Pressure Transmitters

200 series

PZM 200/201/200H/201H
VRM 200/201/200H/201H
PZT 200/201/200H/201H
TPF 200/201/200H/201H
KS 200/201/200H/201H

Operating Instructions

English

PN-TI119

Version 1.0

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Notes / comments:

Please use this space for your own notes or comments. For example, you can enter the TAG numbers of the devices, to which these operating instructions belong. Furthermore, you can specify details such as set values for the installation of the devices or record the reminders of service intervals.

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1 Important notes

1.1 Intended use

The pressure transmitters of the 200 series are designed for measuring the process pressure of aggressive and non-aggressive gases, vapours and fluids. Depending on the construction of the device, the transmitter can be used for measuring both absolute and relative pressures. Furthermore, the 200 series offers you the option of measuring the hydrostatic filling level in pressurised and depressurised containers.

Please read these operating instructions carefully before commissioning the devices. If you have questions, please contact the manufacturer's technical department.

The manufacturer cannot assume any liability for damage due to any other kind of use or the incorrect use of the devices. If in doubt, please contact the manufacturer with regard to the suitability of the device for your specific application before its installation.

The transmitter is not approved for use in explosion-proof areas.

The manufacturer can be contacted under the following address:

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1.2 Assembly, commissioning and operation of the device

The transmitter has been manufactured according to state-of-the-art technical knowledge and complies with all relevant guidelines for it to be safely operated.

The assembly, connection, commissioning, operation and service of the device should always be carried out by qualified personnel. Personnel who are carrying out the above tasks must have been authorised by the plant operator.

This document must be kept in a location where it is easily accessible for the relevant personnel. Please contact us for another copy if required or download another copy from the manufacturer's homepage.

2 Unpacking the transmitter

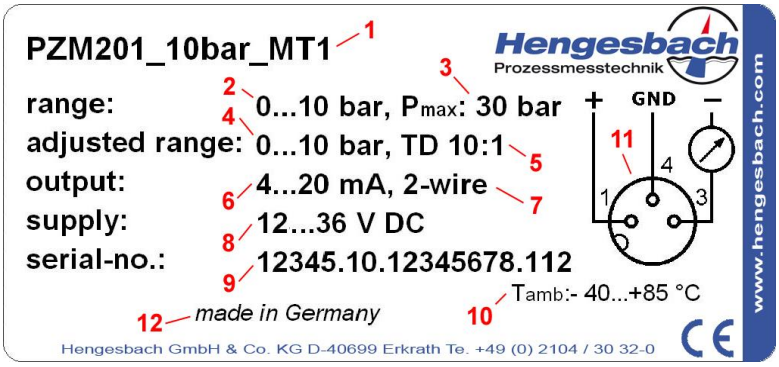
In order to avoid damage to the device, please observe the following notes before unpacking the device.

	**Carefully cut the packaging open as sharp objects may destroy parts of the device inside the packaging.**
	**Depending on the measuring cell, the membrane of the measuring device is covered with a protective cover. Please only remove this cover immediately before assembling / installing the device. The measuring cell must under no circumstances be touched. Any damage to the membrane will result in the malfunction of the transmitter.**
	**Please protect the contents of the shipment until its final installation and when all connections are checked for moisture-proof installation.**

Please check that the goods are correct, undamaged and complete. For this purpose, please compare the details on the delivery note with the contents of the received shipment. Pay special attention to the correspondence between the order data and the details on the transmitter's type plate. If you detect any discrepancies, please contact the manufacturer immediately.

3 Transmitter identification

The following illustration shows the type plate of a transmitter and the meaning of the symbols and details:



1: Device designation
2: Max. measuring range
3: Overload protection
4: Set measuring range
5: Turn down ratio
6: Output signal
7: Connection type
8: Supply voltage
9: Serial number
10: Ambient temperature
11: Electrical connection
12: Manufacturing location

4 Assembly information

Please observe the following assembly notes. These notes are intended to ensure your own safety as well as ensuring the smooth, low-maintenance and reliable operation of the device.

	**You MUST make sure that the plant is depressurised before assembling / installing the device. If there is any residual medium in the facility, this residual medium must be drained beforehand or the plant parts upstream of the transmitter must be blocked accordingly.**
	**You must make sure that personnel can safely work at the plant while the transmitter is installed. Be aware of the danger of burns due to heat or cold and protect yourself against any contact with aggressive media.**
	**Make sure that the potential equalisation between the transmitter and plant is facilitated. In this respect, please also read the section regarding the electrical connections of the device.**
	**Do not remove the protective cover from the measuring cell during the assembly preparations. Only remove the cover shortly before installing the transmitter. Make sure that you don't touch the membrane during the installation.**
	**The device manufacturer recommends that device openings such as ventilation openings should point downwards during the installation if possible. This way, in the event that process media make the device wet, its blockage by highly viscose or drying substances is avoided.**
	**The device should be installed in a low-vibration location and with some distance to larger plants and strong electrical fields if possible.**
	**Make sure that the process connection with the plant has a tight fit and no medium leaks from the connection point. For this purpose, use a seal, which is suited for your specific process, and pay special attention to its suitability for the process temperature.**
	**Tighten the transmitter with the torque that is suitable for your process connection. If in doubt, please contact the manufacturer. It may be that metal screw connections, which have been damaged by an incorrect installation, cannot be loosened without causing problems.**
	**If the provided reference cable is used, please observe a minimum bending radius of the cable of 120 mm. Protect the cable against the ingress of moisture by making sure that it ends inside a dry room.**

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5 Servicing and cleaning

The transmitter does not contain any parts that can be serviced by the user. In the event of problems with the device, please contact the manufacturer in order to discuss any further action.

	**Any changes that are made to the inside of the device will automatically result in the loss of warranty. Furthermore, the manufacturer reserves the right to reject any repair request for devices, which have been opened by the customer. (The above does not apply to the opening of the device lid for the purpose of wiring.)**

You should only check the electrical connections, seals and pressure compensation openings (only for relative pressure devices) as part of your regular service activities.

Make sure that the connection wires are tightly secured in the screw terminals and the cable screw connections are tightly connected to the connection wire (if applicable). For devices with an M12 plug, the screw connection must be checked for a tight fit. Also check the tight fit of the lid in order to ensure the best possible sealing.

The ventilation opening must be free from highly viscose media or other adhesive media. A blocked ventilation opening prevents the pressure compensation of relative pressure devices and will result in the distortion of the measuring value. If the reference cable is used, the ventilation tube must also be free from foreign objects.

The transmitters are fully encapsuled and therefore have no dead spaces. However, especially during the cleaning process, major heating-up with subsequent cooling-down processes can result in a vacuum inside the device. This effect will be reduced to a minimum due to the small dead space volume. However, the transmitter head should be visually inspected at regular intervals in order to make sure that no foreign media have ingressed. Such foreign media can result in the build-up of conductive deposits (salts, etc.), which cause leakage currents, which will distort the measuring result.

You should also check the seals, both in the lid and at the process connection, for corrosion.

	**Observe the maximum permitted temperatures when cleaning. Sustained overtemperature can destroy both the electronics and attachments at the housing.**
	**The membrane of the measuring cell must not be directly radiated by localised pressure sources, such as high-pressure cleaning equipment. This may result in the destruction of the membrane. Please continue to avoid any mechanical contact with the measuring cell.**

The housing of the transmitter can be cleaned with all common cleaning agents and methods. But please contact the manufacturer if you consider using special types of cleaning agents and processes.

When using high-pressure equipment for cleaning, please make sure that you don't directly aim at the openings of the device, such as the pressure compensation element.

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6 Electrical connection

6.1 A note regarding the electrical connection

This transmitter is a loop-fed, 2-wire, low-voltage DC device. Like all devices with a 2-wire design, the transmitter is supplied straight from the current loop, which also provides the analogue output signal between 4 and 20 mA.

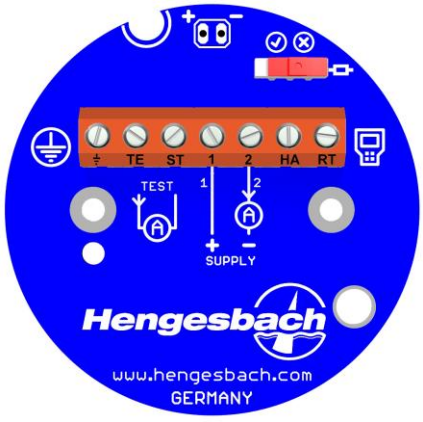
	**The operating voltage of the device is 12 to 36 VDC. The transmitter must under NO circumstances be operated with ANY other supply voltage.**

6.2 The connection terminals in the transmitter head

The following illustration shows the connection terminals in the transmitter head. Depending on the device version, these terminals can be accessed as follows:

- **Pressure transmitter type 201/201H** *(without an integrated display module)***:**
  Unscrew the device lid in anti-clockwise direction.

- **Pressure transmitter type 200/200H** *(with an integrated display module)***:**
  Unscrew the device lid in anti-clockwise direction. The operating module is hard-wired to the electronics with a cable. When taking the module out of the device, make sure that the connection cable is not unnecessarily twisted or subjected to excessive tensile stress. Carefully pull the module out straight to the front.



Circuit board with connection terminals in the head of the transmitter housing

(here: HART® version 200H/201H of the transmitter)

Please proceed in the reverse order in order to close the device lid. Screw the lid hand-tight without applying excessive force, but enough to ensure that it is sufficiently tight.

Permissible cable cross sections:

Without wire-end sleeve	(only for rigid wires)	0.2 to 1.5 mm² (AWG 24 to AWG 16)
With wire-end sleeve	(for flexible and rigid wires)	0.25 to 0.75 mm²

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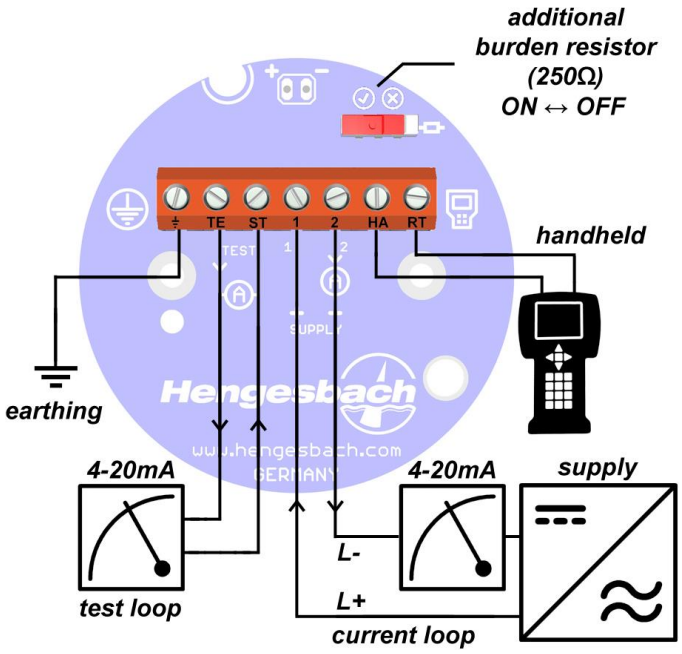
6.3 The terminal connection diagram

The layout of the connection circuit board can vary depending on the transmitter version. The following two variants are possible:

- **Transmitter 200/201** *(without HART® option)*:
  5 occupied connection terminals: **EARTH**, **TE**, **ST**, **1**, **2**
  2 free terminal positions
  1 free switch position

- **Transmitter 200H/201H** *(with HART® option)*:
  7 occupied connection terminals: **EARTH**, **TE**, **ST**, **1**, **2**, **HA**, **RT**
  1 occupied switch



Connection diagram for a device in 200H/201H version

	**The manufacturer recommends that you earth yourself and the device before installing the connections in order to minimise unnecessary loads due to static electricity.**
	**The screw connections must ensure that the connection lines are reliably fixed. The manufacturer recommends the use of wire-end sleeves.**
	**Use shielded and twisted wires for connecting the transmitter in order to suppress any interference due to electromagnetic fields to the best possible extent.**

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6.4 Functions of the connection terminals

Terminal	Function	Description
EARTH	Housing earth	**Connection with the transmitter housing** Connect this connection with the potential equalisation between the transmitter and supply source.
TE **ST**	Test tap **+** Test tap **–**	**Test tap for the continuous measuring of the actual loop current** Connect a low-resistance measuring instrument for detecting the actual loop current to this tap. This may be a hand-held multimeter or equivalent. This connection is only used for service purposes and should remain free during the normal operation of the device. The current flows from the TE terminal (multimeter connection +) to the ST terminal (multimeter connection –). The power supply to the device does not have to be disconnected for the test tapping.
1 **2**	Supply **+** Supply **–**	**Transmitter supply connections** The transmitter supply voltage is connected to terminals 1 and 2. Connect terminal 1 with the positive supply terminal and terminal 2 with the negative supply terminal. The current in this loop also represents the analogue output signal of 4 to 20 mA. This connection is protected against voltage reversal.
HA **RT**	HART® connection for an on-site operating panel	**Connection of a HART® on-site operating panel** These terminals can be used for connecting a HART®-capable operating panel. This connection is intended for on-site diagnosis and parametrisation of the transmitter. During normal operation this connection should remain free and the communication should run via the current loop. Please note that the communication requires a minimum burden resistor of 250 Ω in the current loop. If this resistance is not provided, the sliding switch above the connection terminals can be used for adding an additional communication resistor to the line. **In this case the minimum operating voltage will increase to 18 VDC.**

6.5 Electrical connection variants at the point of delivery

Depending on the connection variant, which you have ordered, the transmitter can come in one of four possible configurations. The electrical connection of the device is contained in the device designation. The four possible variants are listed in the following:

- **Cable screw connection**

  PZM201_10bar_**K**T1

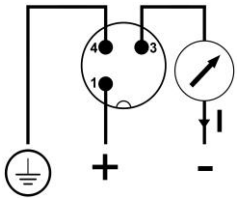
(example for the designation of a device with a cable screw connection)

Cable connection acc. to connection terminal designation

- **M12 device plug**

PZM201_10bar_**M**T1

(example for the designation of a device with an M12 device plug)

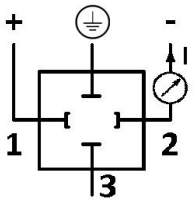


Assignment of the M12 device plug
(as viewed from the plug side of the housing)

- **Angle plug**

PZM201_10bar_**W**T1

(example for the designation of a device with an angle plug)



Assignment of the angle plug
(as viewed from the plug side of the housing)

- **Reference cable is connected**

PZM201_10bar_**R(10m)**T1

(example for the designation of a device with a connected 10 metre reference cable)

Brown	Supply **+**
Black	Supply **–**
White	EARTH
Shield	EARTH

Assignment of the reference cable

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7 The on-site display / external OPUS*i*

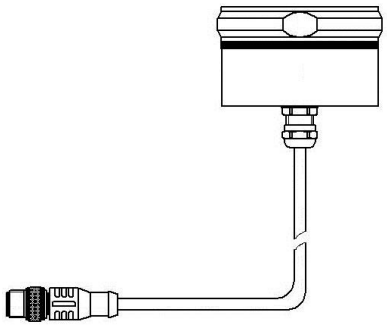
Depending on the device version, the on-site display has either already been integrated in your transmitter (device type 200/200H) or it can be connected to the transmitter as an external OPUS*i* display and operating module (device type 201/201H).

The module can display the measuring values directly on site. Furthermore, the device can be fully parametrised via the keys that are integrated in the display.

Also, the transmitters of the *200 series* offer the option to transfer stored parameters to an operating module of the OPUS*i* series and subsequently recall those parameters from the operating module. This way you can make settings at one device and copy all parameters to other devices without having to set these again manually.

The display and operating modules of previous model series are 100% compatible with the *200 series*. The devices of the *100 series* can also be operated with an operating module of the OPUS*i* series.

However, please note that the copying function between the devices is only available for the combination of OPUS*i* and the 200 series.

The display and operating module consist of the two-row LCD display part and three keys, which are located below the display and are used for navigating the menu.	The external OPUS*i* display and operating module in a separate stainless steel housing is connected via an integrated M12 device plug, which for the 201/201H device type is integrated in the side of the transmitter.
	

The integrated display and operating module is protected against environmental impact by an acrylic glass pane in the lid, which also makes the display easy to read. The external OPUS*i* variant has its own stainless steel housing.

If the external operating module is used, please make sure that the locking screw of the device's M12 plug is screwed tight after the parametrisation has been completed. It protects the internal contacts from environmental influences.

The display of the 200/200H device types can be rotated by 360 degrees in the housing. This way, optimum readability is ensured depending on the position, in which the device is installed. In order to adjust its position, carefully pull the display out of the device, adjust its position and press it back in.

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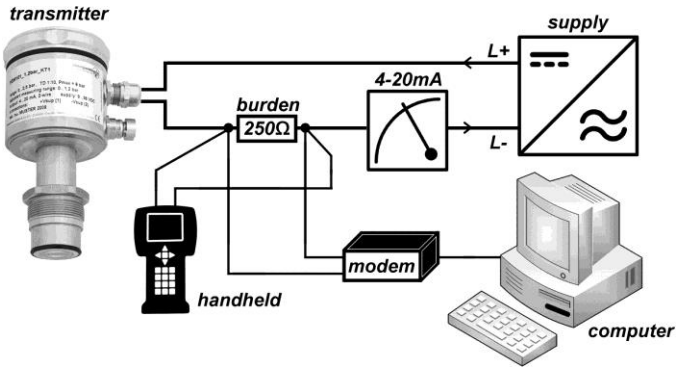
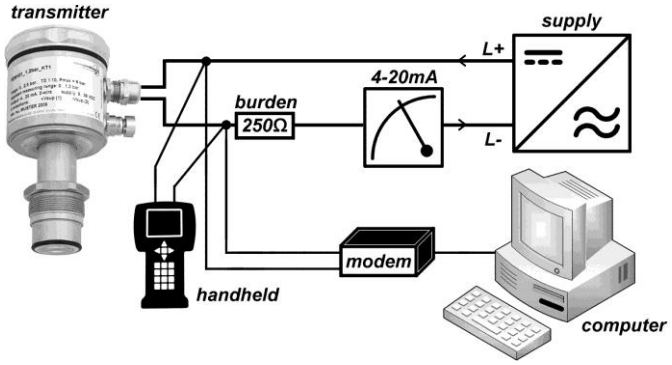
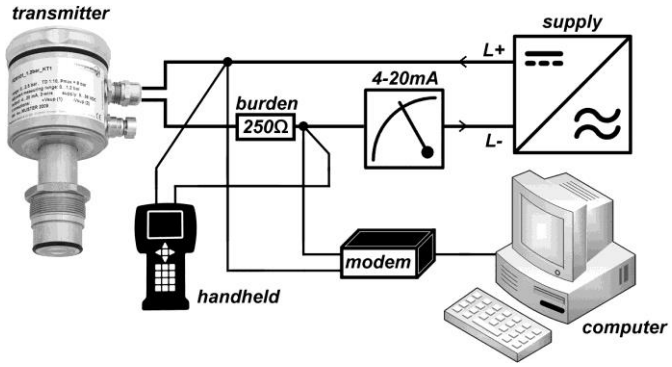
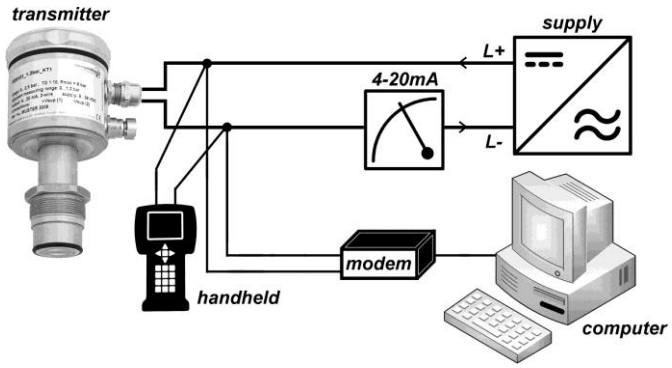
8 Communication via the HART® protocol

8.1 *The physical connection in the current loop*

	✓
	✓
	✗
	✗

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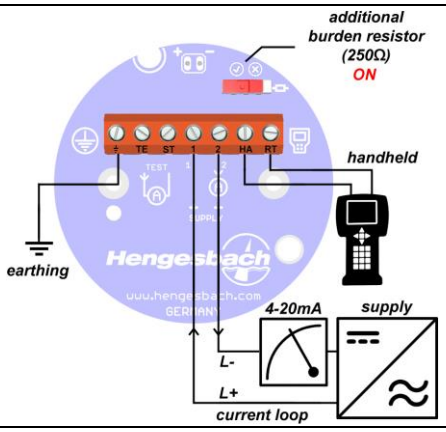
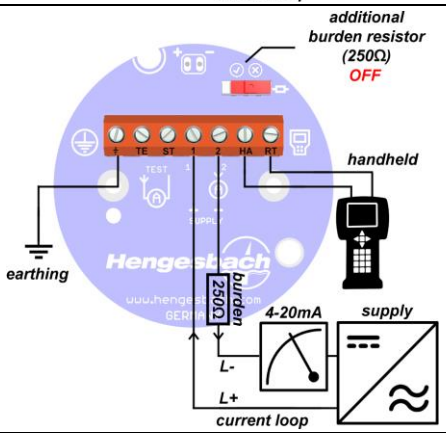
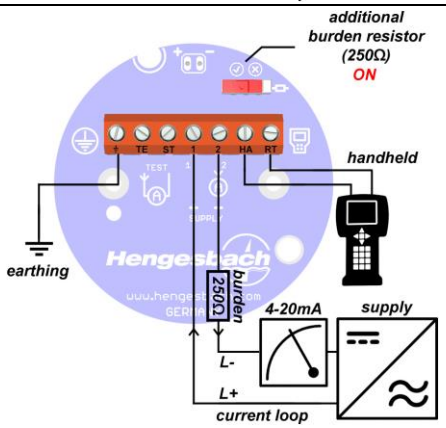
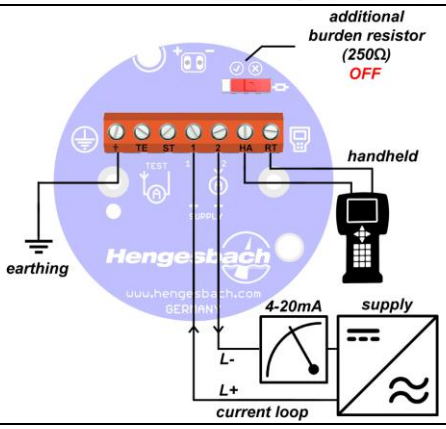
8.2 The physical connection for on-site operation

	✓
	✓
	✓
	✗

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9 Repairs, returns and warranty

9.1 Repairs

If the transmitter shows any sign of malfunction, please always contact the manufacturer first. The manufacturer will help you over the telephone with all further actions that are necessary and may be able to suggest a solution for the problem. Often, the devices are merely incorrectly set and seem to be malfunctioning because of such incorrect settings.

However, if a device has a definite fault, please return it to the manufacturer. The transmitter does not contain any parts, which can be repaired by the user. The manufacturer's QA department will ensure that your device is repaired as quickly as possible or, if the device is still under warranty, will provide you with a free replacement device.

	**Please do not attempt to repair the transmitter on your own accord. You may lose your warranty entitlement and possibly make the fault worse.**

9.2 Returns

If you return a device to us, please observe the following notes:

- Please secure the measuring cell against all forms of contact.
- Pack the device in transport-proof outer packaging.
- Pack the electronic components in ESD-compliant outer packaging.
- Please include a precise description of the transmitter fault with the returned device.
- Please tell us what you would like us to do with the returned item if applicable.
- Please use the enclosed *Returns Form* for your product return.

The manufacturer's returns address is:

Hengesbach Prozessmesstechnik GmbH & Co. KG

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9.3 Warranty

The manufacturer warrants all manufactured products for a period of 2 years from delivery. Devices, which develop a fault or fail entirely during this period, will be repaired or replaced by the manufacturer. Please contact the manufacturer before you make your complaint in order to discuss further actions, as this will ensure the quick and smooth processing of your request.

	**Faults, which are due to incorrect handling, incorrect installation or other improper handling of the product, will not be regarded as warranty cases. In such instances, the manufacturer will prepare a report for each individual case.**

Please also observe the return notes in the event of warranty processing. The manufacturer may not be able to tell who should be responsible for a device, which has become damaged during its return transport to the manufacturer because it was incorrectly packed. Therefore, in the worst case scenario, you may have to bear the damage yourself. For this reason we ask you to always make sure that you choose a safe means of transport packaging and pay special attention to the membrane of the measuring cell, as this is the one item, which gets damaged most often.

10 Storage

Always choose a clean, dry and cool location for devices that are stored. Furthermore, the devices should be protected against vibration and must under no circumstances be stored while standing on their measuring cell. Always protect the measuring cell against any form of contact.

11 Disposal

11.1 Packaging material

A certain packaging effort is required to protect the device against damage during transport. Please recycle the packaging materials correctly or reuse them for packing other items.

11.2 Obsolete devices

The devices consist of a number of different materials, all of which need to be specifically disposed of. Therefore, please dispose of the devices via a suitable recycling specialist or return them to the manufacturer for the purpose of disposal.

	The device is not subject to the WEEE directive 2002/96/EC and its associated laws and regulations. Therefore, obsolete devices are not designed for disposal in communal recycling centres.

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12 Operation via the on-site display

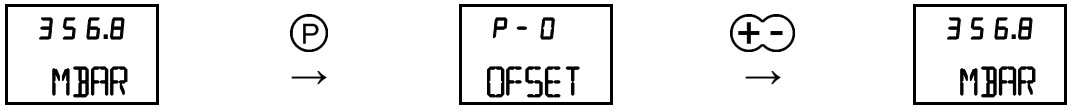
12.1 Operating notes

The transmitter is operated via the OPUS*i* display and operating module. All settings can be made with the three keys. The symbols, which are used in this documentation, and their meanings are listed in the following:

Symbol	Meaning	Function
⊕	A single press on the ⊕ key	The ⊕ key is used for incrementing values and for the ascending navigation within the menu.
⊖	A single press on the ⊖ key	The ⊖ key is used for decrementing values and for the descending navigation within the menu.
Ⓟ	A single press on the Ⓟ key	The Ⓟ key is used for opening parameters in the menu as well as for incrementing cursor positions and acknowledging the entering of values.
⊕⊖	A single press on the ⊕ and ⊖ keys at the same time	If the ⊕ and ⊖ keys are pressed at the same time, the menu returns to the previous level. Any data that have not been stored will be lost.
⊕⊖	A single press on the ⊕ or ⊖ key	You can press either the ⊕ or ⊖ key in order to increment or decrement a value or navigate the menu.
ⓅⓅ	A long press on the Ⓟ key	A long press on the Ⓟ key accepts the settings, which are selected on the display module, and saves them in the transmitter.
⊕	A long press on the ⊕ key	A long press on the ⊕ key is equivalent to the repeated pressing of the key with ascending order. (if supported by the parameter)
⊖	A long press on the ⊖ key	A long press on the ⊖ key is equivalent to the repeated pressing of the key with ascending order. (if supported by the parameter)

Press the Ⓟ key to change from the display of the measuring values to the configuration menu. The measurements of the process parameters are continued in the background. By pressing the ⊕ and ⊖ keys at the same time you will leave the respective level and exit the parameter, which you have just selected, or go back by one item in the parameter menu.

If no key is pressed in the configuration menu over a period of three minutes, the menu is closed and the transmitter returns to the display of the measuring values. Any settings, which have not been saved, will be lost.



Measuring value display | Keypress Ⓟ | Basic settings parameter level | Keypress ⊕ and ⊖ | Measuring value display

12.2 The parameter level with the basic parameters

The fundamental settings of the transmitter can be made on the basic parameter level. After the Ⓟ key has been pressed, the transmitter changes from the measuring mode to this level. The starting point is the 0 parameter for setting the beginning of the measuring range. Press the ⊕ or ⊖ key to toggle

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between the various parameters. Press the Ⓟ key to open the respective parameter. Press the ⊕ and ⊖ keys at the same time to revert the device to the display of the measuring values.

Display	Description
P-0 OFSET	**OFFSET:** This parameter is used for setting the beginning of the measuring range. The value, which is set here, is assigned the output current of 4 mA. The adjustable range is within 0 to 90 % of the nominal measuring range.
P-1 SPAN	**SPAN:** The span sets the end value for the measuring range. The value, which is set here, represents an output current of 20 mA. The adjustable range is within 10 to 100 % of the nominal measuring range.
P-2 I OUT	**OUTPUT CURRENT:** The current range of 4 to 20 mA can by inverted if required. The beginning of the measuring range, in its inverted state, corresponds to a current of 20 mA, and the end of the measuring range to 4 mA accordingly.
P-3 DAMP	**DAMPING:** If the pressure conditions vary heavily, the measuring value can be settled by activating the damping function. However, because this will slow down the reaction time of the device, this setting should only be activated if required.
P-4 MAINS	**MAINS FREQUENCY:** The setting of the mains frequency, which is used at the respective operating location, serves to suppress any interference inside the device. This way, the mains noise of the power supply unit can be cut out to a large extent.
P-5 UNIT	**MEASURING UNIT:** This setting is used for selecting between different measuring units depending on the measuring value (pressure, temperature, volume, mass), which is currently displayed.
P-6 DISPL	**DISPLAY VALUE:** This parameter allows the selection of the displayed measuring value. Depending on the device configuration, you can choose between the pressure, temperature, current, percentage, volume or mass.
P-7 BIAS	**INLET PRESSURE:** A possible offset pressure, which should not be included in the measuring result, can be hidden by entering an inlet pressure / bias. This is particularly useful for volume measurements in pressurised tanks.
P-8 SYSTM	**SYSTEM:** On the system level you can change basic settings of the device. Some of these parameters have a direct influence on the operating method of the transmitter and should therefore only be changed with caution.
P-9 INFO	**INFORMATION:** The information menu provides details about various parameters of the device, which, for example, are used for diagnosis or help with troubleshooting.

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12.3 The parameter level with the system settings

	**Some of the changes that are made to these parameters have a direct influence on the functioning of the transmitter and should therefore only be made with caution. Incorrect settings may result in incorrect measuring values.**

The starting point is the 8.1 parameter for programming an output current. Press the ⊕ or ⊖ key to toggle between the various parameters. Press the Ⓟ key to open the respective parameter. Press the ⊕ and ⊖ keys at the same time to revert the device to the basic settings parameter level.

You can access this level via parameter No. 8 of the basic parameter menu.

Display	Description
P - 8.1 I PRG	**PROGRAMMING THE OUTPUT CURRENT:** This parameter can be used for programming an output current in the current loop. This function is used for testing the wiring and installation of the device within the overall system.
P - 8.2 I RNG	**CURRENT LIMITS:** If the measuring range is exceeded, the output current can either marginally follow the measuring value or immediately shift to the current limitation.
P - 8.3 I ERR	**CURRENT IN AN ERROR CASE:** If the transmitter is faulty, the output current can either assume the lower limit (3.8 mA), upper limit (22 mA) or the last valid value (hold).
P - 8.4 TANK	**TANK LINEARISATION:** This parameter contains the specification for the tank geometry. This means that the transmitter is able to carry out a linearisation via the tank volume or the contained mass.
P - 8.5 HART	**HART PARAMETER:** If the transmitter is equipped with a HART functionality, this parameter can be used for specifying the device parameters that are required for the communication.
P - 8.6 COPY	**COPYING FUNCTION:** The transmitter allows you to export set parameters in order to transfer them to other devices of the 200 series. The transfer is made via a display and operating module of the OPUS*i* series.
P - 8.7 DAC	**DIGITAL-ANALOGUE CONVERTER:** This parameter is used for adjusting the current limits of the measuring range (4 and 20 mA). This way the measuring range can be precisely aligned depending on the connected measuring instrument.
P - 8.8 DEFLT	**DEFAULT SETTINGS:** Here you can restore the factory settings of the device. If the transmitter has been wrongly set due to incorrect handling, it can be reset to its basic state.
P - 8.9 RESET	**DEVICE RESET:** This parameter is used for restarting the device without having to interrupt its power supply. If the device does not work correctly for whatever reason, you should restart it.

12.4 The parameter level with the device information

	On the device information level you can access process data and general device information. This information is used in first instance for process and system diagnosis as well as troubleshooting.

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The starting point is the 9.1 parameter for displaying the trailing pointers for pressure and temperature. Press the ⊕ or ⊖ key to toggle between the various parameters. Press the Ⓟ key to open the respective parameter. Press the ⊕ and ⊖ keys at the same time to revert the device to the basic settings parameter level.

You can access this level via parameter No. 9 of the basic parameter menu.

Display	Description
P - 9.1 LIMIT	**TRAILING POINTER:** The device continuously writes the minimum and maximum values of the recorded measuring data, and these trailing pointers are provided both as a continuous and non-deletable version as well as a resettable version.
P - 9.2 RTIME	**RUNTIME:** This parameter shows the runtime of the device. Apart from the total run time, another runtime can be used for diagnostic purposes and can be reset by the user at any time.
P - 9.3 CELL	**MEASURING CELL INFORMATION:** This parameter is used for viewing information about the employed measuring cell. It contains details concerning the measuring span of the cell and the pressure property with regard to the absolute or relative pressure.
P - 9.4 DEVCE	**MANUFACTURING INFORMATION:** This parameter contains details about the production date and serial number of the transmitter. This information allows the clear identification of the device.
P - 9.5 VERSN	**VERSION:** Both the version of the installed hardware (electronics) and the software (firmware) in the device can be viewed under this parameter. In the event of a fault it is possible to draw conclusions regarding the revision of the device.
P - 9.6 SUPLY	**SUPPLY VOLTAGE:** This parameter shows the internal operating voltage of the transmitter. The value should be between 3.25 V and 3.35 V and is used for control purposes in the event of a device malfunction.
P - 9.7 CHIP	**ELECTRONICS TEMPERATURE:** This item shows the actual temperature of the microprocessor. In the event of a device fault the temperature of the electronics can be displayed. Set value: <85 °C

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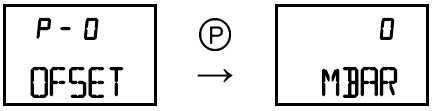
13 The device parameters in greater detail

13.1 Parameter 0 – Setting the beginning of the measuring range

You will need to specify the beginning of the measuring range for the transmitter. The value, which you set here, corresponds to the output current of 4 mA (or 20 mA for the inverted current signal).

Press the Ⓟ key to go to the level where you enter the beginning of the measuring range. The currently set value is displayed.



	**Independent of the set measuring unit, the values are entered in the transmitter's basic unit of *millibar*.**

If you want to change the value, you need to press the Ⓟ key to change to the editing mode. Repeated pressing of the Ⓟ key moves the cursor to the right by one digit at a time, and the selected digit will flash. If the cursor has reached the last digit, the process starts again from the first digit. Leading zeros are automatically hidden by the transmitter.

Press the ⊕ or ⊖ key to change the respective digit. If you press the Ⓟ for a long time, the new value is accepted and the flashing cursor goes off.

If the set value is above or below the maximum display range, the transmitter automatically adapts the unit to the required range.

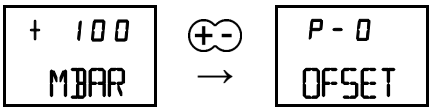
	**Please note the minimum measuring span of 10% of the nominal measuring range. If your entry is below the minimum span, the transmitter automatically adapts the value to the maximum value.**

Example: Nominal measuring range 0 to 10 bar → minimum span 1000 mbar

If the entry is below the minimum value, the transmitter automatically sets the value to the applicable lower limit. When this end value has been reached, a flashing *MIN* is displayed.

If the entry is above the maximum value, the transmitter automatically sets the value to the applicable upper limit. When this end value has been reached, a flashing *MAX* is displayed.

Press the ⊕ and ⊖ key at the same time to exit the parameter. Any settings, which have not been saved, will be lost.



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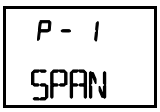
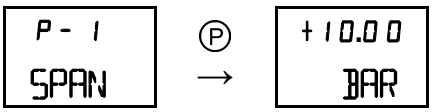
13.2 Parameter 1 – Setting the end of the measuring range



You will need to specify the end of the measuring range for the transmitter. The value, which you set here, corresponds to the output current of 20mA (or 4mA for the inverted current signal).

Press the Ⓟ key to go to the level where you enter the beginning of the measuring range. The currently set value is displayed.



Independent of the set measuring unit, the values are entered in the transmitter's basic unit of *millibar*.

If you want to change the value, you need to press the Ⓟ key to change to the editing mode. Repeated pressing of the Ⓟ key moves the cursor to the right by one digit at a time, and the selected digit will flash. If the cursor has reached the last digit, the process starts again from the first digit. Leading zeros are automatically hidden by the transmitter.

Press the ⊕ or ⊖ key to change the respective digit. If you press the Ⓟ for a long time, the new value is accepted and the flashing cursor goes off.

If the set value is above or below the maximum display range, the transmitter automatically adapts the unit to the required range.

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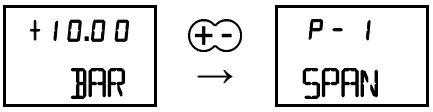
Please note the minimum measuring span of 10% of the nominal measuring range. If your entry is below the minimum span, the transmitter automatically adapts the value to the minimum value.

Example: Nominal measuring range 0 to 10 bar → minimum span 1000 mbar

If the entry is below the minimum value, the transmitter automatically sets the value to the applicable lower limit. When this end value has been reached, a flashing *MIN* is displayed.

If the entry is above the maximum value, the transmitter automatically sets the value to the applicable upper limit. When this end value has been reached, a flashing *MAX* is displayed.

Press the ⊕ and ⊖ key at the same time to exit the parameter. Any settings, which have not been saved, will be lost.



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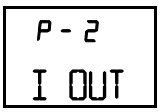
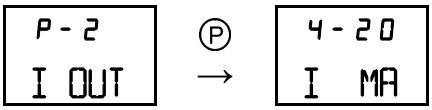
13.3 Parameter 2 – Setting the output current

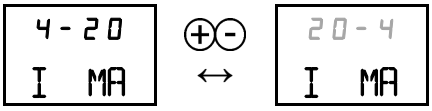


During normal operation, the measuring value is represented by an output current between 4 and 20 mA. If this range is to be inverted to 20 to 4 mA, you can make this setting here. The beginning of the measuring range is represented by 20 mA and the end of the measuring range by 4 mA.

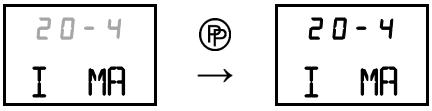
Press the Ⓟ key to go to the level where you select the output current. The currently set output current is displayed.



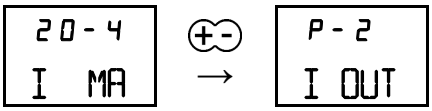
Press the ⊕ or ⊖ key to toggle between both variants. If the display flashes, the currently displayed value is not saved.



Press the Ⓟ key for a long time to stop the flashing and save the value in the transmitter.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the basic parameter menu. Any settings, which have not been saved, will be lost.



Settings between 4 and 20 mA (normal operation) or inverted settings between 20 and 4 mA are possible.

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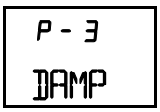
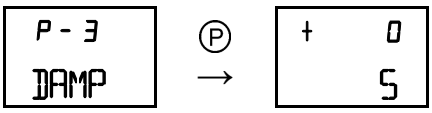
13.4 Parameter 3 – Setting the damping



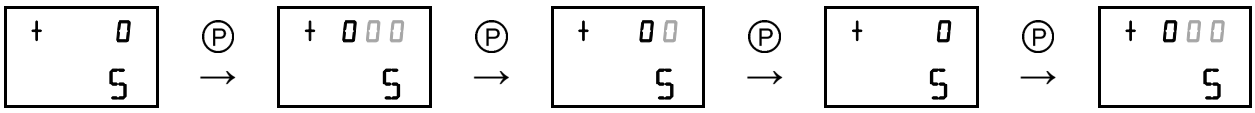
The damping is used for calming a heavily varying input signal at the output side. Therefore, the transmitter will not react immediately to pressure changes. Both the display and the current output will appear more constant (depending on the set damping time).

	**The damping value should only ever be adapted to the degree that the process requires. A value, which has been set too high, can give the appearance that the output signal no longer reacts to process changes.**

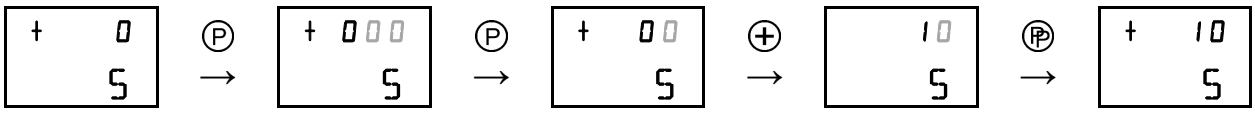
Press the Ⓟ key to go to the level where you set the damping. The currently set value is displayed. A **+** in the top left corner of the display indicates that the currently displayed value is saved in the transmitter.



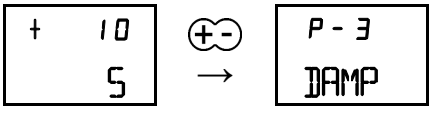
If you want to change the value, you need to press the Ⓟ key to change to the editing mode. Repeated pressing of the Ⓟ key moves the cursor to the right by one digit at a time, and the selected digit will flash. If the cursor has reached the last digit, the process starts again from the first digit. Leading zeros are automatically hidden by the transmitter.



Press the ⊕ or ⊖ key to change the respective digit. If the displayed value no longer equals the currently saved value, the **+** in the left corner of the display goes off. You will need to press the Ⓟ key for a long time to accept the new damping value. This is confirmed by the **+** on the display, and the flashing cursor goes off.



Press the ⊕ and ⊖ key at the same time to exit the parameter. Any settings, which have not been saved, will be lost.



The adjustable damping time is between *0 and 300 seconds*.

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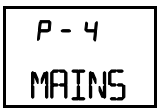
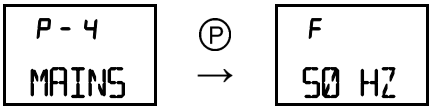
13.5 Parameter 4 – Setting the mains frequency



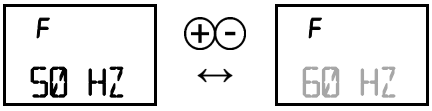
You can optimise the measurements of the transmitter by setting the correct mains frequency for the respective location. This way the mains noise of 50/60 Hz can be suppressed to the best possible extent for the internal digitalisation of the measuring values, which will have a positive effect on the measuring result.

	The transmitter should always be adapted to the mains frequency of the respective location. As a result, the interference, which is caused by the mains noise, is eliminated to the best possible extent.

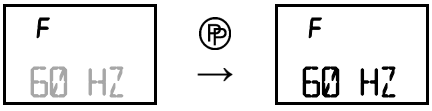
Press the Ⓟ key to go to the level where you select the mains frequency. The currently set frequency is displayed.



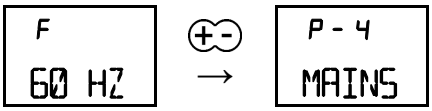
Press the ⊕ or ⊖ key to toggle between both variants. If the display flashes, the currently displayed value is not saved.



Press the Ⓟ key for a long time to stop the flashing and save the frequency in the transmitter.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the basic parameter menu. Any settings, which have not been saved, will be lost.



You can choose between the settings of *50 Hz* and *60 Hz*.

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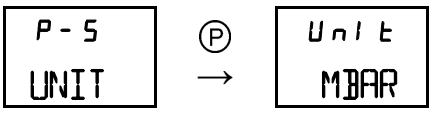
13.6 Parameter 5 – Setting the measuring unit

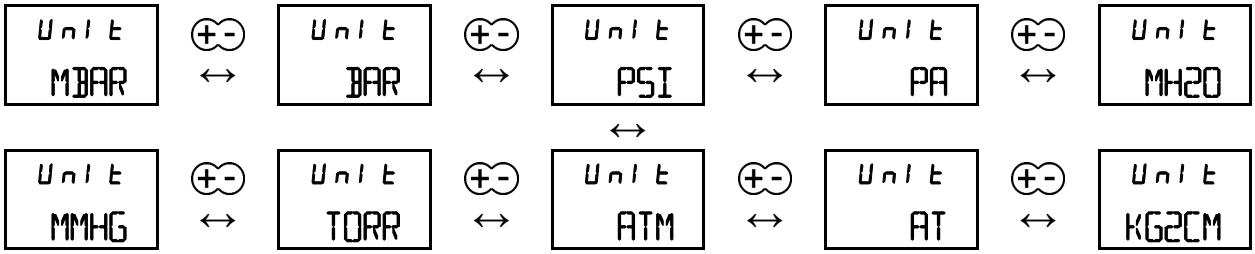
The setting option for the measuring unit varies depending on the measuring value that is currently displayed (see the setting in parameter 6). If the transmitter, for example, is set to display the pressure, a selection of the possible units for displaying the process pressure is shown. The same applies to the temperature, volume and mass. The units for the output current (mA) and percentage (%) cannot be changed.

Press the Ⓟ key to go to the level where you select the measuring unit. The currently selected unit for the currently displayed measuring value is shown.

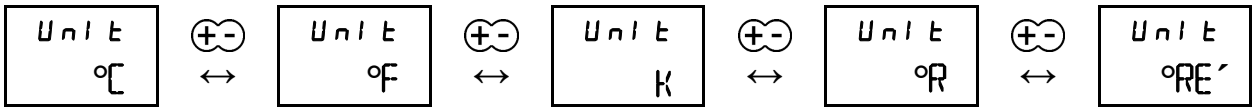


Press the ⊕ or ⊖ key to toggle between the various units. If the display flashes, the currently displayed value is not saved.

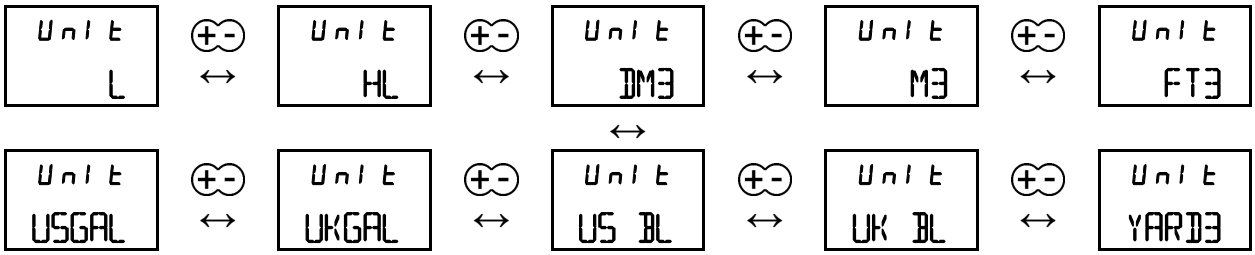
Units for the pressure:



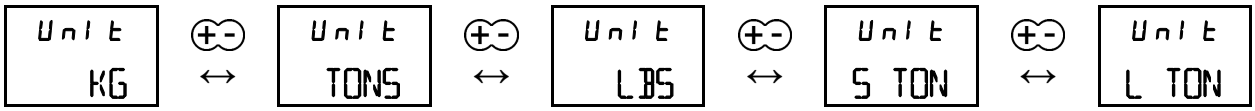
Units for the temperature:



Units for the volume:



Units for the mass:



Press the Ⓟ key for a long time to stop the flashing and save the measuring unit in the transmitter.

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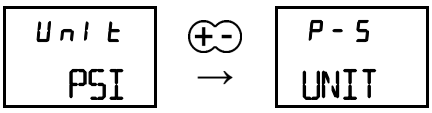
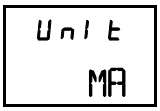
Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the basic parameter menu. Any settings, which have not been saved, will be lost.

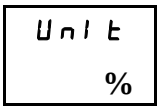


If the transmitter is set to display the current or percentage, you can open the measuring units but you won't be able to change them.

If you open the measuring unit for the current, the following will be displayed:



If you open the measuring unit for the percentage, the following will be displayed:



In this case you can to press any key to exit the parameter and return the transmitter to the basic parameter menu.

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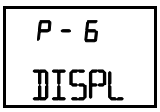
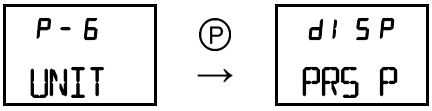
13.7 Parameter 6 – Setting the displayed measuring value

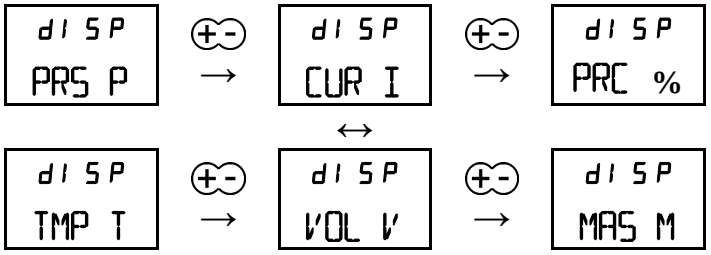


You need to set the measuring value, which is to be shown by the transmitter on the display.

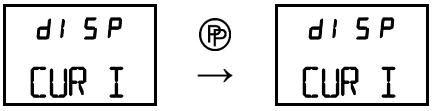
Press the Ⓟ key to go to the level where you select the displayed measuring value. The currently set value is displayed.



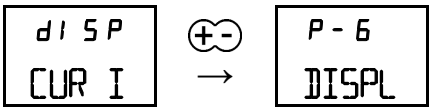
Press the ⊕ or ⊖ key to change between the various measuring values. If the display flashes, the currently displayed value is not saved.



Press the Ⓟ key for a long time to stop the flashing and save the measuring value in the transmitter.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the basic parameter menu. Any settings, which have not been saved, will be lost.



The options for the volume and mass can only be selected if information regarding the employed tank is stored in the transmitter. This information can be set in parameter 8.4.

If no information regarding the employed tank exists, the following display is shown:

In this case you need to acknowledge the message by pressing any key. Select another measuring value or enter the information regarding the employed tank in parameter 8.4.

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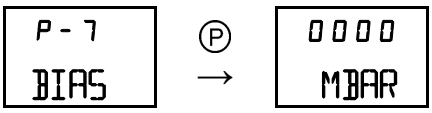
13.8 Parameter 7 – Setting an inlet pressure

If a pressure is to be measured, which - in addition - is to be differentiated from a constant pressure over time, the inlet pressure can be entered under this parameter. The transmitter does not reflect this inlet pressure in its output signal. This entry is equally helpful for the hydrostatic measuring of the filling level in pressurised tanks.

	**The device is NOT a differential pressure transmitter. Therefore, any inlet pressure, which is entered, must be constant over time. A fluctuation of the inlet pressure cannot be detected by the device and will therefore not be incorporated in the output signal.**
	**Please observe the maximum permitted values for your transmitter. Pressure values above its specification may cause irreversible damage to the device.**
	**Independent of the set measuring unit, the values are entered in the transmitter's basic unit of *millibar*.**

Press the Ⓟ key to go to the level where you enter an inlet pressure. The currently set value is displayed.



If you want to change the value, you need to press the Ⓟ key to change to the editing mode. Repeated pressing of the Ⓟ key moves the cursor to the right by one digit at a time, and the selected digit will flash. If the cursor has reached the last digit, the process starts again from the first digit. Leading zeros are automatically hidden by the transmitter.

Press the ⊕ or ⊖ key to change the respective digit. If you press the Ⓟ for a long time, the new value is accepted and the flashing cursor goes off.

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If the set value is above or below the maximum display range, the transmitter automatically adapts the unit to the required range.

The minimum and maximum values for the adjustable inlet pressure are determined by both the nominal measuring range of the transmitter and the minimum measuring span.

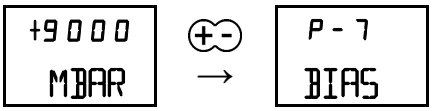
Example: Nominal measuring range 0 to 10 bar (relative) → minimum span 1000 mbar
→ maximum inlet pressure +9000 mbar

Nominal measuring range -1 to 9 bar (relative) → minimum span 1000 mbar
→ minimum inlet pressure -1000 mbar
→ maximum inlet pressure +8000 mbar

If the entry is below the minimum value, the transmitter automatically sets the value to the applicable lower limit. When this end value has been reached, a flashing *MIN* is displayed.

If the entry is above the maximum value, the transmitter automatically sets the value to the applicable upper limit. When this end value has been reached, a flashing *MAX* is displayed.

Press the ⊕ and ⊖ key at the same time to exit the parameter. Any settings, which have not been saved, will be lost.



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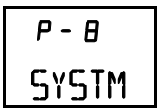
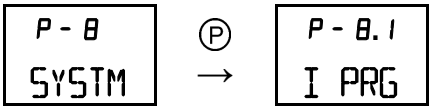
13.9 Parameter 8 – Level of the system settings



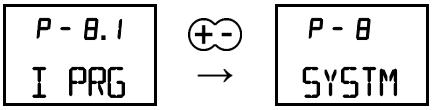
This parameter opens the submenu of the system settings. The menu contains further parameters for adjusting the transmitter.

Press the Ⓟ key to go to the menu level of the system settings. The starting point is the 8.1 parameter for programming an output current.

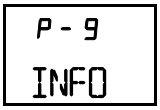


Press the ⊕ or ⊖ key to toggle between the menu parameters. The content of this level is shown in the overview of the system settings (see chapter 14.3).

Press the ⊕ and ⊖ keys at the same time to exit the menu level of the system settings and go to the basic functions level.

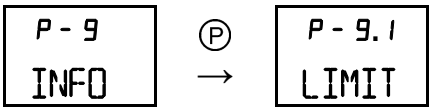


13.10 Parameter 9 – Level of the device information



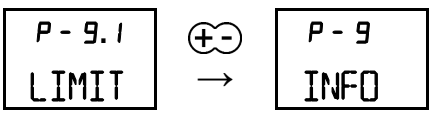
This parameter opens the device information submenu. The parameter contains further parameters for providing information about the transmitter.

Press the Ⓟ key to go to the menu level of the device information. The starting point is the 9.1 parameter for displaying the trailing pointers.



Press the ⊕ or ⊖ key to toggle between the menu parameters. The content of this level is shown in the overview of the device information see (chapter 14.4).

Press the ⊕ and ⊖ keys at the same time to exit the menu level of the device information and go to the basic functions level.



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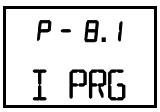
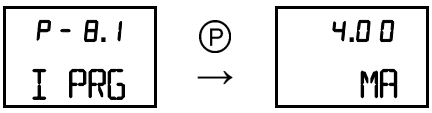
13.11 Parameter 8.1 – Programming an output current



This function is used for simulating any transmitter output current. The function is useful for commissioning the device or testing the installation / wiring of the device. You can specify a fixed output current between 3.85 mA and 24.00 mA.

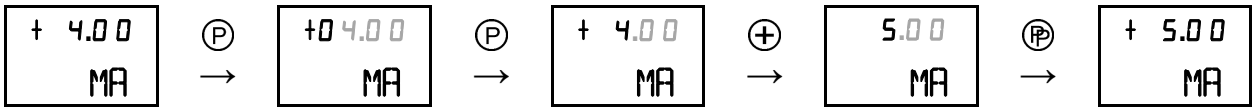
	**While the transmitter is simulating an output current it will not react to process changes. The analogue output current is not related to the existing measuring value.**

Press the Ⓟ key to go to the parameter for programming an output current. The display shows a value of 4.00 mA. However, at this point, the transmitter is still in measuring mode and therefore does not follow the displayed value.

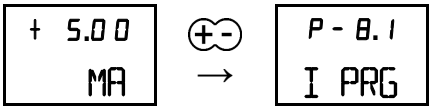


If you want to change the value, you need to press the Ⓟ key to change to the editing mode. Repeated pressing of the Ⓟ key moves the cursor to the right by one digit at a time, and the selected digit will flash. If the cursor has reached the last digit, the process starts again from the first digit. Leading zeros are automatically hidden by the transmitter.

Press the ⊕ or ⊖ key to change the respective digit. If no output current has yet been programmed or if the currently displayed value is not identical with the current that has already been programmed, there will be no **+** shown on the display. You will need to press the Ⓟ key for a long time to accept the value. This is confirmed by the **+** in the left corner of the display, and the flashing cursor goes off. The output current has been stopped and can be measured in the supply loop. If values of less than 3.85 mA or more than 24.00 mA are set, the entry is automatically set to the minimum / maximum value by the transmitter.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the system parameter menu level. Now the output current again follows the existing measuring value.



If no key is pressed over a period of three minutes, the device returns to the display of the measuring value and the current simulation is automatically stopped.

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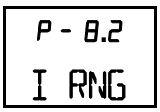
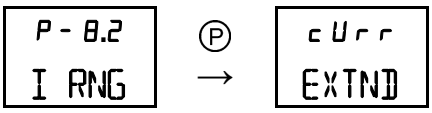
13.12 Parameter 8.2 – Setting the current limits

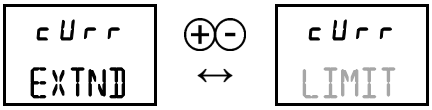


It is possible to specify the behaviour of the transmitter in the event that the measuring range is exceeded. Within the extended current range, the device continues to follow the existing measuring value linearly between the limits of 3.9 mA and 21 mA. Within the limited current range, the transmitter moves straight to the current limitation and then reports an alarm state. If the value is below the minimum limit of the range, the output current is set to 3.85 mA, and if the range is exceeded, the output current is set to 21.5 mA.

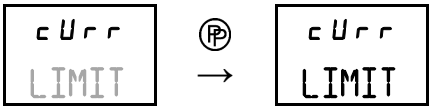
Press the Ⓟ key to go to the parameter for setting the current limits. The value that is currently stored in the device is displayed.



Press the ⊕ or ⊖ key to toggle between both variants. If the display flashes, the currently displayed value is not saved.



Press the Ⓟ key for a long time to stop the flashing and save the value in the transmitter.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the system parameter menu level. Any settings, which have not been saved, will be lost.

Possible settings are the *extended current range* and *limited current range*.

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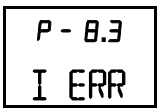
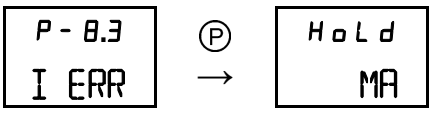
13.13 Parameter 8.3 – Setting the current in the event of an error



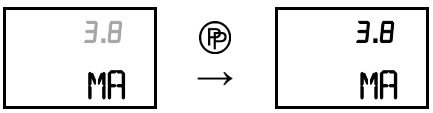
You will need to specify how the transmitter should behave in the event of a device error. Devices errors include, for example, faulty memory contents in the EEPROM or faulty data with regard to the measuring electronics. In such an event the behaviour of the device can no longer be predicted. In order to avoid an uncontrolled output current, the output current can be set to a fixed value, which will indicate that an error has occurred. The output can adopt an error current of 3.8 mA or 22 mA. Alternatively, the last valid value can be maintained (held).

Press the Ⓟ key to go to the parameter for setting the current limits. The value that is currently stored in the device is displayed.

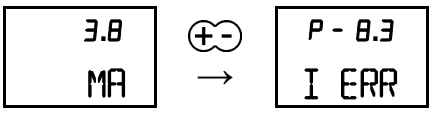


Press the ⊕ or ⊖ key to toggle between the variants. If the display flashes, the currently displayed value is not saved.

Press the Ⓟ key for a long time to stop the flashing and save the value in the transmitter.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the system parameter menu level. Any settings, which have not been saved, will be lost.



The following three settings are possible: *Hold last value (Hold)*, *3.8 mA* and *22 mA*.

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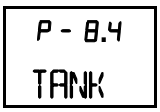
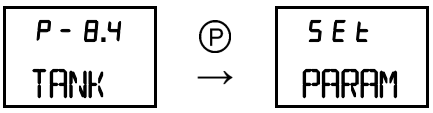
13.14 Parameter 8.4 – Tank linearisation



Press the Ⓟ key to go to the parameter for managing the tank parameters.



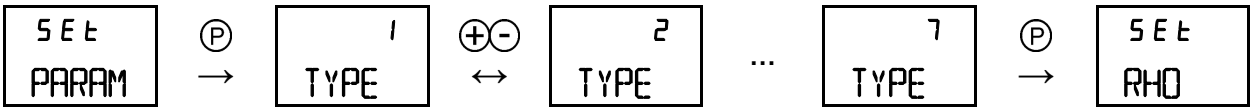
Press the ⊕ or ⊖ key to open the various options for managing the tank parameters. The parameters can be set, viewed and deleted.

Press the Ⓟ key to select the requested option.

Entering new tank parameters or changing existing tank parameters:

The transmitter offers two variants for entering tank parameters. Firstly, a standard tank shape can be chosen (selection type 1-6), for which merely the specific dimensions of the tank and medium have to be entered. Secondly, the device offers the option of gauging the capacity by litres (selection type 7). Here the transmitter creates value pairs consisting of the filling volume and pressure, which are used to create a linearisation diagram.

Press the Ⓟ key to change to the selection of the tank shape. The selection is done by pressing the ⊕ or ⊖ key. Hereby, the type number is incremented or decremented. You need to acknowledge your selection by pressing the Ⓟ key. Then the specific data is entered, beginning with the density of the medium that is to be measured.



Procedure for using a standard tank shape:

The six standard tank shapes (types 1 to 6) with their relevant geometry dimensions are listed in the following table.

	**You should only select a standard tank shape if the geometry really corresponds to the employed tank. For all other tank shapes please use the procedure for gauging the capacity by litres. In particular for measuring the content, even minor geometry deviations will result in big measuring errors.**

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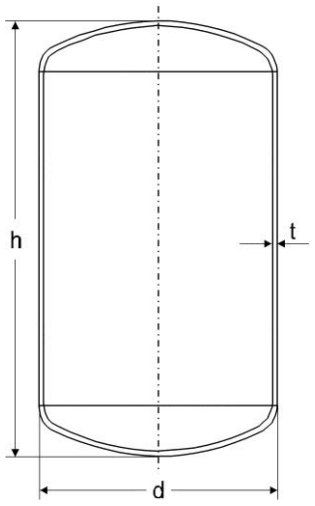
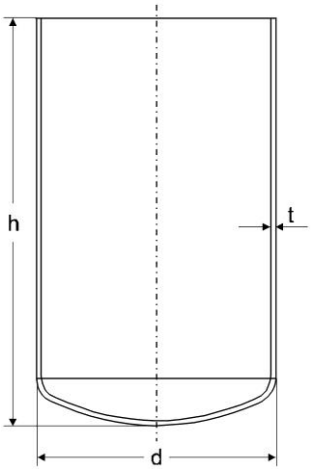
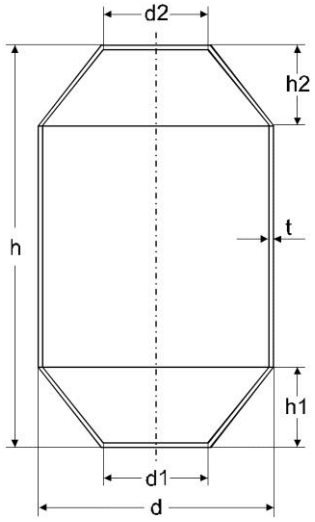
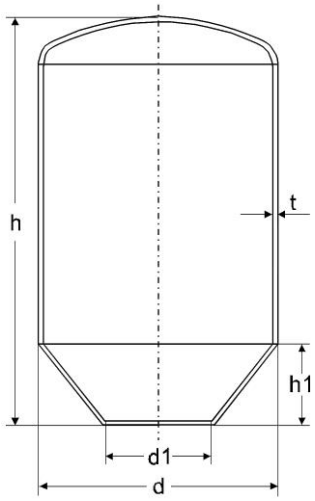
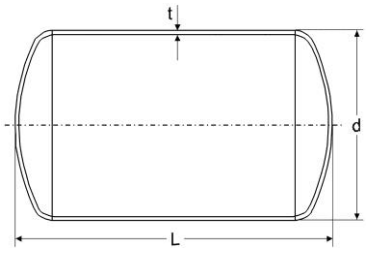
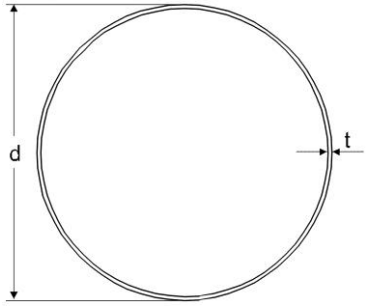
The following standard tank shapes are stored in the transmitter:

Type 1	Type 2	Type 3
		
Standing cylinder with a bumped boiler end at the top and bottom	Standing cylinder with a bumped boiler end at the bottom	Standing cylinder with conically shaped ends

Type 4	Type 5	Type 6
		
Standing cylinder with a bumped boiler end at the top and a conically shaped end at the bottom	Lying cylinder with bumped boiler ends both on the left and right	Ball tank

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If a standard tank shape has been selected, the geometry dimensions must be entered. The transmitter will only prompt for the details, which are required for the respective tank shape.

	**Depending on the employed tank shape, not all of the dimensions that are listed here may be requested. The table overview of the standard tank shapes explains the required details.**

The following dimensions may be requested by the transmitter:

SEt RHO	**Density of the medium**	in g/cm³	Type 1, 2, 3, 4, 5, 6, 7
SEt T	**Thickness of the tank walls**	in mm	Type 1, 2, 3, 4, 5, 6
SEt IH	**Transmitter installation height**	in cm	Type 1, 2, 3, 4, 5, 6
SEt H	**Total height**	in cm	Type 1, 2, 3, 4
SEt D	**Main diameter**	in cm	Type 1, 2, 3, 4, 5, 6
SEt H1	**Offset bottom height**	in cm	Type 3, 4
SEt D1	**Offset bottom diameter**	in cm	Type 3, 4
SEt H2	**Offset top height**	in cm	Type 3
SEt D2	**Offset top diameter**	in cm	Type 3
SEt L	**Total length**	in cm	Type 5

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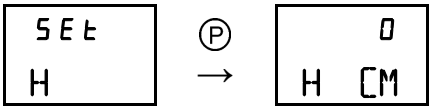
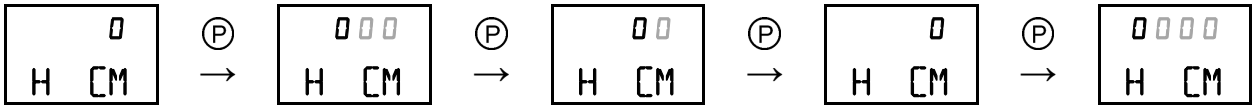
The entry of the individual geometry data is identical for all dimensions. The sequence of steps is demonstrated using the example of the specification of the total height.

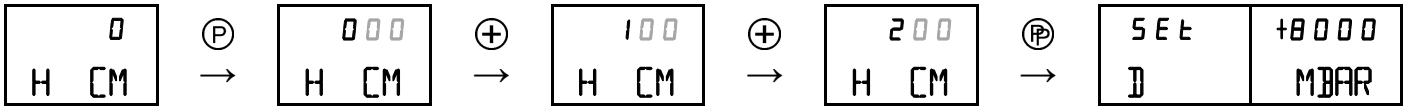
Press the Ⓟ key to go to the level where you enter the respective value. If tank information is already stored in the transmitter, the currently set value is displayed. Existing data can be changed in that way. However, if no information exists, the start value is 0.



If you want to change the value, you need to press the Ⓟ key to change to the editing mode. Repeated pressing of the Ⓟ key moves the cursor to the right by one digit at a time, and the selected digit will flash. If the cursor has reached the last digit, the process starts again from the first digit. Leading zeros are automatically hidden by the transmitter. Depending on the currently selected value, the cursor moves to a reasonable start position for entering the data. In this example the data entry starts with full hundreds. However, you can move to the first digit by pressing the Ⓟ key repeatedly.

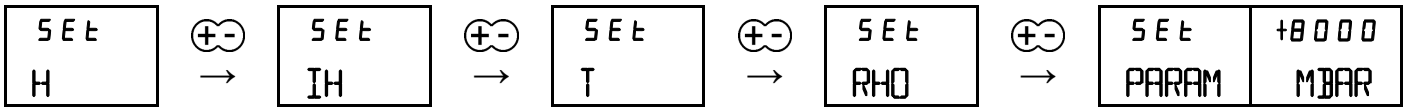


Press the ⊕ or ⊖ key to change the respective digit. Press the Ⓟ key for a long time to accept the new value and move to the entry of the next parameter – in this example the main diameter.



The entry of the next parameter and all remaining dimensions is identical.

Press the ⊕ and ⊖ keys at the same time to return to the previous parameter at any time. This way, the entry of the tank parameters can also be exited without saving the values.



After the last dimension has been entered, a success message is displayed. The new values have been saved in the transmitter. This success message can be acknowledged by pressing the Ⓟ key. The transmitter is now back in the menu item for managing the tank parameters.

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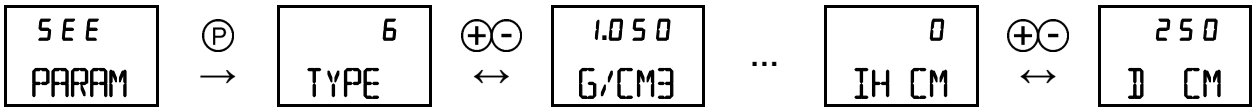
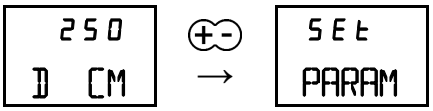
Viewing stored geometry data:

The geometry data, which is currently stored in the device, can be viewed via the display. Press the Ⓟ key to change to the display of the information. Only the relevant geometry data is displayed depending on the tank shape.

Press the ⊕ or ⊖ key to open the various pieces of information.



Press the ⊕ and ⊖ keys at the same time to return to the parameter management.



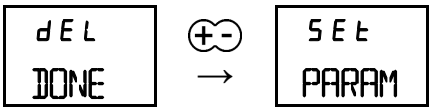
Deleting stored geometry data:

If data is stored in the transmitter, it can be removed from the memory.

	**The deletion of the geometry data closes the linearisation mode and resets the transmitters operating mode to the pressure measurement. Deleted settings cannot be restored.**

Press the Ⓟ key to change to the parameter for deleting the geometry data. The transmitter will initially reject the deletion process. Press the ⊕ or ⊖ key to confirm the deletion. Then press the Ⓟ key to confirm the deletion, which will be acknowledged by a success message.

Press the ⊕ and ⊖ keys at the same time to return to the parameter management.



Note:

If no data for a tank geometry has been stored, the items "**Viewing stored geometry data**" and "**Deleting stored geometry data**" cannot be accessed. The transmitter shows this status via the following message, which can be acknowledged by pressing any key.

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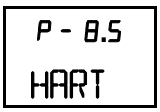
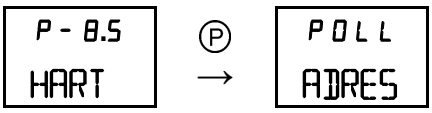
13.15 Parameter 8.5 – Setting the HART® parameters

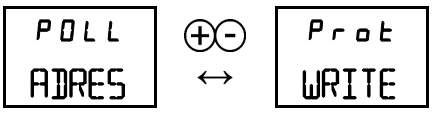


Here you can specify the HART® polling address for the transmitter in order to be able to address it within a network. Furthermore, you have the option to specify the write protection for the HART® communication. Once this write protection has been set, no parameter manipulation via the protocol can be carried out.

Press the Ⓟ key to change to the parameter for setting the HART® parameters.



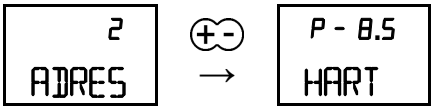
Press the ⊕ or ⊖ key to toggle between the polling address and write protection.



The displayed value corresponds to the currently assigned address for the device. Press the ⊕ or ⊖ key to increment or decrement the transmitter address. If the entered address is different from the currently stored address, the digit will flash. The address can be any number between 0 and 63. However, normally only addresses between 0 and 15 are assigned. Select the 0 address in order to identify a device within the network. Press the Ⓟ key for a long time to save the address, and the digit will stop flashing.

Press the ⊕ or ⊖ key to select the required setting for changing the status of the write protection. When the parameter is opened, the value that is currently stored in the transmitter is displayed. If you change this value, the display flashes and thereby shows that the setting has not be saved. You will need to press the Ⓟ key for a long time to save the setting.

Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the system parameter menu level. Any settings, which have not been saved, will be lost.



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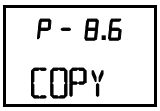
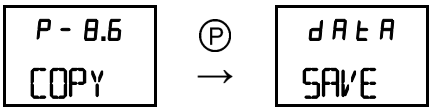
13.16 Parameter 8.6 – Copying device parameters



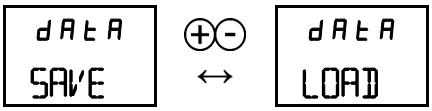
The transmitters of the 200 series, in combination with the OPUS*i* display and operating module, offer the option of transferring device parameters from one device to another. This function saves time during the commissioning of several transmitters, which would ideally be identical. You also have the option to save the set parameters before replacing a device and then to transfer them to the new device.

The copying of device parameters is only possible with the combination of the 200 series and the OPUS*i* display and operating module.

Press the Ⓟ key to go to the parameter for copying the device settings.

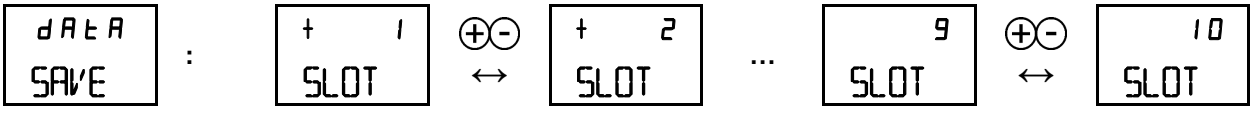


Press the ⊕ or ⊖ key to choose between the saving and loading of the device settings.



Saving the device settings:

The display and operating module offers several slots for storing device parameters. This way, datasets of different devices can be saved to one OPUS*i*. If a slot is already occupied by a dataset, a "+" is displayed in the top left corner of the display. However, the data in this slot can be overwritten at any time.



Press the Ⓟ key to select a slot. Then you can choose, which data you want to transfer from the transmitter to the OPUS*i*. Press the ⊕ or ⊖ key to select the individual parameters.

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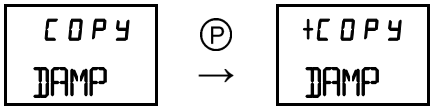
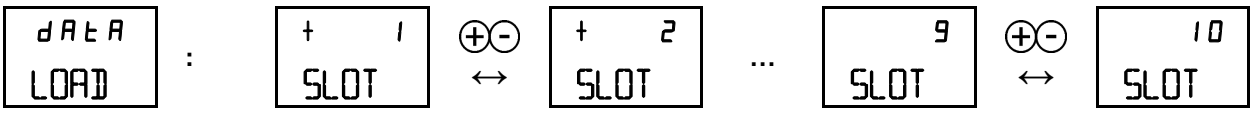
Briefly press the Ⓟ key to select the current selection. This is indicated by a "+" in the top left corner of the display. The same applies to the deselection of a parameter. Apart from the individual selection, you can also select all parameters together.



If all relevant parameters are selected, the selection is written to the EEPROM of the OPUS*i* by pressing the Ⓟ key. The transmitter will acknowledge the successful writing process. Press any key to return to the previous menu item.

Loading the device settings:

The loading of device settings is done in a similar way to the saving of data. If a slot is already occupied by a dataset, a "+" is displayed in the top left corner of the display. Loading is only possible from occupied slots.



Press the Ⓟ key to select a slot. The transmitter copies the data from the OPUS*i* and acknowledges the successful copying process by displaying a success message. This message can be acknowledged by pressing any key. Then the transmitter returns to the menu of the system parameters.

Note:

If an older OPUS without EEPROM is connected, the transmitter will detect this. In this case an error message will be displayed when you open the copy options. Press any key to acknowledge the error message and return to the system level.

The following message is displayed when loading from an unoccupied slot. Press any key to acknowledge the message and return to the system level.

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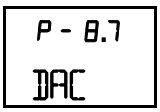
13.17 Parameter 8.7 – Setting the D/A converter



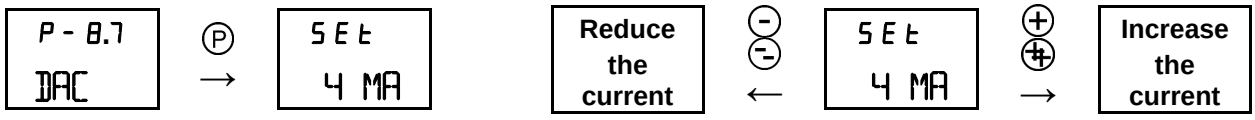
The lower limit (4 mA) and upper limit (20 mA) of the internal digital-to-analogue converter can be adapted to the measuring facility if required. This function is used for compensating measuring errors or display errors at the evaluating point within the measuring system.

Example: The evaluating unit has a known offset error and displays a value of 4.091 mA for a given current of 4.000 mA. The display can be adjusted to a precise 4.000 mA value by adjusting the transmitter's output current. This adjustment can also be made for 20 mA.

This function is NOT intended for adjusting the beginning and end of the measuring range.

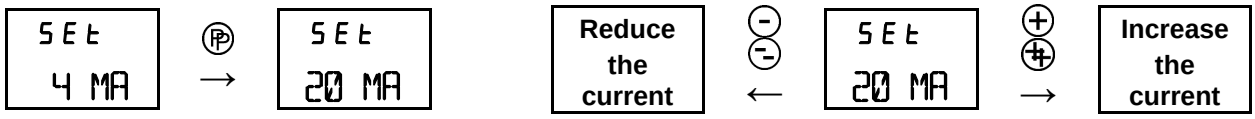
	**This setting changes the values, which have been calibrated in the factory. Please only use this option if the situation absolutely requires it. After the changes have been made, the transmitter will show the wrong values for a correctly working current measuring device.**
	**The transmitter saves the values that have been adjusted by you in its internal EEPROM and loads them automatically during each device initialisation process. However, the factory-calibrated settings can be restored at any time by loading the factory settings.**

Press the Ⓟ key to go to the parameter for adjusting the output current. Observe the displayed current value for 4 mA and adjust it using the ⊕ and ⊖ keys. Press and hold the ⊕ or ⊖ key to incrementally increase the rate of change.



Press the Ⓟ key for a long time to change to the adjustment of the 20 mA value. The setting process is identical to the previous adjustment of the 4 mA value.

Press the ⊕ and ⊖ keys at the same time to return to the previous menu item **without saving** the set values.



After you have set the value for 20 mA, press the Ⓟ key for a long time to save it in the transmitter. The 4 mA value is only accepted at this point in time. At the same time, the device returns to the system level.

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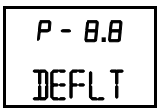
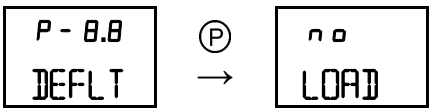
13.18 Parameter 8.8 – Restoring the default settings



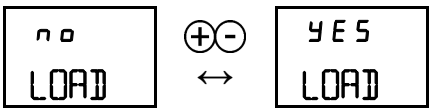
This parameter is used for restoring the transmitter's default (factory) settings. Please use this function if a correct measuring operation seems to have become impossible due to incorrect changes to the device settings. All parameters of the transmitter will be reset to their original states by importing the factory data from the internal EEPROM of the device.

	**Any data, which the user has stored in the device, will be overwritten, and the device will return to its delivery state.**

Press the Ⓟ key to go to the parameter for loading the default settings. Initially, the transmitter will reject the loading of the default settings.

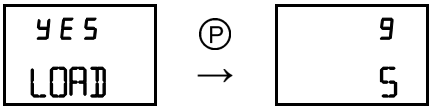


Press the ⊕ or ⊖ key to accept the loading of the default settings. If you press the ⊕ or ⊖ key again, the option will be negated. You can exit the parameter at any time by pressing the ⊕ and ⊖ keys at the same time.

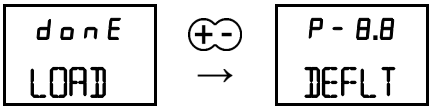


If you have decided to restore the default settings, you need to finally confirm the loading of the default settings by pressing the Ⓟ key. The transmitter will start a countdown.

During this countdown you have the last opportunity to cancel the loading of the default settings by pressing any key. If you do so, the transmitter will exit the parameter and return to the system settings menu.



After the default settings have been loaded successfully, the success message can be acknowledged by pressing the ⊕ and ⊖ keys at the same time. The device will return to the system parameter level.



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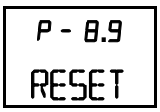
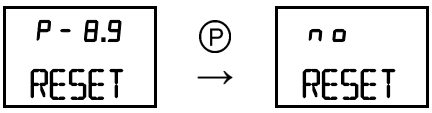
13.19 Parameter 8.9 – Resetting the device



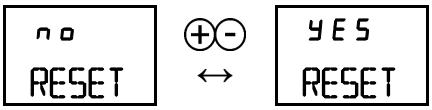
If the transmitter no longer functions correctly, please carry out a device reset. The reset will result in a full reinitialisation of the device, which means that all data is reloaded from the internal EEPROM. This function is equivalent to disconnecting the power supply, but will save you the mechanical effort. If a problem cannot be corrected in this way, please contact the manufacturer.

	**During a device reset the transmitter will not react to process changes, i.e. the analogue output current does not represent the existing measuring value. Therefore, before carrying out a reset please make sure that no other process parameters are dependent on the output signal of the device.**

Press the Ⓟ key to go to the parameter for carrying out the device reset. Initially, the transmitter will refuse the implementation.

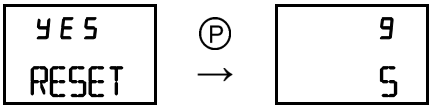


Press the ⊕ or ⊖ key to confirm the implementation. If you press the ⊕ or ⊖ key again, the option will be negated. You can exit the parameter at any time by pressing the ⊕ and ⊖ keys at the same time.

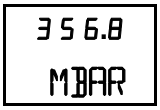


If you have decided to reset the device, you need to finally confirm the reset by pressing the Ⓟ key. The transmitter will start a countdown at second intervals.

During this countdown you have the last opportunity to cancel the reset by pressing any key. If you do so, the transmitter will exit the parameter and return to the system settings menu.



After the device has been reset, the transmitter is in normal measuring mode and shows the selected measuring value.



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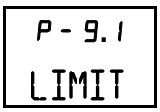
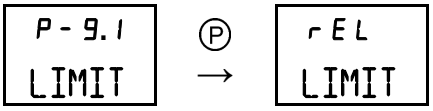
13.20 Parameter 9.1 – Displaying the trailing pointers

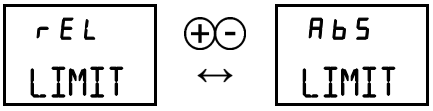


The trailing pointers continuously record the minimum and maximum values for the pressure and temperature. The stored values are available in two variants. The first variant - the device trailing pointers - cannot be manipulated, but only viewed. They record the minimum and maximum values, which have occurred during the entire transmitter operation. The process trailing pointers, on the other hand, can be reset as required and are useful for monitoring the minimum and maximum values during any time period.

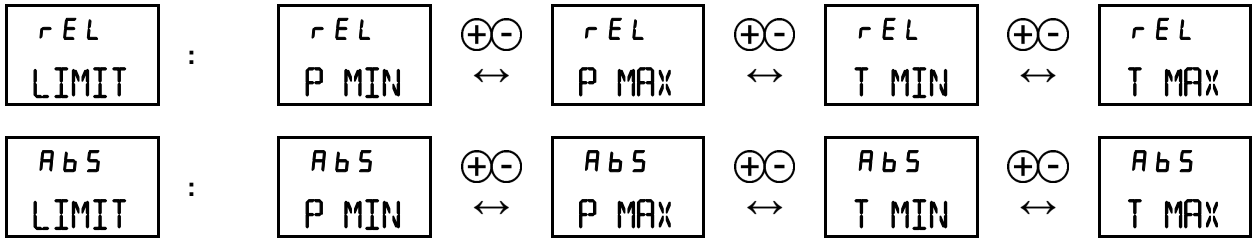
Press the Ⓟ key to go to the parameter for displaying the trailing pointers.



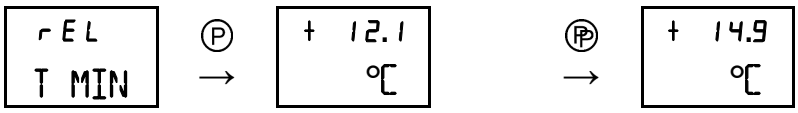
Press the ⊕ or ⊖ key to toggle between the process trailing pointers (relative trailing pointers) and device trailing pointers (absolute trailing pointers).



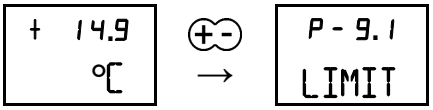
Press the Ⓟ key to choose between the two trailing pointers. Press the ⊕ or ⊖ key to select the trailing pointer, which you would like to display.



Press the Ⓟ key to select the respective trailing pointer. It will be displayed in the measuring unit, which has been set for the measuring value (see parameter 5). If a process trailing pointer (relative trailing pointer) has been selected, the displayed value can be deleted by pressing the Ⓟ for a long time. This does not apply to the device trailing pointers. The transmitter will update the deleted value immediately.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the device information menu level.



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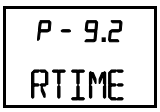
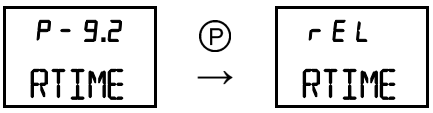
13.21 Parameter 9.2 – Displaying the device runtime

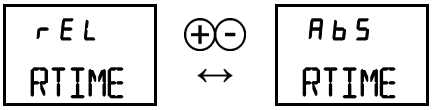


The device runtime is implemented in the device in two variants. Firstly, the absolute total runtime of the transmitter is documented. This value can only be viewed and reflects the operating time. Secondly, another relative operating time counter is available, which begins from zero after each restart (i.e. device reset or connection to the power supply). Alternatively, this counter can be reset manually. This function is useful in order to detect possible faults with the power supply since it shows the last uninterrupted runtime. Furthermore, together with the deletable trailing pointers, the minimum and maximum value during a certain period of time can be determined.

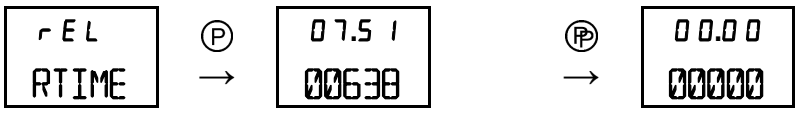
Press the Ⓟ key to go to the parameter for displaying the device runtime.



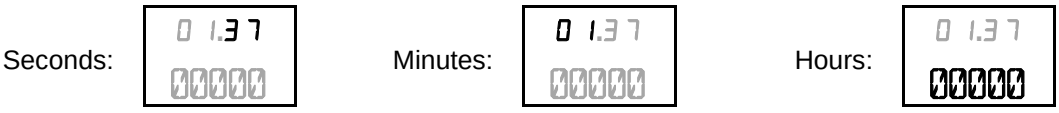
Press the ⊕ or ⊖ key to toggle between the relative runtime (i.e. since the start of the device or the runtime reset) and the absolute device runtime.



Press the Ⓟ key to choose between the two trailing pointers. If the relative runtime of the device is displayed, this can be deleted by pressing the Ⓟ key for a long time. This does not apply to the absolute device runtime. The recording of the operating time is restarted immediately.



The transmitter displays the runtime in seconds, minutes and hours.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the device information menu level.

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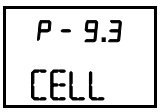
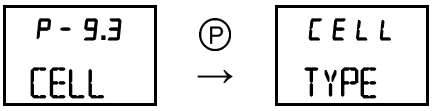
13.22 Parameter 9.3 – Displaying the measuring cell information



The measuring cell information shows the installed cell type and its property with regard to the relative or absolute pressure, the nominal measuring range of the cell and the maximum overload limit. Press the Ⓟ key to go to the parameter for displaying the cell information.



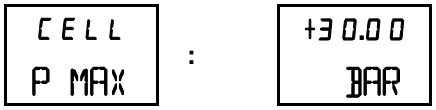
Press the ⊕ or ⊖ key to toggle between the cell type, the nominal measuring range of the cell and the maximum overload limit.

Press the Ⓟ key to choose, which information you want to display.

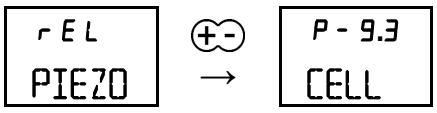
The information about the cell type shows, whether it is a relative pressure cell or an absolute pressure cell and whether it works on a piezoresistive or capacitive basis.

The parameter for the nominal measuring range of the cell allows you to display the minimum and maximum value. Press the ⊕ or ⊖ key to select the required value and confirm your selection by pressing the Ⓟ key.

You should under no circumstances exceed the maximum overload pressure of the measuring cell. Also please pay attention to any pressure shocks in your system. The value that is displayed here indicates the peak value, to which the measuring cell can be subjected without being damaged.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the device information menu level.



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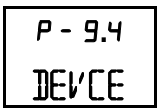
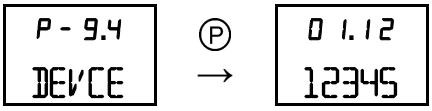
13.23 Parameter 9.4 – Displaying the manufacturing information



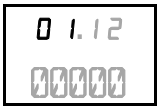
The manufacturing information contains the serial number and manufacturing date of the transmitter. Should the type plate be illegible, the device can still be clearly identified on the basis of this information.

Press the Ⓟ key to go to the parameter for displaying the manufacturing data.

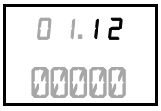


Displayed are the manufacturing month and year as well as the serial number of the device.

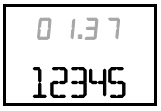
Month:



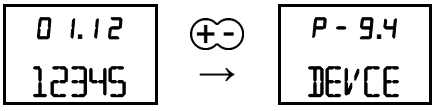
Year:



Serial No.:



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the device information menu level.



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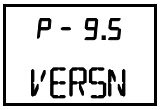
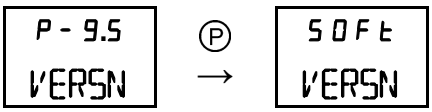
13.24 Parameter 9.5 – Displaying the hardware and software version

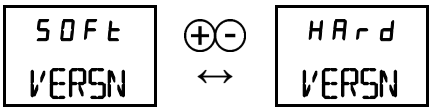


This parameter allows you to display information about the revision of the transmitter. It shows both the hardware and software version of the device. This information can be useful in the event of a malfunction of the transmitter. Furthermore, over time, changes to the functional scope or handling of the transmitter may occur. In order to be able to support the operation of the device in such an event, the device version must be known.

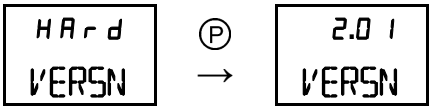
Press the Ⓟ key to go to the parameter for displaying the version information.



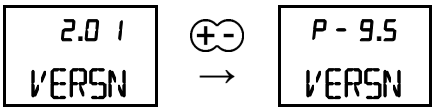
Press the ⊕ or ⊖ key to toggle between the software version and hardware version.



Press the Ⓟ key to choose between the two trailing pointers. The selected version number is displayed.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the device information menu level.



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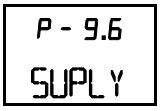
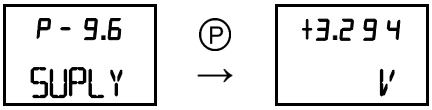
13.25 Parameter 9.6 – Displaying the operating voltage of the device

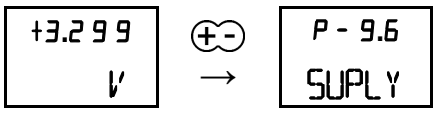


This parameter is used for checking the internal supply voltage of the device. The internal supply voltage should be between 3.25 V and 3.35 V. If the value is outside these limits, the transmitter may have a fault.

Press the Ⓟ key to go to the parameter for displaying the operating voltage.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the device information menu level.



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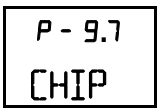
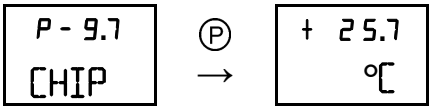
13.26 Parameter 9.7 – Displaying the electronics temperature



You can display the actual temperature of the internal device electronics. The transmitter electronics works up to a maximum temperature of 85 °C. If you are working with hot processes, you should check this value in the event of a device malfunction.

Press the Ⓟ key to go to the parameter for displaying the electronics temperature.



Press the ⊕ and ⊖ keys at the same time to exit the actual parameter and return to the device information menu level.

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14 Faults and troubleshooting

14.1 Transmitter malfunction

In the event of a fault or malfunction, please check the following items first in order to exclude possible error sources before beginning with the actual troubleshooting. However, if you cannot find a solution for the problem, please contact the manufacturer to discuss further actions.

Fault	Possible causes	Check / correction
The device does not start or no current is flowing in the loop.	The voltage of the power supply is reversed or incorrectly connected.	Make sure that the power supply is connected correctly.
	The power supply is not switched on.	Use a voltmeter to check whether voltage is applied to the transmitter.
	The supply line has a broken cable.	
The output current does not react to pressure.	The transmitter is in the current transducing mode.	Exit the current transducing mode.
The current value is outside the range of 4 to 20 mA.	The transmitter has been applied with a pressure, which is outside the set measuring range.	Return the transmitter to its set measuring range.
HART® communication is impossible.	The required burden is either not existent or too low.	Add a communication resistor to the loop or activate the resistor when operating the device on site.
The display is difficult to read or its display is sluggish.	The temperature is very low.	Check the display in a warmer environment. (This behaviour in severe cold is normal.)

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14.2 Error messages

The transmitter messages, which might be shown on the display during the device operation, are listed in the following. These messages can be general notes, warnings or device errors.

Err EPROM	**ERROR** **An error has occurred while writing to the EEPROM.**	Please restart the device. Check whether the maximum permitted value for electromagnetic radiation has been exceeded. Repeat the saving process.
Err CRC	**ERROR** **An error has occurred while reading from the EEPROM.**	Please restart the device. Check whether the maximum permitted value for electromagnetic radiation has been exceeded. If the error persists, please load the default settings from the device.
Err ADC	**ERROR** **Error during the A/D conversion**	Check whether the transmitter is overloaded and bring it into a depressurised state. If the problem persists, please contact the manufacturer.
FULL SCALE	**NOTE** **The maximum display range of the display has been exceeded.**	Please select another measuring unit.
LO ALARM	**WARNING** **A value falls short of the set measuring range.**	Return the transmitter to its set measuring range.
HI ALARM	**WARNING** **The set measuring range is exceeded.**	Return the transmitter to its set measuring range.

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14.3 Technical data of the PZM / VRM

General details								
Device type / measuring principle	- PIEZOMESS **PZM** 200/201/200H/201H: piezoresistive - VARIMESS **VRM** 200/201/200H/201H: capacitive							
Input								
Measuring ranges (depending on the device type)	PZM 200/201/200H/201H				VRM 200/201/200H/201H			
Nominal measuring ranges (bar)	relative	OP	absolute	OP	relative	OP	absolute	OP
OP = overload protection (bar) Special measuring ranges are available on request. All ranges are also available for vacuum operation.	0.35	1			-1/0 to +1	10	0 to 1	10
	1	3	1	3	-1/0 to +2	10	0 to 2	18
	2.5	8	2.5	8	-1/0 to +4	25	0 to 10	40
	5	15	5	15	-1/0 to +10	40	0 to 20	40
	10	30	10	30	-1/0 to +20	60	0 to 70	105
	30	90	30	90	-1/0 to +40	105		
	100	250	100	250	-1/0 to +70			
Setting the measuring range	Via the keypad of the OPUS*i* display and operating module / via the integrated on-site display Optional: via HART®							
Setting ranges	Start the measuring *zero*: 0 to 90 % of the sensor's nominal measuring range Measuring span *span*: 10 to 100 % of the sensor's nominal measuring span (TD = 10:1)							
Burst pressure DIN 16086	>= 4-fold measuring range							
Output								
Output signal	2-wire: 4 to 20 mA with a test circuit connection in the device Optional: 4 to 20 mA with HART®							
Fault signal	Optional: 3.8 mA, 22 mA, hold (i.e. holding the last value)							
Current limitation	3.85 mA and 21.5 mA (normal operation)							
Integration time	Continuously selectable between 0 and 300 s (setting time after a pressure leap)							
Measuring accuracy								
Reference conditions	acc. to DIN IEC 770							
Linearity, hysteresis and repeatability acc. to the limit point method DIN IEC 770	≤ ± 0.05 % of the nominal measuring range							
Activation time	< 5 s (The device will carry out a self-test.)							
Setting time (without damping)	< 200 ms							
Long-time drift	≤ 0.2 % of the span per year							
Thermal hysteresis	Zero point and measuring span are compensated within a temperature range from 0 to 80 °C (VRM) ≤ ± 0.2 % of the sensor's nominal measuring range / 10 K (-20 to +80 °C) from 4 bar (PZM) ≤ ± 0.3 % of the sensor's nominal measuring range / 10 K (-20 to +80 °C) up to 0.6 bar (PZM)							
Conditions of use								
Installation position / calibration position	Any position / standing vertically (position-dependent zero point displacement)							
Temperature of the medium	PZM: T1: -40 °C to +125 °C (140 °C over one hour at the most) T2: -40 °C to +200 °C (high-temperature version) VRM: -40 °C to +140 °C							
Ambient and storage temperature	Type 201/201H: -40 °C to +85 °C Type 200/200H: -30 °C to +75 °C (Below -20 °C cable breakage might occur and the display's function may be impaired.)							
Protection class acc. to EN 60529	IP 67 and IP 69K							
Electromagnetic compatibility	Sensitivity against interference: acc. to DIN IEC 61000-6-2 Interference radiation: acc. to DIN IEC 61000-6-4							
Construction								
Electrical connection	- Standard: cable screw connection M16x1.5, nickel-plated brass, stainless steel available on request - Optional: round plug-in connector M12x1, nickel-plated brass, stainless steel available on request - Optional: angle plug acc. to EN 175301-803 - Optional: reference cable							
Process connection	- Membrane, flush-welded on the front, CrNiSt, other materials available on request - EHEDG type EL-ASEPTIC CLASS I, certified modular connection system PZM / VRM with press screw M38x1.5 and elastomer sealing - Process seal EPM (FDA) (temperature range: -20 °C to +150 °C) - Process seal FPM (FDA) (temperature range: -40 °C to +200 °C)							

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Materials	- Field housing / lid:	CrNiSt 1.4301
	- Housing seal:	FPM
	- Pressure compensation opening:	polyamide
	- Inspection gauge (200/200H series):	polycarbonate
	- Process connection / connection adapter:	CrNiSt 1.4404
	- Process membrane:	CrNiSt 1.4435 / 1.4404
	- Locking screw (201/201H series):	CrNiSt 1.4301
	- Reference cable: 5-wire with reference tube:	PUR (recommended: 80 m maximum)
Filling fluid	- Silicon oil (FDA) VRM: medical mineral oil (FDA)	Other filling fluids are available on request.
Display and operation		
Display	LCD, 4-digit numerical display and 5-digit alphanumerical display Type 200/200H: integrated on-site display Type 201/201H: external OPUS*i* display and operating module	
Displayable units	Pressure: mbar, bar, psi, Pa, mH_2O, mmHg, Torr, atm, at, kg/cm^2 Temperature: °C, °F, K, °R, °Ré Volume: l, hl, dm^3, m^3, ft^3, US gal, UK gal, US bl, UK bl Mass: kg, t, lbs, tn. sh., tn. l.	
Additional displays	Output current in mA or % (in relation to the span)	
Operation	200/200H: via the configuration menu with the integrated on-site display 201/201H: via the external OPUS*i* display and operating module Optional: operation via HART® protocol (200H/201H)	
Auxiliary energy resources		
Power supply / burden	12-36 VDC, maximum burden: (V_{supply} – 12 V) / 24 mA	
Accessories for type 201		
OPUS*i* display module	External display and operating module, CrNiSt, IP 67, 41x70 mm, 1 m connection cable and M12x1 round plug-in connector, integrated memory for the parameter transfer to other devices (downwardly compatible with existing devices of the 100 series, but without a copying function between the transmitter and the display and operating module)	
Certificates	Calibration certificate, declaration of conformity acc. to FDA regulations	
Process connection adapter	See order overview	

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14.4 Technical data of the PZT

General details				
Device type / measuring principle	- PIEZOTEC **PZT** 200/201/200H/201H: piezoresistive			
Input				
Measuring ranges	PZT 200/201/200H/201H			
Nominal measuring ranges (bar)	relative	OP	absolute	OP
OP = overload protection (bar) Special measuring ranges are available on request. All ranges are also available for vacuum operation.	0.35	1		
	1	3	1	3
	2.5	8	2.5	8
	5	15	5	15
	10	30	10	30
	30	90	30	90
	100	250	100	250
Setting the measuring range	Via the keypad of the OPUS*i* display and operating module / via the integrated on-site display Optional: via HART®			
Setting ranges	Start the measuring *zero*: 0 to 90 % of the sensor's nominal measuring range Measuring span *span*: 10 to 100 % of the sensor's nominal measuring span (TD = 10:1)			
Burst pressure DIN 16086	>= 4-fold measuring range			
Output				
Output signal	2-wire: 4 to 20 mA with a test circuit connection in the device Optional: 4 to 20 mA with HART®			
Fault signal	Optional: 3.8 mA, 22 mA, hold (i.e. holding the last value)			
Current limitation	3.85 mA and 21.5 mA (normal operation)			
Integration time	Continuously selectable between 0 and 300 s (setting time after a pressure leap)			
Measuring accuracy				
Reference conditions	acc. to DIN IEC 770			
Linearity, hysteresis and repeatability acc. to the limit point method DIN IEC 770	≤ ± 0.05 % of the nominal measuring range			
Activation time	< 5 s (The device will carry out a self-test.)			
Setting time (without damping)	< 200 ms			
Long-time drift	≤ 0.2 % of the span per year			
Thermal hysteresis	≤ ± 0.2 % of the sensor's nominal measuring range / 10 K (-20 to +80 °C) from 4 bar ≤ ± 0.3 % of the sensor's nominal measuring range / 10 K (-20 to +80 °C) up to 0.6 bar			
Conditions of use				
Installation position / calibration position	Any position / standing vertically (position-dependent zero point displacement)			
Temperature of the medium	PZM: T1: -40 °C to +125 °C (140 °C over one hour at the most) T2: -40 °C to +200 °C (high-temperature version)			
Ambient and storage temperature	Type 201/201H: -40 °C to +85 °C Type 200/200H: -30 °C to +75 °C (Below -20 °C cable breakage might occur and the display's function may be impaired.)			
Protection class acc. to EN 60529	IP 67 and IP 69K			
Electromagnetic compatibility	Sensitivity against interference: acc. to DIN IEC 61000-6-2 Interference radiation: acc. to DIN IEC 61000-6-4			
Construction				
Electrical connection	- Standard: cable screw connection M16x1.5, nickel-plated brass, stainless steel available on request - Optional: round plug-in connector M12x1, nickel-plated brass, stainless steel available on request - Optional: angle plug acc. to EN 175301-803 - Optional: reference cable			
Process connection	- Membrane, flush-welded on the front, CrNiSt, other materials available on request - EHEDG type EL-CLASS I, certified modular connection system PZM / VRM with press screw M38x1.5 and elastomer sealing - Process seal EPM (FDA) (temperature range: -20 °C to +150 °C) - Process seal FPM (FDA) (temperature range: -40 °C to +200 °C)			
Materials	- Field housing / lid: CrNiSt 1.4301 - Housing seal: FPM - Pressure compensation opening: polyamide - Inspection gauge (200/200H series): polycarbonate - Process connection / connection adapter: CrNiSt 1.4404 - Process membrane: CrNiSt 1.4435 / 1.4404 - Locking screw (201/201H series): CrNiSt 1.4301 - Reference cable: 5-wire with reference tube: PUR (recommended: 80 m maximum)			

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Filling fluid	PZM: silicon oil (FDA)	Other filling fluids are available on request.

Display and operation	
Display	LCD, 4-digit numerical display and 5-digit alphanumerical display Type 200/200H: integrated on-site display Type 201/201H: external OPUS*i* display and operating module
Displayable units	Pressure: mbar, bar, psi, Pa, mH_2O, mmHg, Torr, atm, at, kg/cm² Temperature: °C, °F, K, °R, °Ré Volume: l, hl, dm³, m³, ft³, US gal, UK gal, US bl, UK bl Mass: kg, t, lbs, tn. sh., tn. l.
Additional displays	Output current in mA or % (in relation to the span)
Operation	200/200H: via the configuration menu with the integrated on-site display 201/201H: via the external OPUS*i* display and operating module Optional: operation via HART® protocol (200H/201H)
Auxiliary energy resources	
Power supply / burden	12-36 VDC, maximum burden: (V_{supply} – 12 V) / 24 mA
Accessories for type 201	
OPUS*i* display module	External display and operating module, CrNiSt, IP 67, 41x70 mm, 1 m connection cable and M12x1 round plug-in connector, integrated memory for the parameter transfer to other devices (downwardly compatible with existing devices of the 100 series, but without a copying function between the transmitter and the display and operating module)
Certificates	Calibration certificate, declaration of conformity acc. to FDA regulations
Process connection adapter	See order overview

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14.5 Technical data of the TPF

General details				
Device type / measuring principle	- **TPF** 200/201/200H/201H: piezoresistive			
Input				
Measuring ranges	TPF 200/201/200H/201H			
Nominal measuring ranges (bar)	relative	OP	absolute	OP
OP = overload protection (bar) Special measuring ranges are available on request. All ranges are also available for vacuum operation.	0 to 0.35	1		
	0 to 1	3	0 to 1	3
	-1/0 to 2.5	8	0 to 2.5	8
	-1/0 to 5	15	0 to 5	15
	-1/0 to 10	30	0 to 10	30
	-1/0 to 30	90	0 to 30	90
	-1/0 to 100	250	0 to 100	250
Setting the measuring range	Via the keypad of the OPUS*i* display and operating module / via the integrated on-site display Optional: via HART®			
Setting ranges	Start the measuring *zero*: 0 to 90 % of the sensor's nominal measuring range Measuring span *span*: 10 to 100 % of the sensor's nominal measuring span (TD = 10:1)			
Burst pressure DIN 16086	>= 4-fold measuring range			
Output				
Output signal	2-wire: 4 to 20 mA with a test circuit connection in the device Optional: 4 to 20 mA with HART®			
Fault signal	Optional: 3.8 mA, 22 mA, hold (i.e. holding the last value)			
Current limitation	3.85 mA and 21.5 mA (normal operation)			
Integration time	Continuously selectable between 0 and 300 s (setting time after a pressure leap)			
Measuring accuracy				
Reference conditions	acc. to DIN IEC 770			
Linearity, hysteresis and repeatability acc. to the limit point method DIN IEC 770	≤ ± 0.05 % of the nominal measuring range			
Activation time	< 5 s (The device will carry out a self-test.)			
Setting time (without damping)	< 200 ms			
Long-time drift	≤ 0.2 % of the span per year			
Thermal hysteresis	≤ ± 0.2 % of the sensor's nominal measuring range / 10 K (-20 to +80 °C) from 4 bar ≤ ± 0.3 % of the sensor's nominal measuring range / 10 K (-20 to +80 °C) up to 0.6 bar			
Conditions of use				
Installation position / calibration position	Any position / standing vertically (position-dependent zero point displacement)			
Temperature of the medium	PZM: T1: -40 °C to +125 °C (140 °C over one hour at the most) T2: -40 °C to +200 °C (high-temperature version)			
Ambient and storage temperature	Type 201/201H: -40 °C to +85 °C Type 200/200H: -30 °C to +75 °C (Below -20 °C cable breakage might occur and the display's function may be impaired.)			
Protection class acc. to EN 60529	IP 67 and IP 69K			
Electromagnetic compatibility	Sensitivity against interference: acc. to DIN IEC 61000-6-2 Interference radiation: acc. to DIN IEC 61000-6-4			
Construction				
Electrical connection	- Standard: cable screw connection M16x1.5, nickel-plated brass, stainless steel available on request - Optional: round plug-in connector M12x1, nickel-plated brass, stainless steel available on request - Optional: angle plug acc. to EN 175301-803 - Optional: reference cable			
Process connection	- All standard process connections and those that are commonly used by the manufacturer			
Materials	- Field housing / lid: CrNiSt 1.4301 - Housing seal: FPM - Pressure compensation opening: polyamide - Inspection gauge (200/200H series): polycarbonate - Process connection / connection adapter: CrNiSt 1.4404 - Process membrane: CrNiSt 1.4435 / 1.4404 - Locking screw (201/201H series): CrNiSt 1.4301 - Reference cable: 5-wire with reference tube: PUR (recommended: 80 m maximum)			
Filling fluid	PZM: silicon oil (FDA) Other filling fluids are available on request.			

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Display and operation	
Display	LCD, 4-digit numerical display and 5-digit alphanumerical display Type 200/200H: integrated on-site display Type 201/201H: external OPUS*i* display and operating module
Displayable units	Pressure: mbar, bar, psi, Pa, mH_2O, mmHg, Torr, atm, at, kg/cm² Temperature: °C, °F, K, °R, °Ré Volume: l, hl, dm³, m³, ft³, US gal, UK gal, US bl, UK bl Mass: kg, t, lbs, tn. sh., tn. l.
Additional displays	Output current in mA or % (in relation to the span)
Operation	200/200H: via the configuration menu with the integrated on-site display 201/201H: via the external OPUS*i* display and operating module Optional: operation via HART® protocol (200H/201H)
Auxiliary energy resources	
Power supply / burden	12-36 VDC, maximum burden: (V_{supply} – 12 V) / 24 mA
Accessories for type 201	
OPUS*i* display module	External display and operating module, CrNiSt, IP 67, 41x70 mm, 1 m connection cable and M12x1 round plug-in connector, integrated memory for the parameter transfer to other devices (downwardly compatible with existing devices of the 100 series, but without a copying function between the transmitter and the display and operating module)
Certificates	Calibration certificate, declaration of conformity acc. to FDA regulations
Process connection adapter	See order overview

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14.6 Technical data of the KERAMESS

General details						
Device type / measuring principle	- KERAMESS **KS** 200/201/200H/201H: capacitive					
Input						
Measuring ranges	KERAMESS 200/201/200H/201H					
Nominal measuring ranges (bar)	relative	OP	relative	OP	absolute	OP
OP = overload protection (bar) Special measuring ranges are available on request All ranges are also available for vacuum operation	0.05	4	40	60	0.1	4
	0.1	4	70	105	0.2	6
	±0.1	4	-1 to 1	10	0.4	6
	0.2	6	-1 to 2	18	1	10
	0.4	6	-1 to 4	25	2	18
	1	10	-1 to 10	40	4	25
	2	18	-1 to 20	40	10	40
	4	28	-1 to 40	60	20	40
	10	40	-1 to 70	105	40	60
	20	40			70	105
Setting the measuring range	Via the keypad of the OPUS*i* display and operating module / via the integrated on-site display Optional: via HART®					
Setting ranges	Start the measuring *zero*: 0 to 90 % of the sensor's nominal measuring range Measuring span *span*: 10 to 100 % of the sensor's nominal measuring span (TD = 10:1)					
Burst pressure DIN 16086	>= 4-fold measuring range					
Output						
Output signal	2-wire: 4 to 20 mA with a test circuit connection in the device Optional: 4 to 20 mA with HART®					
Fault signal	Optional: 3.8 mA, 22 mA, hold (i.e. holding the last value)					
Current limitation	3.85 mA and 21.5 mA (normal operation)					
Integration time	Continuously selectable between 0 and 300 s (setting time after a pressure leap)					
Measuring accuracy						
Reference conditions	acc. to DIN IEC 770					
Linearity, hysteresis and repeatability acc. to the limit point method DIN IEC 770	≤ ± 0.05 % of the nominal measuring range					
Activation time	< 5 s (The device will carry out a self-test.)					
Setting time (without damping)	< 200 ms					
Long-time drift	≤ 0.2 % of the span per year					
Thermal hysteresis	Zero point + measuring span are compensated within a temperature range from 0 to 80°C					
Conditions of use						
Installation position / calibration position	Any position / standing vertically (position-dependent zero point displacement)					
Temperature of the medium	PZM: T1: -40 °C to +125 °C (140 °C over one hour at the most) T2: -40 °C to +200 °C (high-temperature version)					
Ambient and storage temperature	Type 201/201H: -40 °C to +85 °C Type 200/200H: -30 °C to +75 °C (Below -20 °C cable breakage might occur and the display's function may be impaired.)					
Protection class acc. to EN 60529	IP 67 and IP 69K					
Electromagnetic compatibility	Sensitivity against interference: acc. to DIN IEC 61000-6-2 Interference radiation: acc. to DIN IEC 61000-6-4					
Construction						
Electrical connection	- Standard: cable screw connection M16x1.5, nickel-plated brass, stainless steel available on request - Optional: round plug-in connector M12x1, nickel-plated brass, stainless steel available on request - Optional: angle plug acc. to EN 175301-803 - Optional: reference cable					
Process connection	- All standard process connections and those that are commonly used by the manufacturer					
Materials	- Field housing / lid: CrNiSt 1.4301 - Housing seal: FPM - Pressure compensation opening: polyamide - Inspection gauge (200/200H series): polycarbonate - Process connection / connection adapter: CrNiSt 1.4404 - Process membrane: Al_2O_3 (99 %) - Locking screw (201/201H series): CrNiSt 1.4301 - Reference cable: 5-wire with reference tube: PUR (recommended: 80 m maximum)					

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Display and operation	
Display	LCD, 4-digit numerical display and 5-digit alphanumerical display Type 200/200H: integrated on-site display Type 201/201H: external OPUS*i* display and operating module
Displayable units	Pressure: mbar, bar, psi, Pa, mH_2O, mmHg, Torr, atm, at, kg/cm^2 Temperature: °C, °F, K, °R, °Ré Volume: l, hl, dm^3, m^3, ft^3, US gal, UK gal, US bl, UK bl Mass: kg, t, lbs, tn. sh., tn. l.
Additional displays	Output current in mA or % (in relation to the span)
Operation	200/200H: via the configuration menu with the integrated on-site display 201/201H: via the external OPUS*i* display and operating module Optional: operation via HART® protocol (200H/201H)
Auxiliary energy resources	
Power supply / burden	12-36 VDC, maximum burden: (V_{supply} – 12 V) / 24 mA
Accessories for type 201	
OPUS*i* display module	External display and operating module, CrNiSt, IP 67, 41x70 mm, 1 m connection cable and M12x1 round plug-in connector, integrated memory for the parameter transfer to other devices (downwardly compatible with existing devices of the 100 series, but without a copying function between the transmitter and the display and operating module)
Certificates	Calibration certificate, declaration of conformity acc. to FDA regulations
Process connection adapter	See order overview

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