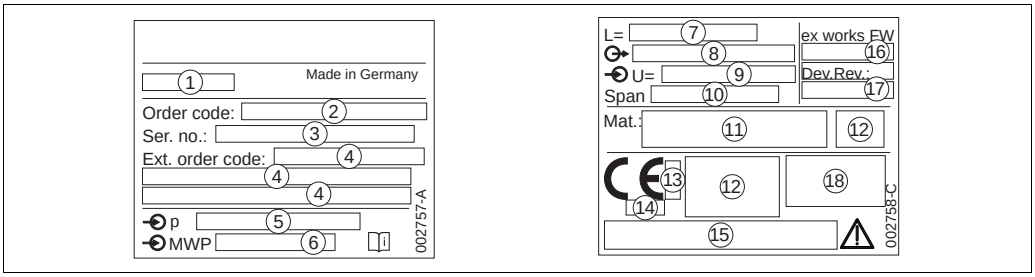
Devices suitable for oxygen applications are fitted with an additional nameplate.



2 Additional nameplate for devices suitable for oxygen application

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

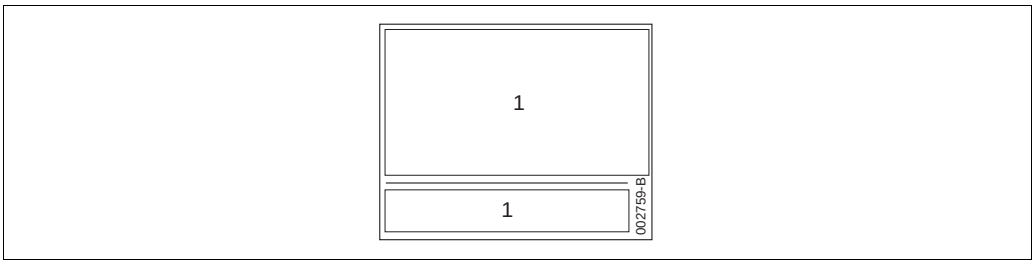
Stainless steel housing, hygienic



3 Nameplate

1 Device name
2 Order code (for re-orders)
3 Serial number (for identification)
4 Extended order code (complete)
5 Nominal measuring range
6 MWP (maximum working pressure)
7 Length data
8 Electronic version (output signal)
9 Supply voltage
10 Min./max. span
11 Wetted materials
12 Approval-specific information
13 ID number of notified body with regard to ATEX (optional)
14 ID number of notified body with regard to Pressure Equipment Directive (optional)
15 Approvals
16 Software version
17 Device version
18 Degree of protection

Devices with certificates are fitted with an additional plate.



4 Additional nameplate for devices with certificates

1 Approval-specific information

2.1.2 Identifying the sensor type

- In the case of gauge pressure sensors, the "Pos. zero adjust" parameter appears in the operating menu ("Setup" → "Pos. zero adjust").
- In the case of absolute pressure sensors, the "Calib. offset" parameter appears in the operating menu ("Setup" → "Calib. offset").

2.2 Scope of delivery

The scope of delivery comprises:

- Device
- Optional accessories

Documentation supplied:

- Brief Operating Instruction: KA01031O (LHC-M51, PPC-M51), KA01034O (LHCR-51, LHCS-51)
- Final inspection report
- Additional Safety Instructions for 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. Pepperl+Fuchs confirms the conformity of the device by affixing to it the CE mark.

2.4 Registered trademarks

KALREZ, VITON, TEFLON
Registered trademark of E.I. Du Pont de Nemours & Co., Wilmington, USA
TRI-CLAMP
Registered trademark of Ladish & Co., Inc., Kenosha, USA
PROFIBUS PA
Trademark of the PROFIBUS User Organization, Karlsruhe, Germany
GORE-TEX®
Registered trademark of W.L. Gore & Associates, Inc., USA

TDOCT-3019_ENG 256722 03/2014

3 Installation

3.1 Incoming acceptance, transport, 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 damage from impact (EN 837-2).

Storage temperature range: See Technical Informations TI00436O (LHC-M51, PPC-M51) or TI00437O (LHCR-51, LHCS-51).

3.2 Installation conditions

3.2.1 Dimensions

- For dimensions, please refer to the Technical Informations TI00436O (LHC-M51, PPC-M51) or TI00437O (LHCR-51, LHCS-51), "Mechanical construction" section.
  See also → 2, "Overview of Documentation" section.

3.3 Installing pressure transmitters LHC-M51, PPC-M51

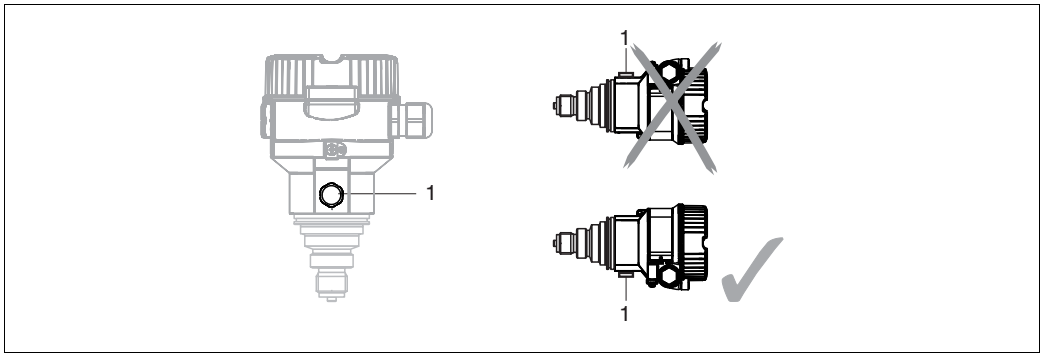
NOTICE

- Due to the orientation of the pressure transmitter, there may be a shift in the zero point, i. e. when the container is empty or partially full, the measured value does not display zero. You can correct this zero point shift, → 25, "Function of the operating elements" or → 60, "Position zero adjustment".
- Pepperl+Fuchs offers a mounting bracket for installing on pipes or walls.
  → 13, "Wall and pipe mounting (optional)".

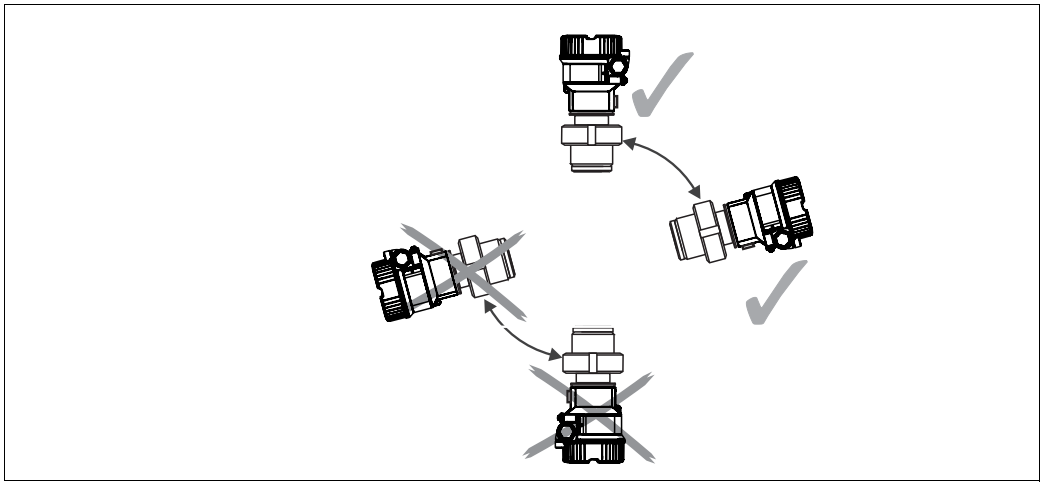
3.3.1 Installation instructions

NOTICE

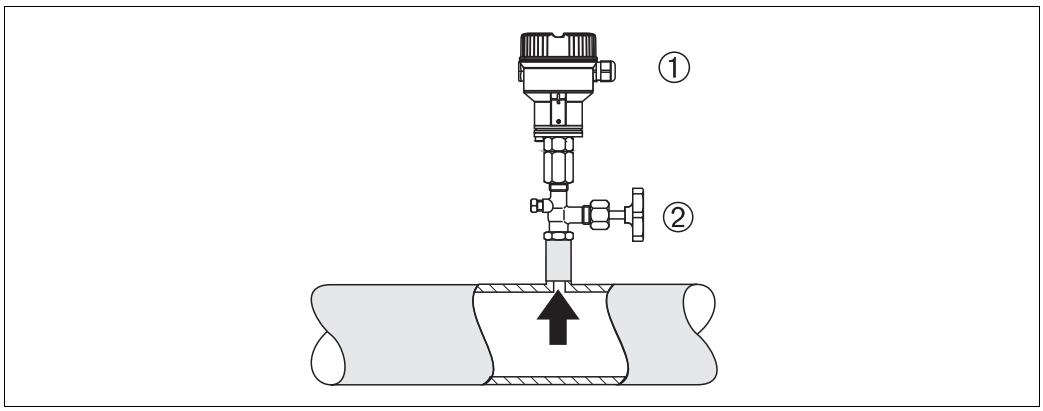
- If a heated pressure transmitter is cooled during the cleaning process (e. g. by cold water), a vacuum develops for a short time, whereby moisture can penetrate the sensor through the pressure compensation (1). If this is the case, mount the pressure transmitter with the pressure compensation (1) pointing downwards.



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



Pressure measurement in gases



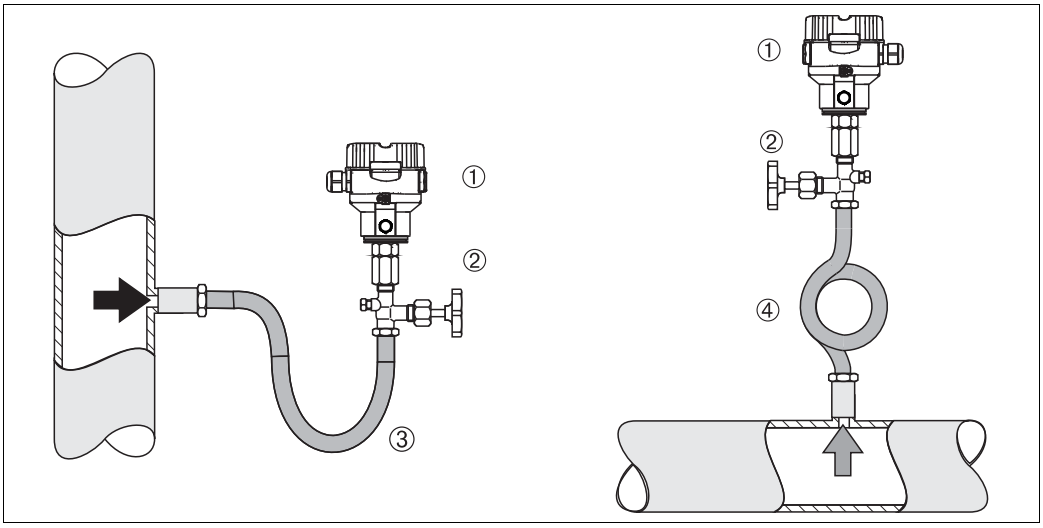
5 Measuring arrangement for pressure measurement in gases

1 Pressure transmitter
2 Shutoff device

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

TDOCT-3019_ENG 256722 03/2014

Pressure measurement in steams

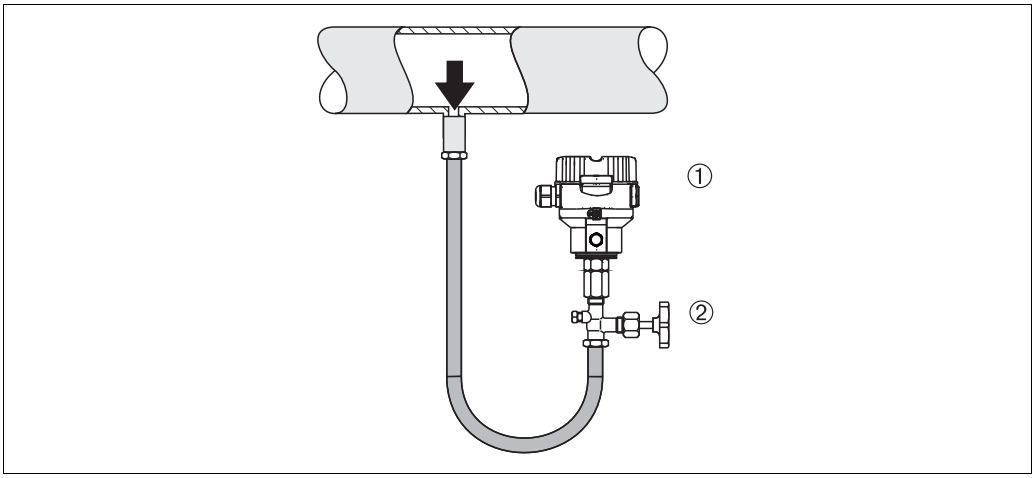


6 Measuring arrangement for pressure measurement in steams

1 Pressure transmitter
2 Shutoff device
3 U-shaped siphon
4 Circular siphon

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

Pressure measurement in liquids

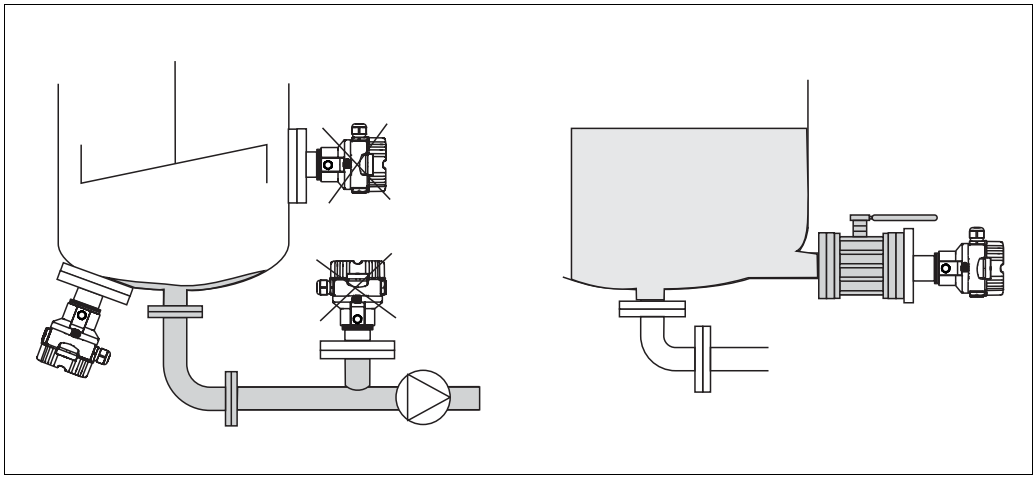


7 Measuring arrangement for pressure measurement in liquids

1 Pressure transmitter
2 Shutoff device

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

Level measurement



8 Measuring arrangement for level

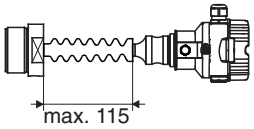
- Always install the pressure transmitter below the lowest measuring point.
- Do not mount the device in the filling curtain or at a point in the tank which could be affected by pressure pulses from an agitator.
- Do not mount the device in the suction area of a pump.
- The calibration and functional test can be carried out more easily if you mount the device downstream of a shutoff device.

PVDF interchangeable threaded boss

NOTICE

A maximum torque of 7 Nm (5.16 lbs ft) is permitted for devices with a PVDF interchangeable threaded boss. The thread connection may become loose at high temperatures and pressures. This means that the integrity of the thread must be checked regularly and may need to be tightened using the torque given above. Teflon tape is recommended for sealing the 1/2NPT thread.

Mounting with temperature isolator

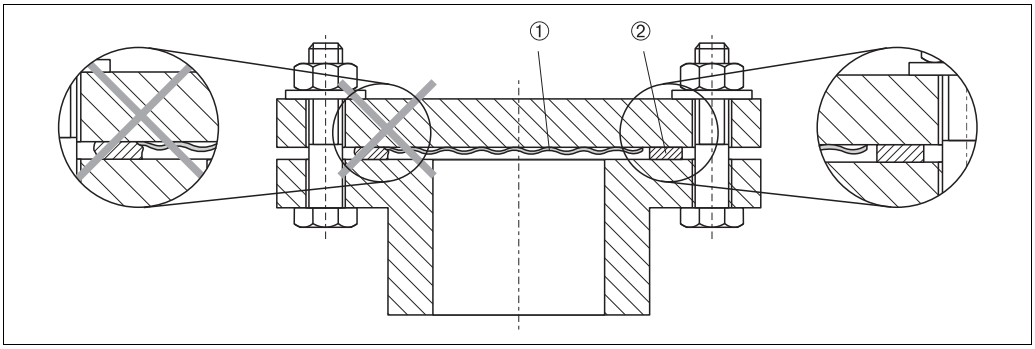


Pepperl+Fuchs recommends the use of temperature isolators in the event of constant extreme medium temperatures which lead to the maximum permissible electronics temperature of +85 °C (+185 °F) being exceeded. To minimize the influence of rising heat, Pepperl+Fuchs recommends the device be mounted horizontally or with the housing pointing downwards.

The additional installation height also brings about a zero point shift of approx. 21 mbar (0.315 psi) due to the hydrostatic column in the temperature isolator. You can correct this zero point shift, → 25, "Function of the operating elements" or → 60, "Position zero adjustment".

TDOCT-3019_ENG 256722 03/2014

3.3.2 Seal for flange mounting



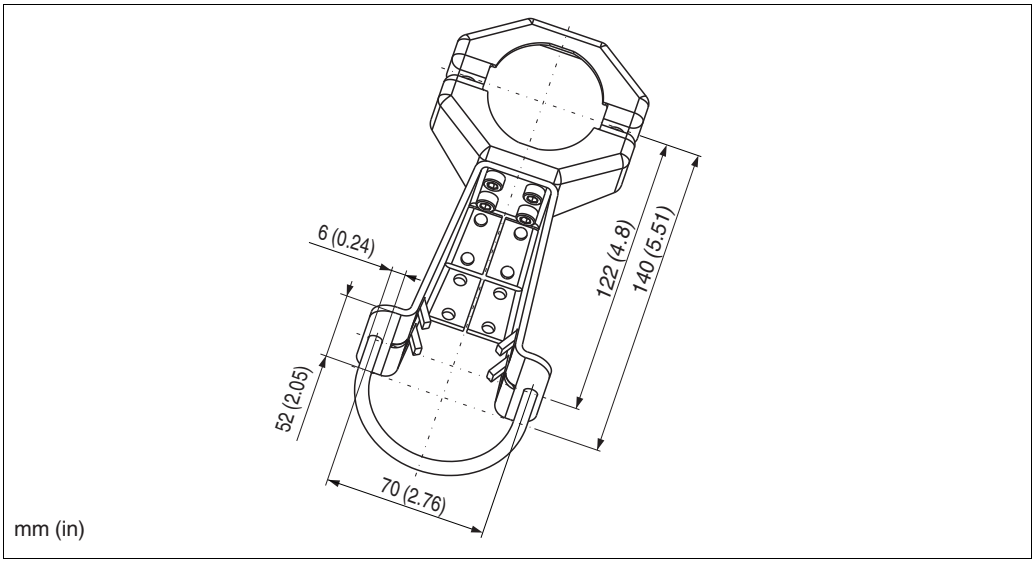
9 Mounting the versions with a flange

1 Process isolating diaphragm
2 Seal

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

3.3.3 Wall and pipe mounting (optional)

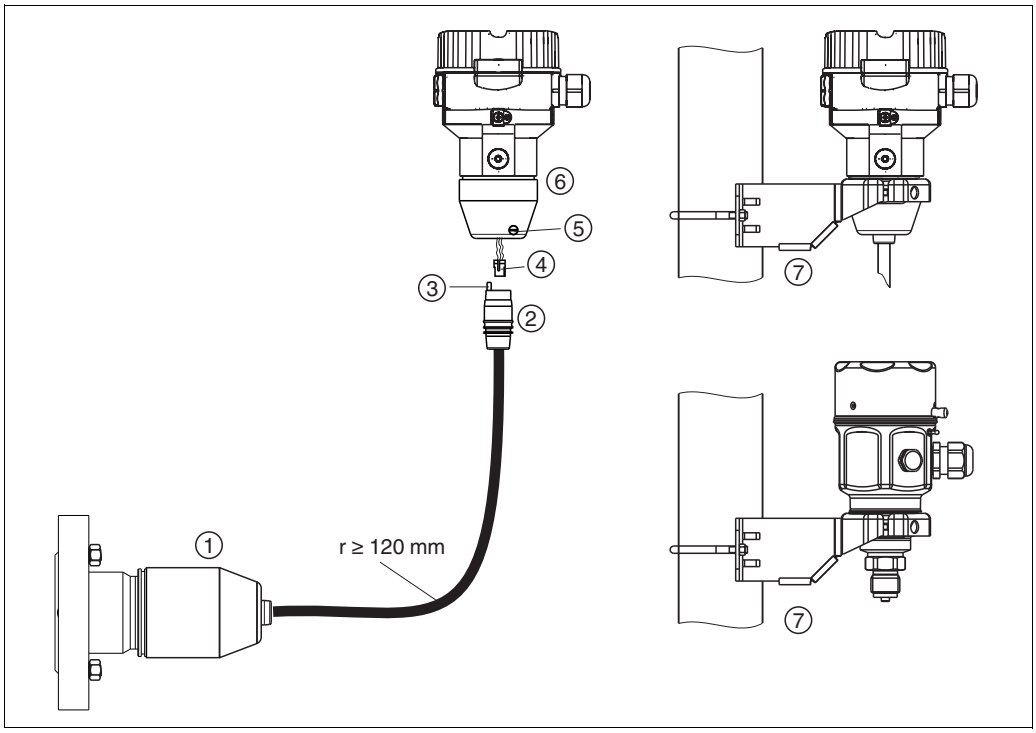
Pepperl+Fuchs offers a mounting bracket for installing on pipes or walls (for pipes from 1-1/4 in up to 2 in diameter).



Please note the following when mounting:

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

3.3.4 Assembling and mounting the"separate housing" version



10 "Separate housing" version

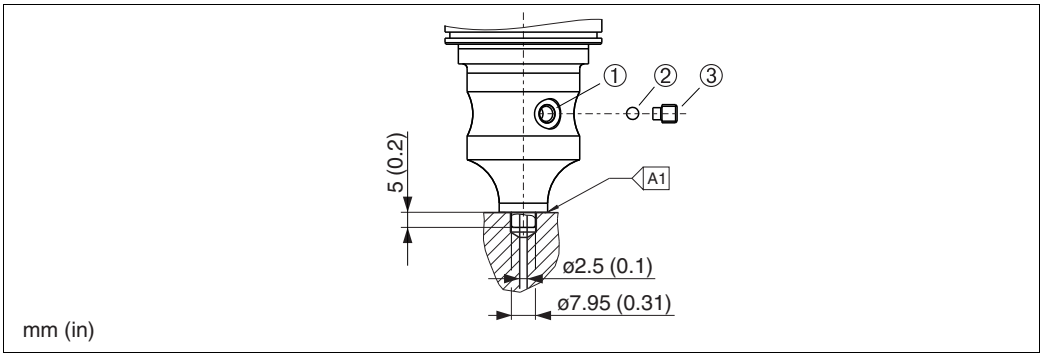
1 In the case of the "separate housing" version, the sensor is delivered with the process connection and cable ready mounted.
2 Cable with connection jack
3 Pressure compensation
4 Connector
5 Locking screw
6 Housing mounted with housing adapter, included
7 Mounting bracket provided, suitable for pipe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

Assembly and mounting

1. Insert the connector (4) into the corresponding connection jack of the cable (2).
2. Plug the cable into the housing adapter (6).
3. Tighten the locking screw (5).
4. Mount the housing on a wall or pipe using the mounting bracket (7). When mounting on a pipe, tighten the nuts on the bracket uniformly with a torque of at least 5 Nm (3.6 lbs ft).
   Mount the cable with a bending radius (r) ≥ 120 mm (4.72 in).

TDOCT-3019_ENG 256722 03/2014

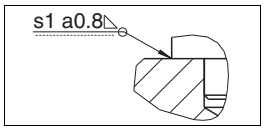
3.3.5 LHC-M51, version prepared for diaphragm seal mount – welding recommendation



11 Version XSJ: prepared for diaphragm seal mount

1 Hole for fill fluid
2 Bearing
3 Setscrew
A1 See the "Welding recommendation" table below

Pepperl+Fuchs recommends welding on the diaphragm seal as follows for the "XSJ" version in feature "Process connections" in the order code up to, and including, 40 bar (600 psi) sensors: the total welding depth of the fillet weld is 1 mm (0.04 in) with an outer diameter of 16 mm (0.63 in). Welding is performed according to the WIG method.

Consecutive seam no.	Sketch/welding groove shape, dimension as per DIN 8551	Base material matching	Welding process DIN EN/ISO 24063	Welding position	Inert gas, additives
A1 for sensors ≤ 40 bar (600 psi)		Adapter made of AISI 316L (1.4435) to be welded to diaphragm seal made of AISI 316L (1.4435 or 1.4404)	141	PB	Inert gas Ar/H 95/5 Additive: ER 316L Si (1.4430)

Information on filling

The diaphragm seal must be filled as soon as it has been welded on.

- After welding into the process connection, the sensor assembly must be properly filled with a filling oil and sealed gas-tight with a sealing ball and lock screw.
  Once the diaphragm seal has been filled, the device display should not exceed 10 % of the full scale value of the cell measuring range at the zero point. The internal pressure of the diaphragm seal must be corrected accordingly.
- Adjustment/calibration:
  - The device is operational once it has been fully assembled.
  - Perform a reset. The device then has to be calibrated to the process measuring range as explained in the Operating Instructions.
  - Once the device has been switched on, the total reset code (7864) must be entered in the path: "Expert" → "System" → "Management" → "Factory reset (124)" (→ 35, "Resetting to factory settings (reset)"). The electronics then read all the specific sensor data out of the sensor electronics. The device then has to be calibrated to the process measuring range as explained in the Operating Instructions.

3.4 Installing pressure transmitters LHCR-51, LHCS-51

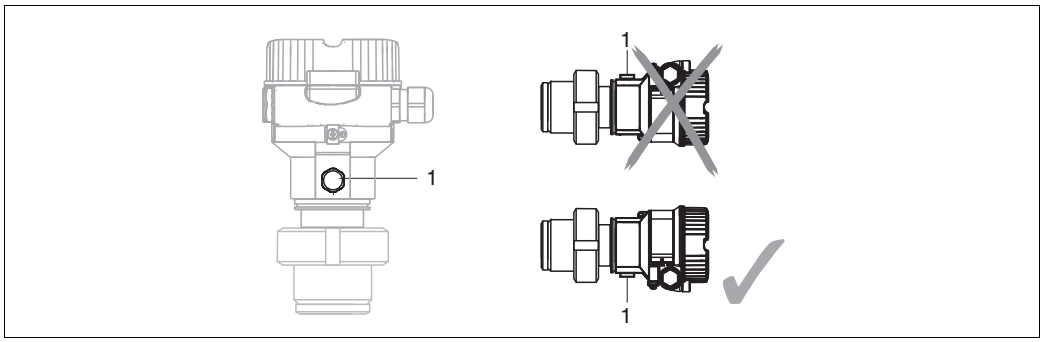
NOTICE

- Due to the orientation of the pressure transmitter, there may be a shift in the zero point, i. e. when the container is empty or partially full, the measured value does not display zero. You can correct this zero point shift, → 25, "Function of the operating elements" or → 60, "Position zero adjustment".
- The onsite display can be rotated in 90° stages.
- Pepperl+Fuchs offers a mounting bracket for installing on pipes or walls.
  → 17, section "Wall and pipe mounting (optional)".

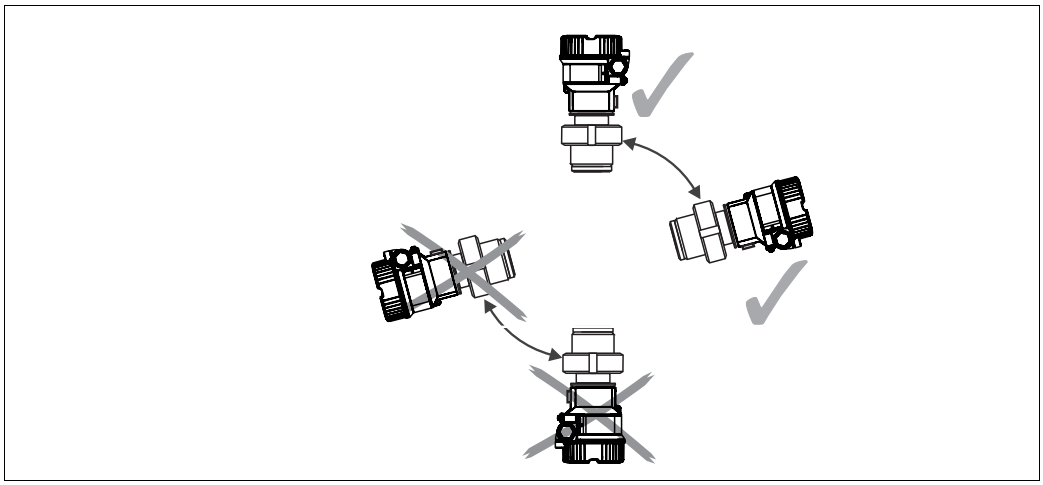
3.4.1 General installation instructions

NOTICE

- Do not clean or touch process isolating diaphragms with hard or pointed objects.
- The process isolating diaphragm in the rod and cable version is protected against mechanical damage by a plastic cap.
- If a heated pressure transmitter is cooled during the cleaning process (e. g. by cold water), a vacuum develops for a short time, whereby moisture can penetrate the sensor through the pressure compensation (1). If this is the case, mount the pressure transmitter with the pressure compensation (1) pointing downwards.

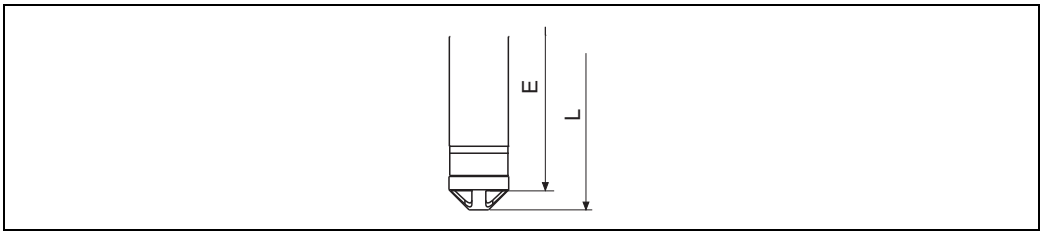


- Keep the pressure compensation and GORE-TEX® filter (1) free from contamination.
- The device must be installed as follows in order to comply with the cleanability requirements of the ASME-BPE (Part SD Cleanability):

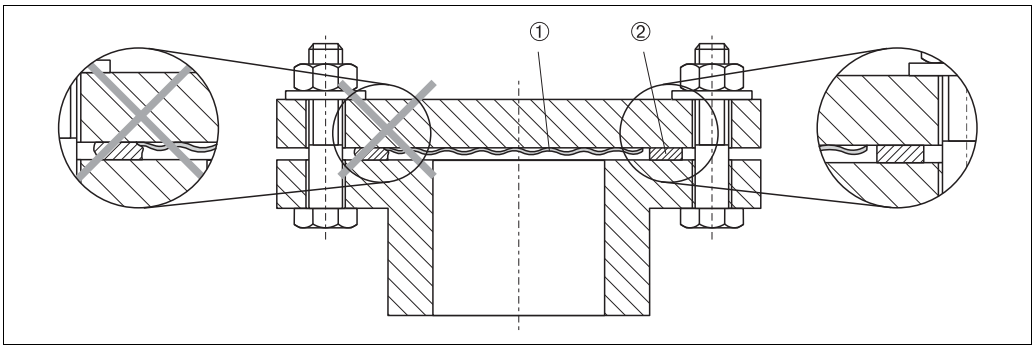


- When mounting rod and cable versions, make sure that the probe head is located at a point as free as possible from flow. To protect the probe from impact resulting from lateral movement, mount the probe in a guide tube (preferably made of plastic) or secure it with a clamping fixture.
- In the case of devices for hazardous areas, comply strictly with the safety instructions when the housing cover is open.
- The length of the extension cable or the probe rod is based on the planned level zero point. The height of the protective cap must be taken into consideration when designing the layout of the measuring point. The level zero point (E) corresponds to the position of the process isolating diaphragm.
  Level zero point = E; top of the probe = L.

TDOCT-3019_ENG 256722 03/2014



3.4.2 Seal for flange mounting



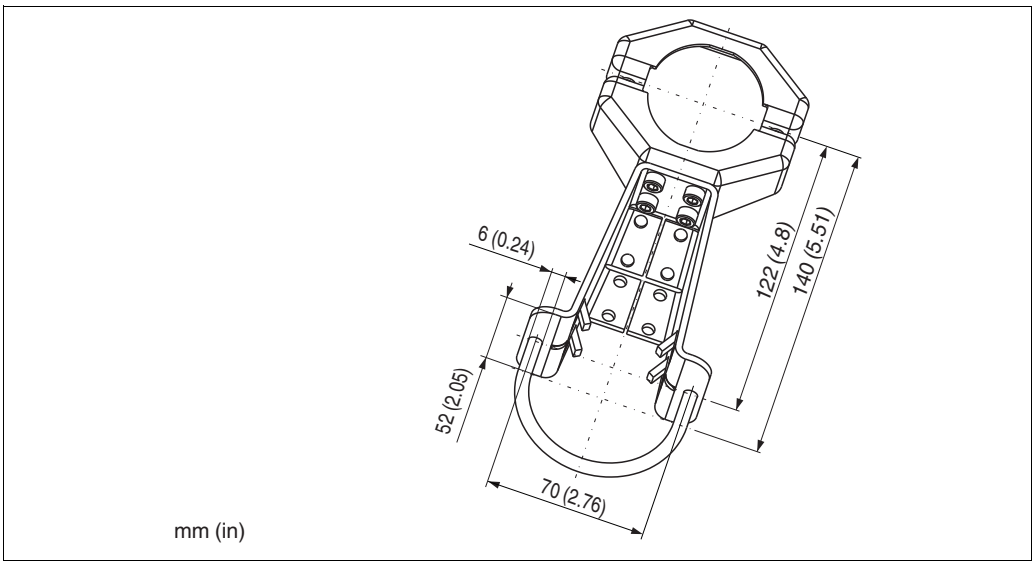
12 Mounting the versions with a flange

1 Process isolating diaphragm
2 Seal

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

3.4.3 Wall and pipe mounting (optional)

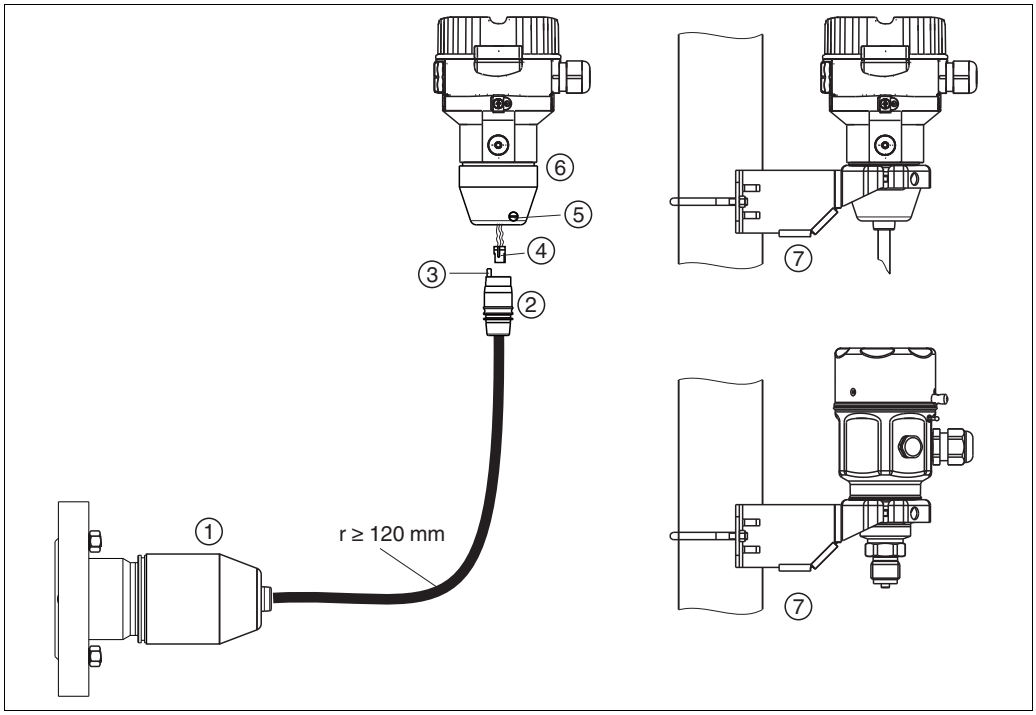
Pepperl+Fuchs offers a mounting bracket for installing on pipes or walls (for pipes from 1-1/4 in up to 2 in diameter).



In the case of pipe mounting

- The nuts on the bracket must be tightened uniformly with a torque of at least 5 Nm (3.69 lbf ft).

3.4.4 Assembling and mounting the "separate housing" version



13 "Separate housing" version

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

Assembly and mounting

1. Insert the connector (4) into the corresponding connection jack of the cable (2).
2. Plug the cable into the housing adapter (6).
3. Tighten the locking screw (5).
4. Mount the housing on a wall or pipe using the mounting bracket (7).
   When mounting on a pipe, tighten the nuts on the bracket uniformly with a torque of at least 5 Nm (3.69 lbf ft). Mount the cable with a bending radius (r) ≥ 120 mm (4,72 in).

Routing the cable (e. g. through a pipe)

You require the cable shortening kit.

3.4.5 Supplementary installation instructions

Seal

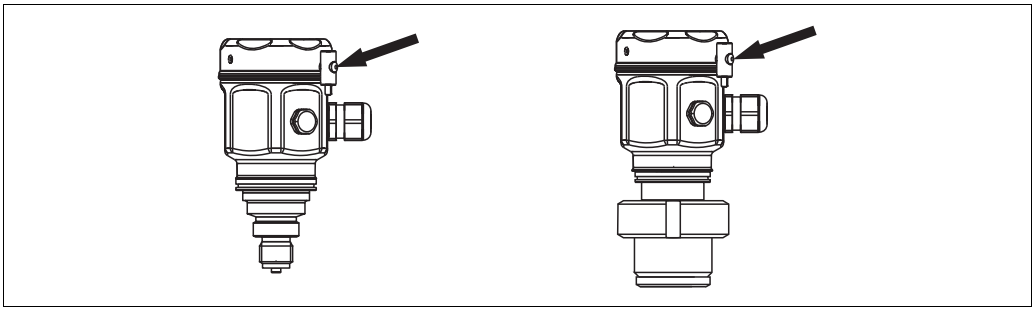
- LHCR-51, LHCS-51 with a G 1-1/2 thread:
  When screwing the device into the tank, the flat seal has to be positioned on the sealing surface of the process connection. To avoid additional strain on the process isolating diaphragm, the thread should never be sealed with hemp or similar materials.
- LHCR-51, LHCS-51 with NPT thread:
  - Wrap Teflon tape around the thread to seal it.
  - Tighten the device at the hexagonal bolt only. Do not turn at the housing.
  - Do not overtighten the thread when screwing. Max. torque: 20 Nm to 30 Nm (14.75 lbf ft to 22.13 lbf ft)

Sealing the probe housing

- Moisture must not penetrate the housing when mounting the device, establishing the electrical connection and during operation.
- Always firmly tighten the housing cover and the cable entries.

TDOCT-3019_ENG 256722 03/2014

3.5 Closing the cover on the stainless steel housing



14 Closing the cover

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

3.6 Post-installation check

After installing the device, carry out the following checks:

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

4 Wiring

4.1 Connecting the device

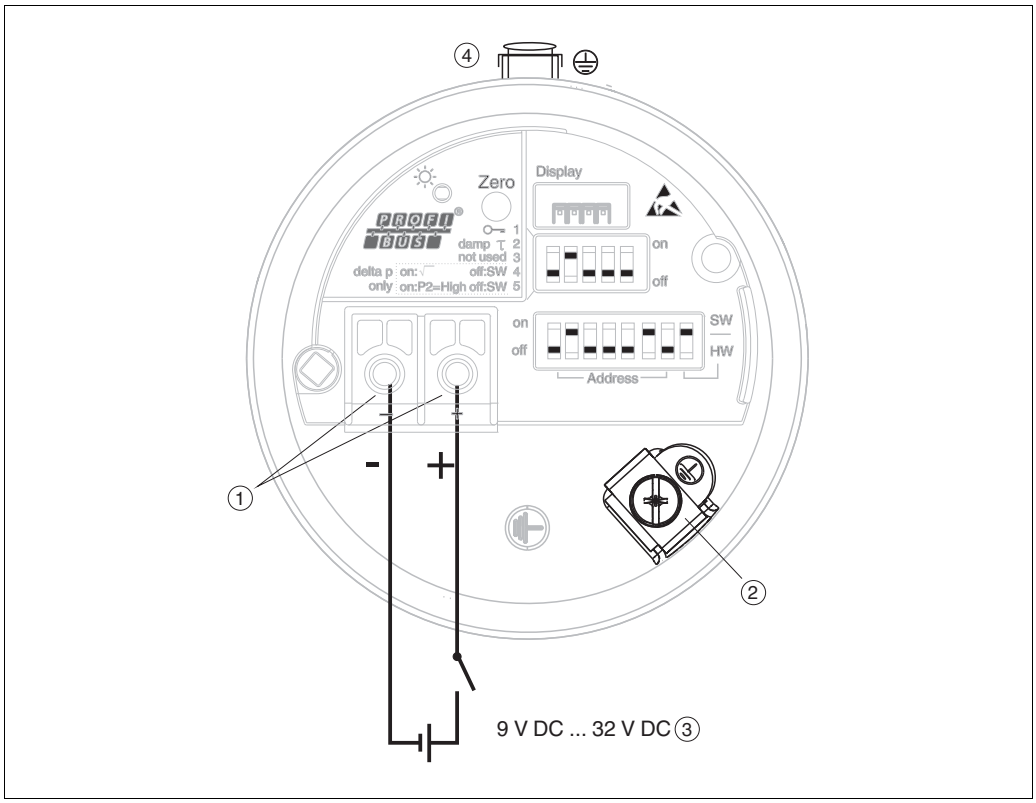
WARNING Risk of electric shock and/or explosion in hazardous areas! In a wet environment, do not open the cover if voltage is present.

NOTICE

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

The procedure

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



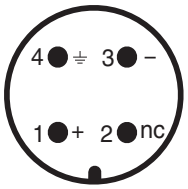
15 PROFIBUS PA electrical connection

1 Terminals for supply voltage and signal
2 Grounding terminal
3 Supply voltage: 9 V DC to 32 V DC (Segment coupler)
4 External ground terminal

TDOCT-3019_ENG 256722 03/2014

4.1.1 Connecting devices with an M12 connector

PIN assignment for M12 connector



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

4.2 Connecting the measuring unit

NOTICE 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. the PNO Guideline.

4.2.1 Supply voltage

NOTICE

- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas.

Electronic version	
PROFIBUS PA, version for non-hazardous areas	9 V DC to 32 V DC

4.2.2 Current consumption

11 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 mm^2 to 2.5 mm^2 (20 AWG to 14 AWG)
- Cable outer diameter: 5 mm to 9 mm (0.2 in to 0.35 in)

NOTICE For further information on the cable specifications, see the PNO Guideline 2.092 "PROFIBUS PA User and Installation Guideline" and IEC 61158-2 (MBP).

4.2.4 Shielding/potential equalization

- You achieve optimum shielding against disturbances if the shielding is connected on both sides (in the cabinet and on the device). If potential equalization currents are expected in the plant, only ground shielding on one side, preferably at the transmitter.
- When using in hazardous areas, you must observe the applicable regulations.
  Separate Ex documentation with additional technical data and instructions is included with all Ex systems as standard.

4.3 Potential equalization

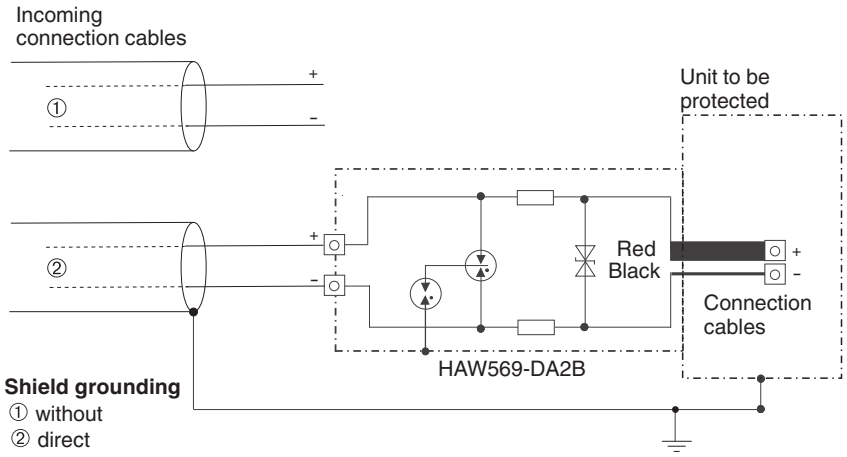
Hazardous area applications: Connect all devices to the local potential equalization.
Observe the applicable regulations.

4.4 Overvoltage protection (optional)

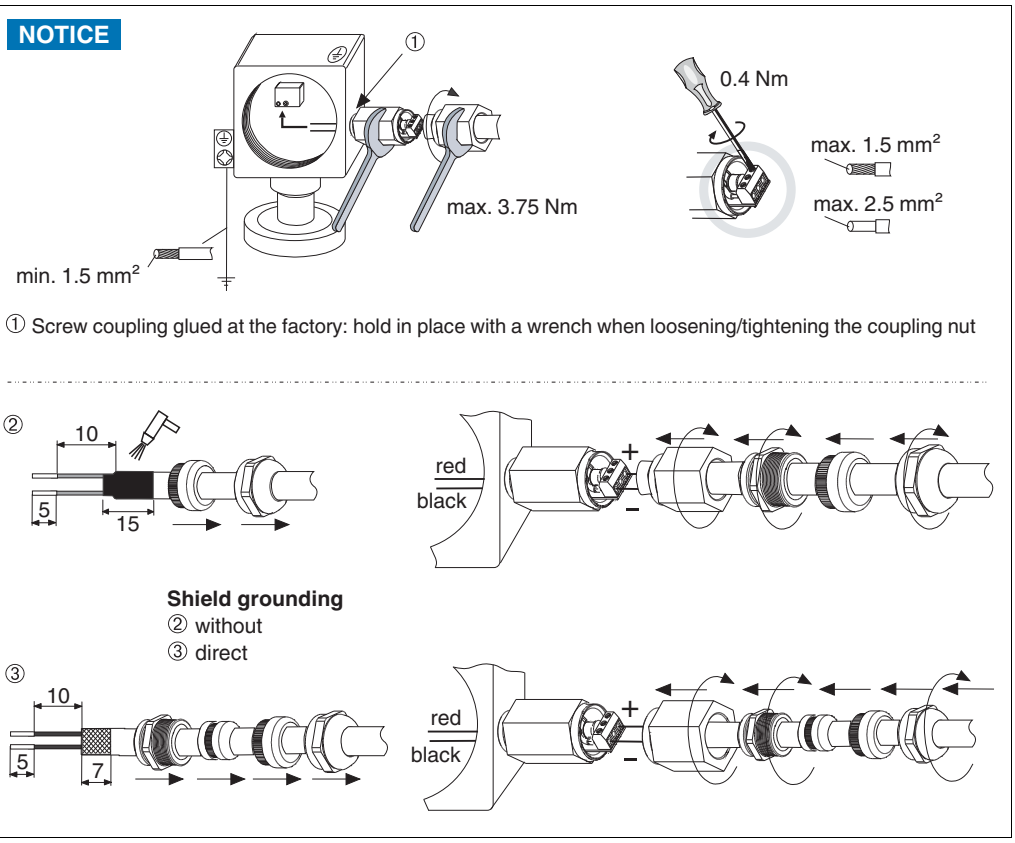
The device can be fitted with overvoltage protection. The overvoltage protection is mounted at the factory on the housing thread (M20x1.5) for the cable gland (take additional length into account when installing).

The device is connected as illustrated in the following graphic.

4.4.1 Wiring



4.4.2 Installation



4.5 Post-connection check

Perform the following checks after completing electrical installation of the device:

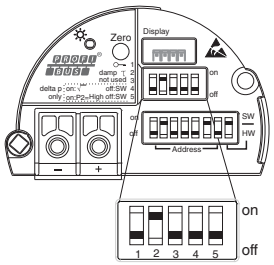
- Does the supply voltage match the specifications on the nameplate?
- Is the device connected as per section 4.1?
- Are all screws firmly tightened?
- Are the housing covers screwed down tight?

As soon as voltage is applied to the device, the green LED on the electronic insert lights up briefly or the connected onsite display lights up.

5 Operation

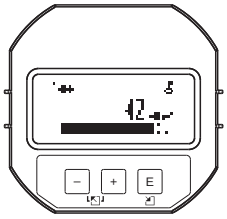
5.1 Operating options

5.1.1 Operation without operating menu

Operating options	Explanation	Graphic illustration	Description
Local operation without device display	The device is operated using the operating key and DIP switches on the electronic insert.		→ 25

5.1.2 Operation with operating menu

Operation with an operating menu is based on an operation concept with "user roles" → 27.

Operating options	Explanation	Graphic illustration	Description
Local operation with device display	The device is operated using the operating keys on the device display.		→ 29
Remote operation via **PACT***ware*™	The device is operated using the **PACT***ware*™ operating tool.		→ 33

5.1.3 Operation via PA communication protocol

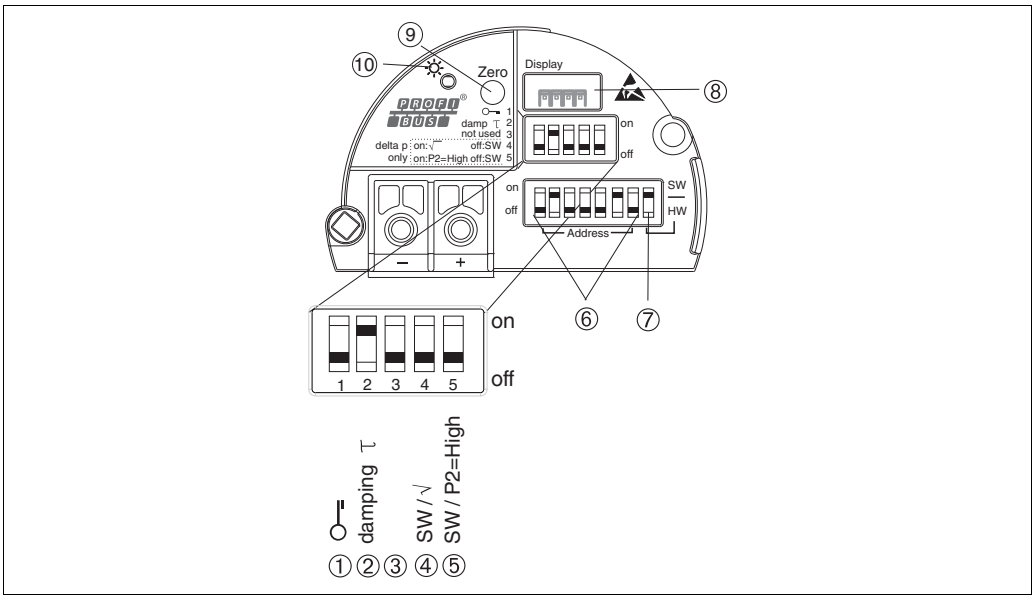
Operating options	Explanation	Graphic illustration	Description
Remote operation via **PACT***ware*™	The device is operated using the **PACT***ware*™ operating tool.		→ 36

TDOCT-3019_ENG 256722 03/2014

5.2 Operation without operating menu

5.2.1 Position of operating elements

The operating key and DIP switches are located on the electronic insert in the device.



16 PROFIBUS PA electronic insert

1 DIP switch for locking/unlocking parameters relevant to the measured value
2 DIP switch for switching damping on/off
3/4/5 Not assigned
6 DIP switch for hardware address
7 DIP switch for bus address SW/HW
8 Slot for optional onsite display
9 Operating key for position adjustment or reset (zero)
10 Green LED to indicate successful operation (Position adjustment, Reset, Warm start)

Function of the DIP switches

Switch	Symbol/ labeling	Switch position	
		"off"	"on"
1		The device is unlocked. Parameters relevant to the measured value can be modified.	The device is locked. Parameters relevant to the measured value cannot be modified.
2	damping τ	Damping is switched off. The output signal follows measured value changes without any delay.	Damping is switched on. The output signal follows measured value changes with the delay time τ. [1]
6	Address	Set the device address using switches 1-7	
7	SW/HW	Hardware addressing	Software addressing

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

Function of the operating elements

Operating key(s)	Meaning
"Zero" pressed for at least 3 seconds	**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".
"Zero" pressed for at least 12 seconds	**Reset** All parameters are reset to the order configuration.

Performing position adjustment on site

NOTICE

- Operation must be unlocked. → 34, section 5.3.5 "Locking/unlocking operation".
- The device is configured for the Pressure measuring mode as standard.
- 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.
4. If the LED does not light up, the pressure applied was not accepted. Observe the input limits. For error messages, → 130, Section 10.1 "Messages".

5.2.2 Locking/unlocking operation

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

NOTICE

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 the operating menu, you can only unlock operation again using the operating menu.

Locking/unlocking via DIP switches

DIP switch 1 on the electronic insert is used to lock/unlock operation.
→ 25, section "Function of the DIP switches".

TDOCT-3019_ENG 256722 03/2014

5.3 Operation with an operating menu

5.3.1 Operation concept

The operation concept makes a distinction between the following user roles:

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

5.3.2 Structure of the operating menu

User role	Submenu	Meaning/use
Operator	Language	Only consists of the "Language" parameter (000) where the operating language for the device is specified. The language can always be changed even if the device is locked.
Operator	Display/operat.	Contains parameters that are needed to configure the measured value display (selecting the values displayed, display format, display contrast, etc.). With this submenu, users can change the measured value display without affecting the actual measurement.
Service engineer/ technician	Setup	Contains all the parameters that are needed to commission measuring operations. This submenu has the following structure: • **Standard setup parameters** A wide range of parameters, which can be used to configure a typical application, is available at the start. The measuring mode selected determines which parameters are available. After making settings for all these parameters, the measuring operation should be completely configured in the majority of cases. • **"Extended setup" submenu** The "Setup" submenu contains additional parameters for more in-depth configuration of the measurement operation to convert the measured value and to scale the output signal. This menu is split into additional submenus depending on the measuring mode selected.
Service engineer/ technician	Diagnosis	Contains all the parameters that are needed to detect and analyze operating errors. This submenu has the following structure: • **Diagnostic list** Contains up to 10 error messages currently pending. • **Event logbook** Contains the last 10 error messages (no longer pending). • **Instrument info** Contains information on the device identification. • **Measured values** Contains all the current measured values • **Simulation** Is used to simulate pressure, level, and alarm/warning. • **Factory Reset**

User role	Submenu	Meaning/use
Expert	Expert	Contains all the parameters of the device (including those in one of the submenus). The "Expert" submenu is structured by the function blocks of the device. It thus contains the following submenus: • **System** Contains all the device parameters that neither affect measurement nor integration into a distributed control system. • **Measurement** Contains all the parameters for configuring the measurement. • **Communication** Contains the parameters of the PROFIBUS PA interface. • **Application** Contains all the parameters for configuring the functions that go beyond the actual measurement. • **Diagnosis** Contains all the parameters that are needed to detect and analyze operating errors.

NOTICE For an overview of the entire operating menu: → 74.

Direct access to parameters

The parameters can only be accessed directly via the "Expert" user role.

Parameter name	Description
Direct Access (119) Entry Menu path: Expert → Direct Access	Use this function to enter a parameter code for direct access. **User input:** Enter the desired parameter code. **Factory setting:** 0

TDOCT-3019_ENG 256722 03/2014

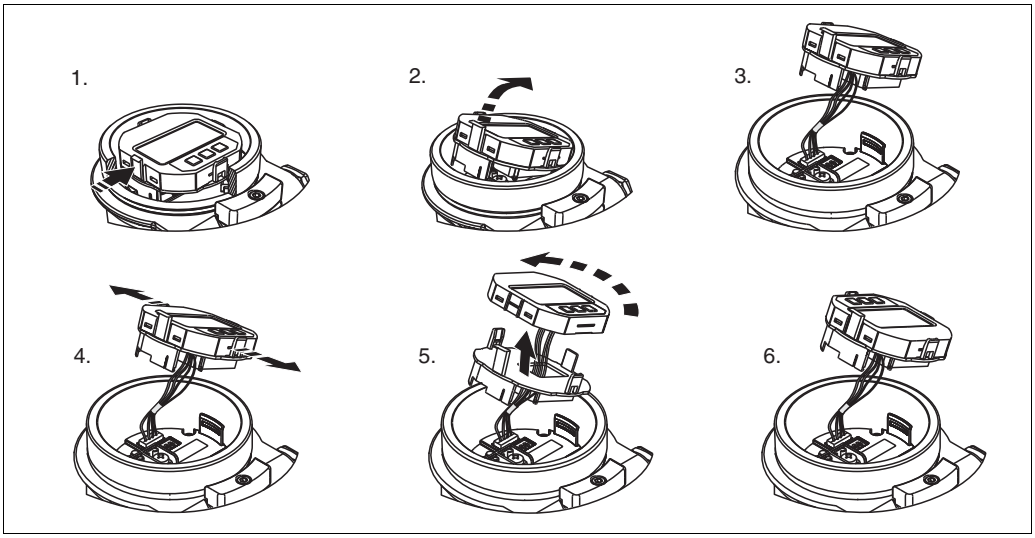
5.3.3 Operation with a device display (optional)

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

For easy operation the display can be taken out of the housing (1) to (3). It is connected to the device through a 90 mm (3.54 in) cable.

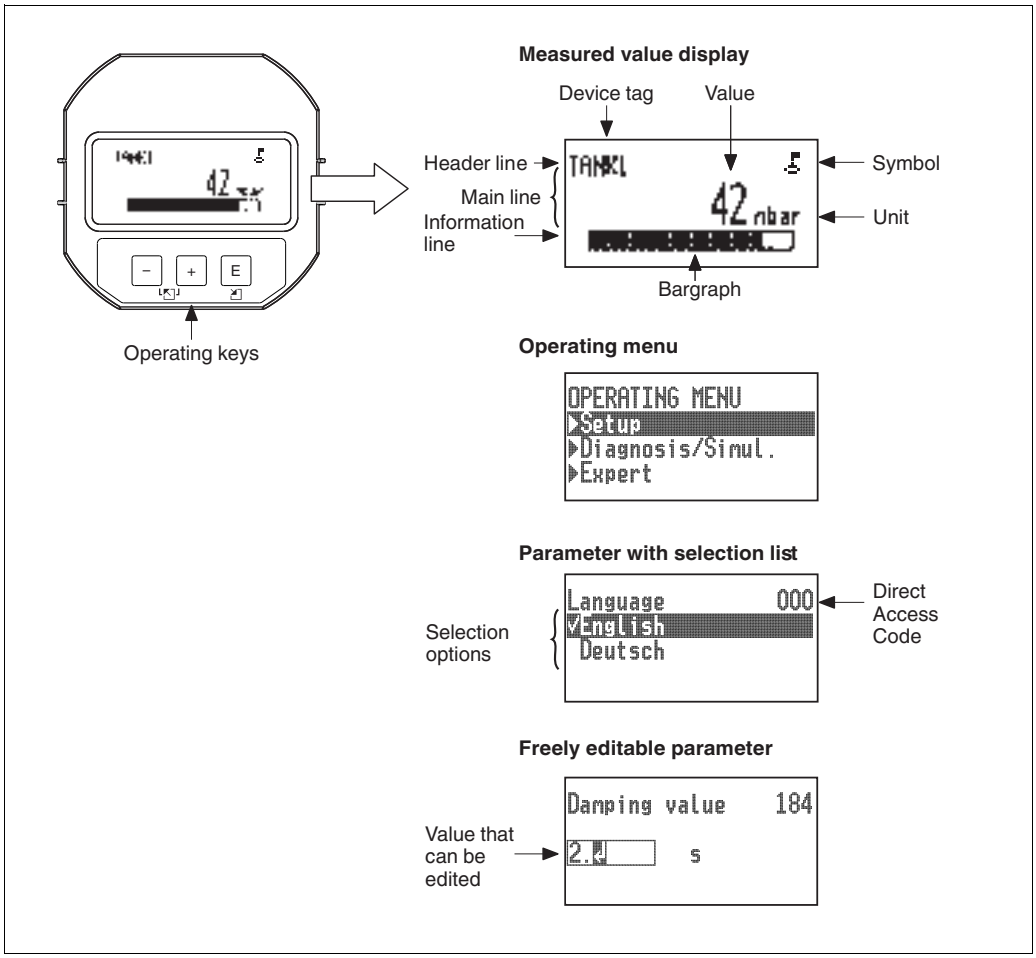
The display of the device can be turned in 90° stages (4) to (6).

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



Functions:

- 8-digit measured value display including sign and decimal point
- Bar graph as graphic display of the standardized value of the Analog Input Block
  (→ see also 95, "Scaling the output value (Out Value)", graphic)
- Three keys for operation
- Simple and complete menu guidance as parameters are split into several levels and groups
- Each parameter is given a 3-digit parameter code for easy navigation
- Possibility of configuring the display to suit individual requirements and preferences, such as language, alternating display, display of other measured values such as sensor temperature, contrast setting.
- Comprehensive diagnostic functions (fault and warning message etc.)



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

Symbol	Meaning
	Lock symbol The operation of the device is locked. To unlock the device, → 34, "Locking/unlocking operation".
	Communication symbol Data transfer via communication
S	**Error message "Out of specification"** The device is being operated outside its technical specifications (e. g. during warm-up or cleaning processes).
C	**Error message "Service mode"** The device is in the service mode (during a simulation, for example).
M	**Error message "Maintenance required"** Maintenance is required. The measured value remains valid.
F	**Error message "Failure detected"** An operating error has occurred. The measured value is no longer valid.

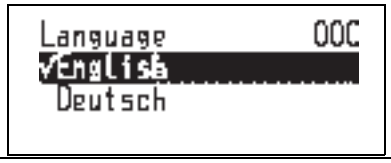
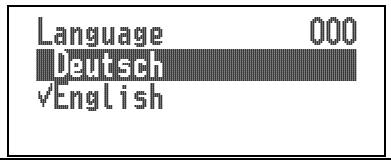
TDOCT-3019_ENG 256722 03/2014

Operating keys on the display and operating module

Operating key(s)	Meaning
[+]	• Navigate downwards in the picklist • Edit the numerical values and characters within a function
[–]	• Navigate upwards in the picklist • Edit the numerical values and characters within a function
[E]	• Confirm entry • Jump to the next item • Selection of a menu item and activation of the editing mode
[+] and [E]	Contrast setting of onsite display: darker
[–] and [E]	Contrast setting of onsite display: brighter
[+] and [+]	**ESC functions:** • Exit the edit mode for a parameter without saving the changed value. • You are in a menu at a selection level. Each time you press the keys simultaneously, you go up a level in the menu.

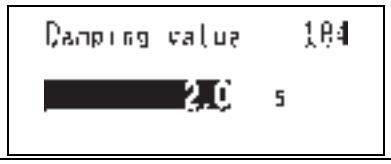
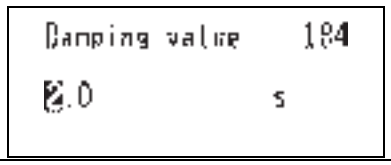
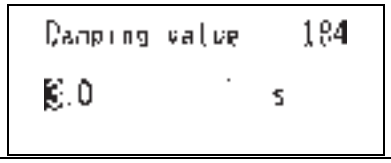
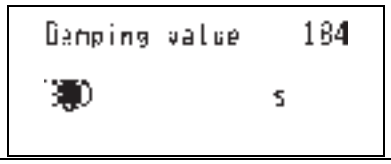
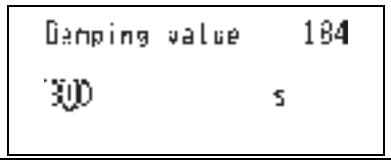
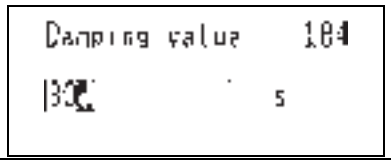
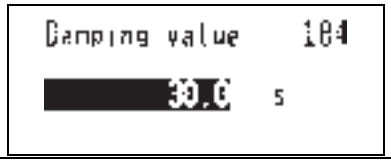
Parameter with picklist

Example: selecting "Deutsch" as the language of the menu.

Onsite display	Operation
	"English" is set as the menu language (default value). A ✓ in front of the menu text indicates the active option.
	Select "Deutsch" with "+" or "–".
	1. Confirm your choice with "E". A ✓ in front of the menu text indicates the active option. ("Deutsch" is now selected as the menu language.) 2. Exit the edit mode for the parameter with "E" .

User-definable parameters

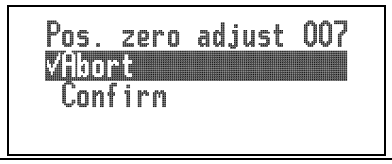
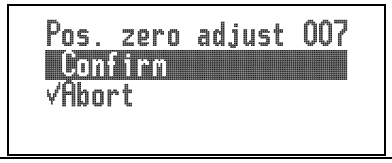
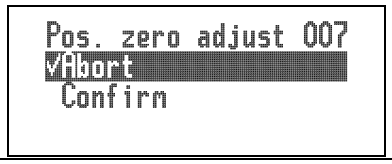
Example: changing the damping function from 2.0 s to 30.0 s.

Onsite display	Operation
	The onsite display shows the parameter to be changed. The value highlighted in black can be changed. The unit "s" is prespecified and cannot be changed.
	1. Press "+" or "–" to get to the editing mode. 2. The first digit is highlighted in black.
	1. Use "+" to change "2" to "3". 2. Confirm "3" with "E". The cursor jumps to the next position (highlighted in black).
	The decimal point is highlighted in black. This means you can now edit this digit.
	1. Press "+" or "–" until "0" is displayed. 2. Confirm "0" with "E". The cursor goes to the next position. ↵ is displayed and highlighted in black. → See next graphic.
	Use "E" to save the new value and exit the editing mode. → See next graphic.
	The new value for the damping is 30.0 s. • Go to the next parameter with "E" . • You can get back to the editing mode with "+" or "–".

TDOCT-3019_ENG 256722 03/2014

Accepting the pressure present

Example: setting position adjustment

Onsite display	Operation
	The pressure for position adjustment is present at the device.
	Use "+" or "–" to switch to the "Confirm" option. The active option is highlighted in black.
	Accept the pressure present as position adjustment with the "E" key. The device confirms the adjustment and goes back to the "Pos. zero adjust" parameter.
	Exit the edit mode for the parameter with "E".

5.3.4 Operation via PACT*ware*™

PACT*ware*™ is an asset management tool based on FDT technology. With **PACT***ware*™, you can configure all Pepperl+Fuchs devices as well as devices from other manufacturers that support the FDT standard. Hardware and software requirements you can find on the internet: www.pepperl-fuchs.com.

PACT*ware*™ supports the following functions:

- Configuration of transmitters in online/offline mode
- Loading and saving device data (upload/download)
- Documentation of the measuring point
- Offline parametrization of transmitters

Connection options via modem and USB port of a computer

NOTICE

- Further information on **PACT***ware*™ can be found on the Internet: www.pepperl-fuchs.com.
- As not all internal device dependencies can be mapped in offline operation, the consistency of the parameters must be checked before the parameters are transmitted to the device.

5.3.5 Locking/unlocking operation

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

Locked operation is indicated as follows:

- By the symbol on the onsite display
- The parameters are grayed out in **PACT***ware*™ and the handheld terminal, which means they cannot be edited. Indicated in the corresponding "Locking" parameter.

Parameters which refer to how the display appears, e. g. "Language (000)", can still be altered.

NOTICE

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 the operating menu, you can only unlock operation again using the operating menu. The "Operator code (021)" parameter is used to lock and unlock the device.

Parameter name	Description
Operator code (021) Entry Menu path: Setup → Extended setup → Operator code	Use this function to enter a code to lock or unlock operation. **User input:** • To lock: Enter a number ≠ the release code (value range: 1 to 9999). • To unlock: Enter the release code. **NOTICE** The release code is "0" in the order configuration. Another release code can be defined in the "Code definition" parameter. If the user has forgotten the release code, the release code can be visible by entering the number "5864". **Factory setting:** 0

The release code is defined in the "Code definition" parameter.

Parameter name	Description
Code definition (023) Entry Menu path: Setup → Extended setup → Code definition	Use this function to enter a release code with which the device can be unlocked. **User input:** A number between 0 and 999 **Factory setting:** 0

5.3.6 Resetting to factory settings (reset)

By entering a certain code, you can completely, or partially, reset the entries for the parameters to the factory settings. Enter the code by means of the "Factory reset (124)" parameter (menu path: "Expert" → "System" → "Management" → "Factory reset (124)") or "Diagnosis" → "Factory reset" → "Factory reset (124)").

The factory setting of each parameter is indicated in the parameter description (→ 79).

There are various reset codes for the device. The following table illustrates which parameters are reset by the particular reset codes. Operation must be unlocked to reset parameters (→ 34).

NOTICE Any customer-specific configuration carried out at the factory is not affected by a reset (customer-specific configuration remains). If you want to change the customer-specific configuration carried out at the factory, please contact Pepperl+Fuchs Service.

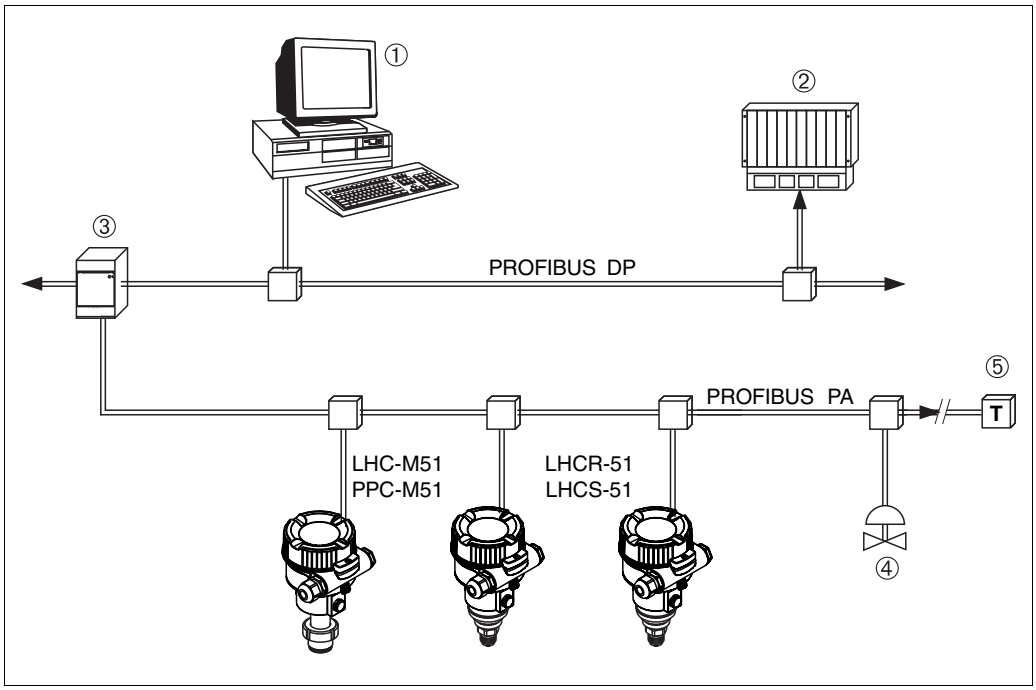
Reset code [1]	Description and effect
62	**PowerUp reset (warm start)** • The device is restarted. • Data are read back anew from the EEPROM (processor is initialized again). • Any simulation which may be running is ended.
333	**User reset** • This code resets all the parameters apart from: - Device tag (022) - Operating hours (162) - Lo trim sensor (131) - Hi trim sensor (132) - Event logbook - Linearization table • Any simulation which may be running is ended. • The device is restarted.
7864	**Total reset** • This code resets all the parameters apart from: - Operating hours (162) - Lo trim sensor (131) - Hi trim sensor (132) - Event logbook • Any simulation which may be running is ended. • The device is restarted.

[1] To be entered in "System" → "Management" → "Factory reset (124)"

NOTICE After a "Total reset" in **PACT***ware*™ you have to press the "refresh" button in order to ensure that the measuring units are also reset.

5.4 PROFIBUS PA communication protocol

5.4.1 System architecture



17 PROFIBUS system architecture

1 PC with PROFIBUS interface card (Profiboard/Proficard) and **PACT***ware*™ operating program (Class 2 master)
2 PLC (Class 1 master)
3 Segment coupler (DP/PA signal converter and bus power supply)
4 Additional devices and adjusters such as valves, for example
5 PROFIBUS PA terminating resistor

NOTICE Further information on PROFIBUS PA is provided in the PNO Guideline and the IEC 61158, IEC 61784, EN 50170/DIN 19245 and EN 50020 standards (FISCO model).

5.4.2 Number of devices

- Pepperl+Fuchs 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 8 devices for EEx ia, CSA and FM IS applications
  - Up to 31 devices in all other applications, e. g. in non hazardous areas, EEx 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.

5.4.3 Operation

You can obtain special configuration and operating programs from various manufacturers for the configuration, such as the **PACT***ware*™ operating program from Pepperl+Fuchs (→ 33, "Operation via PACTwareTM"). This operating program makes it possible to configure the PROFIBUS PA and device-specific parameters. The predefined function blocks allow uniform access to network and device data.

TDOCT-3019_ENG 256722 03/2014

5.4.4 Identification number of the device

The "Ident number sel (229)" parameter allows users to modify the identification number.

The identification number (Ident number (Ident_Number)) must support the following settings:

Values for "Ident number sel"	Description
0 "0x9700"	Profile-specific identification number V3.02 with the "Classic" or "Condensed" status.
1 "0x0E3A", "0x0E3C"	Manufacturer-specific identification number (V3.02). Pressure transmitters LHC-M51 and PPC-M51, pressure transmitters LHCR-51 and LHCS-51.
127 "Auto. identification number (Auto.Id.Num.)"	Device adaptation mode (the device can communicate using a variety of identification numbers), see "Smart device management" (automatic smart device management).
128	Manufacturer-specific identification number (V3.00). Pressure transmitters LHC-M51 and PPC-M51, pressure transmitters LHCR-51 and LHCS-51.

The "Automatic Identification Number Selection" (value = 127) for Profile 3.02 is described in Section "Smart device management (automatic smart device management)".

The choice of identification number affects the status and diagnostic messages ("Classic" or "Condensed"). "Old" identification numbers work with the "Classic" status and old diagnostic messages.

New identification numbers only work with the "Condensed" status and new diagnostic messages.

Depending on the configuration data of the user or the behavior selected in the physical "Cond.status diag" block parameter, the profile identification number works with either the "Condensed" or "Classic" status.

The identification number can only be changed if no cyclic communication is taking place with the device.

Cyclic data transmission and the corresponding identification number of the device remain the same until cyclic transmission is aborted and reestablished or the device is shut down. When reestablishing cyclic data transmission the device uses the last value of the "Ident number sel" parameter.

The choice of identification number also determines how many modules are assigned during cyclic communication. All blocks are internally instantiated in advance for all the devices but only the configured modules can be accessed depending on the entries in the device master data.

Table of the function blocks:

"Ident number sel" parameter	0 (Profile-specific)	128 (Old identification number)	127 (Auto. identification number)	1 (New identification number)
Pressure transmitters LHC-M51/PPC-M51, pressure transmitters LHCR-51/LHCS-51	3 blocks (PB,TB,AI)	3 blocks (PB,TB,AI)	Depends on the identification number automatically selected.	6 blocks (PB,TB,AI1, AI2,DAO_EH1, DAO_EH2)
	1 module (1xAI)	3 modules (2xAI, 1xAO)		4 modules (2xAI, 2xDAO_EH)

NOTICE If the device is configured with an old identification number (0x151C), then it automatically switches to the pressure measurement mode (Pressure). The level measuring mode (Level) is not supported in an old pressure measuring device of the Cerabar M series (0x151C).

Table of the identification numbers:

	Identification number		Selection text		Status	Diagnosis
Value for "Ident number sel"	**LHC-M51, PPC-M51**	**LHCR-51, LHCS-51**	**LHC-M51, PPC-M51**	**LHCR-51, LHCS-51**		
0 (Profile-specific 3.x)	0x9700	0x9700	0x9700	0x9700	Classic status/ Condensed status	Old diagnostic messages/new diagnostic messages
128 (Old identification number)	–	–	–	–	Classic status	Old diagnostic messages
127 (Adaptation mode)	–	–	Auto. identification number	Auto. identification number	Depends on ident numbers	Depends on ident numbers
1 (New identification number)	0x0E3A	0x0E3C	0x0E3A	0x0E3C	Condensed status	New diagnostic messages

Smart device management (automatic smart device management)

Smart PA device management is performed by automatically adapting the device identification number. This makes it possible to replace old devices with new models without having to modify the PLC, allowing the transition from an installed device technology to a more sophisticated technology without interrupting the process.

With the "Automatic Identification Number Selection" option, the device behavior and rules (diagnostics, cyclic communication etc.) remain the same as those for a static identification number. The identification number is selected automatically depending on the recognized request frame - "Set Slave Parameter" or "Set Slave Address".

It is permitted to change the identification number in two specific device transition states, namely after Set Slave Address (SAP 55) and after Set Slave Parameter (SAP 61), and only if the identification number is listed in the table above.

If the identification number is undefined and the selector is set to "automatic", following a "Get Slave Diagnosis" frame the device returns an identification number diagnostic value which is compatible with the device. After every new "Get Slave Diagnosis" frame, the device returns another identification number that is compatible with the device until the PLC sends a "Set Slave Address" or "Set Slave Parameter" frame with a known identification number.

TDOCT-3019_ENG 256722 03/2014

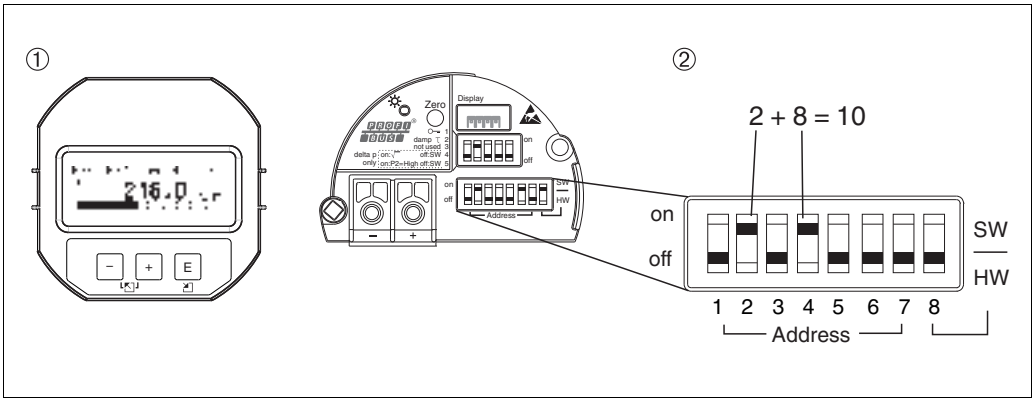
5.4.5 Device identification and addressing

Please note the following:

- An address must be assigned to each PROFIBUS PA device. The control system/master can only recognize the device if the address is set correctly.
- Each address can only be assigned once in any PROFIBUS PA network.
- Device addresses in the range from 0 to 125 are valid.
- The address 126 configured at the factory can be used for functional device testing and to connect to a PROFIBUS PA network already in operation. This address must be changed subsequently to add additional devices.
- On leaving the factory, all devices are delivered with the default address 126 and software addressing.
- The **PACT***ware*™ operating program is delivered with the default address 1.

There are two ways to assign the device address to a pressure transmitter LHC-M51/PPC-M51 and a pressure transmitter LHCR-51/LHCS-51:

- Via an operating program of the DP Class 2 master, such as **PACT***ware*™ or
- Onsite via DIP switches.



18 Setting the device address via DIP switches

1 If necessary, remove onsite display (optional)
2 Set the hardware address via the DIP switches

Hardware addressing

A hardware address is set as follows:

1. Set the DIP switch 8 (SW/HW) to "Off".
2. Set the address with DIP switches 1 to 7.
3. The change of address takes effect after 10 seconds. The device is restarted.

DIP switch	1	2	3	4	5	6	7
Value when set to "On"	1	2	4	8	16	32	64
Value when set to "Off"	0	0	0	0	0	0	0

Software addressing

A software address is set as follows:

1. Set the DIP switch 8 (SW/HW) to "On" (factory setting).
2. The device is restarted.
3. The device reports its current address. Factory setting: 126
4. Set the address via the configuration program.
   For the operating programs, see the corresponding operating manual.

5.4.6 System integration

Device master data (GSD files)

The device is ready for system integration following commissioning via the Class 2 master (**PACT***ware*™). To integrate the field devices into the bus system, the PROFIBUS PA system requires a description of the device, such as the device ID, identification number (Ident_Number), supported communication features, module structure (combination of cyclic input/output telegrams) and the meaning of the diagnostic bits.

These data are found in a device master file (GSD file) which is made available to the PROFIBUS DP master (e. g. PLC) when the communication system is being commissioned.

In addition, it is also possible to integrate device bit maps which appear as icons in the network tree structure.

The following versions of the GSD are possible when using devices that support the "PA devices" profile:

- LHCR-51, LHCS-51:
  - Manufacturer-specific GSD, identification number (Ident_Number): PF__0E3C
    This GSD ensures the complete and unrestricted functionality of the field device. All the device-specific process parameters and functions are available.
  - Manufacturer-specific GSD, identification number: 0x0E3C
- LHC-M51, PPC-M51:
  - Manufacturer-specific GSD, identification number (Ident_Number): PF__0E3A
    This GSD ensures the complete and unrestricted functionality of the field device. All the device-specific process parameters and functions are available.
  - Manufacturer-specific GSD, identification number: 0x0E3A
- Profile GSD:
  As an alternative to the manufacturer-specific GSD, the PNO makes available a general database file called PA139700.gsd for devices with an Analog Input Block. This file supports transmission of the primary value. The transmission of a 2nd cyclic value or a display value is not supported. If a system is commissioned with the profile GSDs, devices of different manufacturers can be exchanged.

The following device master files (GSD) can be used:

Name of the device	Comments	Identification number (Ident_Number)	GSD
All	Profile GSD	0x9700	PA139700.gsd
LHCR-51, LHCS-51 PROFIBUS PA	Device-specific GSD	PF__0E3A	
LHC-M51, PPC-M51 PROFIBUS PA	Device-specific GSD	PF__0E3C	

The factory setting for the "Ident number sel" parameter is "Auto.Id.Num" (adaptation mode). The adaptation mode allows automatic identification/integration into the control system.

The "Ident number sel" parameter can only be changed if the device is not included in cyclic communication (not commissioned in the PLC) or if cyclic communication of the PLC is set to "Stop". If an attempt is nevertheless made to change the parameter via a configuration software program, such as **PACT***ware*™, the entry is ignored.

The device master data (GSD files) for Pepperl+Fuchs devices can be acquired as follows:

- Internet: http://www.pepperl-fuchs.com
- Internet PNO: http://www.profibus.com (Products – Product Guide)

The profile device master data (GSD files) of the PNO can be acquired as follows:

- Internet PNO: http://www.profibus.com (Products – Profile GSD Library)

Working with the device master data (GSD files)

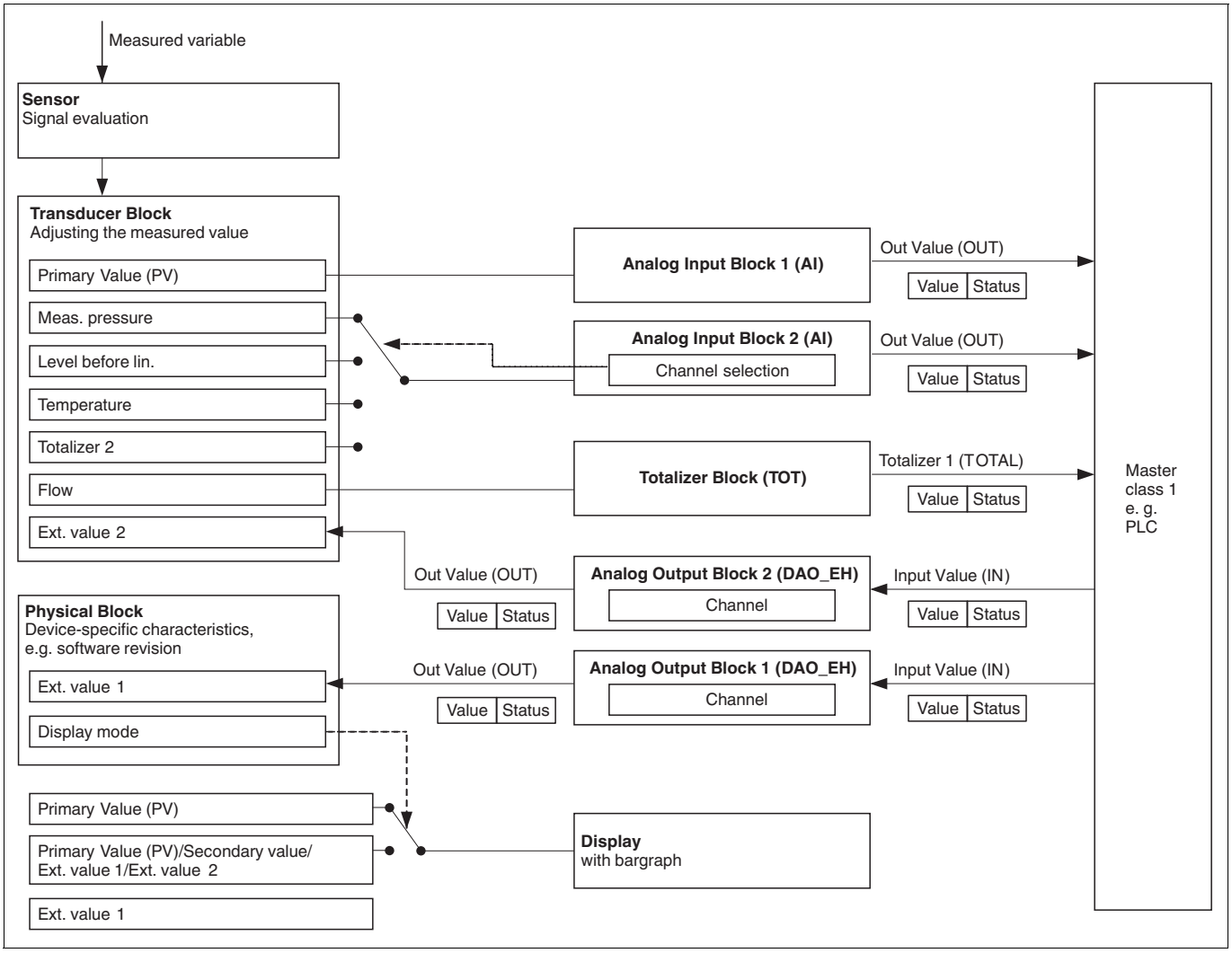
The device master data (GSD files) must be integrated into a specific subdirectory of the PROFIBUS DP configuration software of the PLC used. Depending on the software used, these data can be either copied to the program-specific directory or imported into the database using an import function in the configuration software.

More information on the directories to which the device master data (GSD files) are to be saved is provided in the description of the specific configuration software used.

5.4.7 Cyclic data exchange

Block model

TDOCT-3019_ENG 256722 03/2014



19 Block model

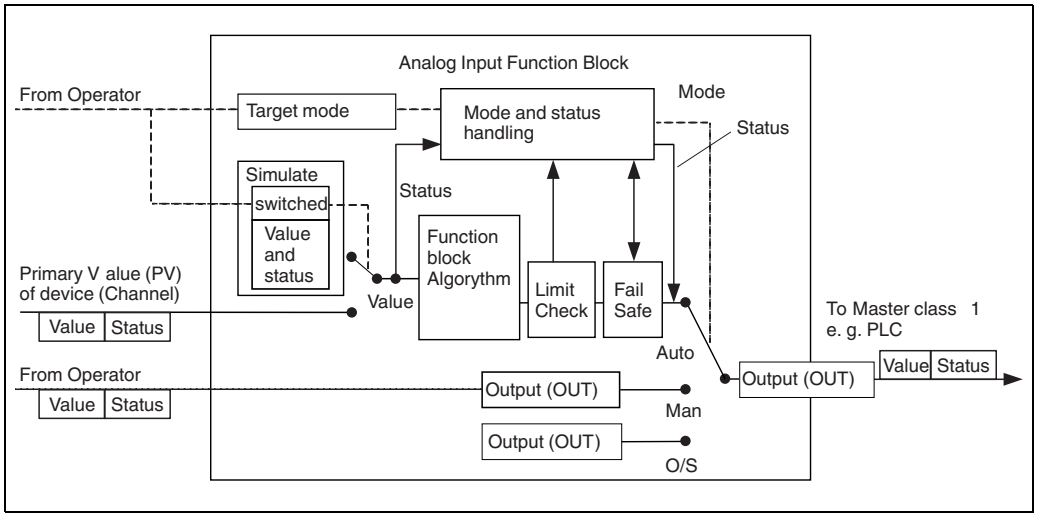
The block model shows what data can be transmitted between the measuring device and the Class 1 master (e. g. PLC) during cyclic data exchange. Using the configuration software of your PLC, you can configure the cyclic data telegram via modules (→ see also this chapter, "Modules for the cyclic data diagram" section). The parameters written in upper-case are parameters in the operating program (e. g. PLC) via which you can make settings for the cyclic data telegram or show values on the screen (→ see also this chapter, "Description of parameters" section).

Function blocks

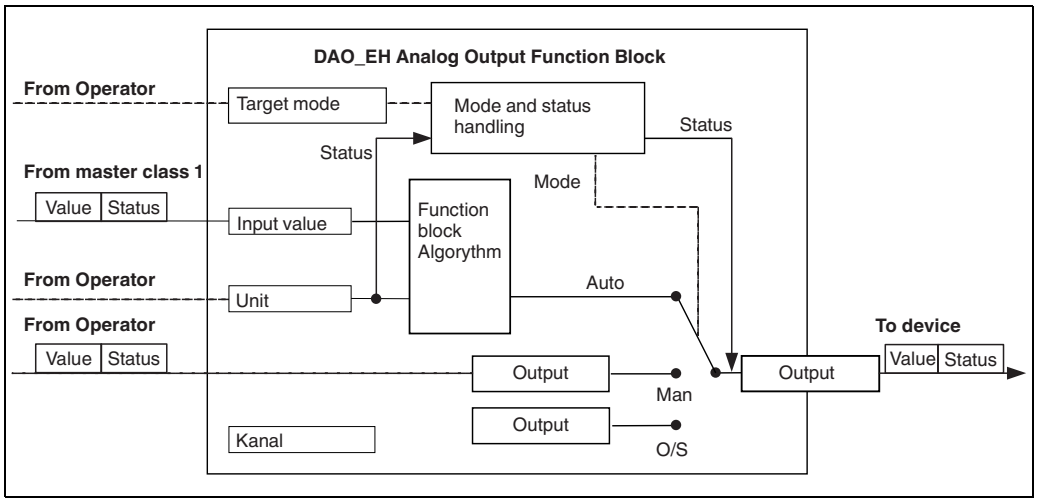
PROFIBUS uses predefined function blocks to describe the function blocks of a device and to define standard data access.

The following blocks are implemented:

- Physical Block:
  The Physical Block contains device-specific features such as the device type, manufacturer, version etc. as well as functions such as write protection management and identification number changeover (Ident_Number)
- Transducer Block:
  The Transducer Block contains all the measuring and device-specific parameters of the device.
  LHC-M51, PPC-M51und LHCR-51, LHCS-51:
  The Transducer Block contains the pressure measuring principle for use as a pressure and level transmitter.
- Analog Input Block (function block):
  The Analog Input Block contains the signal processing functions of the measured value, such as scaling, special function calculations, simulation etc.
  The following graphic illustrates the structure of the standard Analog Input Block:



- Analog Output Block (function block)
  The DAO_EH Block is an Analog Output Block specific to Pepperl+Fuchs which is used to transmit external values from the PLC to the device and show them on the display. The block contains the signal processing functions that process the external value (IN) into the output value (Out Value). The following graphic illustrates the structure of the Pepperl+Fuchs-specific Analog Output Block:



TDOCT-3019_ENG 256722 03/2014

Description of parameters

Parameter name	Description
Output value (Out Value) (Analog Input Block 1)	This parameter displays the digital Output value (Out Value) of the Analog Input Block 1. The channel selection (channel entry) is permanently linked to the primary value. Menu path in **PACT***ware*™: Expert → Communication → Analog input 1 → AI parameter Menu path for onsite display: Expert → Communication → Analog input 1
Output value (Out Value) (Analog Input Block 2)	This parameter displays the digital Output value (Out Value) of the Analog Input Block. The following device measured values are linked via the channel entry: "Meas. pressure", "Level before lin." and temperature Menu path in **PACT***ware*™: Expert → Communication → Analog input 2 → AI parameter Menu path for onsite display: Expert → Communication → Analog input 2
Input value (IN Value) (Analog Output Block 1)	The PLC sends this value to the device. The channel selection (channel) is permanently linked to the Ext. value 1. The "Ext. value 1" can be displayed on the onsite display (see this table, Display mode). Menu path in **PACT***ware*™: Expert → Communication → Analog output 1 → AO parameter Expert → Communication → Physical Block → PB parameter → Display value Menu path for onsite display: Expert → Communication → Analog output 1
Input Value (IN Value) (Analog Output 2)	The PLC sends this value to the device. The channel selection (channel) is permanently linked to the Ext. value 2. The "Ext. value 2" can be shown on the onsite display (see this table, Display mode). This channel is used by the pressure transmitters LHC-M51, PPC-M51, LHCR-51 and LHCS-51 to display and/or transmit the calculated electrical differential pressure. Menu path in **PACT***ware*™: Expert → Communication → Analog output 2 → AO parameter Menu path for onsite display: Expert → Communication → Analog output 2 Menu path for onsite display: and **PACT***ware*™ Expert → Application
Display mode	Use this parameter to specify whether the main value or the Ext. value 1 should be displayed or whether the display should alternate between these values and the Ext. value 2. The appropriate modules (DAO_EH) must be cyclically configured to display the external values from the PLC in alternating mode. Menu path in **PACT***ware*™: Display/operat. Menu path for onsite display: Display/operat. **Options:** • Main value only: the main value is shown on the onsite display. • Ext. value 1 only: a value from the PLC is shown on the onsite display (see → 19). • All alternating: the display alternates between the main value, Ext. value 1 and Ext. value 2. A value previously configured via "Add. disp. value" also alternates with the other values on the display. **Example for the "Ext. value 1" option:** Two pressure transmitters measure the drop in pressure over a filter. The differential pressure is calculated in the PLC. Using the "Ext. value 1" option, assign this calculated value to the onsite display. **Factory setting:** Main value only

Modules for the cyclic data diagram

The following modules are available in the measuring device for the cyclic data diagram:

- Output value (Out Value) (Analog Input Block 1)
  Depending on the measuring mode selected, a pressure, flow or level value is transmitted here.
- Output value (Out Value) (Analog Input Block 2)
  Depending on the option selected, the measured pressure, level before linearization, or sensor temperature is transmitted here.
- Input value (IN Value) (Analog Output Block 1)
  This can be any value which is transmitted by the PLC to the device. This value can also be shown on the onsite display (Ext. value 1).
- Input value (IN Value) (Analog Output Block 2)
  This can be any value which is transmitted by the PLC to the device. This value can also alternate with another value on the onsite display (Ext. value 2) or be used to calculate the differential pressure.
- FREE PLACE
  Select this empty module if a value should not be used in the data telegram.

Structure of the output data PLC

Using the Data_Exchange service, a PLC can write output data to the device in the call telegram. The cyclic data telegram has the following structure:

Index	Output data	Data access	Data format/comments
0, 1, 2, 3	Input value (IN Value) (Analog Output 1)	Write	32 bit floating point number (IEEE 754)
4	Input status (IN Status) (Analog Output 1)	Write	→ See "Status codes" section
5, 6, 7, 8	Input value (IN Value) (Analog Output 2)	Write	32 bit floating point number (IEEE 754)
9	Input status (IN Status) (Analog Output 2)	Write	→ See "Status codes" section

Structure of the input data measuring device – PLC

Using the Data_Exchange service, a PLC can read input data from the device in the response telegram. The cyclic data telegram has the following structure:

Index	Input data	Data access	Data format/comments
0, 1, 2, 3	Output value (Out Value) (Analog Input 1)	Read	32 bit floating point number (IEEE 754)
4	Output status (Out Status) (Analog Input 1)	Read	→ See "Status codes" section
5, 6, 7, 8	Output value (Out Value) (Analog Input 2)	Read	32 bit floating point number (IEEE 754)
9	Output status (Out Status) (Analog Input 2)	Read	→ See "Status codes" section

Status codes

The devices support the "Condensed Status" function as defined in the PNO specification. However, the "Classic" status is also supported to ensure compatibility with older devices in the M series and due to the profile-specific identification number (Profile Specific Ident. Number).

The status type is selected depending on the device identification number:

- The "Classic" status is enabled if the identification number (Ident number) is set to 0x0E3A (LHC-M51, PPC-M51)/0x0E3C (LHCR-51, LHCS-51)/0x9700 (specific identification number for Profile 3.x).
- The "Condensed" status is enabled if the identification number (Ident number) is set to 0x0E3A (LHC-M51, PPC-M51)/0x0E3C (LHCR-51, LHCS-51)/0x9700 (specific identification number for Profile 3.02).

If the profile identification number is selected, the status type can be set via the "Cond.status diag" parameter.

The "Condensed" and/or "Classic" status and their current active states are displayed by the "Physical Block" in the "Feature" parameter.

TDOCT-3019_ENG 256722 03/2014

The measuring device supports the following status codes for the Output value parameters of the Analog Input Blocks:

Classic status

Status code	Device state	Meaning	Output value (Out Value) (Analog Input 1)	Output value (Out Value) (Analog Input 2)
0000 0000	BAD	Not specific	x [1]	x [1]
0000 0100	BAD	Configuration error (e. g. adjustment not performed correctly)	x [1]	x [1]
0000 1100	BAD	Device error	x [1]	x [1]
0001 0000	BAD	Sensor error	x [1]	x [1]
0001 1100	BAD	Out of service (Target mode)	x	x
0100 0000	UNCERTAIN	Not specific	x	x
0100 0100	UNCERTAIN	Last valid value (Fail safe mode =1)	x	x
0100 1000	UNCERTAIN	Substitute value (Fail safe mode = 0)	x	x
0100 1100	UNCERTAIN	Initial value (Fail safe mode = 1)	x	x
0101 1000	UNCERTAIN	Abnormal	x	x
0101 1100	UNCERTAIN	Configuration error (e. g. linearization table not monotonic increasing)	x	x
0101 0011	UNCERTAIN	Sensor calibration – constant	x	x
0101 0010	UNCERTAIN	Sensor calibration – limit value exceeded	x	x
0101 0010	UNCERTAIN	Sensor calibration – limit value undershot	x	x
0101 0000	UNCERTAIN	Sensor calibration	x	x
0110 0000	UNCERTAIN	Simulation value	x	x
1000 0000	GOOD	Good	x	x
1000 1000	GOOD	Warning limit	x	x
1000 1001	GOOD	Warning limit – limit value exceeded	x	x
1000 1010	GOOD	Warning limit – limit value undershot	x	x
1000 1100	GOOD	Alarm limit	x	x
1000 1101	GOOD	Alarm limit – limit value exceeded	x	x
1000 1110	GOOD	Alarm limit – limit value undershot	x	x

[1] Only if the analog input failure behavior = 2 ("Status BAD")

Condensed status

The main reason for implementing the "Condensed" status mode in the PROFIBUS PA Profile 3.02 is to clarify the diagnostic events resulting from use in the PCS/DCS and in the operating station.

Furthermore, this functionality also implements the requirements of NE 107.

The following "Condensed" status codes are configured via the device.

Status code [1]	Device state	Meaning	Output value (Out Value) (Analog Input 1)	Output value (Out Value) (Analog Input 2)
0010 01xx	BAD [2]	Maintenance alarm, advanced diagnostics present	x	x
0010 10xx	BAD [2]	Process error, no maintenance required	x [3]	x [3]
0011 11xx	BAD [2]	Function check/local override	x [3]	x [3]
0010 0011	BAD [2]	Switch off	x	x
0111 1011	UNCERTAIN	Process error, no maintenance required – limit value constant	x	x
0111 1010	UNCERTAIN	Process error, no maintenance required – limit value exceeded	x	x
0111 1001	UNCERTAIN	Process error, no maintenance required – limit value undershot	x	x
0111 1000	UNCERTAIN	Process error, no maintenance required	x	x
0110 10xx	UNCERTAIN	Maintenance required	x	x
0100 1011	UNCERTAIN	Substitute value	x	x
0100 1111	UNCERTAIN	Initial value	–	–
0111 0011	UNCERTAIN	Simulated value, start	x	x
0111 0100	UNCERTAIN	Simulated value, end	x	x
1000 0000	GOOD	Good	x	x
1011 1100	GOOD	Function check	x	x

1 Variable x: 0 or 1

2 See → 🗎 132

3 Only if the analog input failure behavior = 2 ("Status BAD")

5.4.8 Acyclic data exchange

Acyclic data exchange is used:

- To transmit commissioning or maintenance parameters
- To display measured variables that are not part of the cyclic data diagram.

Using the acyclic data exchange function, device parameters can be modified even when the device is involved in cyclic data exchange with a PLC.

There are two kinds of acyclic data exchange:

- Acyclic communication via the C2 channel (MS2)
- Acyclic communication via the C1 channel (MS1)

Acyclic communication via the C2 channel (MS2)

During communication via the C2 channel, a master opens a communication channel via a service access point (SAP) in order to access the device. A master that supports acyclic communication via the C2 channel is known as a Class 2 master. **PACT***ware*™, for example, is a Class 2 master.

All the device parameters must be made known to the master before data can be exchanged via PROFIBUS.

The following options are available here:

- A configuration program in the master which accesses the parameters via slot and index addresses (e. g. **PACT***ware*™)
- A software component (DTM: device type manager)

NOTICE

- The DTM can be found on the **PACT***ware*™-CD.
- The number of SAPs available will determine the number of Class 2 masters that can simultaneously communicate with a device. The device supports MS2 communication with two SAPs. Ensure that multiple masters do not write-access the same data as the consistency of the data cannot be guaranteed if this occurs.
- The use of the C2 channel for acyclic data exchange increases the cycle times of the bus system. This must be taken into account when programming the control system or controller.

Acyclic communication via the C1 channel (MS1)

During acyclic communication via the C1 channel, a master which is already communicating cyclically with the device opens an additional acyclic communication channel via the SAP 0x33 (special SAP for MS1). It can then acyclically read or write the parameters via the slot and index addresses like a Class 2 master.

The device supports MS1 communication with one SAP.

⚠ WARNING

In the application program, avoid permanently writing parameters, such as for every program cycle.

Parameters written acyclically are saved as persistent data to the memory modules (e. g. EEPROM, Flash). The memory modules are only designed for a limited number of writes. The device does not even come close to reaching this maximum number of writes during normal operation without MS1 (during configuration). However, this number can be quickly exceeded if the device is incorrectly programmed. This reduces the service life of the device dramatically.

5.4.9 Slot/index tables

The device parameters are listed in the following tables. The parameters can be accessed via the slot and index numbers. The individual blocks each contain standard parameters, block parameters and manufacturer-specific parameters.

If you use **PACT***ware*™ as the operating program, input screens are available as the user interface.

General explanatory remarks

Object type

- Record: contains data structures (DS)
- Array: group of a specific data type
- Simple: contains individual data types, e. g. Float

Data type

- DS: data structure, contains data types such as Unsigned8, OctetString etc.
- Float: IEEE 754 format
- Integer:
  - Integer8: value range = -128 to 127
  - Integer16: value range = -32768 to 32767
  - Integer32: value range = -2^{31} to (2^{31}–1)
- OctetString: binary encoded
- VisibleString: ASCII encoded
- 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

TDOCT-3019_ENG 256722 03/2014

Physical Block

Parameter	Slot	Index	Object type	Data type	Size (Byte)	Storage Class	Read	Write	Page
Physical Block Standard Parameters									
Block object	0	16	Record	DS-32	20	Cst	x		98
Static rev. no.	0	17	Simple	Unsigned16	2	N	x		98
TAG	0	18	Simple	VisibleString	32	S	x	x	98
Strategy	0	19	Simple	Unsigned16	2	S	x	x	98
Alert key	0	20	Simple	Unsigned8	1	S	x	x	98
Target mode	0	21	Simple	Unsigned8	1	S	x	x	99
Block mode	0	22	Record	DS-37	3	D	x		99
Alarm summary	0	23	Record	DS-42	8	D	x		99
Firmware version	0	24	Simple	VisibleString	16	Cst	x		99
Hardware Rev.	0	25	Simple	VisibleString	16	Cst	x		99
Manufacturer ID	0	26	Simple	Unsigned16	2	Cst	x		99
Device name str.	0	27	Simple	VisibleString	16	Cst	x		99
Serial number	0	28	Simple	VisibleString	16	Cst	x		99
Diagnosis	0	29	Simple	Unsigned32	4	D	x		99
Diag extension	0	30	Simple	OctetString	6	D	x		99
Diag mask	0	31	Simple	OctetString	4	Cst	x		100
Diag mask Ex	0	32	Simple	OctetString	6	Cst	x		100
Dev. certificat.	0	33	Simple	VisibleString	32	Cst	x		100
Write locking	0	34	Simple	Unsigned16	2	N	x	x	100
Factory reset	0	35	Simple	Unsigned16	2	S	x	x	100
Additional info.	0	36	Simple	OctetString	32	S	x	x	100
Message	0	37	Simple	OctetString	32	S	x	x	100
Install. date	0	38	Simple	OctetString	16	S	x	x	100
Ident number sel	0	40	Simple	Unsigned8	1	S	x	x	100
Lock switch	0	41	Simple	Unsigned8	1	D	x		101
Feature	0	42	Record	DS-68	8	N	x		101
Cond.status diag	0	43	Simple	Unsigned8	1	S	x	x	101
Physical Block Pepperl+Fuchs Parameters									
Diagnostic code	0	54	Record	Pepperl+Fuchs-specific	5	D	x		101
Last diag. code	0	55	Record	Pepperl+Fuchs-specific	5	D	x		101
Bus address	0	59	Simple	Unsigned8	1	D	x		101
Set unit to bus	0	61	Simple	Unsigned8	1	S	x	x	101
Ext. value 1	0	62	Record	Pepperl+Fuchs-specific	6	D	x	x	102
Profile revision	0	64	Simple	VisibleString	32	Cst	x		102
Reset logbook	0	65	Simple	Unsigned8	1	S	x	x	102
Ident number (Ident_Number)	0	66	Simple	Unsigned16	2	D	x		102
Check conf.	0	67	Simple	Unsigned8	1	D	x		102
Order number	0	69	Simple	VisibleString	32	Cst	x		102
Tag location	0	70	Simple	VisibleString	22	Cst	x	x	102
Signature	0	71	Simple	OctetString	54	Cst	x	x	102
ENP version	0	72	Simple	VisibleString	16	Cst	x		102
Device diag.	0	73	Simple	OctetString	48	D	x		102
Ext. order code	0	74	Simple	VisibleString	60	Cst	x		103
Service locking	0	75	Simple	Unsigned16	2	D	x	x	103
Up/Dl feature	0	76	Simple	Unsigned16	2	Cst	x		103
Updl control	0	77	Simple	Unsigned8	1	D	x	x	103
Updl status	0	78	Simple	Unsigned8	1	N	x		103
Updl veri delay	0	79	Simple	Unsigned16	2	N	x		103
Up/Dl rev	0	80	Simple	Unsigned16	2	Cst	x		103
Config. counter	0	89	Simple	Unsigned16	2	D	x		103
Operating hours	0	90	Simple	Unsigned32	4	D	x		103
Sim. error no.	0	91	Simple	Unsigned16	2	D	x	x	103
Sim. messages	0	92	Simple	Unsigned8	1	D	x	x	103

Parameter	Slot	Index	Object type	Data type	Size (Byte)	Storage Class	Read	Write	Page
Language	0	93	Simple	Unsigned8	1	N	x	x	103
Device name str.	0	94	Simple	Unsigned8	1	Cst	x		103
Display mode	0	95	Simple	Unsigned8	1	N	x	x	104
Add. disp. value	0	96	Simple	Unsigned8	1	N	x	x	104
Format 1st value	0	97	Simple	Unsigned8	1	N	x	x	104
Format 1st value	0	98	Simple	Unsigned8	1	N	x		104
Status (Device Status)	0	99	Simple	Unsigned8	1	D	x		104
Format ext. val. 2	0	100	Simple	Unsigned8	1	N	x	x	104
Advanced diagnostics 7 (Diag add ext.)	0	101	Record	OctetString	6	D	x		104
Diag mask add ext.	0	102	Record	OctetString	6	Cst	x		105
Electr. serial no.	0	103	Simple	VisibleString	16	Cst	x		105
Diagnostic code	0	104	Simple	Array	20	D	x		105
Sw build nr.	0	105	Simple	Unsigned16	2	Cst	x		105
Lockstate	0	106	Simple	Unsigned8	1	D	x		105
Com.err.counters	0	107	Record	Pepperl+Fuchs-specific	10	D	x		105
Addressing	0	108	Simple	Unsigned8	1	D	x		105
Alarm behav. P	0	109	Simple	Unsigned8	1	S	x	x	105
Maintenance instructions	0	110	Simple	Array	20	D	x		105
Operator code	0	111	Simple	Unsigned16	2	N	x	x	105
Format ext. val. 1	0	112	Simple	Unsigned8	1	N	x	x	106
Reset	0	113	Simple	Unsigned16	2	D	x	x	106
Code definition	0	114	Simple	Unsigned16	2	N	x	x	106
DIP switch	0	115	Record	Pepperl+Fuchs-specific	4	D	x		106
Last diag. code	0	116	Simple	Array	20	D	x		106
Instructions	0	117	Simple	Unsigned16	2	D	x		106
Download select.	0	118	Simple	Unsigned8	1	D	x	x	107
PB view 1	0	126	Simple	PB_View	17	N	x		107

TDOCT-3019_ENG 256722 03/2014

Analog Input Block 1 and Analog Input Block 2

Parameter	Slot [1]	Index	Object type	Data type	Size (Byte)	Storage Class	Read	Write	Page
Analog Input Block Standard Parameters									
Block object	1/2	16	Record	DS-32	20	Cst	x		107
Static rev. no.	1/2	17	Simple	Unsigned16	2	N	x		108
TAG	1/2	18	Simple	VisibleString	32	S	x	x	108
Strategy	1/2	19	Simple	Unsigned16	2	S	x	x	108
Alert key	1/2	20	Simple	Unsigned8	1	S	x	x	108
Target mode	1/2	21	Simple	Unsigned8	1	S	x	x	108
Block mode	1/2	22	Record	DS-37	3	D	x		108
Alarm summary	1/2	23	Record	DS-42	8	D	x		108
Analog Input Block Parameters									
Batch information	1/2	24	Record	DS-67	10	S	x	x	109
Output value (Out Value)	1/2	26	Record	DS-33	5	D	x	x[2]	109
Proc value scale	1/2	27	Array	Float	8	S	x	x	109
Output scale	1/2	28	Record	DS-36	11	S	x	x	109
Characterization	1/2	29	Simple	Unsigned8	1	S	x	x	110
Channel	1/2	30	Simple	Unsigned16	2	S	x	x	110
Filt. time const.	1/2	32	Simple	Float	4	S	x	x	110
Fail safe mode	1/2	33	Simple	Unsigned8	1	S	x	x	110
Failsafe default	1/2	34	Simple	Float	4	S	x	x	110
Limit hysteresis	1/2	35	Simple	Float	4	S	x	x	111
Upper limit alarm	1/2	37	Simple	Float	4	S	x	x	111
Upper limit warning	1/2	39	Simple	Float	4	S	x	x	111
Lower limit warning	1/2	41	Simple	Float	4	S	x	x	111
Lower limit alarm	1/2	43	Simple	Float	4	S	x	x	111
Upper limit alarm	1/2	46	Record	DS-39	16	D	x		112
Upper limit warning	1/2	47	Record	DS-39	16	D	x		112
Lower limit warning	1/2	48	Record	DS-39	16	D	x		112
Lower limit alarm	1/2	49	Record	DS-39	16	D	x		112
Simulate	1/2	50	Record	DS-50	6	S	x	x	113
Unit text	1/2	51	Simple	OctetString	16	S	x	x	113
PV scale unit	1/2	61	Simple	Unsigned16	2	N	x		113
AI view 1	1/2	62	Simple	FB_view	18	D	x		113

1 Analog Input Block 1 = Slot 1; Analog Input Block 2 = Slot 2

2 If "Block mode" current mode = manual (Man)

Analog Output Block 1 and Analog Output Block 2

Parameter	Slot [1]	Index	Object type	Data type	Size (Byte)	Storage Class	Read	Write	Page
Analog Output Block Standard Parameters									
Block object	3/4	16	Record	DS-32	20	Cst	x		114
Static rev. no.	3/4	17	Simple	Unsigned16	2	N	x		114
TAG	3/4	18	Simple	VisibleString	32	S	x	x	114
Strategy	3/4	19	Simple	Unsigned16	2	S	x	x	114
Alert key	3/4	20	Simple	Unsigned8	1	S	x	x	114
Target mode	3/4	21	Simple	Unsigned8	1	S	x	x	114
Block mode	3/4	22	Record	DS-37	3	D	x		115
Alarm summary	3/4	23	Record	DS-42	8	D	x		115
Analog Output Block Parameters									
Batch information	3/4	24	Record	DS-67	10	S	x	x	115
Input value	3/4	26	Record	DS-101	5	D	x		115
Channel	3/4	27	Simple	Unsigned16	2	S	x	x	115
Data size	3/4	28	Simple	Unsigned8	1	Cst	x		116
Data max. size	3/4	29	Simple	Unsigned8	1	Cst	x		116
Fail safe time	3/4	32	Simple	Float	4	S	x	x	116
Fail safe mode	3/4	33	Simple	Unsigned8	1	S	x	x	116
Failsafe default	3/4	34	Simple	Float	4	S	x	x	116
Unit	3/4	35	Simple	Unsigned16	2	S	x	x	116
Output value (Out Value)	3/4	36	Simple	DS-101	5	D	x	x	116
AO view 1	3/4	39	Simple	OctetString	20	D	x		117

[1] Analog Output Block 1 = Slot 3; Analog Output Block 2 = Slot 4

TDOCT-3019_ENG 256722 03/2014

Transducer Block

Parameter	Slot	Index	Object type	Data type	Size (Byte)	Storage Class	Read	Write	Page
Transducer Block Standard Parameters									
Block object	6	16	Record	DS-32	20	Cst	x		117
Static rev. no.	6	17	Simple	Unsigned16	2	N	x		117
TAG	6	18	Simple	VisibleString	32	S	x	x	117
Strategy	6	19	Simple	Unsigned16	2	S	x	x	117
Alert key	6	20	Simple	Unsigned8	1	S	x	x	118
Target mode	6	21	Simple	Unsigned8	1	S	x	x	118
Block mode	6	22	Record	DS-37	3	D	x		118
Alarm summary	6	23	Record	DS-42	8	D	x		118
Sensor pressure	6	24	Simple	Float	4	D	x		118
URL sensor	6	25	Simple	Float	4	N	x		118
LRL sensor	6	26	Simple	Float	4	N	x		118
Hi trim sensor	6	27	Simple	Float	4	S	x	x	118
Lo trim sensor	6	28	Simple	Float	4	S	x	x	118
Minimum span	6	29	Simple	Float	4	N	x		118
Press. eng. unit	6	30	Simple	Unsigned16	2	S	x		119
Corrected press.	6	31	Record	DS-33	5	D	x		119
Sensor Meas. Type	6	32	Simple	Unsigned16	2	N	x		119
Sensor serial no.	6	33	Simple	Unsigned32	4	N	x		119
Primary value	6	34	Record	DS-33	5	D	x		119
Primary value unit	6	35	Simple	Unsigned16	2	S	x	x	119
Transmitter type	6	36	Simple	Unsigned16	2	S	x	x	119
Sensor Temp.	6	43	Record	DS-33	5	D	x		119
Temp. eng. unit.	6	44	Simple	Unsigned16	2	S	x	x	119
Value (sec val 1)	6	45	Record	DS-33	5	D	x		119
Press. eng. unit	6	46	Simple	Unsigned16	2	S	x	x	120
Value (sec val 2)	6	47	Record	DS-33	5	D	x		120
Sec val2 unit	6	48	Simple	Unsigned16	2	S	x	x	120
Characterization	6	49	Simple	Unsigned8	1	S	x	x	120
Measuring range	6	50	Array	Float	8	S	x	x	120
Working range	6	51	Array	Float	8	S	x	x	120
Squareroot point	6	53	Simple	Float	4	S	x	x	120
Tab actual numb	6	54	Simple	Unsigned8	1	N	x		120
Line numb.:	6	55	Simple	Unsigned8	1	D	x	x	120
Table max. number	6	56	Simple	Unsigned8	1	N	x		120
Table min. number	6	57	Simple	Unsigned8	1	N	x		120
Simulation mode	6	58	Simple	Unsigned8	1	D	x	x	121
Status (characteristic)	6	59	Simple	Unsigned8	1	D	x		121
Tab xy value	6	60	Array	Float	8	D	x	x	121
Max. meas. press.	6	61	Simple	Float	4	N	x	x [1]	121
Min. meas. press.	6	62	Simple	Float	4	N	x	x [1]	121
Transducer Block Pepperl+Fuchs Parameter									
Empty calib. (Tr)	6	66	Simple	Float	4	S	x	x	121
Full calib.	6	67	Simple	Float	4	S	x	x	121
Pressure Empty/Full	6	68	Array	Float	8	N	x		121
Calibration Empty/Full	6	69	Array	Float	8	N	x		121
Max. Turndown	6	70	Simple	Float	4	S	x	x	122
High-press. side	6	71	Simple	Unsigned8	1	S	x	x	122
Reset peakhold	6	72	Simple	Unsigned8	1	D	x	x	122
Measuring mode	6	73	Simple	Unsigned8	1	S	x	x	122
Simulation mode	6	74	Simple	Unsigned8	1	D	x	x	122
Sim. level	6	76	Simple	Float	4	D	x	x	122
Sim. tank cont.	6	77	Simple	Float	4	D	x	x	122
Sim. pressure	6	79	Simple	Float	4	D	x	x	122
Electr. delta P	6	80	Simple	Unsigned8	1	S	x	x	123
Pressure abs range	6	81	Simple	Float	4	N	x		123
Lo trim measured	6	82	Simple	Float	4	N	x	x	123

Parameter	Slot	Index	Object type	Data type	Size (Byte)	Storage Class	Read	Write	Page
Hi trim measured	6	83	Simple	Float	4	N	x	x	123
Pos. zero adjust (pressure sensors)	6	84	Simple	Unsigned8	1	N	x	x	123
Calib. offset (absolute pressure sensor)	6	86	Simple	Float	4	S	x	x	123
Damping	6	87	Simple	Float	4	S	x	x	123
Meas. pressure	6	88	Simple	Float	4	D	x		123
Unit before lin.	6	89	Simple	Unsigned16	2	S	x	x	124
Calibration mode	6	90	Simple	Unsigned8	1	S	x	x	124
Height unit	6	91	Simple	Unsigned16	2	S	x	x	124
Density unit	6	92	Simple	Unsigned16	2	S	x		124
Adjust density	6	93	Simple	Float	4	S	x	x	124
Process Density	6	94	Simple	Float	4	S	x	x	124
Meas. Level	6	95	Simple	Float	4	D	x		125
Empty height	6	96	Simple	Float	4	S	x	x	125
Full height	6	97	Simple	Float	4	S	x	x	125
Level before lin.	6	97	Simple	Float	4	S	x	x	125
Tank description	6	101	Simple	VisibleString	32	S	x	x	125
Lin. mode	6	102	Simple	Unsigned8	1	S	x	x	125
Unit after lin.	6	103	Simple	Unsigned16	2	S	x	x	125
Tank content	6	104	Simple	Float	4	D	x		126
Empty calib.	6	105	Simple	Float	4	S	x	x	126
Full calib.	6	106	Simple	Float	4	S	x	x	126
Tab xy value	6	107	Array	Float	8	D	x		126
Edit table	6	108	Simple	Unsigned8	1	D	x	x	126
Lin tab index 01	6	109	Array	Float	8	D	x	x	126
...									...
Lin tab index 32	6	140	Array	Float	8	D	x	x	126
Ext. value 2	6	141	Record	DS-101	5	D	x		127
Ext.val.2 unit	6	142	Simple	Unsigned16	2	D	x		127
Damping	6	165	Simple	Float	4	S	x		127
Level selection	6	166	Simple	Float	1	S	x	x	127
High-press. side	6	167	Simple	Unsigned8	1	N	x		127
Fixed ext. value	6	168	Simple	Float	4	S	x	x	127
Empty pressure	6	169	Simple	Float	4	S	x	x	127
Full pressure	6	170	Simple	Float	4	S	x	x	127
Pressure af. damp	6	171	Simple	Float	4	D	x		128
Calib. Offset	6	172	Simple	Float	4	S	x	x	128
Sensor temp.	6	173	Simple	Float	4	D	x		128
X-value	6	174	Simple	Float	4	D	x		128
Sensor serial no.	6	175	Simple	VisibleString	16	N	x		128
PaTbRangeParameters	6	177	Record	X	32	S	x	x	128

[1] Can only be reset

5.4.10 Data format

In PROFIBUS PA, the analog values are cyclically transmitted to the PLC in data blocks that are 5 bytes long. The measured value is represented in the first 4 bytes in the form of floating point numbers in accordance with the IEEE standard. The 5th byte contains standardized status information pertaining to the device.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Measured value as IEEE 754 floating point number				Status

The measured value is transmitted as an IEEE 754 floating point number as follows:
Measured value = $(-1)^{Sign} \times 2^{(E - 127)} \times (1 + F)$

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Sign	Exponent (E)								Fraction (F)						
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}
Fraction (F)															
2^{-8}	2^{-9}	2^{-10}	2^{-11}	2^{-12}	2^{-13}	2^{-14}	2^{-15}	2^{-16}	2^{-17}	2^{-18}	2^{-19}	2^{-20}	2^{-21}	2^{-22}	2^{-23}

Example

40 F0 00 00 hex = 0100 0000 1111 000 000 000 000 0000 binary

Value = $(-1)^0 \times 2^{(129 - 127)} \times (1 + 2^{-1} + 2^{-2} + 2^{-3})$
$= 1 \times 2^2 \times (1 + 0.5 + 0.25 + 0.125)$
$= 1 \times 4 \times 1.875$
$= 7.5$

NOTICE

- Not all programmable logic controllers support the IEEE 754 format. In such cases, a conversion module must be used or written.
- Depending on the data management mode (most-significant byte or low significant byte) used in the PLC (master), the byte sequence may have to be changed (byte swapping routine).

Data structures

A number of data types, e. g. DS-36, are listed in the slot/index table. These data types are data structures, structured in accordance with the PROFIBUS PA Specification, Part 1, Version 3.0. They consist of several elements that are addressed via the slot, index and sub-index:

Parameter name	Type	Slot	Index	Element	Sub-index	Type	Size (Byte)
Output value (Out Value)	DS-33	1	26	Output value (Out Value)	1	Float	4
				Status (Device Status)	5	Unsigned8	1

Parameter name	Type	Slot	Index	Element	Sub-index	Type	Size (Byte)
Output scale	DS-36	1	28	Upper value	1	Float	4
				Lower value	5	Float	4
				Unit	9	Unsigned16	2
				Decimal point	11	Integer8	1

5.4.11 Assignment of the PA profile to internal parameters

As defined in the specification of the Profibus device, the following table describes the influence of the profile parameters on the basic parameters and the assignment of the Transducer Block:

	Basic parameter			PROFIBUS PA profile parameter		
Sensor Type	**Measuring mode (005)**	**Lin. mode (037)[1]**	**Primary value unit**	**Characterization type (TB_LIN_TYPE)**	**Transmitter type (PV_TYPE)**	**Unit (PV_UNIT)**
Absolute pressure/gauge pressure/diff.	Pressure		Press. eng. unit (125)	No linearization (=0)	Pressure (=0)	Press. eng. unit
Absolute pressure/gauge pressure/diff.	Level (linear)	Linear or table editing mode	Unit before lin (025)	No linearization (=0)	Level easy (=130)	Level unit (%, Volume, Mass, Height)
	Level (with lin. table)	Activate table	Unit after lin. (038)	Linearization (=1)	Level easy (=130)	Level unit (%, Volume, Mass, Height)

[1] The device uses the "Lin. mode (037)" parameter internally to enable or disable the linearization table (to set the device to the linear or linearization measuring mode). The same parameter is also used to set the table to the edit mode or to check and validate the edited table.

The editing, enabling/disabling and control of the linearization table in the "Level" measuring mode affects the Transducer Block and the internal "Basic" parameters. They have to be assigned to one another to obtain a simple mechanism between the internal and profile configuration.

The device only contains one table and the linearization cannot be activated while the table is being edited or if the table is incorrect. We have defined that the "Level" mode must be linear in such instances. The "Characterization Type" parameter (TB_TYPE) must be set to "Linear" as soon as the linearization table is disabled or is being edited or cannot be enabled.

If the level configuration is modified:

1. Using the "Basic" parameters:
   - Successful modification of the LinearisationTableMode basic parameter ("Lin. mode (037)") to "Linear" or "Activate table" must update the PA profile parameters. If the linearization table could not be activated due to a mistake in the table, the "Characterization Type" (TB_TYPE) parameter then remains unchanged.
   - The linearization table mode ("Lin. mode (037)" basic parameter) can be set to the editing mode (manual or semi-automatic entry): in instances of this nature, the "Characterization Type" (TB_TYPE) Profibus parameter must be changed to "Linear".
   - The "Erase table" option of the "Lin. mode (037)" basic parameter resets the parameter to "Linear" so that the "Characterization Type" (TB_TYPE) parameter must return to "No linearization".
2. Using the PA profile parameters:
   - The modification of the Characterization Type (TB_LIN_TYPE) PA profile parameter updates the basic parameter "Lin. mode (037)". If the linearization table cannot be activated due to a mistake in the table, then the table must be corrected and activated again.

To edit the table the parameter Simulation mode (TAB_OP_CODE) must be set to 1 (Editing) to allow the edition. At the end of the edition the new table can be activated by setting 3 (Check and aktivate table).

Simulation mode (TAB_OP_CODE)	**Function**	**Effect on "Lin. mode (037)"**
0	Reset table	Delete table, then "Linear"
1	Editing	Manual entry
3	Check and activate table	Activate table if the table is correct or leave the table unchanged.
4	Delete point (only available in the manual and semiautomatic mode)	Manual or semi automatic entry
5	Enter point (only available in the manual and semiautomatic mode)	Manual or semi automatic entry

TDOCT-3019_ENG 256722 03/2014

The Characterization parameter (TB_LIN_TYPE) is affected by:

- Simulation mode (TAB_OP_CODE): If the table is being edited, the Characterization parameter (TB_LIN_TYPE) is automatically set to "Linear". If the table was activated successfully, the Characterization Type parameter (TB_LIN_TYPE) is automatically set to "Linearization".
- "Lin. mode (037)": Just as in the case of the Simulation mode (TAB_OP_CODE), this parameter is also used by the basic application to set the device to linear or linearized conversion or to edit the linearization table. The "Linear", "Manual entry", "Semi-auto. entry" or "Delete table" options must reset Characterization parameter (TB_LIN_TYPE) to "Linear". The "Activate table" option with a successful result must reset the Characterization parameter (TB_LIN_TYPE) to "Linearization".

6 Commissioning without an operating menu

WARNING If a pressure smaller than the minimum permitted pressure or greater than the maximum permitted pressure is present at the device, the following messages are output in succession:

- "S140 Working range P" or "F140 Working range P"
- "S841 Sensor range" or "F841 Sensor range"

Depending on the setting in the "Alarm behav. P (050) parameter.

NOTICE The device is configured for the Pressure measuring mode as standard. The measuring range and the unit in which the measured value is transmitted correspond to the specifications on the nameplate.

6.1 Function check

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

- "Post-installation check" checklist → 19
- "Post-connection check" checklist → 23

6.2 Position adjustment

The following functions are possible by means of the key on the electronic insert:

- Position adjustment (zero point correction)
- Device reset → 35 (total reset)

NOTICE

- Operation must be unlocked. → 34, "Locking/unlocking operation"
- The device is configured for the "Pressure" measuring mode as standard.
- The pressure applied must be within the nominal pressure limits of the sensor. See information on the nameplate.

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

[1] Observe warning on commissioning (→ 58)

7 Commissioning with an operating menu (onsite display/Software)

WARNING If a pressure smaller than the minimum permitted pressure or greater than the maximum permitted pressure is present at the device, the following messages are output in succession:

- "S140 Working range P" or "F140 Working range P"
- "S841 Sensor range" or "F841 Sensor range"

Depending on the setting in the "Alarm behav. P (050) parameter.

NOTICE The device is configured for the Pressure measuring mode as standard. The measuring range and the unit in which the measured value is transmitted correspond to the specifications on the nameplate.

7.1 Function check

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

- "Post-installation check" checklist → 19
- "Post-connection check" checklist → 23

7.2 Commissioning

Commissioning comprises the following steps:

1. Function check → 59
2. Selecting the language, measuring mode and pressure unit → 59
3. Position zero adjustment → 60
4. Configuring measurement:
   - Pressure measurement → 73
   - Level measurement → 61

7.2.1 Selecting the language, measuring mode and pressure unit

Language selection

Parameter name	Description
Language (000) Options Menu path: Main menu → Language	Select the language for the onsite display. **Options:** • English • Possibly another language (as selected when ordering the device) • One further language (language of the manufacturing plant) **Factory setting**: English

Measuring mode selection

Parameter name	Description
Measuring mode (005) Options Menu path: Setup → Measuring mode (005)	Select the measuring mode. The operating menu is structured differently depending on the measuring mode selected. **NOTICE** If the measuring mode is changed, no conversion takes place. If necessary, the device has to be recalibrated after the measuring mode has been changed. **Options:** • Pressure • Level • Flow **Factory setting:** Pressure

Pressure unit selection

Parameter name	Description
Press. eng. unit (125) Options Menu path: Setup → Press. eng. unit (125)	Select the pressure unit. If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit. **Options:** • mbar, bar • mmH2O, mH2O, • inH2O, ftH2O • Pa, kPa, MPa • psi • mmHg, inHg • kgf/cm^2 **Factory setting:** mbar or bar depending on the sensor nominal measuring range, or as per order specifications

7.3 Position zero adjustment

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

Parameter name	Description
Corrected press. (172) Display Menu path: Setup → Corrected press. (172)	Displays the measured pressure after sensor trim and position adjustment. **NOTICE** If this value is not equal to "0", it can be corrected to "0" by the position adjustment.
Calib. offset (192) (008) (absolute pressure sensor) Entry Menu path: Setup → Calib. offset (192)	Position adjustment – the pressure difference between the set point and the measured pressure must be known. **Example:** • Measured value = 982.2 mbar (14.25 psi) • You correct the measured value with the value entered (e. g. 2.2 mbar (0.032 psi)) via the "Calib. offset (192)" parameter. This means that you are assigning the value 980.0 mbar (14.21 psi) to the pressure present. • Measured value (after calib. offset) = 980.0 mbar (14.21 psi) **Factory setting:** 0.0

TDOCT-3019_ENG 256722 03/2014

7.4 Level measurement

7.4.1 Information on level measurement

NOTICE You have a choice of two methods for calculating the level: "In pressure" and "In height". The table in the "Overview of level measurement" section that follows provides you with an overview of these two measuring tasks.

- The limit values are not checked, i. e. the values entered must be appropriate for the sensor and the measuring task for the device to be able to measure correctly.
- Customer-specific units are not possible.
- There is no unit conversion.
- The values entered for "Empty calib. (028)/Full calib. (031)", "Empty pressure (029)/Full pressure (032)", "Empty height (030)/Full height (033)" must be at least 1 % apart. The value will be rejected, and a warning message displayed, if the values are too close together.

7.4.2 Overview of level measurement

Measuring task	Level selection	Measured variable options	Description	Measured value display
Calibration is performed by entering two pressure-level value pairs.	"In pressure"	Via the "Unit before lin (025)" parameter: %, level, volume or mass units.	Calibration with reference pressure (wet calibration), see → 62 Calibration without reference pressure (dry calibration), see → 63	The measured value display and the "Level before lin. (019)" parameter display the measured value.
Calibration is performed by entering the density and two height-level value pairs.	"In height"		Calibration with reference pressure (wet calibration), see → 67 Calibration without reference pressure (dry calibration), see → 65	

7.4.3 "In pressure" level selection Calibration with reference pressure (wet calibration)

Example:

In this example, the level in a tank should be measured in "m". The maximum level is 3 m (9.8 ft). The pressure range is due to the filling height and the density.

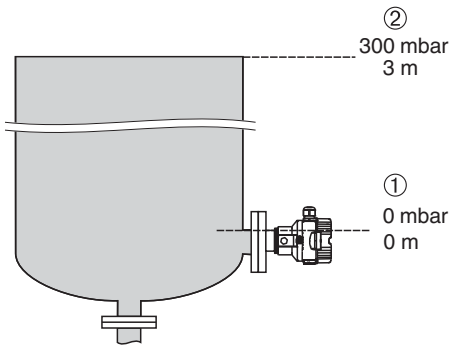
Prerequisite:

- The measured variable is in direct proportion to the pressure.
- The tank can be filled and emptied.

NOTICE

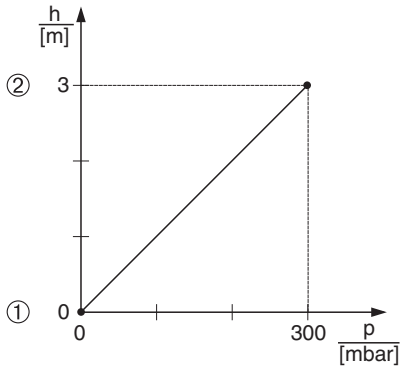
The values entered for "Empty calib. (028)/Full calib. (031)" and the pressures present at the device must be at least 1% apart. The value will be rejected, and a warning message displayed, if the values are too close together. Further limit values are not checked; i. e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly.

	Description
1	Perform "position adjustment" → 60
2	Select the "Level" measuring mode via the "Measuring mode (005)" parameter. Menu path: Setup → Measuring mode (005)
3	Select a pressure unit via the "Press. eng. unit (125)" parameter, here "mbar" for example. Menu path: Setup → Press. eng. unit (125)
4	Select the "in pressure" level mode by means of the "Level selection (024)" parameter. Menu path: Setup → Extended Setup → Level → Level selection (024)
5	Select a level unit by means of the "Unit before lin (025)" parameter, here "m" for example. Menu path: Setup → Extended Setup → Level → Unit before lin (025)
6	Select the "Wet" option by means of the "Calibration mode (027)" parameter. Menu path: Setup → Extended Setup → Level → Calibration mode (027)
7	The pressure for the lower calibration point is present at the device, here 0 mbar for example.
	Select the "Empty calib. (028)" parameter. Menu path: Setup → Extended Setup → Level → Empty calib. (028)
	Enter the level value, here 0 m for example. The pressure value present is assigned to the lower level value by confirming the value.
8	The pressure for the upper calibration point is present at the device, here 300 mbar (4.35 psi) for example.
	Select the "Full calib. (031)" parameter. Menu path: Setup → Extended Setup → Level → Full calib. (031)
	Enter the level value, here 3 m (9.8 ft) for example. The pressure value present is assigned to the upper level value by confirming the value.
9	If calibration is performed with a medium other than the process medium, enter the density of the calibration medium in "Adjust density (034)". Menu path: Setup → Extended Setup → Level → Adjust density (034)
10	If calibration was performed with a medium other than the process medium, specify the density of the process medium in the "Process density (035)" parameter. Menu path: Setup → Extended setup → Level → Process density (035).
11	Result: The measuring range is set for 0 to 3 m (9.8 ft).



Calibration with reference pressure – wet calibration

1 See Table, step 7.
2 See Table, step 8.



Calibration with reference pressure – wet calibration

1 See Table, step 7.
2 See Table, step 8.

NOTICE

The measured variables %, level, volume and mass are available for this level mode. See → 83 "Unit before lin (025)".

TDOCT-3019_ENG 256722 03/2014

7.4.4 "In pressure" level selection Calibration without reference pressure (dry calibration)

Example:

In this example, the volume in a tank should be measured in liters. The maximum volume of 1000 liters (264 gal) corresponds to a pressure of 450 mbar (6.53 psi). The minimum volume of 0 liters corresponds to a pressure of 50 mbar (0.72 psi) since the device is mounted below the start of the level measuring range.

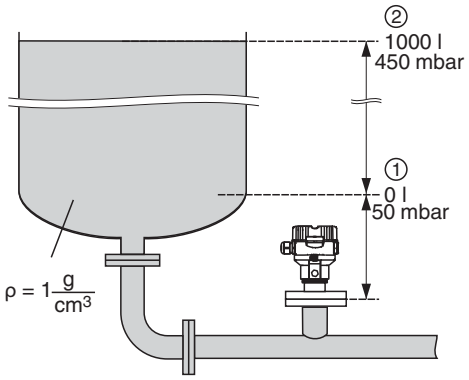
Prerequisite:

- The measured variable is in direct proportion to the pressure.
- This is a theoretical calibration i. e. the pressure and volume values for the lower and upper calibration point must be known.

NOTICE

- The values entered for "Empty calib. (028)/Full calib. (031)", "Empty pressure (029)/Full pressure (032)" must be at least 1% apart. The value will be rejected, and a warning message displayed, if the values are too close together. Further limit values are not checked; i. e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly.
- Due to the orientation of the device, there may be pressure shifts in the measured value, i. e. when the container is empty or partly filled, the measured value is not zero. For information on how to perform position adjustment, see → 60 "Position zero adjustment".

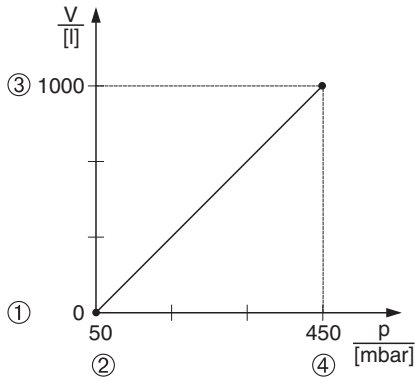
	Description
1	Select the "Level" measuring mode via the "Measuring mode (005)" parameter. Menu path: Setup → Measuring mode (005)
2	Select a pressure unit via the "Press. eng. unit (125)" parameter, here "mbar" for example. Menu path: Setup → Press. eng. unit (125)
3	Select the "in pressure" level mode by means of the "Level selection (024)" parameter. Menu path: Setup → Extended Setup → Level → Level selection (024)
4	Select a volume unit via the "Unit before lin (025)" parameter, here "l" (liter) for example. Menu path: Setup → Extended Setup → Level → Unit before lin (025)



Calibration without reference pressure – dry calibration

1 See Table, steps 7 and 8.
2 See Table, steps 9 and 10.

	Description
5	Select the "Dry" option by means of the "Calibration mode (027)" parameter. Menu path: Setup → Extended Setup → Level → Calibration mode (027)
6	"Adjust density (034)" contains the factory setting 1.0, but this value can be changed if required. The entered value pairs must correspond to this density. Menu path: Setup → Extended Setup → Level → Adjust density (034)
7	Enter the volume value for the lower calibration point via the "Empty calib. (028)" parameter, here 0 liters for example. Menu path: Setup → Extended Setup → Level → Empty calib. (028)
8	Enter the pressure value for the lower calibration point via the "Empty pressure (029)" parameter, here 50 mbar (0.72 psi) for example. Menu path: Setup → Extended Setup → Level → Empty pressure (029)
9	Enter the volume value for the upper calibration point via the "Full calib. (031)" parameter, here 1000 liters (264 gal) for example. Menu path: Setup → Extended Setup → Level → Full calib. (031)
10	Enter the pressure value for the upper calibration point via the "Full pressure (032)" parameter, here 450 mbar (6.53 psi) for example. Menu path: Setup → Extended Setup → Level → Full pressure (032)
11	If calibration was performed with a medium other than the process medium, specify the density of the process medium in the "Process density (035)" parameter. Menu path: Setup → Extended setup → Level → Process density (035).
12	Result: The measuring range is set for 0 to 1000 l (264 gal).



Calibration without reference pressure – dry calibration

1 See Table, step 7.
2 See Table, step 8.
3 See Table, step 9.
4 See Table, step 10.

NOTICE The measured variables %, level, volume and mass are available for this level mode.
See → 83 "Unit before lin (025)".

TDOCT-3019_ENG 256722 03/2014

7.4.5 "In height" level selection Calibration with reference pressure (wet calibration)

Example:

In this example, the volume in a tank should be measured in liters. The maximum volume of 1000 liters (264 gal) corresponds to a level of 4.5 m (14.8 ft). The minimum volume of 0 liters corresponds to a level of 0.5 m (1.6 ft) since the device is mounted below the start of the level measuring range.

The density of the medium is 1 g/cm^3 (1 SGU).

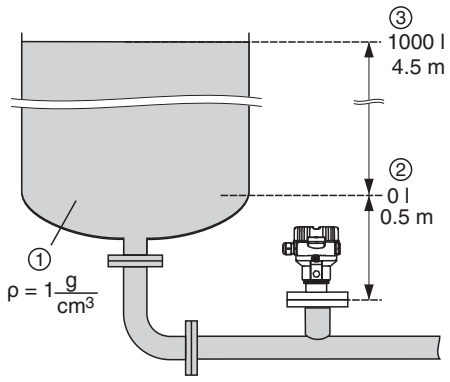
Prerequisite:

- The measured variable is in direct proportion to the pressure.
- The tank can be filled and emptied.

NOTICE

The values entered for "Empty calib. (028)/Full calib. (031)" and the pressure values present at the device must be at least 1% apart. The value will be rejected, and a warning message displayed, if the values are too close together. Further limit values are not checked; i. e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly.

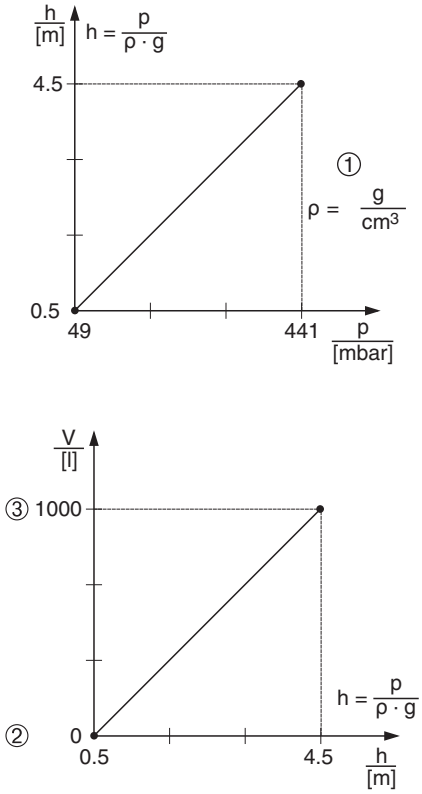
	Description
1	Perform "position adjustment" → 60
2	Select the "Level" measuring mode via the "Measuring mode (005)" parameter. Menu path: Setup → Measuring mode (005)
3	Select a pressure unit via the "Press. eng. unit (125)" parameter, here "mbar" for example. Menu path: Setup → Press. eng. unit (125)
4	Select the "in height" level mode via the "Level selection (024)" parameter. Menu path: Setup → Extended Setup → Level → Level selection (024)
5	Select a volume unit via the "Unit before lin (025)" parameter, here "l" (liter) for example. Menu path: Setup → Extended Setup → Level → Unit before lin (025)



Calibration with reference pressure – wet calibration

1 See Table, step 8.
2 See Table, step 9.
3 See Table, step 10.

	Description
6	Select a level unit by means of the "Height unit (026)" parameter, here "m" for example. Menu path: Setup → Extended Setup → Level → Height unit (026)
7	Select the "Wet" option by means of the "Calibration mode (027)" parameter. Menu path: Setup → Extended Setup → Level → Calibration mode (027)
8	If calibration is performed with a medium other than the process medium, enter the density of the calibration medium in the "Adjust density (034)" parameter, here 1 g/cm³ (1 SGU) for example. Menu path: Setup → Extended Setup → Level → Adjust density (034)
9	The pressure for the lower calibration point is present at the device, here 0.5 m covered/49 mbar (0.71 psi) for example.
	Enter the volume value for the lower calibration point via the "Empty calib. (028)" parameter, here 0 liters for example. Menu path: Setup → Extended Setup → Level → Empty calib. (028)
10	The pressure for the upper calibration point is present at the device, here 4.5 m covered/441 mbar (6.4 psi) for example.
	Enter the volume value for the upper calibration point via the "Full calib. (031)" parameter, here "1000 liters" (264 gal) for example. Menu path: Setup → Extended Setup → Level → Full calib. (031)
11	If calibration was performed with a medium other than the process medium, specify the density of the process medium in the "Process density (035)" parameter. Menu path: Setup → Extended Setup → Level → Process density (035)
12	Result: The measuring range is set for 0 to 1000 l (264 gal).



Calibration with reference pressure – wet calibration

1 See Table, step 8.
2 See Table, step 9.
3 See Table, step 10.

NOTICE The measured variables %, level, volume and mass are available for this level mode.
See → 83 "Unit before lin (025)".

TDOCT-3019_ENG 256722 03/2014

7.4.6 "In height" level selection Calibration without reference pressure (dry calibration)

Example:

In this example, the volume in a tank should be measured in liters. The maximum volume of 1000 liters (264 gal) corresponds to a level of 4.5 m (14.8 ft). The minimum volume of 0 liters corresponds to a level of 0.5 m (1.6 ft) since the device is mounted below the start of the level measuring range.

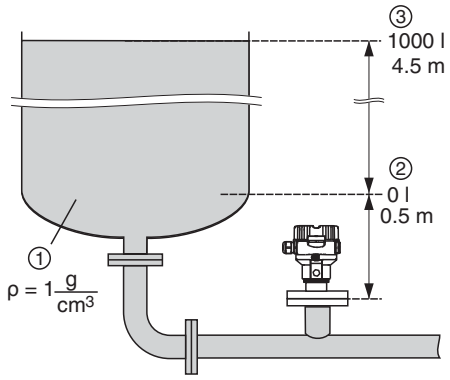
Prerequisite:

- The measured variable is in direct proportion to the pressure.
- This is a theoretical calibration i. e. the height and volume values for the lower and upper calibration point must be known.

NOTICE

- The values entered for "Empty calib. (028)/Full calib. (031)", "Empty height (030)/Full height (033)" must be at least 1 % apart. The value will be rejected, and a warning message displayed, if the values are too close together. Further limit values are not checked; i. e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly.
- Due to the orientation of the device, there may be pressure shifts in the measured value, i. e. when the container is empty or partly filled, the measured value is not zero. For information on how to perform position adjustment, see → 60 "Position zero adjustment".

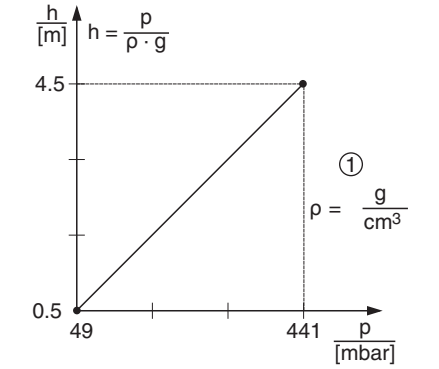
	Description
1	Select the "Level" measuring mode via the "Measuring mode (005)" parameter. Menu path: Setup → Measuring mode (005)
2	Select a pressure unit via the "Press. eng. unit (125)" parameter, here "mbar" for example. Menu path: Setup → Press. eng. unit (125)
3	Select the "in height" level mode via the "Level selection (024)" parameter. Menu path: Setup → Extended Setup → Level → Level selection (024)
4	Select a volume unit via the "Unit before lin (025)" parameter, here "l" (liter) for example. Menu path: Setup → Extended Setup → Level → Unit before lin (025)
5	Select a level unit by means of the "Height unit (026)" parameter, here "m" for example. Menu path: Setup → Extended Setup → Level → Height unit (026)
6	Select the "Dry" option by means of the "Calibration mode (027)" parameter. Menu path: Setup → Extended Setup → Level → Calibration mode (027)
7	Enter the density of the medium via the "Adjust density (034)" parameter, here "1 g/cm³" (1 SGU) for example. Menu path: Setup → Extended Setup → Level → Adjust density (034)

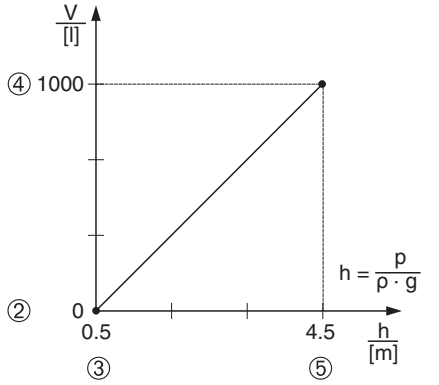


Calibration without reference pressure – dry calibration

1 See Table, step 7.
2 See Table, steps 8 and 9.
3 See Table, steps 10 and 11.

	Description
8	Enter the volume value for the lower calibration point via the "Empty calib. (028)" parameter, here 0 liters for example. Menu path: Setup → Extended Setup → Level → Empty calib. (028)
9	Enter the height value for the lower calibration point via the "Empty height (030)" parameter, here 0.5 m (1.6 ft) for example. Menu path: Setup → Extended Setup → Level → Empty height (030)
10	Enter the volume value for the upper calibration point via the "Full calib. (031)" parameter, here 1000 liters (264 gal) for example. Menu path: Setup → Extended Setup → Level → Full calib. (031)
11	Enter the height value for the upper calibration point via the "Full height (033)" parameter, here 4.5 m (14.8 ft) for example. Menu path: Setup → Extended Setup → Level → Full height (033)
12	If the process uses a medium other than that on which the calibration was based, the new density must be specified in the "Process density (035)" parameter. Menu path: Setup → Extended setup → Level → Process density (035).
13	Result: The measuring range is set for 0 to 1000 l (264 gal).





Calibration without reference pressure – dry calibration

1 See Table, step 7.
2 See Table, step 8.
3 See Table, step 9.
4 See Table, step 10.
5 See Table, step 11.

NOTICE The measured variables %, level, volume and mass are available for this level mode.
See → 83 "Unit before lin (025)".

7.4.7 Required parameters for Level measuring mode

Parameter name	Description
Level selection (024)	→ 83
Unit before lin (025)	→ 83
Height unit (026)	→ 83
Calibration mode (027)	→ 84
Empty calib. (028)	→ 84
Empty pressure (029)	→ 84
Empty height (030)	→ 84
Full calib. (031)	→ 84
Full pressure (032)	→ 84
Full height (033)	→ 85
Density unit (127)	→ 85
Adjust density (034)	→ 85
Process density (035)	→ 85
Level before lin. (019)	→ 85

7.5 Linearization

7.5.1 Manual entry of the linearization table via onsite display

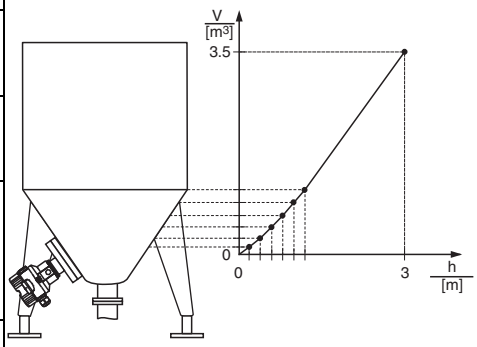
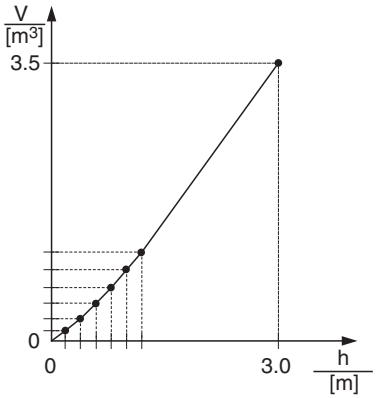
Example:

In this example, the volume in a tank with a conical outlet should be measured in m^3.

Prerequisite:

- This is a theoretical calibration, i. e. the points for the linearization table are known.
- The "Level" operating mode has been selected.
- A level calibration in m has been performed.

NOTICE For a description of the parameters mentioned, → 79 "Description of parameters".

	Description	
1	Select the "Manual entry" option via the "Lin. mode (037)" parameter. Menu path: Setup → Extended Setup → Linearization → Lin. mode (037)	
2	Select a unit via the "Unit after lin. (038)" parameter, e. g. m^3. Menu path: Setup → Extended Setup → Linearization → Unit after lin. (038)	
3	Enter the number of the point in the table via the "Line numb. (039)" parameter. Menu path: Setup → Extended Setup → Linearization → Line numb. (039)	
	The level is entered via the "X-value (040) (manual entry)" parameter, here 0 m for example. Confirm your entry. Menu path: Setup → Extended Setup → Linearization → X-value (040) (manual entry)	
	Using the "Y-value (041) (manual entry/in semi-auto. entry)" parameter, enter the associated volume value, here 0 m^3 for example, and confirm the value. Menu path: Setup → Extended Setup → Linearization → Y-value (041) (manual entry/in semi-auto. entry)	
4	To enter another point in the table, select the "Next point" option via the "Edit table (042)" parameter. Enter the next point as explained in step 3. Menu path: Setup → Extended Setup → Linearization → Edit table (042)	
5	Once all the points have been entered in the table, select the "Activate table" option via the "Lin. mode (037)" parameter. Menu path: Setup → Extended Setup → Linearization → Lin. mode (037)	
6	Result: The measured value after linearization is displayed.	

NOTICE Error message F510 "Linearization" is displayed as long as the table is being entered and is not activated.

7.5.2 Manual entry of the linearization table via the operating tool

Using an operating tool based on FDT technology (e. g. **PACT***ware*™), you can enter linearization using a module specially designed for this purpose. This provides you with an overview of the selected linearization even during entry. In addition, it is possible to access preprogrammed tank shapes.

NOTICE The linearization table may also be entered manually point by point in the operating tool menu, see → 70 "Manual entry of the linearization table via onsite display".

7.5.3 Semi-automatic entry of the linearization table

Example:

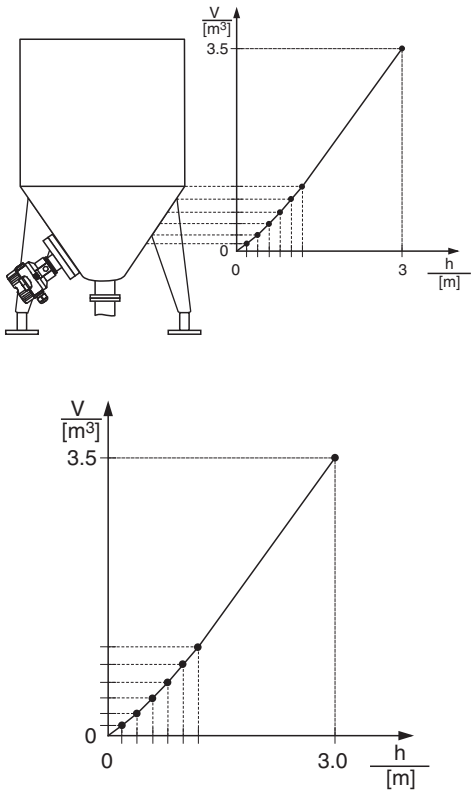
In this example, the volume in a tank with a conical outlet should be measured in m^3.

Prerequisite:

- The tank can be filled or emptied. The linearization characteristic must rise continuously.
- A level calibration has been performed.

NOTICE For a description of the parameters mentioned, → 79 "Description of parameters".

	Description
1	Select the "Semi-auto. entry" option via the "Lin. mode (037)" parameter. Menu path: Setup → Extended Setup → Linearization → Lin. mode (037)
2	Select a unit via the "Unit after lin. (038)" parameter, e. g. m^3. Menu path: Setup → Extended Setup → Linearization → Unit after lin. (038)
3	Fill the tank to the height of the 1st point.
4	Enter the number of the point in the table via the "Line numb. (039)" parameter. Menu path: Setup → Extended Setup → Linearization → Line numb. (039)
	The actual level is displayed via the "X-value (040) (manual entry)" parameter. Menu path: Setup → Extended Setup → Linearization → X-value (040) (manual entry)
	Using the "Y-value (041) (manual entry/in semi-auto. entry)" parameter, enter the associated volume value, here 0 m^3 for example, and confirm the value. Menu path: Setup → Extended Setup → Linearization → Y-value (041) (manual entry/in semi-auto. entry)
5	To enter another point in the table, select the "Next point" option via the "Edit table (042)" parameter. Enter the next point as explained in step 4. Menu path: Setup → Extended Setup → Linearization → Edit table (042)
6	Once all the points have been entered in the table, select the "Activate table" option via the "Lin. mode (037)" parameter. Menu path: Setup → Extended Setup → Linearization → Lin. mode (037)
7	Result: The measured value after linearization is displayed.



Semi-automatic entry of the linearization table

NOTICE Error message F510 "Linearization" is displayed as long as the table is being entered and is not activated.

7.5.4 Required parameters for linearization

Parameter name	Description
Lin. mode (037)	→ 85
Unit after lin. (038)	→ 85
Line numb. (039)	→ 86
X-value (040) (manual entry)	→ 86
Y-value (041) (manual entry/in semi-auto. entry)	→ 86
Edit table (042)	→ 86
Tank description (173)	→ 86
Tank content (043)	→ 86

TDOCT-3019_ENG 256722 03/2014

7.6 Pressure measurement

7.6.1 Calibration without reference pressure (dry calibration)

Example:

In this example, a device with a 400 mbar (6 psi) sensor is configured for the 0 mbar to +300 mbar (4.35 psi) measuring range, i. e. 0 mbar and 300 mbar (4.35 psi) are assigned.

Prerequisite:

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

NOTICE

Due to the orientation of the device, there may be pressure shifts in the measured value, i. e. the measured value is not zero in a pressureless condition. For information on how to perform position adjustment, see → 60 "Position zero adjustment".
Calibration is possible only using **PACT***ware*™.

	Description
1	Select the "Pressure" measuring mode via the "Measuring mode (005)" parameter. Menu path: Setup → Measuring mode (005)
2	Select a pressure unit via the "Press. eng. unit (125)" parameter, here "mbar" for example. Menu path: Setup → Press. eng. unit (125)
3	Where necessary scale the "Output value (Out Value) (224)" of the Analog Input Block, → 95, parameter descriptions for "Proc value scale" and "Output scale".
4	Result: The measuring range is configured for 0 mbar to +300 mbar (4.35 psi).

7.7 Overview of the onsite display operating menu

All parameters and their direct access code (in brackets) are listed in the following table. The page number refers to where a description of the parameter can be found.

Level 1	Level 2	Level 3	Level 4	Direct access	Page
Parameters in italics cannot be edited (read only). Specific settings, such as the Measuring mode, dry or wet calibration, or hardware locking, determine whether these parameters are displayed.					
Language				000	80
Display/operat.	Display mode			001	80
	Add. disp. value			002	80
	Format 1st value			004	80
	Format ext. val. 1			235	81
	Format ext. val. 2			258	81
Setup	Measuring mode Measuring mode (read only)			005 182	81
	Press. eng. unit			125	82
	Corrected press.			172	83
	Pos. zero adjust (gauge pressure sensor) Calib. offset (absolute pressure sensors)			007 192	82 82
	Empty calib. ("Level" measuring mode and "Calibration mode (027)" = wet)			011	84
	Full calib. ("Level" measuring mode and "Calibration mode (027)" = wet)			012	84
	Damping switch (read only)			164	82
	Damping value Damping value (read only)			184 017	82
	Level before lin. ("Level" measuring mode)			019	85
	Pressure af. damp			111	83
	Extended setup	Code definition		023	79
		Device tag		022	80
		Ident number sel		229	87
		Operator code		021	79
		Level (Level measuring mode)	Level selection	024	83
			Unit before lin	025	83
			Height unit	026	83
			Calibration mode	027	84
			Empty calib.	028	84
			Empty pressure Empty pressure (read only)	029 185	84
			Empty height Empty height (read only)	030 186	84
			Full calib.	031	84
			Full pressure Full pressure (read only)	032 187	84
			Full height Full height (read only)	033 188	85
			Density unit	127	85
			Adjust density	034	85
			Process density	035	85
			Level before lin.	019	85
		Linearization	Lin. mode	037	85
			Unit after lin.	038	85
			Line numb.	039	86
			X-value (manual entry) X-value (in linear/activ table) (read only)	040 123	86
			Y-value (manual entry/in semi-auto. entry) Y-value (in linear/activ table) (read only)	041 194	86
			Edit table	042	86
			Tank description	173	86
...	...		Tank content	043	86

TDOCT-3019_ENG 256722 03/2014

Level 1	Level 2	Level 3	Level 4	Direct access	Page
... Setup	**... Extended setup**	**Analog input 1**	Channel	171	88
			Output value (Out Value)	224	88
			Status	196	88
			Filt. time const.	197	88
			Fail safe mode	198	88
			Failsafe default	199	88
		Analog input 2	Channel	230	88
			Output value (Out Value)	201	88
			Status	202	88
			Filt. time const.	203	88
			Fail safe mode	204	88
			Failsafe default	205	88
		Analog output 1	Fail safe time	206	89
			Fail safe mode	207	89
			Failsafe default	208	89
			Input value	209	89
			Input status	220	89
			Unit	211	89
		Analog output 2	Fail safe time	212	89
			Fail safe mode	213	89
			Failsafe default	214	89
			Input value	215	89
			Input status	223	89
			Unit	217	89
Diagnosis	Diagnostic code			071	91
	Last diag. code			072	91
	Min. meas. press.			073	91
	Max. meas. press.			074	91
	Diagnostic list	Diagnostic 1		075	92
		Diagnostic 2		076	92
		Diagnostic 3		077	92
		Diagnostic 4		078	92
		Diagnostic 5		079	92
		Diagnostic 6		080	92
		Diagnostic 7		081	92
		Diagnostic 8		082	92
		Diagnostic 9		083	92
		Diagnostic 10		084	92
	Event logbook	Last diag. 1		085	92
		Last diag. 2		086	92
		Last diag. 3		087	92
		Last diag. 4		088	92
		Last diag. 5		089	92
		Last diag. 6		090	92
		Last diag. 7		091	92
		Last diag. 8		092	92
		Last diag. 9		093	92
		Last diag. 10		094	92
	Instrument info	Firmware version		095	80
		Serial number		096	80
		Ext. order code		097	80
		Order code		098	80
		Device tag		022	80
		ENP version		099	80
		Config. counter		100	91
		LRL sensor		101	86
		URL sensor		102	86
		Ident number		225	87
...	**Measured values**	Level before lin.		019	85

Level 1	Level 2	Level 3	Level 4	Direct access	Page
... Diagnosis	**... Measured values**	Tank content		043	86
		Meas. pressure		020	83
		Sensor pressure		109	83
		Corrected press.		172	83
		Sensor temp.		110	82
		Pressure af. damp		111	83
		Analog input 1	Channel	171	88
			Output value (Out Value)	224	88
			Status	196	88
		Analog input 2	Channel	230	88
			Output value (Out Value)	201	88
			Status	202	88
		Analog output 1	Input value	209	89
			Input status	220	89
		Analog output 2	Input value	215	89
			Input status	223	89
	Simulation	Simulation mode		112	93
		Sim. pressure		113	93
		Sim. level		115	93
		Sim. tank cont.		116	93
		Sim. error no.		118	93
	Factory reset	Factory reset		124	81
Expert	Direct access			119	79
	System	Code definition		023	79
		Lock switch		120	79
		Operator code		021	79
		Instrument info	Device tag	022	80
			Serial number	096	80
			Firmware version	095	80
			Ext. order code	097	80
			Order code	098	80
			ENP version	099	80
			Electr. serial no.	121	80
			Sensor serial no.	122	80
		Display	Language	000	80
			Display mode	001	80
			Add. disp. value	002	80
			Format 1st value	004	80
			Format ext. val. 1	235	81
			Format ext. val. 2	258	81
		Management	Factory reset	124	81
			Download select.		81
	Measurement	Measuring mode Measuring mode (read only)		005 182	81
		Basic setup	Pos. zero adjust (gauge pressure sensor)	007	82
			Calib. offset Calib. offset (read only)	192 008	82
			Damping switch (read only)	164	82
			Damping value Damping value (read only)	017 184	82
			Press. eng. unit	125	82
			Temp. eng. unit.	126	82
			Sensor temp.	110	82
		Pressure	Meas. pressure	020	83
			Sensor pressure	109	83
			Corrected press.	172	83
...	...		Pressure af. damp	111	83

TDOCT-3019_ENG 256722 03/2014

Level 1	Level 2	Level 3	Level 4	Direct access	Page
... Expert	... Measurement	Level	Level selection	024	83
			Unit before lin	025	83
			Height unit	026	83
			Calibration mode	027	84
			Empty calib.	028	84
			Empty pressure Empty pressure (read only)	029 185	84
			Empty height Empty height (read only)	030 186	84
			Full calib.	031	84
			Full pressure Full pressure (read only)	032 187	84
			Full height Full height (read only)	033 188	85
			Density unit	127	85
			Adjust density	034	85
			Process density	035	85
			Level before lin.	019	85
		Linearization	Lin. mode	037	85
			Unit after lin.	038	85
			Line numb.	039	86
			X-value (manual entry) X-value (in linear/activ table)	040 123	86
			Y-value (manual entry/in semi-auto. entry) Y-value (in linear/activ table)	041 194	86
			Edit table	042	86
			Tank description	173	86
			Tank content	043	86
		Sensor limits	LRL sensor	101	86
			URL sensor	102	86
		Sensor trim	Lo trim measured	129	87
			Hi trim measured	130	87
			Lo trim sensor	131	87
			Hi trim sensor	132	87
	Communication	PB-PA Info	Ident number	225	87
			Profile revision	227	87
		PB-PA Config	Addressing	228	87
			Bus address	233	87
			Ident number sel	229	87
			Cond.status diag	234	87
		Analog input 1	Channel	171	88
			Output value (Out Value)	224	88
			Status	196	88
			Filt. time const.	197	88
			Fail safe mode	198	88
			Failsafe default	199	88
		Analog input 2	Channel	230	88
			Output value (Out Value)	201	88
			Status	202	88
			Filt. time const.	203	88
			Fail safe mode	204	88
			Failsafe default	205	88
		Analog output 1	Fail safe time	206	89
			Fail safe mode	207	89
			Failsafe default	208	89
			Input value	209	89
			Input status	220	89
...	...		Unit	211	89

Level 1	Level 2	Level 3	Level 4	Direct access	Page
... Expert	**... Communication**	**Analog output 2**	Fail safe time	212	89
			Fail safe mode	213	89
			Failsafe default	214	89
			Input value	215	89
			Input status	223	89
			Unit	217	89
	Application	Electr. Delta P		158	90
		Fixed ext. value		174	90
		Ext. val. 2		259	90
		Ext. val. 2 status		260	90
	Diagnosis	Diagnostic code		071	91
		Last diag. code		072	91
		Reset logbook		159	91
		Min. meas. press.		073	91
		Max. meas. press.		074	91
		Reset peakhold		161	91
		Alarm behav. P		050	91
		Operating hours		162	91
		Config. counter		100	91
		Diagnostic list	Diagnostic 1	075	92
			Diagnostic 2	076	92
			Diagnostic 3	077	92
			Diagnostic 4	078	92
			Diagnostic 5	079	92
			Diagnostic 6	080	92
			Diagnostic 7	081	92
			Diagnostic 8	082	92
			Diagnostic 9	083	92
			Diagnostic 10	084	92
		Event logbook	Last diag. 1	085	92
			Last diag. 2	086	92
			Last diag. 3	087	92
			Last diag. 4	088	92
			Last diag. 5	089	92
			Last diag. 6	090	92
			Last diag. 7	091	92
			Last diag. 8	092	92
			Last diag. 9	093	92
			Last diag. 10	094	92
		Simulation	Simulation mode	112	93
			Sim. pressure	113	93
			Sim. level	115	93
			Sim. tank cont.	116	93
			Sim. error no.	118	93

TDOCT-3019_ENG 256722 03/2014

7.8 Description of parameters

This section describes the parameters in the order they are arranged in the "Expert" operating menu.

Expert

Parameter name	Description
Direct access (119) Entry	Enter the direct access code to go directly to a parameter. **Options:** A number between 0 and 999 (only valid entries are recognized) **Factory setting:** 0 **NOTICE** For direct access, it is not necessary to enter leading zeros.

7.8.1 System

Expert → System

Parameter name	Description
Code definition (023) Entry	Use this function to enter the release code that will be used to unlock the device. **Options:** A number between 0 and 9999 **Factory setting:** 0
Lock switch (120) Display	Displays the status of DIP switch 1 on the electronic insert. You can lock or unlock parameters relevant to the measured value with DIP switch 1. If operation is locked by means of the "Operator code" (021) parameter, you can only unlock operation again by means of this parameter. **Display:** • On (locking switched on) • Off (locking switched off) **Factory setting:** Off (locking switched off)
Operator code (021) Entry	Use this function to enter a code to lock or unlock the device operation. **Options:** • To lock: Enter a number ≠ the release code. • To unlock: Enter the release code. **NOTICE** The release code is "0" in the default configuration. Another release code can be defined in the "Code definition" parameter. If the user has forgotten the release code, it can be made visible again by entering the number sequence "5864". **Factory setting:** 0

Expert → System → Instrument info

Parameter name	Description
Device tag (022) Entry	Enter the device tag (max. 32 alphanumeric characters). **Factory setting:** As per order specifications
Serial number (096) Display	Displays the serial number of the device (11 alphanumeric characters).
Firmware version (095) Display	Displays the firmware version.
Ext. order code (097) Display	Displays the extended order code (max. 60 alphanumeric characters). **Factory setting:** As per order specifications
Order code (098) Display	Displays the order code (max. 20 alphanumeric characters). **Factory setting:** As per order specifications
ENP version (099) Display	Displays the ENP version (ENP = electronic nameplate)
Electr. serial no. (121) Display	Displays the serial number of the main electronics (11 alphanumeric characters).
Sensor serial no. (122) Display	Displays the serial number of the sensor (11 alphanumeric characters).

Expert → System → Display

Parameter name	Description
Language (000) Selection	Select the menu language for the onsite display. **Options:** • English • One further language (language of the manufacturing plant) • Optionally one further language (as selected when ordering the device) **Factory setting:** English
Display mode (001) Selection	Specify the contents for the first line of the onsite display in the measuring mode. **Options:** • Main value only (value+bar graph) • Ext. value1 only (value+status) • All alternating (main value+secondary value+Ext. value 1+Ext. value 2) Ext. value 1 and Ext. value 2 are only displayed if the PLC sends these values via the analog output blocks to the device. **Factory setting:** Main value only
Add. disp. value (002) Selection	Specify the contents for the second line of the onsite display in the measuring mode. **Options:** • No value • Pressure • Main value (%) • Temperature The options depend on the measuring mode chosen. **Factory setting:** No value
Format 1st value (004) Selection	Specify the number of places after the decimal point for the value displayed in the main line for the primary value. **Options:** • Auto • x • x.x • x.xx • x.xxx • x.xxxx • x.xxxxx **Factory setting:** Auto

TDOCT-3019_ENG 256722 03/2014

Parameter name	Description
Format ext. val. 1 (235) Selection	Specify the number of places after the decimal point for the value displayed in the main line for the external value 1. **Options:** • x.x • x.xx • x.xxx • x.xxxx • x.xxxxx **Factory setting:** x.x
Format ext. val. 2 (258) Selection	Specify the number of places after the decimal point for the value displayed in the main line for the external value 2. **Options:** • x.x • x.xx • x.xxx • x.xxxx • x.xxxxx **Factory setting:** x.x

Expert → System → Management

Parameter name	Description
Factory reset (124) Entry	Reset parameters completely or partially to the factory values or order configuration by entering a reset code, see → 35, "Resetting to factory settings (reset)". **Factory setting:** 0
Download select. Display	Select the data records for the upload/download function in **PACT***ware*™. **Prerequisite:** DIP switches are set to the "SW" setting and "Damping" is set to "On". A download with the "Configuration copy" factory setting causes the device to download all the parameters required for a measurement. The "Electronics replace" setting only takes effect if an appropriate release code is entered in the "Operator code (021)" parameter. **Options:** • Configuration copy: With this option, general configuration parameters are overwritten except for the serial number, order number, calibration, position adjustment, application and tag information. • Device replacement: With this option, general configuration parameters are overwritten except for the serial number, order number, calibration and position adjustment. • Electronics replace: With this option, general configuration parameters are overwritten. **Factory setting:** Configuration copy

7.8.2 Measurement

Expert → Measurement

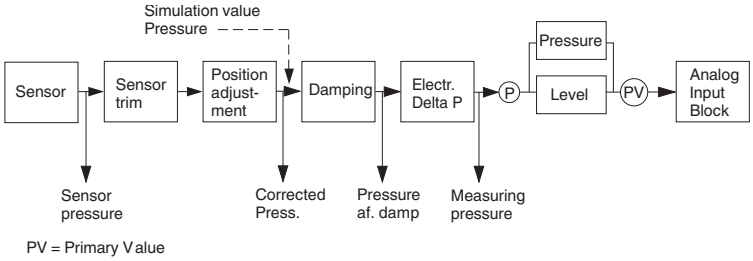
Parameter name	Description
Measuring mode (005) **Measuring mode (182)** Selection	Select the measuring mode. The operating menu is structured differently depending on the measuring mode selected. **NOTICE** If the measuring mode is changed, no conversion takes place. If necessary, the device has to be recalibrated after the measuring mode has been changed. **Options:** • Pressure • Level **Factory setting** Pressure or as per order specifications

Expert → Measurement → Basic setup

Parameter name	Description
Pos. zero adjust (007) (gauge pressure sensor) Selection	Position adjustment – the pressure difference between zero (set point) and the measured pressure does not need to be known. **Example:** • Measured value = 2.2 mbar (0.033 psi) • You correct the measured value via the "Pos. zero adjust (007) (gauge pressure sensor)" 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 **Options** • Confirm • Abort **Factory setting:** Abort
Calib. offset (192) **Calib. offset (008)** Entry	Position adjustment – the pressure difference between the set point and the measured pressure must be known. **Example:** • Measured value = 982.2 mbar (14.25 psi) • You correct the measured value with the value entered (e. g. 2.2 mbar (0.032 psi)) via the "Calib. offset" parameter. This means that you are assigning the value 980.0 mbar (14.21 psi) to the pressure present. • Measured value (after pos. zero adjust) = 980.0 mbar (14.21 psi) **Factory setting:** 0.0
Damping switch (164) Display	Displays the switch position of DIP switch 2 which is used to switch the damping of the output signal on and off. **Display:** • Off The output signal is not damped. • On The output signal is damped. The attenuation constant is specified in the "Damping value (017)" parameter **Factory setting** On
Damping value (017) **Damping value (184)** Entry	Enter the damping time (time constant τ). The damping affects the speed at which the measured value reacts to changes in pressure. **Input range:** 0.0 s to 999.0 s **Factory setting:** 2.0 or as per order specifications
Press. eng. unit (125) Selection	Select the pressure unit. If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit. **Options:** • mbar, bar • mmH2O, mH2O • inH2O, ftH2O • Pa, kPa, MPa • psi • mmHg, inHg • kgf/cm^2 **Factory setting:** mbar or bar depending on the sensor nominal measuring range, or as per order specifications
Temp. eng. unit (126) Selection	Select the unit for the temperature measured values. **NOTICE** The setting affects the unit for the "Sensor temp. (110)" parameter. **Options:** • °C • °F • K **Factory setting:** °C
Sensor temp. (110) Display	Displays the temperature currently measured in the sensor. This can deviate from the process temperature.

TDOCT-3019_ENG 256722 03/2014

Expert → Measurement → Pressure

Parameter name	Description
Meas. pressure (020) Display	Displays the measured pressure. 
Sensor pressure (109) Display	Displays the measured pressure before the sensor trim and position adjustment.
Corrected press. (172) Display	Displays the measured pressure after sensor trim and position adjustment.
Pressure af. damp (111) Display	Displays the measured pressure after sensor trim, position adjustment and damping.

Expert → Measurement → Level

Parameter name	Description
Level selection (024) Selection	Select the method for calculating the level **Options:** • In pressure If this option is selected, specify two pressure/level value pairs. The level value is displayed directly in the unit that you select via the "Unit before lin (025)" parameter. • In height If this option is selected, specify two height/level value pairs. From the measured pressure, the device first calculates the height using the density. This information is then used to calculate the level in the "Unit before lin (025)" selected using the two value pairs specified. **Factory setting:** In pressure
Unit before lin (025) Selection	Select the unit displayed with the measured value and parameter of the level before linearization. **NOTICE** The unit selected is only used to describe the measured value. This means that the measured value is not converted when a new output unit is selected. **Example:** • Current measured value: 0.3 ft • New output unit: m • New measured value: 0.3 m **Options** • % • mm, cm, dm, m • ft, inch • m^3, in^3 • l, hl • ft^3 • gal, lgal • kg, t • lb **Factory setting:** %
Height unit (026) Selection	Select the height unit. The measured pressure is converted to the selected height unit using the "Adjust density (034)" parameter. **Prerequisite** "Level selection (024)" = In height **Options** • mm • m • inch • ft **Factory setting:** m

Parameter name	Description
Calibration mode (027) Selection	Select the calibration mode. **Options:** • Wet Wet calibration takes place by filling and emptying the container. In the case of two different levels, the level, volume, mass or percentage value entered is assigned to the pressure measured at this point in time ("Empty calib. (028)" and "Full calib. (031)" parameters). • Dry Dry calibration is a theoretical calibration. For this calibration, you specify two pressure/level value pairs or height/level value pairs via the following parameters: "Empty calib. (028)", "Empty pressure (029)", "Full calib. (031)", "Full pressure (032)", "Empty height (030)", "Full height (033)". • **Factory setting:** Wet
Empty calib. (028) **Empty calib. (011)** Entry	Enter the output value for the lower calibration point (container empty). The unit defined in "Unit before lin (025)" must be used. **NOTICE** • In the case of wet calibration, the level (container empty) must actually be available. The associated pressure is then automatically recorded by the device. • In the case of dry calibration, the level (container empty) does not have to be available. The associated pressure has to be entered in the "Empty pressure (029)" parameter for the "In pressure" level selection. The associated height has to be entered in the "Empty height (030)" parameter for the "In height" level selection. **Factory setting:** 0.0
Empty pressure (029) **Empty pressure (185)** Entry/display	Enter the pressure value for the lower calibration point (container empty). → See also "Empty calib. (028)". **Prerequisite** • "Level selection (024)" = in pressure • "Calibration mode (027)" = Dry → entry • "Calibration mode (027)" = Wet → display **Factory setting:** 0.0
Empty height (030) **Empty height (186)** Entry/display	Enter the height value for the lower calibration point (container empty). Select the unit via the "Height unit (026)" parameter. **Prerequisite:** • "Level selection (024)" = in height • "Calibration mode (027)" = Dry → entry • "Calibration mode (027)" = Wet → display **Factory setting:** 0.0
Full calib. (031) **Full calib. (012)** Entry	Enter the output value for the upper calibration point (container full). The unit defined in "Unit before lin (025)" must be used. **NOTICE** • In the case of wet calibration, the level (container full) must actually be available. The associated pressure is then automatically recorded by the device. • In the case of dry calibration, the level (container full) does not have to be available. The associated pressure has to be entered in the "Full pressure (032)" parameter for the "In pressure" level selection. The associated height has to be entered in the "Full height (033)" parameter for the "In height" level selection. **Factory setting:** 100.0
Full pressure (032) **Full pressure (187)** Entry/display	Enter the pressure value for the upper calibration point (container full). → See also "Full calib. (031)". **Prerequisite** • "Level selection (024)" = in pressure • "Calibration mode (027)" = Dry → entry • "Calibration mode (027)" = Wet → display **Factory setting:** Upper-range limit (URL) of the sensor

Parameter name	Description
Full height (033) **Full height (188)** Entry/display	Enter the height value for the upper calibration point (container full). Select the unit via the "Height unit (026)" parameter. **Prerequisite:** • "Level selection (024)" = in height • "Calibration mode (027)" = Dry → entry • "Calibration mode (027)" = Wet → display **Factory setting:** Upper-range limit (URL) is converted to a height unit
Density unit (127) Display	Displays the density unit. The measured pressure is converted to a height using the "Height unit (026)" and "Adjust density (034)" parameters. **Factory setting:** g/cm^3
Adjust density (034) Entry	Enter the density of the medium. The measured pressure is converted to a height using the "Height unit (026)" and "Adjust density (034)" parameters. **Factory setting:** 1.0
Process density (035) Entry	Enter a new density value for density correction. The calibration was carried out with water as the medium, for example. Now the container is to be used for another medium with another density. The calibration is corrected appropriately by entering the new density value in the "Process density (035)" parameter. **NOTICE** If you change to dry calibration after a wet calibration using the "Calibration mode (027)" parameter, the density for the "Adjust density (034)" and "Process density (035)" parameters must be entered correctly before changing the calibration mode. **Factory setting:** 1.0
Level before lin. (019) Display	Displays the level value prior to linearization.

Expert → Measurement → Linearization

Parameter name	Description
Lin. mode (037) Selection	Select the linearization mode. **Options:** • Linear The level is output without being converted beforehand. "Level before lin. (019)" is output. • Erase table The existing linearization table is deleted. • Manual entry (sets the table to the edit mode, an alarm is output): The value pairs of the table ("X-value (040) (manual entry)" and "Y-value (041) (manual entry/in semi-auto. entry)") are entered manually. • Semiautomatic entry (sets the table to the edit mode, an alarm is output): The container is emptied or filled in stages in this entry mode. The device automatically records the level value ("X-value (040) (manual entry)"). The associated volume, mass or %-value is entered manually ("Y-value (041) (manual entry/in semi-auto. entry)"). • Activate table The table entered is activated and checked with this option. The device shows the level after linearization. **Factory setting:** Linear
Unit after lin. (038) Selection	Select the unit of the level value after linearization (unit of the Y-value). **Options:** • % • cm, dm, m, mm • hl • in^3, ft^3, m^3 • l • in, ft • kg, t • lb • gal • lgal **Factory setting:** %

Parameter name	Description
Line numb. (039) Entry	Enter the number of the current point in the table. The subsequent entries for "X-value (040) (manual entry)" and "Y-value (041) (manual entry/in semi-auto. entry)" refer to this point. **Input range:** 1 to 32
X-value (040) (manual entry) **X-value (123) (in linear/ activ table)** **X-value (193) (in semi-auto. entry)** Entry/Display	Enter the "X-value (040) (manual entry)" (level before linearization) for the specific point in the table and confirm. **NOTICE** • If "Lin. mode (037)" = "Manual entry", the level value has to be entered. • If "Lin. mode (037)" = "Semiautomatic entry", the level value is displayed and has to be confirmed by entering the associated Y-value.
Y-value (041) (manual entry/in semi-auto. entry) **Y-value (194) (in linear/ activ table)** Entry/Display	Enter the "Y-value (041) (manual entry/in semi-auto. entry)" (value after linearization) for the specific point in the table. The unit is determined by "Unit after lin. (038)". **NOTICE** The linearization table must be monotonic (increasing or decreasing).
Edit table (042) Selection	Select the function for entering the table. **Options:** • Next point: The "Line numb." parameter is incremented by 1. The next point can be entered. • Current point: stay on the current point to correct a mistake for example. • Previous point: The "Line numb." parameter is decremented by 1. The previous point can be corrected/entered again. • Insert point: insert an additional point (see example below). • Delete point: delete the current point (see example below). **Example:** Add a point - in this case between the 4th and 5th point for example • Select point 5 via the "Line numb. (039)" parameter. • Select the "Insert point" option via the "Edit table (042)" parameter. • Point 5 is displayed for the "Line numb. (039)" parameter. Enter new values for the "X-value (040) (manual entry)" and "Y-value (041) (manual entry/in semi-auto. entry)" parameters. **Example:** Delete a point - in this case the 5th point for example • Select point 5 via the "Line numb. (039)" parameter. • Select the "Delete point" option via the "Edit table (042)" parameter. • The 5th point is deleted. All of the subsequent points are moved up one number i. e. following deletion, the 6th point becomes point 5. **Factory setting:** Current point
Tank description (173) Entry	Enter the tank description (max. 32 alphanumeric characters)
Tank content (043) Display	Displays the level value after linearization.

Expert → Measurement → Sensor limits

Parameter name	Description
LRL sensor (101) Display	Displays the lower-range limit of the sensor.
URL sensor (102) Display	Displays the upper-range limit of the sensor.

TDOCT-3019_ENG 256722 03/2014

Expert → Measurement → Sensor trim

Parameter name	Description
Lo trim measured (129) Display	Displays the reference pressure present to be accepted for the lower calibration point.
Hi trim measured (130) Display	Displays the reference pressure present to be accepted for the upper calibration point.
Lo trim sensor (131) Display	Internal service parameter.
Hi trim sensor (132) Display	Internal service parameter.

7.8.3 Communication

Expert → Communikation → PROFIBUS PA Info

Parameter name	Description
Ident number (225) Display	Displays the set identification number.
Profile revision (227) Display	Displays the profile version of the device.

Expert → Communication → PROFIBUS PA conf

Parameter name	Description
Addressing (228) Display	Displays the addressing mode: via hardware (DIP switch) or software. **Factory setting:** Software
Bus address (233) Display	Displays the set bus address. **Factory setting:** 126
Ident number sel (229) Selection	For entering the identification number of the device. For more information, see → 37. **Options:** • Auto ident number: Adaption mode of the device • Profile: 0x9700 • Manufacturer-specific: 0x0E3A (LHC-M51 and PPC-M51), 0x0E3C (LHCR-51 and LHCS-51) **Factory setting:** Auto ident number
Cond.status diag (234) Display/Selection	Displays whether "Condensed status" or "Classic status" is set. Further informations see → 37. **Factory setting:** Condensed status

Expert → Communication → Analog input 1

Parameter name	Description
Channel (171) Display	Displays the Transducer Block measured variable that is used. **Factory setting:** Primary value
Output value (Out Value) (224) Display	Displays the output value (Out Value) of the Analog Input 1 Block.
Status (196) Display	Displays the output status (Out Status) of the Analog Input 1 Block.
Filt. time const. (197) Entry	For entering the damping time of the Analog Input 1 Block. **Factory setting:** 0.0 sec.
Fail safe mode (198) Selection	Specifies the output value of the Analog Input 1 in case of an error. See definition → 37 **Options:** • Fail safe value • Last valid out val. • Status BAD **Factory setting:** Last valid out val.
Failsafe default (199) Entry	Substitute value in case of an error. **Prerequisite:** "Fail safe mode (198)" = Fail safe value **Factory setting:** 0.0

Expert → Communication → Analog input 2

Parameter name	Description
Channel (230) Selection	Select the Transducer Block measured variable to be used. **Options:** • Level before lin. (019) • Pressure • Temperature **Factory setting:** Pressure
Output value (Out Value) (201) Display	Output value (Out Value) of the Analog Input 2 Block.
Status (202) Display	Output status (Out Status) of the Analog Input 2 Block.
Filt. time const. (203) Entry	For entering the damping time of the Analog Input 2 Block. **Factory setting:** 0.0 sec.
Fail safe mode (204) Selection	Specifies the output value of the Analog Input 2 in case of an error. **Options:** • Fail safe value • Last valid out val. • Status BAD **Factory setting:** Last valid out val.
Failsafe default (205) Entry	Substitute value in the event of an error. **Prerequisite:** "Fail safe mode (204)" = Fail safe value **Factory setting:** 0.0

TDOCT-3019_ENG 256722 03/2014

Expert → Communication → Analog output 1

Parameter name	Description
Fail safe time (206) Selection	For entering the damping time of the Analog output 1 Block. **Factory setting:** 0.0 sec.
Fail safe mode (207) Selection	Specifies the output value of the Analog output 1 in case of an error. **Options:** • Fail safe value • Last valid out val. • Status BAD **Factory setting:** Last valid out val.
Failsafe default (208) Entry	Substitute value in the event of an error. **Prerequisite:** "Fail safe mode (207)" = Fail safe value **Factory setting:** 0.0
Input value (209) Display	Displays the value that is sent to the device.
Input status (220) Display	Displays the status that is sent to the device.
Unit (211) Selection	For entering the unit for the value that is sent to the device. **Options:** • % • Pressure units • Flow units • Level units • Temperature units • Unknown **Factory setting:** Unknown

Expert → Communication → Analog output 2

Parameter name	Description
Fail safe time (212) Selection	Enter the damping time of the Analog output 1 Block. **Factory setting:** 0.0 sec.
Fail safe mode (213) Selection	Specifies the output value of the Analog output 1 in the event of an error. **Options:** • Fail safe value • Last valid out val. • Status BAD **Factory setting:** Last valid out val.
Failsafe default (214) Entry	Substitute value in the event of an error. **Prerequisite:** "Fail safe mode (213)" = Fail safe value **Factory setting:** 0.0
Input value (215) Display	Displays the value that is sent to the device.
Input status (223) Display	Displays the status that is sent to the device.
Unit (217) Selection	For entering the unit for the value that is sent to the device. **Options:** Pressure units, temperature units

7.8.4 Application

Expert → Application

Parameter name	Description
Electr. delta P (158) Selection	This funcion activates the electr. delta P application with an external or constant value. **Options:** • Off • Ext. value2 • Constant **Factory setting:** Off
Fixed Ext. value (174) Entry	Use this function to enter the constant value for the electr. delta P application. The value refers to "Press. eng. unit (125)" **Factory setting:** 0.0
Ext. val. 2 (259) Display	Displays the PROFIBUS input value 2 (Analog Output 2).
Ext. val. 2 status (260) Display	Displays the status of the PROFIBUS input value 2 (Analog Output 2).

TDOCT-3019_ENG 256722 03/2014

7.8.5 Diagnosis

Expert → Diagnosis

Parameter name	Description
Diagnostic code (071) Display	Displays the diagnostic message with the highest priority currently present.
Last diag. code (072) Display	Displays the last diagnostic message that occurred and was rectified. **NOTICE** The messages listed in the "Last diag. code (072)" parameter can be deleted via the "Reset logbook (159)" parameter.
Reset logbook (159) Selection	With this parameter, you reset all the messages of the "Last diag. code (072)" parameter and the "Last diag. 1 (085)" to "Last diag. 10 (094)" event log. **Options:** • Abort • Confirm **Factory setting:** Abort
Min. meas. press. (073) Display	Displays the lowest pressure value measured (peakhold indicator). You can reset this indicator by means of the "Reset peakhold (161)" parameter.
Max. meas. press. (074) Display	Displays the highest pressure value measured (peakhold indicator). You can reset this indicator by means of the "Reset peakhold (161)" parameter.
Reset peakhold (161) Selection	You can reset the "Min. meas. press." and "Max. meas. press." indicators with this parameter. **Options:** • Abort • Confirm **Factory setting:** Abort
Alarm behav. P (050) Selection	Set the measured value status for when the sensor limits are exceeded or undershot. **Options:** • Warning The device continues measuring. An error message is displayed. "UNCERTAIN" is displayed for the measured value status. • Alarm "BAD" is displayed for the measured value status. An error message is displayed. **Factory setting:** Warning
Operating hours (162) Display	Displays the hours of operation. This parameter cannot be reset.
Config. counter (100) Display	Displays the configuration counter. This counter is increased by one every time a parameter or group is changed. The counter counts up to 65535 and then starts again at zero.

Expert → Diagnosis → Diagnostic list

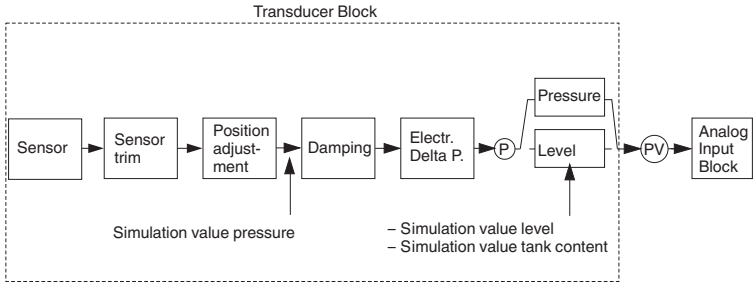
Parameter name	Description
Diagnostic 1 (075) **Diagnostic 2 (076)** **Diagnostic 3 (077)** **Diagnostic 4 (078)** **Diagnostic 5 (079)** **Diagnostic 6 (080)** **Diagnostic 7 (081)** **Diagnostic 8 (082)** **Diagnostic 9 (083)** **Diagnostic 10 (084)**	These parameters contain up to ten diagnosis messages that are currently pending, arranged in order of priority.

Expert → Diagnosis → Event logbook

Parameter name	Description
Last diag. 1 (085) **Last diag. 2 (086)** **Last diag. 3 (087)** **Last diag. 4 (088)** **Last diag. 5 (089)** **Last diag. 6 (090)** **Last diag. 7 (091)** **Last diag. 8 (092)** **Last diag. 9 (093)** **Last diag. 10 (094)**	These parameters contain the last occured 10 diagnosis messages that have been rectified. They can be reset with the "Reset logbook (159)" parameter. Errors which have occurred multiple times are displayed once only.

TDOCT-3019_ENG 256722 03/2014

Expert → Diagnosis → Simulation

Parameter name	Description
Simulation mode (112) Selection	Switch on simulation and select the simulation mode. Any simulation running is switched off if the measuring mode or level type "Lin. mode (037)" is changed. **Options:** • None • Pressure, → see this table, "Sim. pressure (113)" parameter • Level, → see this table, "Sim. level (115)" parameter • Tank content, → see this table, "Sim. tank cont. (116)" parameter • Alarm/warning, → see this table, "Sim. error no. (118)" parameter  PV = Primary Value **Factory setting:** None
Sim. pressure (113) Entry	Enter the simulation value. → See also "Simulation mode (112)". **Prerequisite:** "Simulation mode (112)" = Pressure **Value when switched on:** Current pressure measured value
Sim. level (115) Entry	Enter the simulation value. → See also "Simulation mode (112)". **Prerequisite:** "Measuring mode (005)" = Level and "Simulation mode (112)" = Level
Sim. tank cont. (116) Entry	Enter the simulation value. → See also "Simulation mode (112)". **Prerequisites:** "Measuring mode (005)" = Level, "Lin. mode (037)" = Activate table, and "Simulation mode (112)" = Tank content.
Sim. error no. (118) Entry	Enter the diagnostic message number. → See also "Simulation mode (112)". **Prerequisite:** "Simulation mode (112)"= Alarm/warning **Switch on value:** 484 (Simulation mode (112) active)

7.9 Saving or duplicating device data

The device does not have a memory module. With an operating tool based on FDT technology (e. g. **PACT***ware*™), the following options are, however, available (see "Download select." parameter → 81 in the operating menu or via the Physical Block → 107):

- Storage/recovery of configuration data
- Duplication of device parameters
- Transfer of all relevant parameters when replacing electronic inserts.

For further information, please refer to the Operating Instructions for the **PACT***ware*™ operating program.

8 Commissioning via Class 2 master (Software)

WARNING

If a pressure smaller than the minimum permitted pressure or greater than the maximum permitted pressure is present at the device, the following messages are output in succession:

- "S140 Working range P" or "F140 Working range P"
- "S841 Sensor range" or "F841 Sensor range"

The messages are depending on the setting in the "Alarm behavior" (050) parameter.

NOTICE

The device is configured for the Pressure measuring mode as standard. The measuring range and the unit in which the measured value is transmitted correspond to the specifications on the nameplate.

8.1 Function check

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

- "Post-installation check" checklist → 19
- "Post-connection check" checklist → 23

8.2 Commissioning

The procedure for commissioning and operating the **PACT***ware*™ program is described in the integrated online help.

Proceed as follows to commission the device:

1. Check the hardware write protection on the electronic insert (→ 34, Section 5.3.5 "Locking/unlocking operation").
   The "Lock switch (120)" parameter indicates the status of the hardware write protection (Menu path: Expert → System or Expert → Communication → Physical Block → PB Parameter → Device)
2. Enter the tag name via the "Device tag (022)" parameter. (Menu path: Expert → System → Instrument info or Setup → Extended Setup → Instrument Info)
3. Assign the device an address in the bus:
   Operating program of the DP Class 2 master such as **PACT***ware*™: (→ 39, Section 5.4.5 "Device identification and addressing" or via the address switch.
4. Configure the manufacturer-specific device parameters via the Setup menu or configure the
   Transducer Block
   Configure the Analog Output Block
5. Configure the Physical Block (menu path: Expert → Communication → Physical Block)
6. Configure the Analog Input Block or AI-Block.
   – In the Analog Input Block, the input value or input range can be scaled in accordance with the requirements of the automation system (→ 95, "Scaling the output value (Out Value)".
   – Set limit values if necessary.
7. Configure cyclic data transmission (→ 40, "System integration" and → 40, "Cyclic data exchange".

TDOCT-3019_ENG 256722 03/2014

8.3 Output value (Out Value)

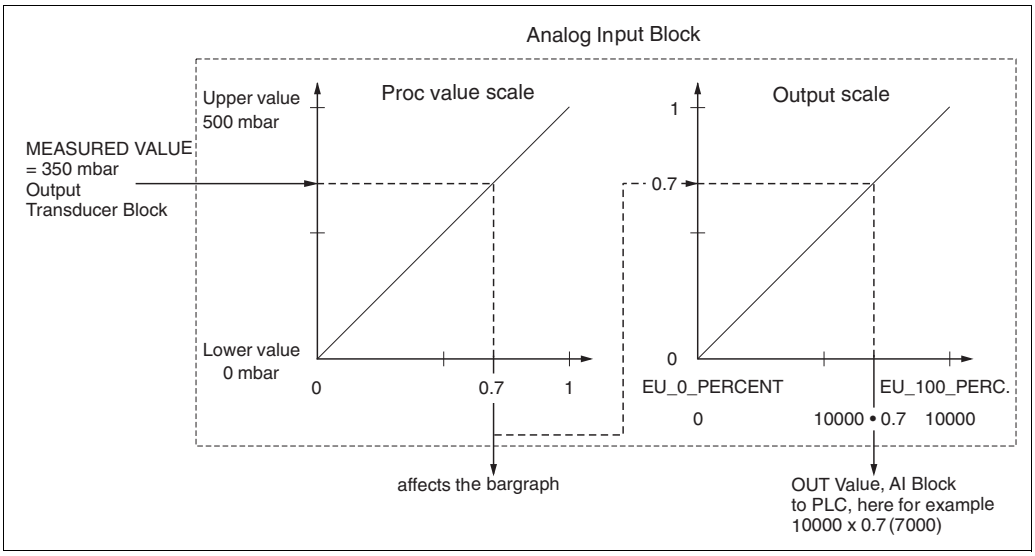
8.3.1 Scaling the output value (Out Value)

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 mbar to 500 mbar should be rescaled to 0 to 10000.

- Select the "Proc value scale" group.
  Menu path: Expert → Communication → Analog input 1 → AI parameter → Proc value scale
  - Enter "0" as the lower value.
  - Enter "500" as the upper value.
- Select the "Output scale" group.
  Menu path: Expert → Communication → Analog input 1 → AI parameter → Output scale
  - For EU_0_PERCENT (lower value), enter "0".
  - For EU_100_PERCENT (upper value), enter "10000".
  - For UNITS_INDEX (unit), select "User unit" for example.
    The unit selected here does not have any effect on the scaling.
- Result:
  At a pressure of 350 mbar, the value 7000 is output to the PLC as the output value (OUT Value).



NOTICE

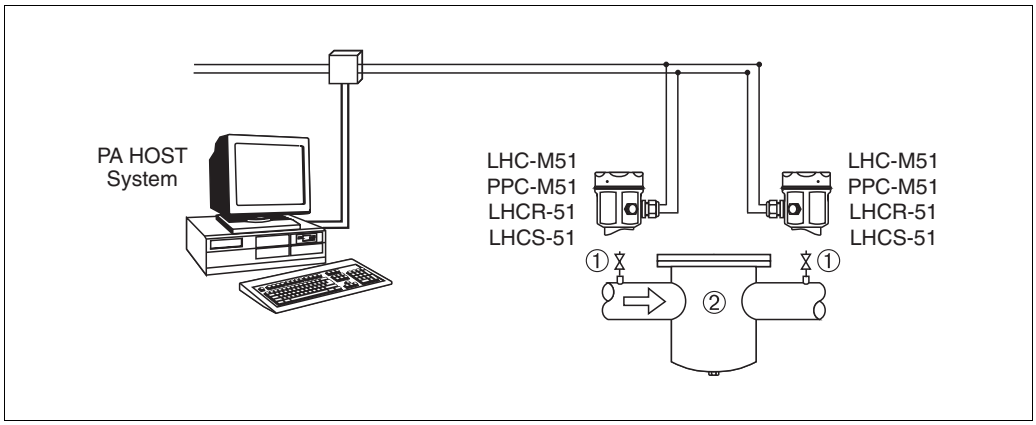
- The output value (Out Value) can only be scaled via remote operation (e. g. **PACT***ware*™).
- When a unit changes within a measuring mode (pressure, flow - flow type), the values for "Proc value scale" and "Output scale" are converted.
  When a unit changes within a measuring mode, the "Proc value scale" is converted and "Output scale" is updated.
- If the measuring mode is changed, no conversion takes place. The device has to be recalibrated if the measuring mode is changed.
- 2 AIs are available. The first is assigned to the primary value and the second can be assigned to a second measured variable. Both must be scaled accordingly.
- When the configuration (measuring mode, unit, scaling) is changed in the Transducer Block, the values of "Proc value scale" and "Output scale" are automatically set equal to the Transducer Block scaling.
- The unit of "Proc value scale" is the primary value unit of the Transducer Block.
- The configuration of the AI Block 1 is automatically updated with the Transducer Block configuration (if the configuration of the Transducer Block is changed in the Setup menu, this change is copied to the AI Block). This means that the configuration of the AI Blocks must be performed at the end, as the configuration would be overwritten by the setup otherwise.

8.4 Electrical differential pressure measurement with gauge pressure sensors

Example:

In the example given, two pressure transmitters (each with a gauge pressure sensor) are interconnected. The pressure difference can thus be measured using two independent pressure transmitters.

NOTICE For a description of the parameters mentioned → 79, "Description of parameters".



20 Electrical differential pressure measurement with gauge pressure sensors

1 Shut-off valves
2 e. g. filter

Description adjustment of the pressure transmitter on the high pressure side in the Transducer Block

1. Open the Transducer Block.
2. Select the "Pressure" measuring mode via the "Measuring mode (005)" or "Transmitter type" parameter.
3. Select a pressure unit via the "Press. eng. unit (125)" parameter, here "mbar" for example.
4. The pressure transmitter is unpressurized, perform position adjustment, see → 60.
5. Set the Transducer Block to the "Auto" block mode. Where necessary, configure via the Analog Input Block "Channel" parameter and output scaling (→ 109).

The output of the Analog Input Block of the device on the high-pressure is read by the PLC and sent as an output variable via the input of the Analog Output 2 block of the device on the low-pressure side. Here, the "Unit" of Analog Output 2 must be set to a pressure unit (the same unit as the unit of the device on the high-pressure side).

Description adjustment of the pressure transmitter on the low pressure side (the differential is generated in this device) in the Transducer Block

1. Select the "Pressure" measuring mode via the "Measuring mode (005)" or "Transmitter type" parameter.
2. Select a pressure unit via the "Press. eng. unit (125)" parameter, here "mbar" for example.
3. The pressure transmitter is unpressurized, perform position adjustment, see → 60.
4. Select "Ext. value 2" via the "Electr. delta P (158)" parameter.
5. Select the desired pressure unit via the "Unit (217)" parameter in the Analog Output 2 Block (here "mbar" for example).
6. The current measured values and status information returned by the device on the high-pressure side can be read via the "Ext. val. 2 (259)" and "Ext. val. 2 status (260)" parameters.

TDOCT-3019_ENG 256722 03/2014

NOTICE

- It is not permitted to reverse the assignment of the measuring points and the direction of communication.
- The measured value of the transmitting device must always be greater than the measured value of the receiving device (via the "Electr. delta P" function).
- Adjustments that result in an offset of the pressure values (e. g. position adjustment, trim) must always be performed in accordance with the individual sensor and its orientation, independently of the "Electr. Delta P" application. Other settings result in non-permitted use of the "Electr. Delta P" function and can lead to incorrect measured values.
- In order to be able to transmit the "BAD" status of the transmitting device (high-pressure side) to the receiver device (low-pressure side), the "Fail safe mode (198)" parameter of the analog input of the device on the high-pressure side and the "Fail safe mode (213)" parameter of analog output 2 of the device on the low-pressure side must be set to "Status BAD".

8.5 Description of parameters

8.5.1 Block model

The pressure transmitter has the following blocks:

- Physical Block
- Analog Input Block 1/Analog Input Block 2
- Analog Output Block 1/Analog Output Block 2
- Transducer Block

8.5.2 Physical Block

Expert → Communication → Physical Block → PB Standard Parameter

Parameter name	Description
Block object Display Slot: 0 Index: 16	The "Block object" parameter is a structured parameter consisting of 13 elements. This parameter describes the characteristics of the Physical Block. **Reserved profile parameter** 250 = not used **Block object** 1 = Physical Block **Parent class** 1 = Transmitter **Class** 250 = not used **Device rev.** 1 **Device rev. comp** 1 **DD_revision** 0 (for future use) **Profile** • Number of the PROFIBUS PA profile in the PNO • 0x40, 0x02 (compact class B) **Profile revision** Displays the profile version, here: 0x302 (Profile 3.02) **Execution time** 0 (for future use) **No. of parameters** Number of parameters of the Physical Block, here: 110 **Index of View 1 Fb** Address of the "PB view 1" parameter, here: 0x00, 0x7E **Number of view lists** 1 = The Block contains one "View object".
Static rev. no. Display Index: 0 Slot: 17	Displays the static revision counter for the parameters of the Physical Block. The counter is incremented by one with each change of a static parameter of the Physical Block. The counter counts up to 65535 and then starts again at zero. **Factory setting:** 0
TAG Entry Slot: 0 Index: 18	Enter device tag e. g. TAG number (max. 32 alphanumeric characters). **Factory setting:** _ or as per order specifications
Strategy Entry Slot: 0 Index: 19	Enter user-specific value for grouping and thus faster evaluation of the blocks. Grouping takes place by entering the same numerical value for the "Strategy" parameter of the block in question. **Input range:** 0 to 65535 **Factory setting:** 0
Alert key Entry Slot: 0 Index: 20	Enter the user-specific value (e. g. identification number of the plant unit). The process control system can use this information to sort alarms and events that were generated by this block. **Input range:** 0 to 255 **Factory setting:** 0

TDOCT-3019_ENG 256722 03/2014

Expert → Communication → Physical Block → PB Standard Parameter

Parameter name	Description
Target mode Options Slot: 0 Index: 21	Select the desired block mode. Only the "Automatic (Auto)" mode can be selected for the Physical Block. **Options:** Automatic (Auto) **Factory setting:** Automatic (Auto)
Block mode Display Slot: 0 Index: 22	The "Block mode" parameter is a structured parameter consisting of three elements. PROFIBUS makes a distinction between the following block modes: automatic mode (Auto), manual user intervention (Man) and out of service (O/S). The Physical Block only works in the automatic mode (Auto) and out of service (O/S). **Actual mode** • Displays the current block mode. • Factory setting: automatic (Auto) **Permitted mode** • Displays the modes supported by the block. • Factory setting: 8 = automatic (Auto) **Normal mode** • Displays the normal working mode of the block. • Factory setting: automatic (Auto)
Alarm summary Display Slot: 0 Index: 23	The "Alarm summary" is a structured parameter consisting of four elements. **Current alarm summary** • Displays the current alarms • Factory setting: 0x0, 0x0
Firmware version Display Slot: 0 Index: 24	Displays the software version. E. g.: 01.00.10
Hardware Rev. Display Slot: 0 Index: 25	Displays the revision number of the main electronics. E. g. 01.00.00
Manufacturer ID Display Slot: 0 Index: 26	Displays the manufacturer number in decimal numerical format. Here: 17 Pepperl+Fuchs
Device name str. Display Slot: 0 Index: 27	Displays the name of the device. Possible names: LHC-M51, PPC-M51, LHCR-51 or LHCS-51
Serial number Display Slot: 0 Index: 28	Displays the serial number of the device (11 alphanumeric characters).
Diagnosis Display Slot: 0 Index: 29	The "Diagnosis" parameter is a structured parameter consisting of two elements. This parameter displays bit-encoded profile alarms that are pending. Several alarm messages can occur at any one time. If the highest bit of the fourth byte is set to 1, the "Diag extension" (→ see this table) and "Advanced diagnostics 7 (Diag add ext.)" (see → 104) parameters display additional messages. **Diagnosis** Factory setting: 0x0, 0x0, 0x0, 0x0
Diag extension Display Slot: 0 Index: 30	The "Diag extension" parameter is a structured parameter consisting of three elements. This parameter displays bit-encoded manufacturer-specific alarms and warnings that are pending. Several alarm messages can occur at any one time. In addition, the "Advanced diagnostics 7 (Diag add ext.)" parameter (see → 104) can display additional alarm messages and warnings. **Extended diagnostics 1, 2** Factory setting: 0x0, 0x0 **Extended diagnostics 3, 4** Factory setting: 0x0, 0x0 **Extended diagnostics 5, 6** Factory setting: 0x0, 0x0

Expert → Communication → Physical Block → PB Standard Parameter

Parameter name	Description
Diag mask Display Slot: 0 Index: 31	The "Diag mask" parameter is a structured parameter consisting of two elements. This parameter describes what profile alarms are supported by the device. Bit = 0: alarm is not supported; Bit = 1: alarm is supported. **Diag mask A** 0xB1, 0x24 **Diag mask B** 0x0, 0x80
Diag mask Ex Display Slot: 0 Index: 32	This parameter describes what manufacturer-specific alarms and warnings are supported by the device. Bit = 0: alarm is not supported; Bit = 1: alarm is supported.
Dev. certificat. Display Slot: 0 Index: 33	Displays the certificate.
Write locking Entry Slot: 0 Index: 34	Use this function to enter a code to lock or unlock operation. **NOTICE** • The -symbol on the onsite display indicates that operation is locked. Parameters which refer to how the display appears, e. g. "Language (000)", can still be modified. • 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. **PACT***ware*™, you can only unlock operation again by means of remote operation. **Options:** • Lock: Enter the number 0. • Unlock: Enter the number 2457. **Factory setting:** 2457
Factory reset Entry Slot: 0 Index: 35	Reset parameters completely or partially to the factory values or order configuration using the "Factory reset". **Factory setting:** 0
Additional info. Entry Slot: 0 Index: 36	Enter the tag description (max. 32 alphanumeric characters). **Factory setting:** Empty field or as per order specifications
Message Entry Slot: 0 Index: 37	Enter the user-specific "Message", e. g. a description of the device in the application or plant (max. 32 alphanumeric characters). **Factory setting:** _ or as per order specifications
Install. date Entry Slot: 0 Index: 38	Enter the installation date of the device (max. 16 alphanumeric characters). **Factory setting:** Empty field
Ident number sel Options Slot: 0 Index: 40	Select the device master data (GSD file) **LHC-M51, PPC-M51:** • PF__0E3A: Profile GSD • 0x0E3A: Device-specific GSD (factory setting) **LHCR-51, LHCS-51:** • PF__0E3C: Profile GSD • 0x0E3C: Device-specific GSD (factory setting)

TDOCT-3019_ENG 256722 03/2014

Expert → Communication → Physical Block → PB Standard Parameter

Parameter name	Description
Lock switch Display Slot: 0 Index: 41	Displays the status of DIP switch 1 (on) on the electronic insert. You can lock or unlock parameters relevant to the measured value with DIP switch 1. If operation is locked by means of the "Write locking" parameter, you can only unlock operation again by means of this parameter ("Write locking" see → 100). **Display:** • On (locking switched on) • Off (locking switched off) **Factory setting:** Off (locking switched off)
Feature Display Slot: 0 Index: 42	Displays optional features implemented in the device, and the status of these features. It indicates whether the feature is supported or not. The settings are based on the actual identification number of the device. The "Classic" and "Condensed" status modes are supported in the profile Ident_Number and both are set in the feature. Only the "Classic" status are supported in the compatibility mode (old identification number). Only the "Condensed" status is supported with the new identification number.
Cond.status diag Display Slot: 0 Index: 43	Indicates the mode of a device that can be configured for status and diagnostic behavior. **Options:** • Condensed status • Classic status **Factory setting:** Condensed status

Expert → Communikation → Physical Block → PB Parameter

Parameter name	Description
Diagnostic code Display Slot: 0 Index: 54	Displays the current message present. → See also these Operating Instructions, → 130 "Messages". The "Status (Device Status)" field and the "Diagnostic code" display the message with the highest priority.
Last diag. code Slot: 0 Index: 55	Displays the last message that occurred and have been already fixed. **NOTICE** The messages listed in the "Last diag. code" parameter can be deleted via the "Reset logbook" parameter.
Bus address Display Slot: 0 Index: 59	Displays the device address in the PROFIBUS PA bus. You can configure the address either locally on the electronic insert (hardware addressing) or via the software (software addressing). Using a DIP switch on the electronic insert, you can specify whether the hardware or software address is active. **Factory setting:** 126
Set unit to bus Options Slot: 0 Index: 61	The onsite display and the "Primary value" parameter display the same value as standard. The digital output value (Out Value) of the Analog Input Block "Output value (Out Value)" is independent of the onsite display and the "Primary value". The following options are available to make the onsite display, the "Primary value" and the digital output value (Out Value) display the same value. • Set the values for the lower and upper limit of the "Proc value scale" (→ 109) and "Output scale" (→ 109) as equal in the Analog Input Block • Via the "Set unit to bus" parameter, confirm the "On" option. Confirming the option automatically sets the limits for "Proc value scale" and "Output scale" to equal values. **NOTICE** If you confirm the "Set unit to bus" parameter, please note that a change in the digital output value (Out Value) can affect the control system.

Expert → Communikation → Physical Block → PB Parameter

Parameter name	Description
Ext. value 1 Display Slot: 0 Index: 62	The "Ext. value 1" parameter is a structured parameter consisting of three elements. The value and status displayed here is transmitted to the device via Analog Output Block 1 by the PLC. The "Ext. value 1" can be displayed on the onsite display (→ 63 and the "Display mode" parameter). **Ext. val. 1** Factory setting: 0.0 **Ext. val. 1 status** Factory setting: BAD **Ext. val. 1 avail.** • This element indicates whether the PLC is sending a value to the device. 0: The PLC is not sending a value, along with the status, to the device. 1: The PLC is sending a value, along with the status, to the device. • Factory setting: 0
Profile revision Display Slot: 0 Index: 64	Displays the profile version, here: 3.02.
Reset logbook Options Slot: 0 Index: 65	Use this parameter to reset all the messages of the "Last diag. code" parameter. **Options:** • Abort • Confirm **Factory setting:** Abort
Ident number (Ident_Number) Display Slot: 0 Index: 66	Displays the device identification number and the selected device master data (GSD file). Select the device master data (GSD file) via the "Ident number sel" parameter (→ 100). **LHC-M51, PPC-M51:** • PF__0E3A: Profile GSD • 0x0E3A: Device-specific GSD (factory setting) **LHCR-51, LHCS-51:** • PF__0E3C: Profile GSD • 0x0E3C: Device-specific GSD (factory setting)
Check conf. Display Slot: 0 Index: 67	Function to check whether the configuration of a Class 1 master was accepted in the device for cyclic data exchange. **Display:** • 0 (configuration not OK) • 1 (configuration OK) **Factory setting:** 0
Order number Display Slot: 0 Index: 69	Device order code. **Factory setting:** As defined per order.
Tag location Entry Slot: 0 Index: 70	User ID description of the slot module location.
Signature Entry Slot: 0 Index: 71	Enter the signature. **Factory setting:** As per order specifications
ENP version Display Slot: 0 Index: 72	This parameter indicates the version of the standard for electronic nameplates supported by the device. **Factory setting:** 2.02.00
Device diag. Display Slot: 0 Index: 73	Contains the device diagnostic in bit-encoded format (bit string). Allows access to all the diagnostic data of the device via one single acyclic read command.

TDOCT-3019_ENG 256722 03/2014

Expert → Communikation → Physical Block → PB Parameter

Parameter name	Description
Ext. order code Display Slot: 0 Index: 74	Display the extended order code. **Factory setting** As per order specifications
Service locking Entry Slot: 0 Index: 75	Internal service parameter.
Up/Dl feature Display Slot: 0 Index: 76	Describes the function supported by the device. **Factory setting** 3
Updl control Display Slot: 0 Index: 77	Control parameter for parameter transaction. **Factory setting** passive
Updl status Display Slot: 0 Index: 78	Status information on the current status of the parameter transaction. **Factory setting** Data transfer status OK
Updl veri delay Entry Slot: 0 Index: 79	Delay between the end of the download and the activation of the new configuration. After this delay, the "Updl status" parameter must be updated correctly. A device restart may be required. **Factory setting** 120
Up/Dl rev Display Slot: 0 Index: 80	Version of the upload/download specification. **Factory setting** 1
Config. counter Display Slot: 0 Index: 89	Displays the configuration counter. This counter is increased by 1 every time a configuration parameter or group is changed. The counter counts up to 65535 and then starts again at zero.
Operating hours Display Slot: 0 Index: 90	Displays the operating hours of the device. This parameter cannot be reset.
Sim. error no. Entry Slot: 0 Index: 91	Enter the diagnostic message number. → See also "Simulation mode". **Prerequisite:** "Simulation mode" = Alarm/warning **Value when switched on:** 484 (Simulation mode active)
Sim. messages Entry Slot: 0 Index: 92	Enter the message number for simulation. **Prerequisite:** Simulation = alarm/warning **Factory setting:** 484 "Simul error" (simulation active)
Language Options Slot: 0 Index: 93	Select language. **Options:** • English • Possibly another language (as selected when ordering the device) • One further language (language of the manufacturing plant) **Factory setting:** English
Device name str. Display Slot: 0 Index: 94	Displays the name of the device. Possible names: LHC-M51, PPC-M51, LHCR-51 or LHCS-51

Expert → Communikation → Physical Block → PB Parameter

Parameter name	Description
Display mode Options Slot: 0 Index: 95	Specify the contents for the first line of the onsite display in the measuring mode. **Options:** • Main value only (value+bar graph) • External value1 only (value+status) • All alternating (main value+secondary value+Ext. value 1+Ext. val. 2 (259)) Ext. value 1 and Ext. val. 2 (259) are only displayed if the PLC sends these values to the device. **Factory setting:** Main value only
Add. disp. value Options Slot: 0 Index: 96	Specify the contents for the second line of the onsite display in the measuring mode. **Options:** • No value • Pressure • Main value (%) • Temperature The options depend on the measuring mode chosen. **Factory setting:** No value
Format 1st value Options Slot: 0 Index: 97	Specify the number of places after the decimal point for the value displayed in the main line. **Options:** Auto • x • x.x • x.xx • x.xxx • x.xxxx • x.xxxxx **Factory setting:** Auto
Format 1st value Display Slot: 0 Index: 98	Displays the number of places after the decimal point for the value displayed in the main line. **Options:** • Auto • x • x.x • x.xx • x.xxx • x.xxxx • x.xxxxx **Factory setting:** Auto
Status (Device Status) Display Slot: 0 Index: 99	Provides information on the current status of the device. **Display:** • Good • Failure • Function check • Maintenance req. • Out of spec.
Format ext. val. 2 Options Slot: 0 Index: 100	Specify the number of places after the decimal point for the value displayed in the main line. **Options:** • x.x • x.xx • x.xxx • x.xxxx • x.xxxxx **Factory setting:** x.x
Advanced diagnostics 7 (Diag add ext.) Display Slot: 0 Index: 101	This parameter displays bit-encoded manufacturer-specific alarms and warnings that are pending. Several alarm messages can occur at any one time. In addition, the "Diag extension" parameter (→ 99) can display additional alarm messages and warnings. **Factory setting:** 0x0, 0x0

TDOCT-3019_ENG 256722 03/2014

Expert → Communikation → Physical Block → PB Parameter

Parameter name	Description
Diag mask add ext. Display Slot: 0 Index: 102	This parameter describes what manufacturer-specific alarms and warnings are supported by the device. • Bit = 0: alarm is not supported • Bit = 1: alarm is supported.
Electr. serial no. Display Slot: 0 Index: 103	Displays the serial number of the main electronics (11 alphanumeric characters).
Diagnostic code Display Slot: 0 Index: 104	Displays the current message present. → See also these Operating Instructions, → 130 "Messages". The "Status" (Slot 0 Index 99) field and the "Diagnostic code" parameter display the message with the highest priority.
Sw build nr. Display Slot: 0 Index: 105	This parameter displays the software build number.
Lockstate Display Slot: 0 Index: 106	Displays the current locking status of the device or conditions that can lock the device (hardware locking, software locking).
Com.err.counters Display Slot: 0 Index: 107	This parameter is a structured parameter and monitors PROFIBUS communication-specific errors on the lowest communication layers. • "Frame CRC error": number of received frames with a PA CRC error. • "Frame delim. err.": number of received frames with an incorrect ASIC start delimitation character. • "Frame length err.": number of received frames with incorrect number of the received byte. • "Frame retry err.": number of time the master has tried to run a retry request. • "Frame type error.": number of received frames with a damaged first frame delimitation character.
Addressing Display Slot: 0 Index: 108	Displays the addressing mode: via hardware (DIP switch) or software. **Factory setting:** Software
Alarm behav. P Options Slot: 0 Index: 109	Set the measured value status for when the sensor limits are exceeded or undershot. **Options:** • Warning The device continues measuring. An error message is displayed. "UNCERTAIN" is displayed for the measured value status. • Alarm "BAD" is displayed for the measured value status. An error message is displayed. **Factory setting:** Warning
Maintenance instructions Display Slot: 0 Index: 110	Displays the diagnostic message with the highest priority currently present (Record with the 10 highest active warnings/error messages).
Operator code Entry Slot: 0 Index: 111	Use this function to enter a code to lock or unlock operation. **User input:** • To lock: Enter a number ≠ the release code (value range: 0 to 9999). • To unlock: Enter the release code. **NOTICE** The release code is "0" in the order configuration. Another release code can be defined in the "Code definition" parameter. If the user has forgotten the release code, the release code can be visible by entering the number "5864". **Factory setting:** 0

Expert → Communikation → Physical Block → PB Parameter

Parameter name	Description
Format ext. val. 1 Options Slot: 0 Index: 112	Specify the number of places after the decimal point for the value displayed in the main line. **Options:** • x.x • x.xx • x.xxx • x.xxxx • x.xxxxx **Factory setting:** x.x
Reset Entry Slot: 0 Index: 113	Reset parameters completely or partially to the factory values or order configuration by entering a reset code. **Factory setting:** 0
Code definition Entry Slot: 0 Index: 114	Use this function to enter a release code with which the device can be unlocked. **User input:** A number between 0 and 9999 **Factory setting:** 0
DIP switch Display Slot: 0 Index: 115	Displays the status of the active DIP switches.
Last diag. code Display Slot: 0 Index: 116	Record with the last diagnostic message that occurred and was rectified. **NOTICE** • Digital communication: the last message is displayed. • The messages listed in the "Last diag. code" parameter can be deleted via the "Reset logbook" parameter.
Instructions Display Slot: 0 Index: 117	Instructions for resolving the highest active warning/error message.

TDOCT-3019_ENG 256722 03/2014

Expert → Communikation → Physical Block → PB Parameter

Parameter name	Description
Download select. Display Slot: 0 Index: 118	Select the data records for the upload/download function in **PACT***ware*™ and PDM. **Prerequisite:** DIP switch 1, 3, 4 and 5 set to "OFF", DIP switch 2 set to "ON" (see picture 🗎 25). A download with the "Configuration copy" factory setting causes the device to download all the parameters required for a measurement. The setting "Electronics replace" only takes effect if an appropriate release code is entered in the "Operator code" parameter. **Options:** • Configuration copy: With this option, general configuration parameters are overwritten except for the serial number, order number, calibration, position adjustment, and application. • Device replacement: With this option, general configuration parameters are overwritten except for the serial number, order number, calibration and position adjustment. • Electronics replace: This option contains all parameters from "Configuration copy" and "Device replacement" and: "position adjustment", "sensor trimm", "serial number", "order number". **Factory setting:** Configuration copy
PB view 1 Display Slot: 0 Index: 126	Group of Physical Block parameters that are read as one via a communication request. The "PB view 1" comprises: • Static rev. no. • Block mode • Alarm summary • Diagnosis

8.5.3 Analog Input Block 1/Analog Input Block 2

Expert → Communication → Analog Input 1/Analog Input 2 → AI Standard Parameter

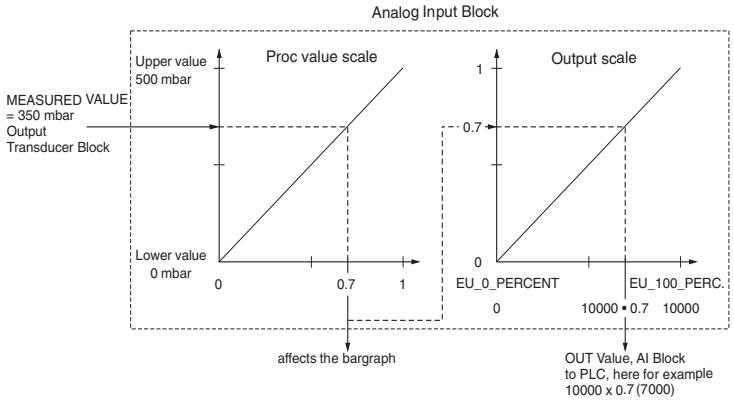
Parameter name	Description
Block object Display AI1 Slot: 1 AI2 Slot: 2 Index: 16	The "Block object" parameter is a structured parameter consisting of 13 elements. This parameter describes the characteristics of the Analog Input Block. **Reserved profile parameter** 250 = not used **Block object** 2 = Function Block **Parent class** 1 = Input **Class** 1 = Analog Input **Device rev.** 1 **Device rev. comp** 1 **DD_revision** 0 (for future use) **Profile** • Number of the PROFIBUS PA profile in the PNO • 0x40, 0x02 (compact class B) **Profile revision** Displays the profile version, here: 0x302 (Profile 3.02) **Execution time** 0 (for future use) **No. of parameters** Number of parameters of the Analog Input Block, here: 46 **Index of View 1** Address of the "AI view 1" parameter, here: AI1 = 0x01, 0x3E; AI2 = 0x02, 0x3E **Number of view lists** 1 = The Block contains one "View object".

Expert → Communication → Analog Input 1/Analog Input 2 → AI Standard Parameter

Parameter name	Description
Static rev. no. Display AI1 Slot: 1 AI2 Slot: 2 Index: 17	Displays the static revision for the parameters of the Analog Input Block. The counter is incremented by one with each change of a static parameter of the Analog Input Block. The counter counts up to 65535 and then starts again at zero. **Factory setting:** 0
TAG Entry AI1 Slot: 1 AI2 Slot: 2 Index: 18	Enter device tag e. g. TAG number (max. 32 alphanumeric characters). **Factory setting:** _ or as per order specifications
Strategy Entry AI1 Slot: 1 AI2 Slot: 2 Index: 19	Enter user-specific value for grouping and thus faster evaluation of the blocks. Grouping takes place by entering the same numerical value for the "Strategy" parameter of the block in question. **Input range:** 0 to 65535 **Factory setting:** 0
Alert key Entry AI1 Slot: 1 AI2 Slot: 2 Index: 20	Enter the user-specific value (e. g. identification number of the plant unit). The process control system can use this information to sort alarms and events that were generated by this block. **Input range:** 0 to 255 **Factory setting:** 0
Target mode Options AI1 Slot: 1 AI2 Slot: 2 Index: 21	Select the desired block mode. **Options:** • Automatic (Auto) • Manual (Man) • Out of service (O/S) **Factory setting:** Automatic (Auto)
Block mode Display AI1 Slot: 1 AI2 Slot: 2 Index: 22	The "Block mode" parameter is a structured parameter consisting of three elements. PROFIBUS makes a distinction between the following block modes: automatic mode (Auto), manual user intervention (Man) and out of service (O/S). **Actual mode** • Displays the current block mode. • Factory setting: automatic (Auto) **Permitted mode** • Displays the modes supported by the block. • Factory setting: 152 = automatic (Auto), manual user intervention or out of service **Normal mode** • Displays the normal working mode of the block. • Factory setting: automatic (Auto)
Alarm summary Display AI1 Slot: 1 AI2 Slot: 2 Index: 23	The "Alarm summary" parameter is a structured parameter consisting of four elements. **Current alarm summary** • Displays the current alarms • Factory setting: 0x0, 0x0

TDOCT-3019_ENG 256722 03/2014

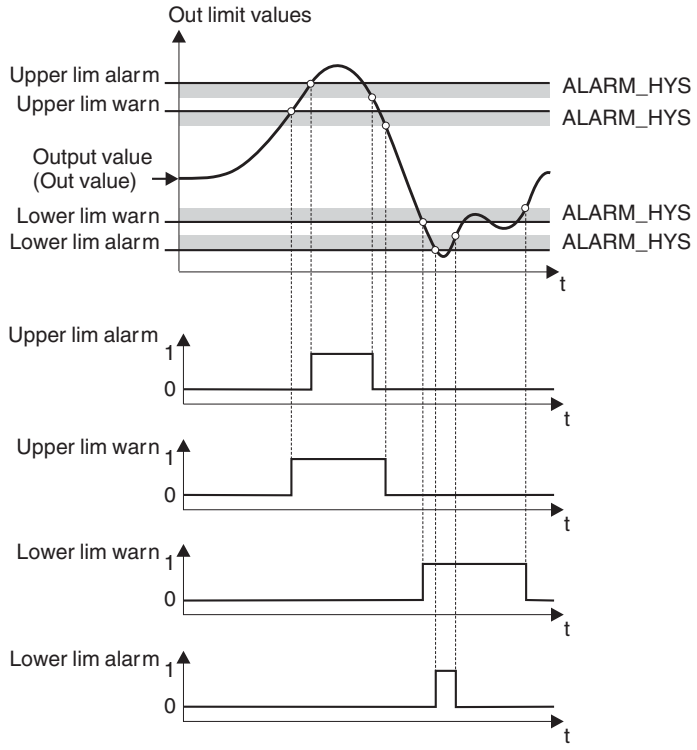
Expert → Communication → Analog Input 1/Analog Input 2 → AI Parameter

Parameter name	Description
Batch information Entry AI1 Slot: 1 AI2 Slot: 2 Index: 24	The "Batch information" parameter is a structured parameter consisting of four elements. This parameter is used in batch processes in accordance with IEC 61512 Part 1 (ISA S88). The "Batch information" parameter is required in a decentralized automation system to identify the input channels used. In addition, the errors occurring for the current batch process can also be displayed. **Batch ID** Enter the ID of a batch application so you can assign device messages, such as alarms etc. **Batch unit (no. of recipe unit procedure or of the unit)** Enter the recipe code required for the batch application or the related unit, such as the reactor for example. **Batch operation** Enter the recipe currently available. **Batch phase** Enter the current recipe phase.
Output value (Out Value) Display/Entry AI1 Slot: 1 AI2 Slot: 2 Index: 26	The "Output value (Out Value)" parameter is a structured parameter consisting of two elements. **Output value (Out Value)** Displays the output value (Out Value) of the Analog Input Block. **Out status** Displays the status of the Output value (Out Value) **NOTICE** If the "MAN" (manual) block mode was selected by means of the "Block mode" parameter, the output value (Out Value) "Output value (Out Value)" and its status can be specified manually here.
Proc value scale Entry AI1 Slot: 1 AI2 Slot: 2 Index: 27	Scale the input value of the Analog Input Block. **Lower value:** • Enter the lower value for the input value of the Analog Input Block. • Factory setting: 0 **Upper value:** • Enter the upper value for the input value of the Analog Input Block. • Factory setting: 100 **Example:** 
Output scale Entry AI1 Slot: 1 AI2 Slot: 2 Index: 28	Scale the output value (Out Value) of the Analog Input Block. → See also this table, "Proc value scale" parameter description. **Lower value:** • Enter the lower limit for the output value (Out Value) of the Analog Input Block. • Factory setting: 0 **Upper value:** • Enter the upper limit for the output value (Out Value) of the Analog Input Block. • Factory setting: 100 **Unit:** • Select the unit. The unit selected here does not have any effect on the scaling. This unit is only editable in the operating program. • Factory setting: % **Decimal point:** • Specify the number of decimal places for the output value (Out Value). • Factory setting: 0

Expert → Communication → Analog Input 1/Analog Input 2 → AI Parameter

Parameter name	Description
Characterization Options AI1 Slot: 1 AI2 Slot: 2 Index: 29	This parameter is used to set the characteristic type for the Analog Input Block ever linear.
Channel Entry AI1 Slot: 1 AI2 Slot: 2 Index: 30	This parameter is used to assign a process variable of the Transducer Block to the input of the Analog Input Block. **AI2 options:** • Pressure (0x011D) • Level before lin. (0x0152) • Sensor temperature (0x011B) **Factory setting:** • AI1: Measured value (digital value 0x0112) (fixed setting) • AI2: Pressure (digital value 0x011D)
Filt. time const. Entry AI1 Slot: 1 AI2 Slot: 2 Index: 32	Enter the filter time constant for the 1st order digital filter. This time is required in order for 63 % of a change in the Analog Input Block (input value) to have an effect on the "Output value (Out Value)". → See also the "Damping" parameter description (→ 123). **NOTICE** If the "MAN" (manual) block mode was selected by means of the "Target mode" parameter, the time entered here does not affect the output value (Out Value). **Factory setting:** 0.0 s
Fail safe mode Options AI1 Slot: 1 AI2 Slot: 2 Index: 33	If the Analog Input Block receives an input value or simulation value with the status BAD, the Analog Input Block continues working with the failsafe mode defined by means of this parameter. The following options are available by means of the "Fail safe mode" parameter: • Last valid out val. The last valid value is used for further processing with the status UNCERTAIN. • Fail safe value The value specified by means of the "Failsafe default" parameter is used for further processing with the status UNCERTAIN. → See this table, "Failsafe default" parameter description. • Status BAD The current value is used for further processing with the status BAD. **NOTICE** The BAD status is anyway activated if the "Out of service" (O/S) option was selected by means of the "Target mode" parameter. **Factory setting:** Last valid out val.
Failsafe default Entry AI1 Slot: 1 AI2 Slot: 2 Index: 34	Enter the value for the "Fail safe value" option selected via the "Fail safe mode" parameter. → See also this table, "Fail safe mode" parameter description. **Factory setting:** 0.0000 %

Expert → Communication → Analog Input 1/Analog Input 2 → AI Parameter

Parameter name	Description
Limit hysteresis Entry AI1 Slot: 1 AI2 Slot: 2 Index: 35	Enter hysteresis value for the upper and lower alarm value or critical alarm value. The alarm conditions remain active as long as the measured value is in the hysteresis. The hysteresis affects the following alarm or critical alarm limit values: • "Upper limit alarm": upper critical alarm limit value • "Upper limit warning": upper alarm limit value • "Lower limit warning": lower alarm limit value • "Lower limit alarm": lower critical alarm limit value  Illustration of the output value (Out Value) with limit values and hysteresis as well as the alarms "Upper limit alarm", "Upper limit warning", "Lower limit warning" and "Lower limit alarm" **Input range:** 0.0 to 50.0 % with regard to the range of the "Output scale" group (→ 109) **Factory setting:** 0.5000 %
Upper limit alarm Entry AI1 Slot: 1 AI2 Slot: 2 Index: 37	Enter upper critical limit value. If the "Output value (Out Value)" exceeds this limit value, the "Upper limit alarm" parameter displays an alarm message. → See also this table, "Limit hysteresis". **Factory setting:** 3.4028e+038 %
Upper limit warning Entry AI1 Slot: 1 AI2 Slot: 2 Index: 39	Enter upper limit value. If the "Output value (Out Value)" exceeds this limit value, the "Upper limit warning" parameter displays an alarm message. → See also this table, "Limit hysteresis" parameter description. **Factory setting:** 3.4028e+038 %
Lower limit warning Entry AI1 Slot: 1 AI2 Slot: 2 Index: 41	Enter lower limit value. If the "Output value (Out Value)" drops below this limit value, the "Lower limit warning" parameter displays an alarm message. → See also this table, "Limit hysteresis" parameter description. **Factory setting:** -3.4028e+038 %
Lower limit alarm Entry AI1 Slot: 1 AI2 Slot: 2 Index: 43	Enter lower critical limit value. If the "Output value (Out Value)" drops below this limit value, the "Lower limit alarm" parameter displays an alarm message. → See also this table, "Limit hysteresis" parameter description. **Factory setting:** -3.4028e+038 %

Expert → Communication → Analog Input 1/Analog Input 2 → AI Parameter

Parameter name	Description
Upper limit alarm Display AI1 Slot: 1 AI2 Slot: 2 Index: 46	The "Upper limit alarm" parameter is a structured parameter consisting of four elements. The parameter displays the status of the upper critical limit value alarm. → 111, "Limit hysteresis", graphic. **Status** • Displays the current status of the "Upper limit alarm" e. g. alarm still active, alarm reported to control level etc. • Factory setting: 0 **Alarm output value (Out Value)** • Displays the value that violated the upper critical limit ("Upper limit alarm"). • Factory setting: 0.0000 %
Upper limit warning Display AI1 Slot: 1 AI2 Slot: 2 Index: 47	The "Upper limit warning" parameter is a structured parameter consisting of four elements. The parameter displays the status of the upper limit value alarm. → 111, "Limit hysteresis", graphic. **Status** • Displays the current status of the "Upper limit warning" e. g. alarm still active, alarm reported to control level etc. • Factory setting: 0 **Warning output value (Out Value)** • Displays the value that violated the upper limit ("Upper limit warning"). • Factory setting: 0.0000 %
Lower limit warning Display AI1 Slot: 1 AI2 Slot: 2 Index: 48	The "Lower limit warning" parameter is a structured parameter consisting of four elements. The parameter displays the status of the lower limit value alarm. → 111, "Limit hysteresis", graphic. **Status** • Displays the current status of the "Lower limit warning" e. g. alarm still active, alarm reported to control level etc. • Factory setting: 0 **Warning output value (Out Value)** • Displays the value that violated the lower limit ("Lower limit warning"). • Factory setting: 0.0000 %
Lower limit alarm Display AI1 Slot: 1 AI2 Slot: 2 Index: 49	The "Lower limit alarm" parameter is a structured parameter consisting of four elements. The parameter displays the status of the lower critical limit value alarm. → 111, "Limit hysteresis", graphic. **Status** • Displays the current status of the "Lower limit alarm" e. g. alarm still active, alarm reported to control level etc. • Factory setting: 0 **Alarm output value (Out Value)** • Displays the value that violated the lower critical limit ("Lower limit alarm"). • Factory setting: 0.0000 %

TDOCT-3019_ENG 256722 03/2014

Expert → Communication → Analog Input 1/Analog Input 2 → AI Parameter

Parameter name	Description
Simulate Entry AI1 Slot: 1 AI2 Slot: 2 Index: 50	The "Simulate" parameter is a structured parameter consisting of three elements. This parameter is used to simulate the input value and status of the Analog Input Block. As this value runs through the complete algorithm, the behavior of the Analog Input Block can be checked. **Simulation** • 0: Simulation mode switched off • 1: Simulation mode switched on **Simulation value** • This element is displayed if the simulation mode was enabled via the simulation element. Depending on the settings for the "Measuring mode (005)", level selection and unit parameters, you can enter a pressure, level, volume, mass or flow value here. • Factory setting: 0.0 **Status** • This element is displayed if the simulation mode was enabled via the simulation element. Enter the status for the simulation value. • Factory setting: 128 (GOOD)
Unit text Entry AI1 Slot: 1 AI2 Slot: 2 Index: 51	Enter text (max. 16 alphanumeric characters). **Factory setting:** Empty field
PV scale unit Display AI1 Slot: 1 AI2 Slot: 2 Index: 61	This parameter describes the unit of the process variable of the Transducer Block which is assigned to this Analog Input Block via the channel (see "Channel" parameter → 110.
AI view 1 Display AI1 Slot: 1 AI2 Slot: 2 Index: 62	Group of Analog Input Block parameters that are read as one via a communication request. The "AI view 1" comprises: • Static rev. no. • Block mode • Alarm summary • Output value (Out Value)

8.5.4 Analog Output Block 1/Analog Output Block 2

Expert → Communication → Analog Output 1/Analog Output 2 → AO Standard Parameter

Parameter name	Description
Block object Display AO1 Slot: 3 AO2 Slot: 4 Index: 16	The "Block object" parameter is a structured parameter consisting of 13 elements. This parameter describes the characteristics of the Analog Output Block. **Reserved profile parameter** 250 = not used **Block object** 2 = Function Block **Parent class** 2 = Output **Class** 128 = Pepperl+Fuchs Analog Output Block (DAO_EH) **Device rev.** 1 **Device rev. comp** 1 **DD-revision** 0 (for future use) **Profile** • Number of the PROFIBUS PA profile in the PNO • 0x40, 0x02 (compact class B) **Profile revision** Displays the profile version, here: 0x302 (Profile 3.02) **Execution time** 0 (for future use) **No. of parameters** Number of parameters of the Pepperl+Fuchs Analog Output, here: 23 **Index of View 1** Address of the "AO view 1" parameter, here: AO1 = 0x03, 0x27; AO2 = 0x04, 0x27 **Number of view lists** 1 = The Block contains one "View object".
Static rev. no. Display AO1 Slot: 3 AO2 Slot: 4 Index: 17	Displays the static revision counter for the parameters of the Analog Output Block. The counter is incremented by one with each change of a static parameter of the Analog Output Block. The counter counts up to 65535 and then starts again at zero. **Factory setting:** 0
TAG Entry AO1 Slot: 3 AO2 Slot: 4 Index: 18	Enter device tag e. g. TAG number (max. 32 alphanumeric characters). **Factory setting:** _ or as per order specifications
Strategy Entry AO1 Slot: 3 AO2 Slot: 4 Index: 19	Enter user-specific value for grouping and thus faster evaluation of the blocks. Grouping takes place by entering the same numerical value for the "Strategy" parameter of the block in question. **Input range:** 0 to 65535 **Factory setting:** 0
Alert key Entry AO1 Slot: 3 AO2 Slot: 4 Index: 20	Enter the user-specific value (e. g. identification number of the plant unit). The process control system can use this information to sort alarms and events that were generated by this block. **Input range:** 0 to 255 **Factory setting:** 0
Target mode Options AO1 Slot: 3 AO2 Slot: 4 Index: 21	Select the desired block mode. **Options:** • Automatic (Auto) • Manual (Man) • Out of service (O/S) **Factory setting:** Automatic (Auto)

TDOCT-3019_ENG 256722 03/2014

Expert → Communication → Analog Output 1/Analog Output 2 → AO Standard Parameter

Parameter name	Description
Block mode Display AO1 Slot: 3 AO2 Slot: 4 Index: 22	The "Block mode" parameter is a structured parameter consisting of three elements. PROFIBUS makes a distinction between the following block modes: automatic mode (Auto), manual user intervention (Man) and out of service (O/S). **Actual mode** • Displays the current block mode. • Factory setting: automatic (Auto) **Permitted mode** • Displays the modes supported by the block. • Factory setting: 152 = automatic (Auto), manual user intervention or out of service **Normal mode** • Displays the normal working mode of the block. • Factory setting: automatic (Auto)
Alarm summary Display AO1 Slot: 3 AO2 Slot: 4 Index: 23	The "Alarm summary" parameter is a structured parameter consisting of four elements. **Current alarm summary** • Displays the current alarms • Factory setting: 0x0, 0x0

Expert → Communication → Analog Output 1/Analog Output 2 → AO Parameter

Parameter name	Description
Batch information Entry AO1 Slot: 3 AO2 Slot: 4 Index: 24	The "Batch information" parameter is a structured parameter consisting of four elements. This parameter is used in batch processes in accordance with IEC 61512 Part 1 (ISA S88). The "Batch information" parameter is required in a decentralized automation system to identify the input channels used. In addition, the errors occurring for the current batch process can also be displayed. **Batch ID** Enter the ID of a batch application so you can assign device messages, such as alarms etc. **Batch unit (no. of recipe unit procedure or of the unit)** Enter the recipe code required for the batch application or the related unit, such as the reactor for example. **Batch operation** Enter the recipe currently available. **Batch phase** Enter the current recipe phase.
Input value Display AO1 Slot: 3 AO2 Slot: 4 Index: 26	The "Input value" parameter is a structured parameter consisting of two elements. **Input value** Displays the input value of the Analog Output Block. **Input status** Displays the status of the input value **NOTICE** If the "MAN" (manual) block mode was selected by means of the "Block mode" parameter, the "Input value" and its status can be specified manually here.
Channel Display AO1 Slot: 3 AO2 Slot: 4 Index: 27	This parameter is used to assign the output of the Analog Output Block to the received parameter of the Transducer Block. **Factory setting:** • "Ext. value 1" fixed assignment to the external value 1 for the Analog Output 1 • "Ext. value 2" fixed assignment to the external value 2 for the Analog Output 2

Expert → Communication → Analog Output 1/Analog Output 2 → AO Parameter

Parameter name	Description
Data size Display AO1 Slot: 3 AO2 Slot: 4 Index: 28	Size of the "Output value (Out Value)" parameter in number of bytes, without status byte. **Factory setting:** 4
Data max. size Display AO1 Slot: 3 AO2 Slot: 4 Index: 29	Maximum size of the "Output value (Out Value)" parameter in number of bytes, with status byte.
Fail safe time Entry AO1 Slot: 3 AO2 Slot: 4 Index: 32	Time in seconds since the failure was detected until action on the part of the block if the condition persists. **Factory setting:** 0
Fail safe mode Options AO1 Slot: 3 AO2 Slot: 4 Index: 33	If the Analog Output Block receives an input value with the status BAD, the Analog Output Block continues working with the failsafe mode defined by means of this parameter. The following options are available by means of the "Fail safe mode" parameter: • Last valid out val. The last valid value is used for further processing with the status UNCERTAIN. • Fail safe value The value specified by means of the "Failsafe default" parameter is used for further processing with the status UNCERTAIN. → See this table, "Failsafe default" parameter description. • Status bad The current value is used for further processing with the status BAD. **NOTICE** The failsafe mode is anyway activated if the "Out of service" (O/S) option was selected by means of the "Target mode" parameter. **Factory setting:** Last valid out val.
Failsafe default Entry AO1 Slot: 3 AO2 Slot: 4 Index: 34	Enter the value for the "Fail safe value" option selected via the "Fail safe mode" parameter. → See also this table, "Fail safe mode" parameter description. **Factory setting:** 0.0000
Unit Entry AO1 Slot: 3 AO2 Slot: 4 Index: 35	This parameter describes the unit for the input value. **Factory setting:** Unknown
Output value (Out Value) Display AO1 Slot: 3 AO2 Slot: 4 Index: 36	The "Output value (Out Value)" parameter is a structured parameter consisting of two elements. **Output value (Out Value)** Displays the output value (Out Value) of the Analog Output Block. It is transmitted to the "Ext. val. 1" or "Ext. value 2" parameter via the channel. **Out status** Displays the status of the output value (Out Value). **NOTICE** If the "MAN" (manual) block mode was selected by means of the "Block mode" parameter, the "Output value (Out Value)" and its status can be written manually here.

Expert → Communication → Analog Output 1/Analog Output 2 → AO Parameter

Parameter name	Description
AO view 1 Display AO1 Slot: 3 AO2 Slot: 4 Index: 39	Group of Analog Output Block parameters that are read as one via a communication request. The "AO view 1" comprises: • Static rev. no. • Block mode • Alarm summary • Input value • Data size • Data max. size

8.5.5 Transducer Block

Expert → Communication → Transducer Block → TB Standard Parameter

Parameter name	Description
Block object Display Slot: 6 Index: 16	The "Block object" parameter is a structured parameter consisting of 13 elements. This parameter describes the characteristics of the Transducer Block. **Reserved profile parameter** 250 = not used **Block object** 3 = Transducer Block **Parent class** 1 = Pressure **Class** 7 = Differential pressure, gauge pressure, absolute pressure **Device rev.** 1 **Device rev. comp** 1 **DD_revision** 0 (for future use) **Profile** • Number of the PROFIBUS PA profile in the PNO • 0x40, 0x02 (compact class B) **Profile revision** Displays the profile version, here: 0x302 (Profile 3.02) **Execution time** 0 (for future use) **No. of parameters** Number of parameters for the transducer, here: 234 **Number of view lists** 1 = The Block contains one "View object".
Static rev. no. Display Index: 6 Slot: 17	Displays the static revision counter for parameters of the Transducer Block. The counter is incremented by one with each change of a static parameter of the Transducer Block. The counter counts up to 65535 and then starts again at zero. **Factory setting:** 0
TAG Entry Slot: 6 Index: 18	Enter device tag e. g. TAG number (max. 32 alphanumeric characters). **Factory setting:** _ or as per order specifications
Strategy Entry Slot: 6 Index: 19	Enter user-specific value for grouping and thus faster evaluation of the blocks. Grouping takes place by entering the same numerical value for the "Strategy" parameter of the block in question. **Input range:** 0 to 65535 **Factory setting:** 0

Expert → Communication → Transducer Block → TB Standard Parameter

Parameter name	Description
Alert key Entry Slot: 6 Index: 20	Enter the user-specific value (e. g. identification number of the plant unit). The process control system can use this information to sort alarms and events that were generated by this block. **Input range:** 0 to 255 **Factory setting:** 0
Target mode Options Slot: 6 Index: 21	Select the desired block mode. Only the "Automatic (Auto)" mode can be selected for the Transducer Block. **Options:** Automatic (Auto) **Factory setting:** Automatic (Auto)
Block mode Display Slot: 6 Index: 22	The "Block mode" parameter is a structured parameter consisting of three elements. PROFIBUS makes a distinction between the following block modes: automatic mode (Auto), manual user intervention (Man) and out of service (O/S). The Transducer Block only works in the "Automatic (Auto)" mode. **Actual mode** • Displays the current block mode. • Factory setting: automatic (Auto) **Permitted mode** • Displays the modes supported by the block. • Factory setting: 8 = automatic (Auto) **Normal mode** • Displays the normal working mode of the block. • Factory setting: automatic (Auto)
Alarm summary Display Slot: 6 Index: 23	The "Alarm summary" parameter is a structured parameter consisting of four elements. **Current alarm summary** • Displays the current alarms • Factory setting: 0x0, 0x0

Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

Parameter name	Description
Sensor pressure Display Slot: 6 Index: 24	Displays the measured pressure before sensor trim, position adjustment and damping. → 83, Meas. pressure (020), graphic
URL sensor Display Slot: 6 Index: 25	Displays the upper-range limit of the sensor.
LRL sensor Display Slot: 6 Index: 26	Displays the lower-range limit of the sensor.
Hi trim sensor Display Slot: 6 Index: 27	Sensor recalibration by entering a target pressure while simultaneously and automatically accepting a reference pressure present for the upper calibration point.
Lo trim sensor Entry Slot: 6 Index: 28	Sensor recalibration by entering a target pressure while simultaneously and automatically accepting a reference pressure present for the lower calibration point.
Minimum span Display Slot: 6 Index: 29	Displays the smallest possible span.

TDOCT-3019_ENG 256722 03/2014

Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

Parameter name	Description
Press. eng. unit Options Slot: 6 Index: 30	Select the pressure unit. If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit. **Options:** • mbar, bar • mmH2O, mH2O, • inH2O, ftH2O • Pa, kPa, MPa • psi • mmHg, inHg • kgf/cm^2 **Factory setting:** mbar or bar depending on the sensor nominal measuring range, or as per order specifications
Corrected press. Display Slot: 6 Index: 31	Displays the measured pressure after sensor trim and position adjustment. **NOTICE** If this value is not equal to "0", it can be corrected to "0" by the position adjustment.
Sensor Meas. Type Display Slot: 6 Index: 32	Displays the sensor type. • LHC-M51, PPC-M51 with gauge pressure sensors = gauge • LHC-M51, PPC-M51 with absolute pressure sensors = absolute • LHCR-51, LHCS-51 with gauge pressure sensors = gauge
Sensor serial no. Display Slot: 6 Index: 33	Displays the serial number of the sensor (11 alphanumeric characters).
Primary value Display Slot: 6 Index: 34	The "Primary value" parameter is a structured parameter consisting of two elements. **Measured value** Depending on the settings for the "Measuring mode (005)", Lin. mode (037) and unit parameters, a pressure, level, volume, mass or flow value is displayed here. **Status** Displays the status of the measured value
Primary value unit Display Slot: 6 Index: 35	This parameter describes the unit of the primary value depending on the "transmitter type".
Transmitter type Display Slot: 6 Index: 36	This parameter describes the measuring mode of the pressure transmitter. **Options:** • Pressure • Level
Sensor Temp. Display Slot: 6 Index: 43	The "Sensor Temp." parameter is a structured parameter consisting of two elements. **Sensor temp.** Displays the temperature currently measured in the sensor. This can deviate from the process temperature. **Status** Displays the status of the measured temperature.
Temp. eng. unit. Options Slot: 6 Index: 44	Select the unit for the temperature measured values. **NOTICE** The setting affects the unit for the "Sensor Temp." parameter. **Options:** • °C • °F • K **Factory setting:** °C
Value (sec val 1) Display Slot: 6 Index: 45	This parameter contains the pressure value and the status that is available for the function block.

Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

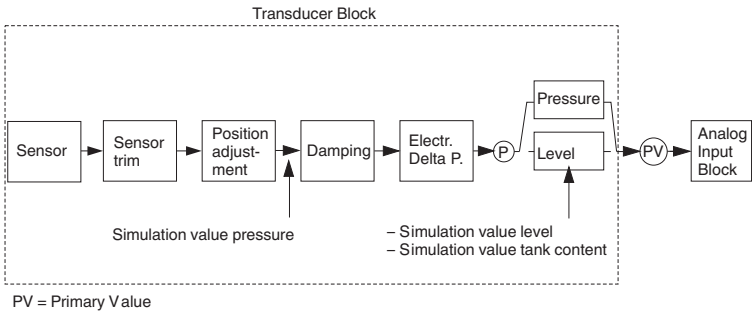
Parameter name	Description
Press. eng. unit Display Slot: 6 Index: 46	This parameter contains the pressure unit of the "Value (sec val 1)" parameter (= "Press. eng. unit").
Value (sec val 2) Display Slot: 6 Index: 47	This parameter contains the measured value after input scaling and the status that is available for the function block. The parameter contains the standardized pressure value without an engineering unit.
Sec val2 unit Display Slot: 6 Index: 48	This parameter contains the unit of the "Value (sec val 2)" parameter. The digital value, that corresponds "None" and is transmitted, is 1997 (PROFIBUS PA Profile).
Characterization Display Slot: 6 Index: 49	Type of characteristic. **Options:** • Linear • Linearization • Square root
Measuring range Entry Slot: 6 Index: 50	The "Measuring range" parameter is a structured parameter consisting of two elements. **Full pressure** • Enter the upper limit for the input value of the Transducer Block. • Factory setting: URL sensor (→ For the sensor upper range value, see "URL sensor".) **Empty pressure** • Enter the lower limit for the input value of the Transducer Block. • Factory setting: 0
Working range Entry Slot: 6 Index: 51	The "Working range" parameter is a structured parameter consisting of two elements. **Full calib.** • Enter the upper limit for the output value (Out Value) of the Transducer Block. • Factory setting: URL sensor (→ For the sensor upper range value, see "URL sensor".) **Empty calib.** • Enter the lower limit for the output value (Out Value) of the Transducer Block. • Factory setting: 0
Squareroot point Display Slot: 6 Index: 53	Shows the number of value pairs of a linearization table. The value is calculated if the table is activated.
Tab actual numb Display Slot: 6 Index: 54	Contains the actual numbers of entries in the table. It is calculated when table transmission has ended.
Line numb.: Display Slot: 6 Index: 55	The "Line numb.:" parameter identifies which element in the table is currently in the "Tab xy value" parameter.
Table max. number Display Slot: 6 Index: 56	"Table max. number" is the maximum size (number of value pairs "X-value" and "Y value") of the table in the device.
Table min. number Display Slot: 6 Index: 57	For device-internal reasons (e. g. calculation), it is sometimes necessary to use a minimum number of table values. This number is provided in the "Table min. number" parameter.

TDOCT-3019_ENG 256722 03/2014

Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

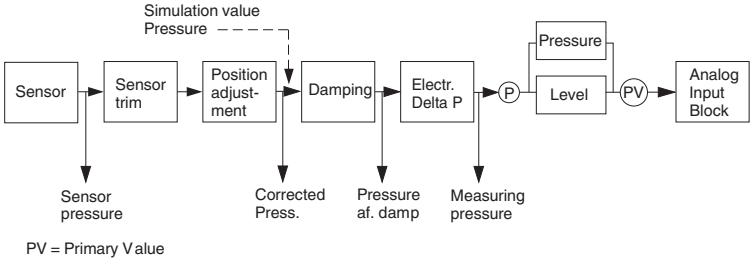
Parameter name	Description
Simulation mode Options Slot: 6 Index: 58	Select the function for entering the table. **Options:** • Clear table: deletes an active linearization table • New operation: creates a new linearization table • Accept input table: enables the linearization table entered • Delete point: deletes a linearization point. • Insert point: adds a new linearization point. **Factory setting:** Clear table
Status (characteristic) Display Slot: 6 Index: 59	Displays the result of check of the linerization table.
Tab xy value Display Slot: 6 Index: 60	"X-value" and "Y value" value pairs for linearization curve.
Max. meas. press. Display Slot: 6 Index: 61	Displays the highest pressure value measured (peakhold indicator). You can reset this indicator by means of the "Reset peakhold" parameter.
Min. meas. press. Display Slot: 6 Index: 62	Displays the lowest pressure value measured (peakhold indicator). You can reset this indicator by means of the "Reset peakhold" parameter.
Empty calib. Entry Slot: 6 Index: 66	Enter the output value for the lower calibration point (container empty). The unit defined in "Unit before lin." must be used. **NOTICE** • In the case of wet calibration, the level (container empty) must actually be available. The associated pressure is then automatically recorded by the device. • In the case of dry calibration, the level (container empty) does not have to be available. The associated pressure has to be entered in the "Empty pressure" parameter for the "In pressure" level selection. The associated height has to be entered in the "Empty height" parameter for the "In height" level selection. **Factory setting:** 0.0
Full calib. Entry Slot: 6 Index: 67	Enter the output value for the upper calibration point (container full). The unit defined in "Unit before lin." must be used. **NOTICE** • In the case of wet calibration, the level (container full) must actually be available. The associated pressure is then automatically recorded by the device. • In the case of dry calibration, the level (container full) does not have to be available. The associated pressure has to be entered in the "Full pressure" parameter for the "In pressure" level selection. The associated height has to be entered in the "Full height" parameter for the "In height" level selection. **Factory setting:** 100.0
Pressure Empty/Full Display Slot: 6 Index: 68	Internal service parameter.
Calibration Empty/Full Display Slot: 6 Index: 69	Internal service parameter.

Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

Parameter name	Description
Max. Turndown Display Slot: 6 Index: 70	Internal service parameter
High-press. side Display Slot: 6 Index: 71	Determines, which pressure input corresponds to the high-pressure side. **NOTICE** This setting is only valid if the "SW/P2 High" DIP switch is switched off. Otherwise P2 corresponds to the high-pressure side in any case.
Reset peakhold Display Slot: 6 Index: 72	You can reset the "Min. meas. press." and "Max. meas. press." indicators with this parameter. **Options:** • Abort • Confirm **Factory setting:** Abort
Measuring mode Options Slot: 6 Index: 73	Select the measuring mode. The operating menu is structured differently depending on the measuring mode selected. **NOTICE** If the measuring mode is changed, no conversion takes place. If necessary, the device has to be recalibrated after the measuring mode has been changed. **Options:** • Pressure • Level **Factory setting:** Pressure
Simulation mode Options Slot: 6 Index: 74	Switch on the simulation mode and select the simulation type. A simulation that is running is switched off if the measuring mode or the level mode Lin. mode (037) is changed. **Options:** • None • Pressure, → see this table, "Sim. pressure" parameter • Level, → see this table, "Sim. level" parameter • Tank content, → see this table, "Sim. tank cont." parameter • Alarm/warning, → see this table, "Sim. error no." parameter  PV = Primary Value **Factory setting:** None
Sim. level Entry Slot: 6 Index: 76	Enter the simulation value. → See also "Simulation mode". **Prerequisite:** "Measuring mode" = Level and "Simulation mode" = Level
Sim. tank cont. Entry Slot: 6 Index: 77	Enter the simulation value. → See also "Simulation mode". **Prerequisite:** "Measuring mode" = Level, "Lin. mode" = Activate table and "Simulation mode" = Tank content.
Sim. pressure Entry Slot: 6 Index: 79	Enter the simulation value. → See also "Simulation mode". **Prerequisite:** "Simulation mode" = Pressure **Value when switched on:** Current pressure measured value

TDOCT-3019_ENG 256722 03/2014

Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

Parameter name	Description
Electr. delta P Options Slot: 6 Index: 80	This function activates the electr. delta P application with an external or constant value. **Options:** • Off • Ext. value 2 • Constant **Factory setting:** Off
Pressure abs range Entry Slot: 6 Index: 81	Absolute measuring range of the sensor.
Lo trim measured Display Slot: 6 Index: 82	Displays the reference pressure present to be accepted for the lower calibration point.
Hi trim measured Display Slot: 6 Index: 83	Displays the reference pressure present to be accepted for the upper calibration point.
Pos. zero adjust (pressure sensors) Options Slot: 6 Index: 84	Position adjustment – the pressure difference between zero (set point) and the measured pressure doesn't need not be known. **Example:** • Measured value = 2.2 mbar (0.032 psi) • Correct the measured value via the "Pos. zero adjust (pressure sensors)" 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 **Options** • Confirm • Abort **Factory setting:** Abort
Calib. offset (absolute pressure sensor) Entry Slot: 6 Index: 86	Position adjustment – the pressure difference between the set point and the measured pressure must be known. **Example:** • Measured value = 982.2 mbar (14.25 psi) • You correct the measured value with the value entered (e. g. 2.2 mbar (0.032 psi)) via the "Calib. offset (absolute pressure sensor)" parameter. This means that you are assigning the value 980.0 mbar (14.21 psi) to the pressure present. • Measured value (after calib. offset) = 980.0 mbar (14.21 psi) **Factory setting:** 0.0
Damping Entry/Display Slot: 6 Index: 87	Enter damping time (time constant τ). The damping affects the speed at which the measured value reacts to changes in pressure. **NOTICE** The damping is only active if DIP switch 2 "damping τ" is in the ON position.
Meas. pressure Display Slot: 6 Index: 88	Displays the measured pressure. 

Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

Parameter name	Description
Unit before lin. Entry Slot: 6 Index: 89	Select the unit for the measured value display for the level before linearization. **NOTICE** The unit selected is only used to describe the measured value. This means that the measured value is not converted when a new output unit is selected. **Example:** • Current measured value: 0.3 ft • New output unit: m • New measured value: 0.3 m **Options** • % • mm, cm, dm, m • ft, in • m^3, in^3 • l, hl • ft^3 • gal, lgal • kg, t • lb **Factory setting:** %
Calibration mode Options Slot: 6 Index: 90	Select the calibration mode. **Options:** • Wet Wet calibration takes place by filling and emptying the container. In the case of two different levels, the level, volume, mass or percentage value entered is assigned to the pressure measured at this point in time ("Empty calib." and "Full calib." parameters). • Dry Dry calibration is a theoretical calibration. For this calibration, you specify two pressure/level value pairs via the following parameters: "Empty calib.", "Empty pressure", "Full calib.", "Full pressure", "Empty height", "Full height". **Factory setting:** Wet
Height unit Options Slot: 6 Index: 91	Select the height unit. The measured pressure is converted to the selected height unit using the "Adjust density" parameter. **Prerequisite** "Level selection" = In height **Options** • mm • m • in • ft **Factory setting:** m
Density unit Display Slot: 6 Index: 92	Displays the density unit. The measured pressure is converted to a height using the "Height unit" and "Adjust density" parameters. **Factory setting:** g/cm^3
Adjust density Entry Slot: 6 Index: 93	Enter the density of the medium. The measured pressure is converted to a height using the "Height unit" and "Adjust density" parameters. **Factory setting:** 1.0
Process Density Entry Slot: 6 Index: 94	Enter a new density value for density correction. The calibration was carried out with water as the medium, for example. Now the container is to be used for another medium with another density. The calibration is corrected appropriately by entering the new density value in the "Process Density" parameter. **NOTICE** If you change to dry calibration after completing a wet calibration using the "Calibration mode" parameter, the density for the "Adjust density" and "Process Density" parameters must be entered correctly before changing the calibration mode. **Factory setting:** 1.0

TDOCT-3019_ENG 256722 03/2014

Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

Parameter name	Description
Meas. Level Display Slot: 6 Index: 95	Displays the height currently measured. The measured pressure is converted to a height using the Process density (035) parameter.
Empty height Entry/Display Slot: 6 Index: 96	Enter the height value for the lower calibration point (container empty). Select the unit via the "Height unit" parameter. **Prerequisite:** • "Level selection" = In height • "Calibration mode" = Dry → entry • "Calibration mode" = Wet → display **Factory setting:** 0.0
Full height Entry/Display Slot: 6 Index: 97	Enter the height value for the upper calibration point (container full). Select the unit via the "Height unit" parameter. **Prerequisite:** • "Level selection" = In height • "Calibration mode" = Dry → entry • "Calibration mode" = Wet → display **Factory setting:** Upper-range limit (URL) is converted to a height unit
Level before lin. Display Slot: 6 Index: 98	Displays the level value before the linearization table.
Tank description Entry Slot: 6 Index: 101	Enter the tank description (max. 32 alphanumeric characters)
Lin. mode Options Slot: 6 Index: 102	Select the linearization mode. **Options:** • Linear The level is output without being converted beforehand. "Level before lin." is output. • Erase table: The existing linearization table is deleted. • Manual entry (sets the table to the edit mode, an alarm is output): The value pairs of the table ("X-value" and "Y-value (041) (manual entry/in semi-auto. entry)") are entered manually. • Semiautomatic entry (sets the table to the edit mode, an alarm is output): The container is emptied or filled in stages in this entry mode. The device records the level value automatically ("X-value"). The associated volume, mass or %-value is entered manually ("Y-value (041) (manual entry/in semi-auto. entry)"). • Activate table The table entered is activated and checked with this option. The device shows the level after linearization. **Factory setting:** Linear
Unit after lin. Options Slot: 6 Index: 103	Select the unit of the level value after linearization (unit of the Y-value). **Options:** • % • cm, dm, m, mm • hl • in^3, ft^3, m^3 • l • in, ft • kg, t • lb • gal • lgal **Factory setting:** %

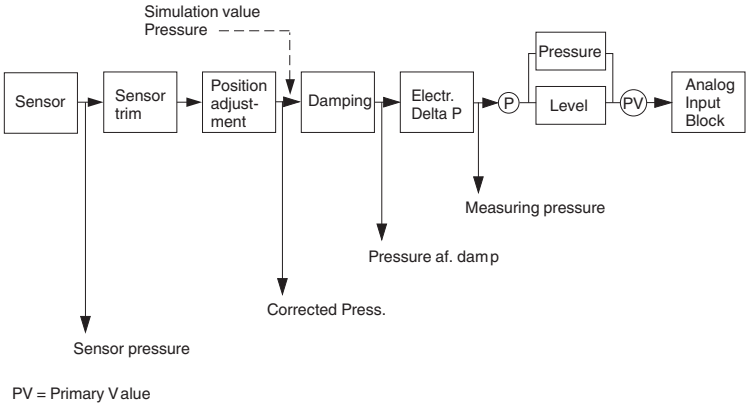
Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

Parameter name	Description
Tank content Display Slot: 6 Index: 104	Displays the level value after linearization.
Empty calib. Entry Slot: 6 Index: 105	Enter the output value for the lower calibration point (container empty). The unit defined in "Unit before lin." must be used. **NOTICE** • In the case of wet calibration, the level (container empty) must actually be available. The associated pressure is then automatically recorded by the device. • In the case of dry calibration, the level (container empty) does not have to be available. The associated pressure has to be entered in the "Empty pressure" parameter for the "In pressure" level selection. The associated height has to be entered in the "Empty height" parameter for the "In height" level selection. **Factory setting:** 0.0
Full calib. Entry Slot: 6 Index: 106	Enter the output value for the upper calibration point (container full). The unit defined in "Unit before lin." must be used. **NOTICE** • In the case of wet calibration, the level (container full) must actually be available. The associated pressure is then automatically recorded by the device. • In the case of dry calibration, the level (container full) does not have to be available. The associated pressure has to be entered in the "Full pressure" parameter for the "In pressure" level selection. The associated height has to be entered in the "Full height" parameter for the "In height" level selection. **Factory setting:** 100.0
Tab xy value Display Slot: 6 Index: 107	Displays a pair of points of the linearization table.
Edit table Options Slot: 6 Index: 108	Select the function for entering the table. **Options:** • Next point: enter the next point. • Current point: stay on the current point to correct a mistake for example. • Previous point: skip back to the previous point to correct a mistake for example. • Insert point: insert an additional point (see example below). • Delete point: delete the current point (see example below). **Example:** • Add a point - in this case between the 4th and 5th point for example • Select point 5 via the "Line numb.:" parameter. • Select the "Insert point" option via the "Edit table" parameter. • Point 5 is displayed for the "Line numb.:" parameter. Enter new values for the "X-value" and "Y-value (041) (manual entry/in semi-auto. entry)" parameters. **Example:** • Delete a point - in this case the 5th point for example • Select point 5 via the "Line numb.:" parameter. • Select the "Delete point" option via the "Edit table" parameter. • The 5th point is deleted. All of the subsequent points are moved up one number i. e. following deletion, the 6th point becomes Point 5. **Factory setting:** Current point
Lin tab index 01 Entry Slot: 6 Index: 109	First table point parameter for linearization via the **PACT***ware*™ module.
...	
Lin tab index 32 Entry Slot: 6 Index: 140	Last table point parameter for linearization via the **PACT***ware*™ module.

Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

Parameter name	Description
Ext. value 2 Display Slot: 6 Index: 141	Output value and status parameters of Analog Output 2.
Ext.val.2 unit Entry Slot: 6 Index: 142	Unit of the output value parameter of Analog Output 2.
Damping Entry/Display Slot: 6 Index: 165	Enter damping time (time constant τ). The damping affects the speed at which the measured value reacts to changes in pressure. **NOTICE** The damping is only active if DIP switch 2 "damping τ" is in the ON position.
Level selection Options Slot: 6 Index: 166	Select the method for calculating the level **Options:** • In pressure If this option is selected, specify two pressure/level value pairs. The level value is displayed directly in the unit that you select via the "Unit before lin." parameter. • In height If this option is selected, specify two height/level value pairs. From the measured pressure, the device first calculates the height using the density. This information is then used to calculate the level in the "Unit before lin." selected using the two value pairs specified. **Factory setting:** In pressure
High-press. side Selection/Display Slot: 6 Index: 167	Determines, which pressure input corresponds to the high-pressure side. **NOTICE** This setting is only valid if the "SW/P2 High" DIP switch is switched off. Otherwise P2 corresponds to the high-pressure side in any case.
Fixed ext. value Entry Slot: 6 Index: 168	Use this function to enter the constant value. The value refers to "Electr. delta P" (→ 123). **Factory setting:** 0.0
Empty pressure Entry/Display Slot: 6 Index: 169	Enter the pressure value for the lower calibration point (container empty). → See also "Empty calib.". **Prerequisite** • "Level selection" = In pressure • "Calibration mode" = Dry → entry • "Calibration mode" = Wet → display **Factory setting:** 0.0
Full pressure Entry/Display Slot: 6 Index: 170	Enter the pressure value for the upper calibration point (container full). → See also "Full calib.". **Prerequisite** • "Level selection" = In pressure • "Calibration mode" = Dry → entry • "Calibration mode" = Wet → display **Factory setting:** Upper-range limit (URL) of the sensor

Expert → Communication → Transducer Block → TB Pepperl+Fuchs Parameter

Parameter name	Description
Pressure af. damp Display Slot: 6 Index: 171	Displays the measured pressure after sensor trim, position adjustment and damping. 
Calib. Offset Entry Slot: 6 Index: 172	Position adjustment – the pressure difference between the set point and the measured pressure must be known. **Example:** • Measured value = 982.2 mbar (14.25 psi) • You correct the measured value with the value entered (e. g. 2.2 mbar (0.032 psi)) via the "Calib. Offset" parameter. This means that you are assigning the value 980.0 mbar (14.21 psi) to the pressure present. • Measured value (after calib. offset) = 980.0 mbar (14.21 psi) **Factory setting:** 0.0
Sensor temp. Display Slot: 6 Index: 173	Displays the temperature currently measured in the sensor. This can deviate from the process temperature.
X-value Display/Semiautomatic entry Slot: 6 Index: 174	If "Lin. mode" = "Semiautomatic", the level value is displayed and must be confirmed by entering the associated Y-value.
Sensor serial no. Display Slot: 6 Index: 175	Displays the serial number of the sensor (11 alphanumeric characters).
PaTbRangeParameters Entry Slot: 6 Index: 177	This parameter is a structured parameter with transducer scaling information for the internal function of the upload/download module.

8.6 Saving or duplicating device data

The device does not have a memory module. With an operating tool based on FDT technology (e. g. **PACT***ware*™), the following options are, however, available (see "Download select." parameter → 81 in the operating menu or via the Physical Block → 107):

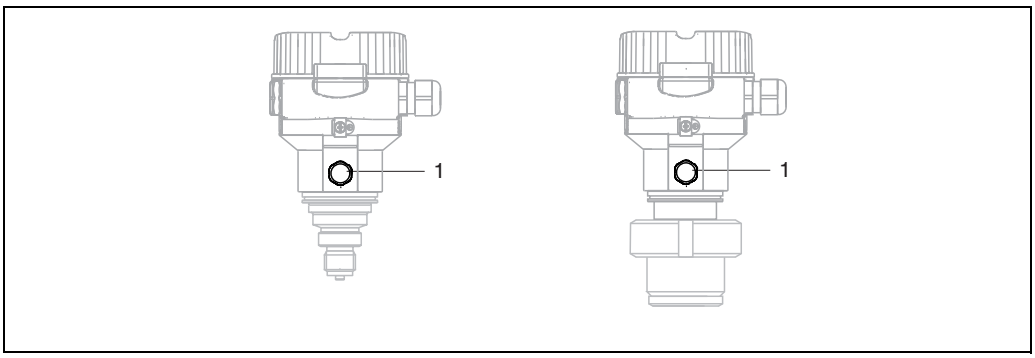
- Storage/recovery of configuration data
- Duplication of device parameters
- Transfer of all relevant parameters when replacing electronic inserts.

For further information, please refer to the Operating Instructions for the **PACT***ware*™ operating program.

TDOCT-3019_ENG 256722 03/2014

9 Maintenance

Keep the pressure compensation and GORE-TEX® filter (1) free from contamination.



9.1 Exterior cleaning

Please note the following points when cleaning the device:

- The cleaning agents used should not corrode the surface and the seals.
- Mechanical damage to the process isolating diaphragm, e. g. due to pointed objects, must be avoided.
- Observe the degree of protection of the device. See the nameplate if necessary (→ 6 ff).

10 Troubleshooting

10.1 Messages

The following table lists the messages that can occur. The Diagnostic code parameter shows the message with the highest priority. The device has four different status information codes according to NAMUR NE107:

- F = failure
- M (warning) = maintenance required
- C (warning) = function check
- S (warning) = out of specification (deviations from the permitted ambient or process conditions determined by the device with the self-monitoring function, or errors in the device itself indicate that the measuring uncertainty is greater than what would be expected under normal operating conditions).

Diagnostic code	Error message	Cause	Measure
0	No error	–	–
C411	Up-/Download	Upload active.	Upload/download active, please wait
C484	Error simul.	Fault state simulation is switched on, i. e. the device is not measuring at present.	End the simulation
C485	Measure simul.	Simulation is switched on, i. e. the device is not measuring at present.	End the simulation
C824	Process pressure	• Overpressure or low pressure present. • Electromagnetic effects are greater than specifications in the technical data. This message normally only appears briefly.	1. Check the pressure value 2. Restart the device 3. Perform a reset
F002	Sens. unknown	Sensor does not suit the device (electronic sensor nameplate).	Contact Pepperl+Fuchs Service
F062	Sensor conn.	• Cable connection between sensor and main electronics disconnected. • Sensor defect. • Electromagnetic effects are greater than specifications in the technical data.	1. Check sensor cable 2. Replace electr. 3. Contact Pepperl+Fuchs Service 4. Replace sensor (snap-on Version)
F081	Initialization	• Cable connection between sensor and main electronics disconnected. • Sensor defect. • Electromagnetic effects are greater than specifications in the technical data. This message normally only appears briefly.	1. Perform a reset 2. Check sensor cable 3. Contact Pepperl+Fuchs Service
F083	Permanent mem.	• Sensor defect. • Electromagnetic effects are greater than specifications in the technical data. This message normally only appears briefly.	1. Restart the device 2. Contact Pepperl+Fuchs Service
F140	Working range P	• Overpressure or low pressure present. • Electromagnetic effects are greater than specifications in the technical data. • Sensor defect.	1. Check the process pressure 2. Check the sensor range
F261	Electronics	• Main electronics defective. • Fault in the main electronics.	1. Restart the device 2. Replace electr.
F282	Data memory	• Fault in the main electronics. • Main electronics defective.	1. Restart the device 2. Replace electr.
F283	Permanent mem.	• Main electronics defective. • Electromagnetic effects are greater than specifications in the technical data. • The supply voltage is disconnected when writing. • An error occurred when writing.	1. Perform a reset 2. Replace electr.
F410	Up-/Download	• 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.	1. Repeat download 2. Use another file 3. Perform a reset
F411	Up-/Download	Download active.	Upload/download active, please wait
F437	Configuration	The Profibus configuration is inconsistent.	Adapt the characteristic type with the transmitter type in the Transducer Block Check the transmitter type Check the characterization Check the unit

TDOCT-3019_ENG 256722 03/2014

Diagnostic code	Error message	Cause	Measure
F510	Linearization	The linearization table is being edited.	1. Conclude entries 2. Select "linear"
F511	Linearization	The linearization table consists of less than 2 points.	1. Table too small 2. Corr. table 3. Accept the table
F512	Linearization	The linearization table is not monotonic increasing or decreasing.	1. Tab. not monotonic 2. Corr. table 3. Accept the table
F841	Sensor range	• Overpressure or low pressure present. • Sensor defect.	1. Check the pressure value 2. Contact Pepperl+Fuchs Service
F882	Input signal	External measured value is not received or displays a failure status.	1. Check the bus 2. Check source device 3. Check the setting
M002	Sens. unknown	Sensor does not suit the device (electronic sensor nameplate). Device continues measuring.	Contact Pepperl+Fuchs Service
M283	Permanent mem.	• Cause as indicated for F283. • Correct measurement can continue as long as you do not need the peakhold indicator function.	1. Perform a reset 2. Replace electr.
M410	Up-/Download	• A value is exceeded or a parameter change was not accepted. • 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. • Electromagnetic effects are greater than specifications in the technical data. • The supply voltage is disconnected when writing. • An error occurred when writing.	1. Press the "Confirm" button to confirm 2. Repeat download 3. Use another file 4. Perform a reset
M431	Adjustment	The pressure applied is outside the set measuring range (but within the sensor range). The calibration carried out would result in the sensor nominal operating range being undershot or overshot.	1. Check the measuring range 2. Check position adjustment 3. Check the setting
M434	Scaling	• Values for calibration (e. g. lower range value and upper range value) are too close together. • Lower range value and/or upper range value undershoot or overshoot the sensor range limits. • The sensor was replaced and the customer-specific configuration does not suit the sensor. • Unsuitable download carried out.	1. Check the measuring range 2. Check the setting 3. Contact Pepperl+Fuchs Service
M438	Data record	• The supply voltage is disconnected when writing. • An error occurred when writing.	1. Check setting 2. Restart the device 3. Replace electr.
M520	Ident. number	• The configured identification number is not supported by the device. • The user configuration data are not compatible with the set identification number. • The configuration data are not supported by the device or a requested feature is not enabled in the device (e. g. watchdog function, failsafe). • Unsuitable download carried out.	Use the correct identification number
M882	Input signal	External measured value displays a warning status.	1. Check the bus 2. Check source device 3. Check the setting
S110	Working range T	• Over temperature and low temperature present. • Electromagnetic effects are greater than specifications in the technical data. • Sensor defect.	1. Check proc. temp. 2. Check temperature range
S140	Working range P	• Overpressure or low pressure present. • Electromagnetic effects are greater than specifications in the technical data. • Sensor defect.	1. Check the process pressure 2. Check the sensor range
S822	Process temp.	• The temperature measured in the sensor is greater than the upper nominal temperature of the sensor. • The temperature measured in the sensor is lower than the lower nominal temperature of the sensor.	1. Check the temperature 2. Check the setting
S841	Sensor range	• Overpressure or low pressure present. • Sensor defect.	1. Check the pressure value 2. Contact Pepperl+Fuchs Service

10.1.1 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	

10.2 Response of outputs to errors

The device makes a distinction between the message types F (failure) and M, S, C (warning).
→ See the following table and 130, "Messages".

Output	F (failure)	M, S, C (warning)
PROFIBUS	The process variable in question is transmitted with the status BAD[1].	Device continues measuring. The process variable in question is transmitted with the status UNCERTAIN.
Onsite display	• The measured value and message are displayed alternately • Measured value display: F-symbol is permanently displayed.	• The measured value and message are displayed alternately • Measured value display: M, S, or C-symbol flashes.

1 Process value: depends on the AI configuration

10.2.1 Analog Input Block

If the Analog Input Block receives an input value or simulation value with the status BAD, the Analog Input Block continues working with the failsafe mode defined by means of the "Fail safe mode " parameter.

The following options are available by means of the "Fail safe mode" parameter:

- Last valid out val.
  The last valid value is used for further processing with the status UNCERTAIN.
- Fail safe value
  The value specified by means of the "Failsafe default" parameter is used for further processing with the status UNCERTAIN.
- Status BAD
  The current value is used for further processing with the status BAD.

Factory setting:

- Fail safe mode: Last valid out val.
- Failsafe default: 0

NOTICE The BAD status is in anyway output if the "Out of service" (O/S) option was selected by means of the "Target mode" parameter.

TDOCT-3019_ENG 256722 03/2014

10.3 Repair

The Pepper+Fuchs repair concept provides for measuring devices to have a modular design and that the customer can also carry out repairs.

NOTICE

- For certified devices, please see the "Repair of Ex-certified devices" section.
- For more information on service and spare parts, contact the Service Department at Pepperl+Fuchs.

10.4 Repair of Ex-certified devices

WARNING When repairing Ex-certified devices, please note the following:

- Only specialist personnel or Pepperl+Fuchs may repair certified devices.
- Relevant standards, national hazardous area regulations and safety instructions and certificates must be observed.
- Only genuine Pepperl+Fuchs 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 device may not be used as spare parts for a certified device.
- Carry out repairs according to the instructions. Following a repair, the device must fulfill the requirements of the specified individual tests.
- A certified device may only be converted to another certified device version by Pepperl+Fuchs.
- All repairs and modifications must be documented.

10.5 Spare parts

An overview of the spare parts for your device is available in the Technical Information TI00436O and TI00437O.

When ordering spare parts, always quote the serial number indicated on the nameplate. As far as necessary, the spare parts also include replacement instructions.

10.6 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, Pepperl+Fuchs, 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 Pepperl+Fuchs website.

10.7 Disposal

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

10.8 Software history

Device	Date	Software version	Software modifications	Operating Instruction
LHC-M51 PPC-M51	01.2011	01.00.zz	Orginal software. Compatible with: • **PACT***ware*™	BA00383O/98/EN/05.12
LHCR-51 LHCS-51	01.2011	01.00.zz	Orginal software. Compatible with: • **PACT***ware*™	BA00383O/98/EN/05.12

11 Technical data

For the technical data, please refer to the Technical Information TI00436O and TI00437O.

TDOCT-3019_ENG 256722 03/2014

TDOCT-3019_ENG 256722 03/2014

PROCESS AUTOMATION – PROTECTING YOUR PROCESS

Worldwide Headquarters
Pepperl+Fuchs GmbH
68307 Mannheim · Germany
Tel. +49 621 776-0
E-mail: info@de.pepperl-fuchs.com

For the Pepperl+Fuchs representative
closest to you check www.pepperl-fuchs.com/contact

71224488

BA00383O/98/EN/05.12
71224488
FM7.2

www.pepperl-fuchs.com

PEPPERL+FUCHS
PROTECTING YOUR PROCESS

TDOCT-3019_ENG 256722
03/2014