Turbidity Meter
with Switching Points
TURBIMESS NG

Operating Instructions

English

A-TI-TMS-D-18

Version 1.0

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1 Important notes

1.1 Explanation of notes and warnings

	**Information**	***Information*** can be used to facilitate or explain operation.
	**Warning**	***Warnings*** point to important criteria required for smooth and safe operation.
	**Attention**	Notes marked with ***Attention*** require absolute compliance. Failure to do so could result in damage to the device.
	**Do not touch**	The instruction ***Do not touch***, requires absolute compliance. Failure to do so could result in irreparable damage to the device.
	**Protect against moisture**	***Protect against moisture*** indicates that contact with moisture could result in damage to the device or its components, thus exercising a negative influence on the operation.
	**Electrostatic danger**	***Electrostatic danger*** points to the fact that the device or its components could suffer irreparable damage from electrostatic discharge.
	**Magnetically sensitive**	***Magnetically sensitive*** points to the fact that placement of the device in electromagnetic fields can subject its operation to a negative influence.
	**Caution heat**	***Caution heat*** is a warning of personal injury from burns or scalds.
	**Caution cold**	***Caution cold*** is a warning of personal injury from cold burns or freezing.
	**Explosive atmosphere**	***Explosive atmosphere*** refers to the operation of the device in areas with an increased danger of explosion.
	**Caution overpressure**	***Caution overpressure*** gives warning of situations presenting an increased danger of injury from pressurised components.
	**Caution corrosive**	***Caution corrosive*** points to the danger of injury from aggressive media.
	**Caution electricity**	***Caution electricity*** points to the danger of an electric shock from live components.
	**Open cautiously**	***Open cautiously*** warns against unintended damage of interior parts from sharp objects.

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1.2 Symbols used in this manual

	⊖ key
	⊕ key
	Combination of the ⊕ and ⊖ keys
	Ⓟ key
	Press the ⊖ key
	Press the ⊕ key
	Press the ⊕ and ⊖ keys
	Press the Ⓟ key
	Release the ⊖ key
	Release the ⊕ key
	Release the ⊕ and ⊖ keys
	Release the Ⓟ key

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1.3 Intended use

The Turbimess NG turbidity meter is suitable for conducting linearised turbidity measurements up to 4000 NTU* and for taking turbidity measurements based on reference points for dairy products with a fat content of up to 30%.

	**Notes on the measurement procedure used:** **The device is calibrated using NTU Standard (Formazin solution). The measurement procedure applied by the turbidity meter does not correspond to the DIN EN ISO 7027:2000-04 standard. This is indicated by the additional asterisk (*) following the units, NTU.**

The maximum permissible pressure is 15 bar.

All stated specifications and certifications are only guaranteed when Hengesbach original components are used. It is up to the system operator to ensure that the materials are compatible with the process conditions and the peripherals. The devices are not suitable for use in potentially explosive atmospheres and safety-related system components (SIL).

	**The manufacturer cannot assume any liability for damage due to any other use or incorrect handling. If in doubt as to the suitability of the device for your specific application, please contact the manufacturer before installation.**
	**The device is <u>not</u> intended for operation in safety-related areas.**
	**The device is <u>not</u> intended for operation in potentially explosive atmospheres.**

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

<u>The manufacturer can be contacted at the following address:</u>

Hengesbach Prozessmesstechnik	Schimmelbuschstr. 17 D-40699 Erkrath-Hochdahl Tel.: +49 (0)2104 3032 – 0 Fax: +49 (0)2104 3032 – 22 technik@hengesbach.com www.hengesbach.com

1.4 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 to ensure safe operation.

The device must only be assembled, connected, commissioned, operated and serviced by qualified personnel. Personnel who are carrying out the above tasks must have been authorised by the system operator.

This document is to be kept in a location accessible to all the persons who need it. A further copy is available from the manufacturer or can be downloaded from their homepage.

2 Opening the outer packaging

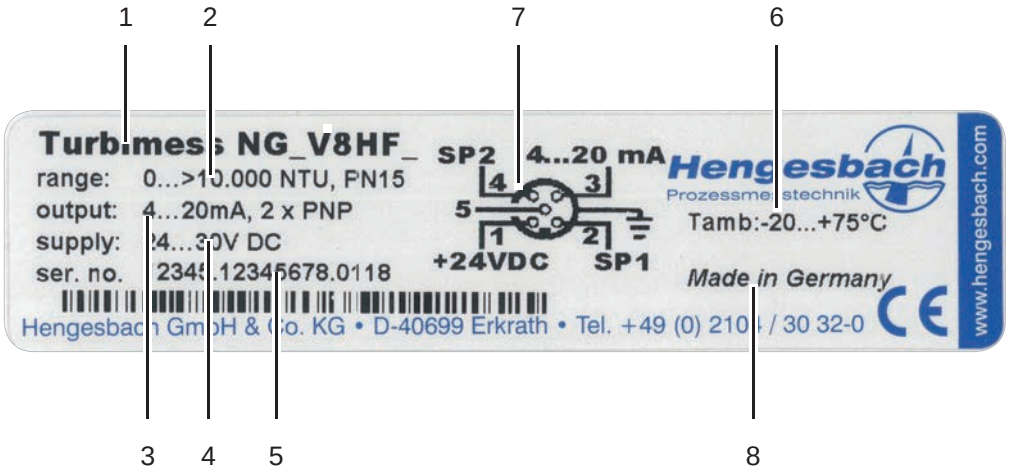
To avoid damaging the parcel, please read the following information before opening the transmitter.

	**Exercise care when using sharp objects to cut open the packaging – you could destroy the components inside.**
	**Avoid any contact with the medium-contacting density gauge. Contact with the density gauge can result in false measurements.**
	**Please protect the contents of the shipment until its commissioning and the check of the tightness of the screw connections.**

Check that the goods are correct, undamaged and complete. Compare the details on the delivery note with the contents of the shipment received. Please notify the manufacturer immediately of any discrepancies.

3 Identifying the device

The following figure shows a transmitter type plate (example) and the meaning of the information on the type plates. Compare the information on the transmitter type plate with the specifications from the delivery note and the order data. In the case of discrepancies between the delivery note and type plate, the data on the type plate is definitive. In such a case, contact the manufacturer.



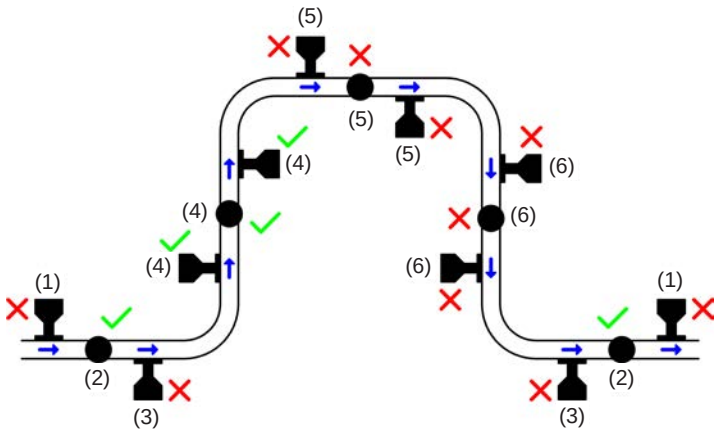
1. Device designation
2. Sensor measurement area
3. Output signal
4. Supply voltage
5. Serial number
6. Ambient temperature
7. Electrical connection
8. Manufacturing location

4 Assembly information

4.1 Installation position of the device

Please note that the transmitter may not function correctly depending on its installation position or the conditions in the system. This is not due to the device itself but rather to technical circumstances resulting from the combination of the installation position and the system process.

The following overview shows both favourable transmitter installation positions and those that should be avoided:



If possible, the transmitter should not be installed vertically on the pipe (1) as gas bubbles could collect in the curved section of the density gauge, which would affect the backscatter of light. Installing the device below the pipe (3) is also not recommended because, depending on the medium, deposits can form on the density gauge over time.

Installation on the side of the pipe (2) should be favoured. The device can be installed in any position in risers (4).

If possible, avoid installing the device in elevated pipe sections (5) where it cannot be ensured that the pipe is always completely full. In such cases, however, installation on the side of the pipe should again be favoured.

Installation in downpipes (6) should also be avoided as it cannot be ensured that the pipe volume flow is at full capacity at all times. The device can, however, be installed at any point around sections of pipe.

4.2 Notes on installation

Please observe the following device assembly notes. This information primarily serves to ensure your own safety; in addition, however, it guarantees smooth installation as well as low-maintenance and reliable operation of your transmitter.

	**The system must be returned to the ambient pressure before the device can be assembled. Failure to do so entails the risk of injury due to flying parts or the sudden release of gases or other media.**
	**Before assembly, ensure that the relevant locations on the system do not become too hot to work on safely. Allow surfaces and attachments to cool before assembly.**
	**Remain aware of the danger of cold burns on strongly-cooled system components. Ensure that you can work safely.**

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	**Ensure that you do not come into contact with aggressive residual media remaining in the system during assembly.**
	**Make sure that the potential equalisation between the transmitter and system is facilitated. In this respect, please also read the section regarding the electrical connections of the device.**
	**Avoid any contact with the medium-contacting density gauge. Contact with the density gauge can result in false measurements.**
	**The device manufacturer recommends that the M12 plug connector should point downwards during the installation if possible. This way, in the event that any process media that escapes and makes the device wet, it will not become blocked by highly viscose or drying substances.**
	**The device should be installed in a low-vibration location and at some distance from larger systems and strong electrical fields if possible.**
	**Make sure that the process connection to the system has a tight fit and that no medium leaks from the connection point. For this purpose, use a seal which is suited to your specific process and pay special attention to its suitability for the process temperature and compatibility with the medium.**
	**Tighten the transmitter with suitable torque for your process connection. If in doubt, please contact the manufacturer. Under certain circumstances, metal screw connections damaged by improper installation may not be able to be loosened without causing problems.**

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 how to proceed.

	**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 refuse to repair devices that have been opened up by the customer. (Note: This does not include opening the lid to operate the device.)**

As part of regular maintenance work, you should only check the electrical connection and the seals.

Ensure that the M12 plug connector is tightly screwed on. Also check that the lid sits tightly in place in order to ensure the best possible sealing. To ensure that the display is can easily be read during operating, you should always avoid contaminating or soiling the gauge glass.

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 excess temperature can destroy both the electronics and attachments to the housing.**
	**Make sure that the the medium-contacting density gauge does not come into contact with any items that could damage its surface.**

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6 Electrical connection

6.1 Permissible operating range

When used in its simplest form, this transmitter is a loop-fed, 2-wire, low-voltage DC device. Like all devices with a 2-wire design, the transmitter is supplied directly from the current loop and enters a current proportional to the measuring size from 4…20mA. It also features two switching points with PNP switching behaviour which therefore turn it into 3-wire or 4-wire device. When the switching outputs are switched, the supply voltage is connected to the switching outputs.

	**The operating voltage of the device is 24–30 VDC. Under NO circumstances should the transmitter be operated with any other supply voltage. Too low a voltage can result in malfunctions; too high a voltage can cause irreparable damage to the device.**
	**The switching points are each intended for an output current of 50mA. This maximum value must not be exceeded. While the device is protected against overloads and short-circuits, you should always make sure that the outputs are not overloaded.**
	**Ensure the correct polarity when making the electrical connection. If the polarity is inverted, the device will not work. Doing so will not damage the transmitter, as it is secured against voltage reversal.**

6.2 Pin assignment and correct connection

	**Please note the different connection types depending on the shielding/earthing available!**
	**The manufacturer recommends that you earth yourself and the device before installing the connections in order to minimise unnecessary loads due to static electricity.**
	**Use shielded and twisted wires for connecting the transmitter in order to suppress any interference due to electromagnetic fields to the best possible extent.**

The device is supplied with a 5-pole M12 plug connector. Pin 1 (+) and pin 3 (-) form the 2-wire current loop. If neither switching point is used, the loop current can be measured in both the forward conductor and the return conductor.

If at least one of the two switching points is used, the current must be measured in the return conductor – otherwise, the current taken from the switching point(s) would also be measured. The two switching points are assigned to pin 2 (switching point 1) and pin 4 (switching point 2) of the M12 plug connector.

Pin 5 inside the M12 plug connector provides an electrical connection to the metal housing of the device. When using a suitable connection cable with end-to-end electrical shielding at earth potential right up to the M12 plug connector, use of pin 5 is not necessary.

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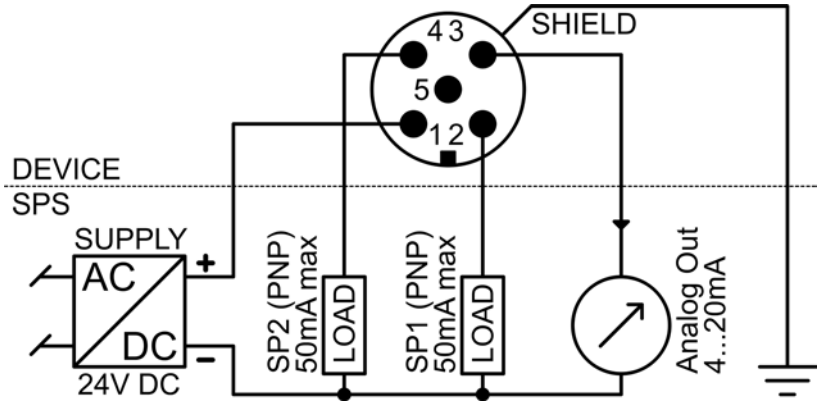
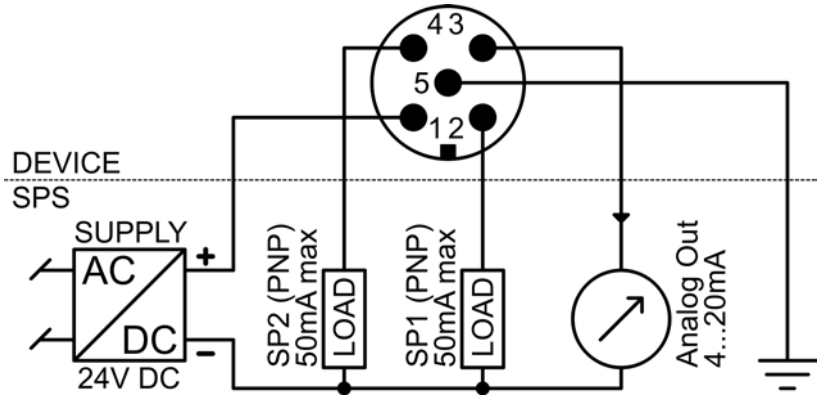
⚠	Earthing via pin 5 is **essential** if: - the connection cable does not provide end-to-end shielding and therefore earthing - the M12 plug connector does not connect the shielding to the metal housing of the turbidity meter (e.g. in the case of non-metallic plugs) - there is no earthing via the turbidity meter's metal housing at the installation location



- **Connection when earthing is ensured at installation location (e.g. earthed stainless steel tank)**
- **When connection cable features earthed shielding. The shield must be connected to the housing of the M12 connector by an electrical connection.**



- **Alternatively: Earth pin 5 at the supply point.**

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7 Repairs, returns and warranty

7.1 Repairs

If the transmitter shows any sign of malfunction, please always contact the manufacturer first. The manufacturer will advise you over the telephone on any further action that are necessary and may be able to suggest a solution to the problem. Often, an incorrect setting can give the appearance of a malfunction.

However, if a device has a definite fault, please return it to the manufacturer. The transmitter does not contain any parts that 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.

Do not attempt to repair the transmitter yourself. Doing so may invalidate the warranty and, in some circumstances, could make the fault worse.

7.2 Returns

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

1. Secure the sensor element against all forms of contact
2. Pack the device in transport-proof outer packaging.
3. Pack the electronic components in ESD-compliant outer packaging.
4. Please use the QA Returns Form for your product return.
   The form is available online at www.hengesbach.com in the "Downloads" section of our site.
5. Please include a precise description of the transmitter fault with the returned device.
6. If applicable, please tell us what you would like us to do with the returned item.

The manufacturer's returns address is:

Schimmelbuschstr. 17
D-40699 Erkrath-Hochdahl

Tel.: +49 (0)2104 3032 – 0
Fax: +49 (0)2104 3032 – 22

technik@hengesbach.com
www.hengesbach.com

7.3 Warranty

The manufacturer issues a one-year warranty for all manufactured products from the date of delivery. The manufacturer will repair or replace devices which develop a fault or fail entirely during this period. Please contact the manufacturer before you make your complaint in order to discuss further action, as this will ensure the quick and smooth processing of your request.

Faults which are caused by 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 been damaged during its return transport to the manufacturer because it was incorrectly packed. As a result, in the worst case, you may have to bear the costs of the damage yourself.

7.4 Storage

Always choose a clean, dry and cool location to store devices. Furthermore, the devices should be protected against vibration. Always protect the medium-contacting density gauge against any form of contact.

If the transmitter comes into contact with metals – and in particular untreated steel – this can cause rust to form on the stainless steel. Rust film also presents a hazard.

7.5 Disposal

A certain degree of care and effort is required in packaging the device in order to protect it against damage during transport. Please recycle the packaging materials correctly or reuse them to package other items.

The devices consist of a number of different materials which must all be disposed of in specific ways. 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, retired devices are not designed for disposal in communal recycling centres.

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8 Operating and display elements in the device head

8.1 Overview and explanation

The operating and display elements are housed inside the device head. In addition to a 4-figure, 7-segment display, the device head features two LEDs and three push-buttons.

4-digit, 7-segment display

The 4-digit, 7-segment display shows the present measured value and simultaneously serves to parametrise the device.

Status indicators for switching points

The device features two switching points. The operating status of each switching point is indicated by an LED. If a switching point is activated, the supply voltage can be measured at the corresponding connection of the M12 plug connector (PNP action). At the same time, the corresponding LED also lights up. If the switching point is not activated, the LED does not light up and there is therefore no voltage to be measured at the corresponding switching point's output.

Keys

The device is parametrised to the desired settings using three keys: ⊕, ⊖ and Ⓟ. The ⊕ key generally serves to increment values and to navigate upwards in the parameter menu. The ⊖ key serves to decrement values and to navigate downwards. The Ⓟ key is primarily used to confirm settings. For information on the keys' precise functions for respective operating modes, please consult the section on operating the transmitter.

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8.2 Display in measuring mode

When in measuring mode, the the behaviour and content of the 4-figure, 7-segment display indicates the operating range of the process – and therefore also of the device.

Within the measuring range

Display sequence	Description	Meaning
	**Display alternating between measured value and unit**	**The current measured value is located within the operating thresholds set for the transmitter. The output current is proportional to the measured value. The transmitter is operating in its optimal working range.**

Outside of the measuring range

Display sequence	Description	Meaning
	**Display alternating between measured value and unit; measured value blinks flashes quickly twice**	**The current measured value is located outside of the operating thresholds set for the transmitter. The transmitter has left its optimum working range. The output current continues to follow the measurement signal up to the current limit.**

	The transmitter allows a shortfall of approx. 1.25% (3.8mA) of the measuring range set and an excess of 3.125% (20.5mA). The output signal follows the present turbidity value. Outside these thresholds, the transmitter begins current limitation.

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9 Operating mode in delivery state

In its delivery state, the device is in the NTU* mode. When the transmitter leaves the factory, it is calibrated to a measuring range of 0 to 4000 NTU*. This measuring range is mapped in a linear manner on the loop current of 4…20mA.

An NTU* value of 4000 corresponds to a fat content of around 0.3%. For a medium with a higher fat content, the device must be switched into reference point mode. The procedure for doing so is explained in the chapter on device operation.

Both of the device's switching points are deactivated on delivery.

*The device is calibrated using NTU Standard (Formazin solution). The measurement procedure of the TURBIMESS NG is close to the NTU measurement procedure.

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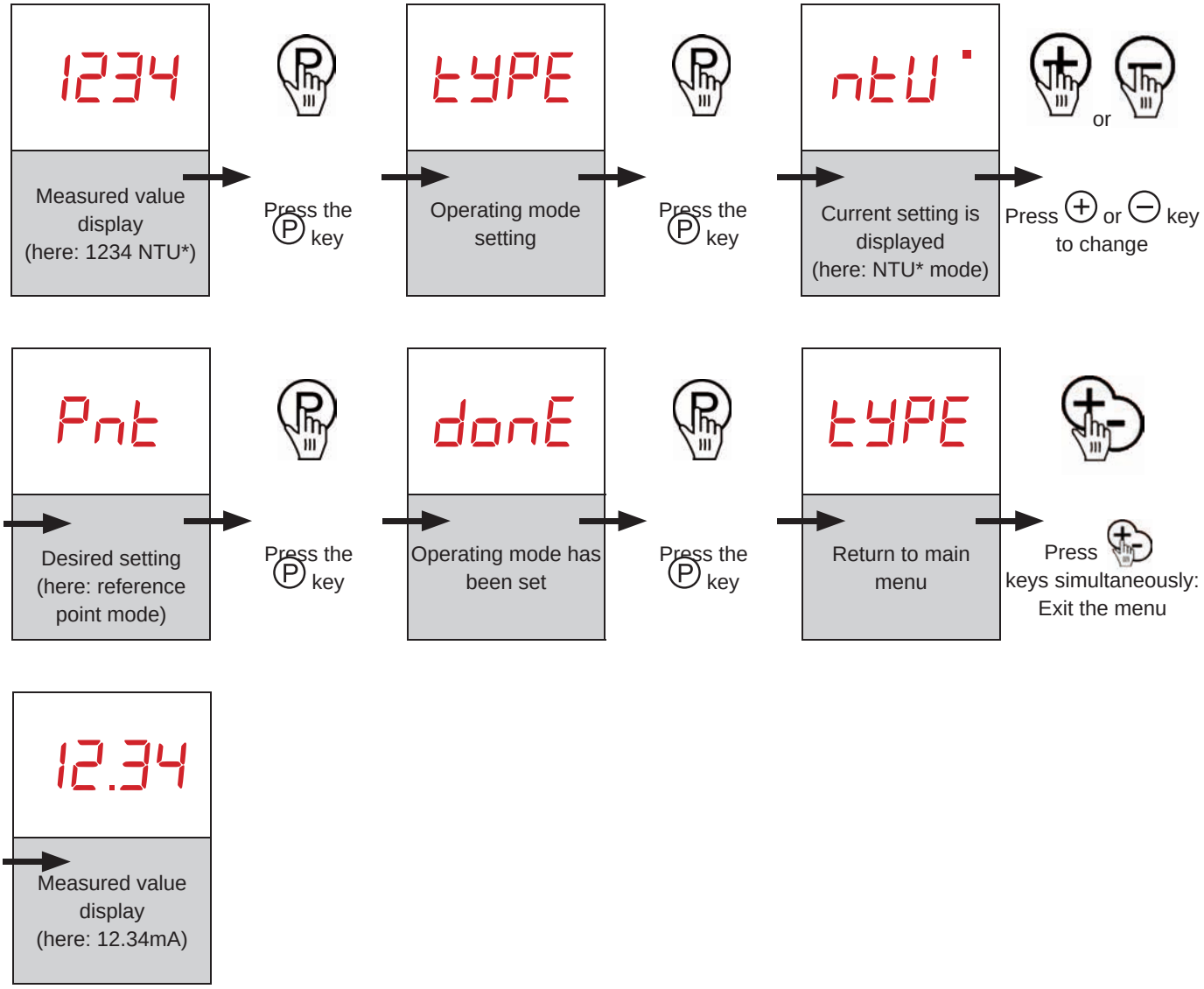
10 Operation

10.1 Changing the operating mode

In both NTU* mode and reference point mode, the operating mode can be switched in the first parameter of the main menu. To change the operating mode, proceed as follows:



Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

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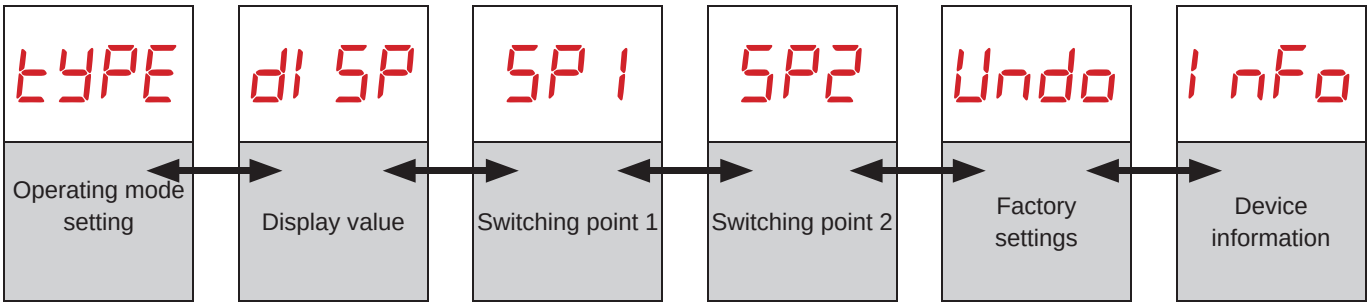
10.2 NTU* mode

In NTU* mode, the transmitter maps a turbidity value from 0 to 4000 NTU* in a linear manner on the loop current of 4…20mA.

Within this measuring range, two switching points can be freely configured independent of one another. A switching point can be entered either as an NTU* value or as an output current. There is also the option of setting the current value as a switching point.

In NTU* mode, the main menu is structured as follows:



*The device is calibrated using NTU Standard (Formazin solution). The measurement procedure of the TURBIMESS NG is close to the NTU measurement procedure.

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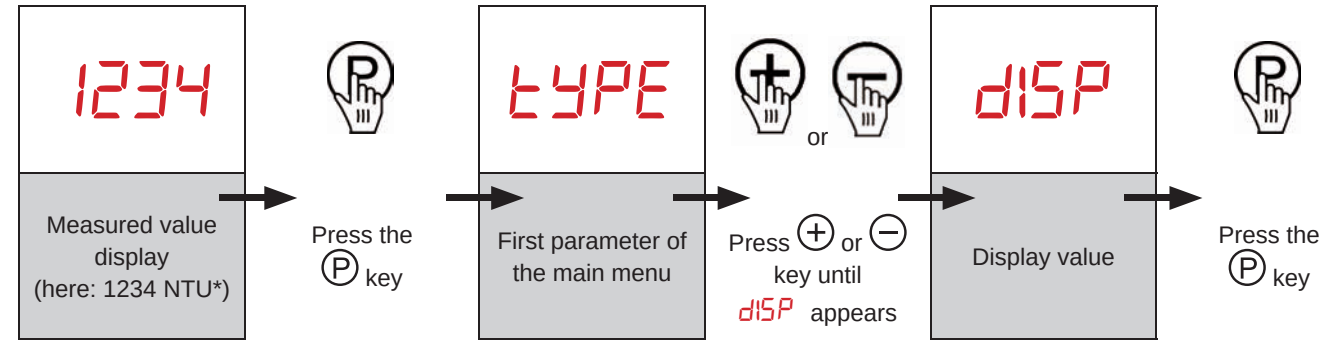
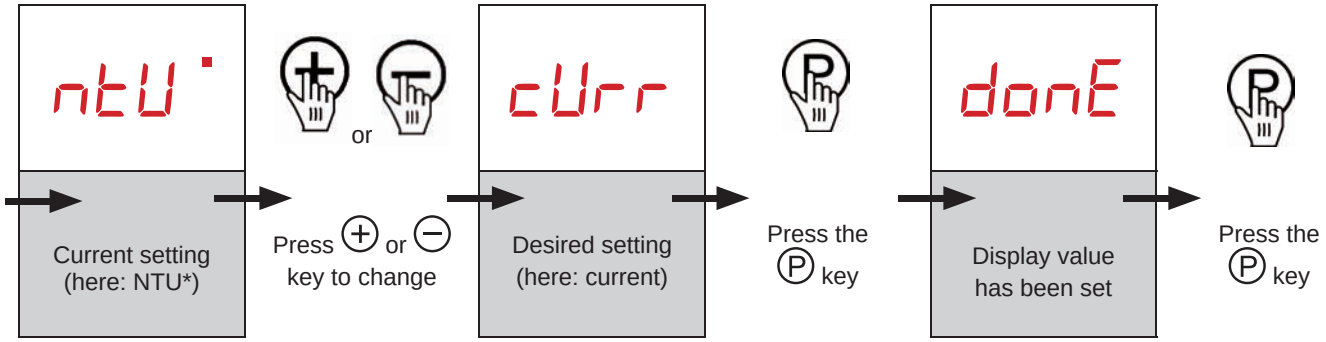
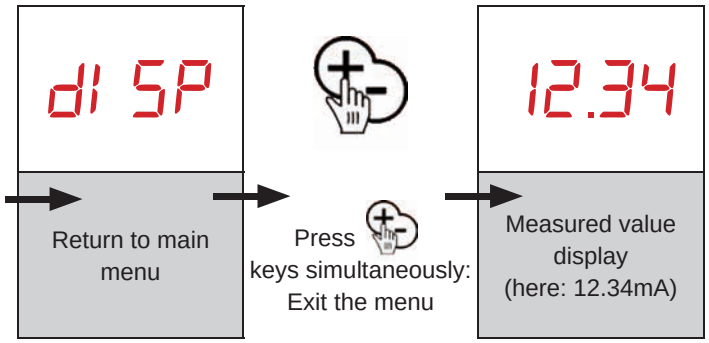
10.2.1 Changing the display value

In NTU* mode, you can select to display either the measured NTU* value or the present loop current. To change the display value, proceed as follows:







Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

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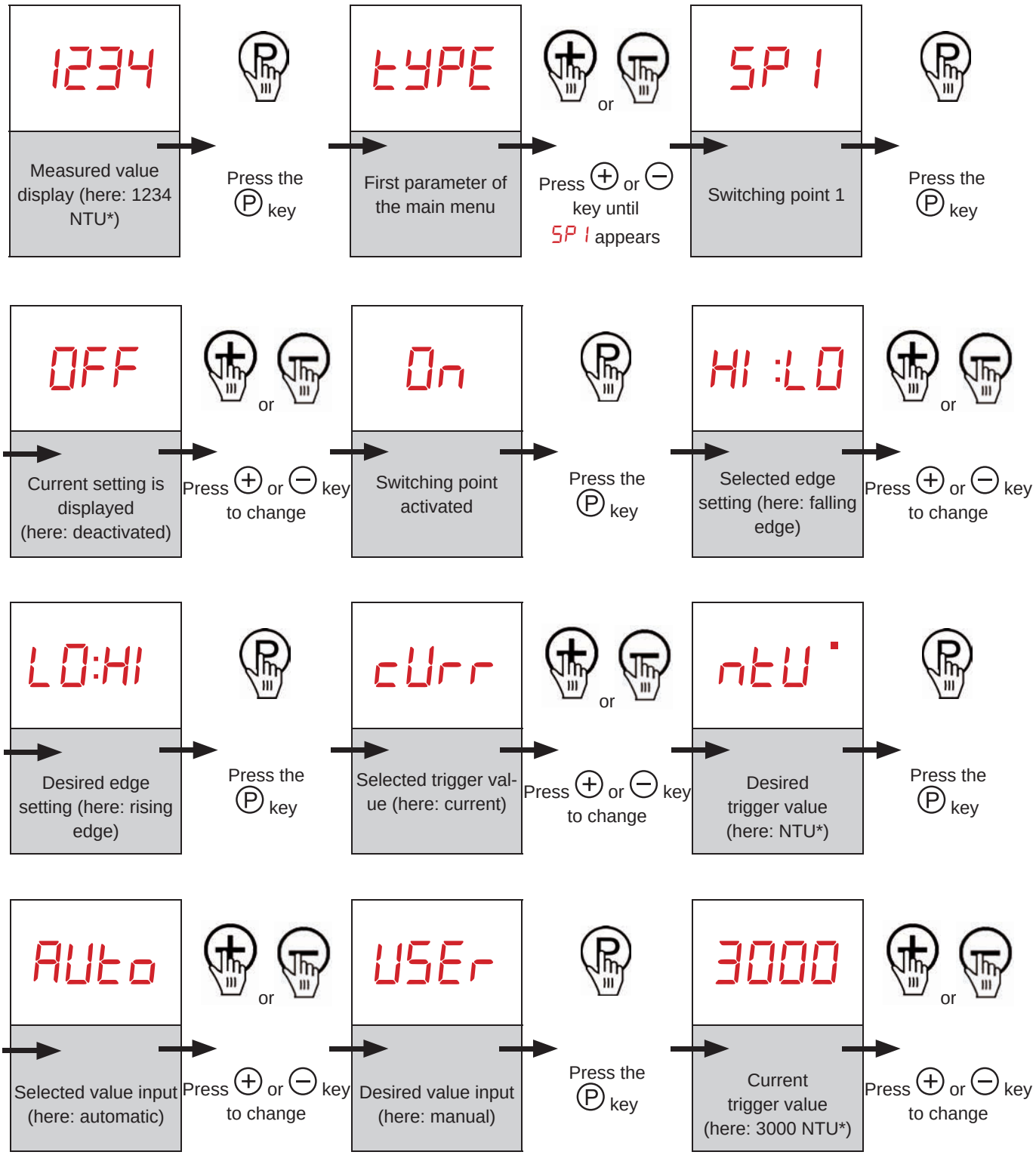
10.2.2 Manually setting a switching point to specific NTU* value

To manually set a switching point by defining an NTU* value, proceed as follows (here: shown taking switching point 1 as an example – procedure is identical for switching point 2):



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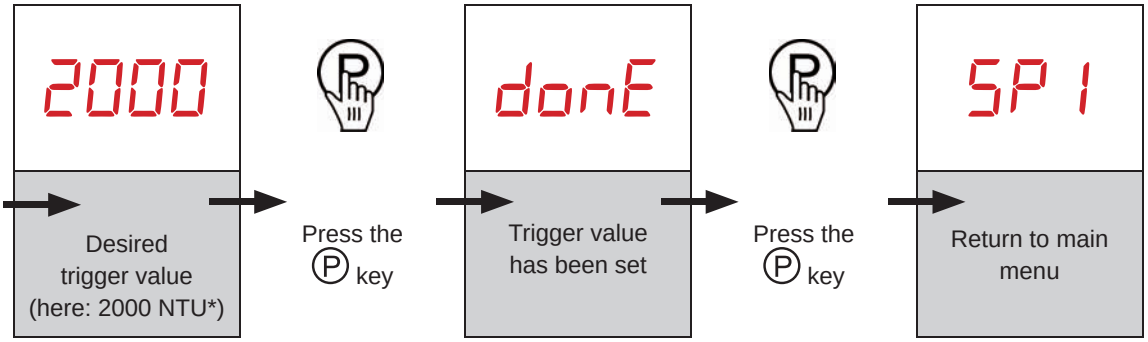

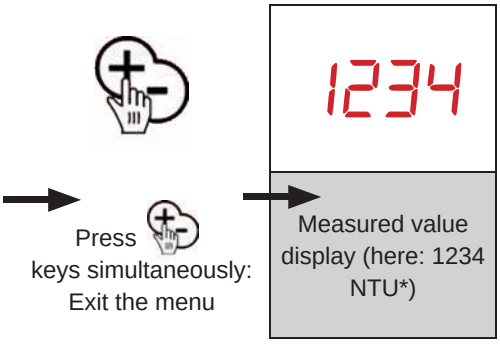

Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

	The maximum configurable NTU* value is 4000.

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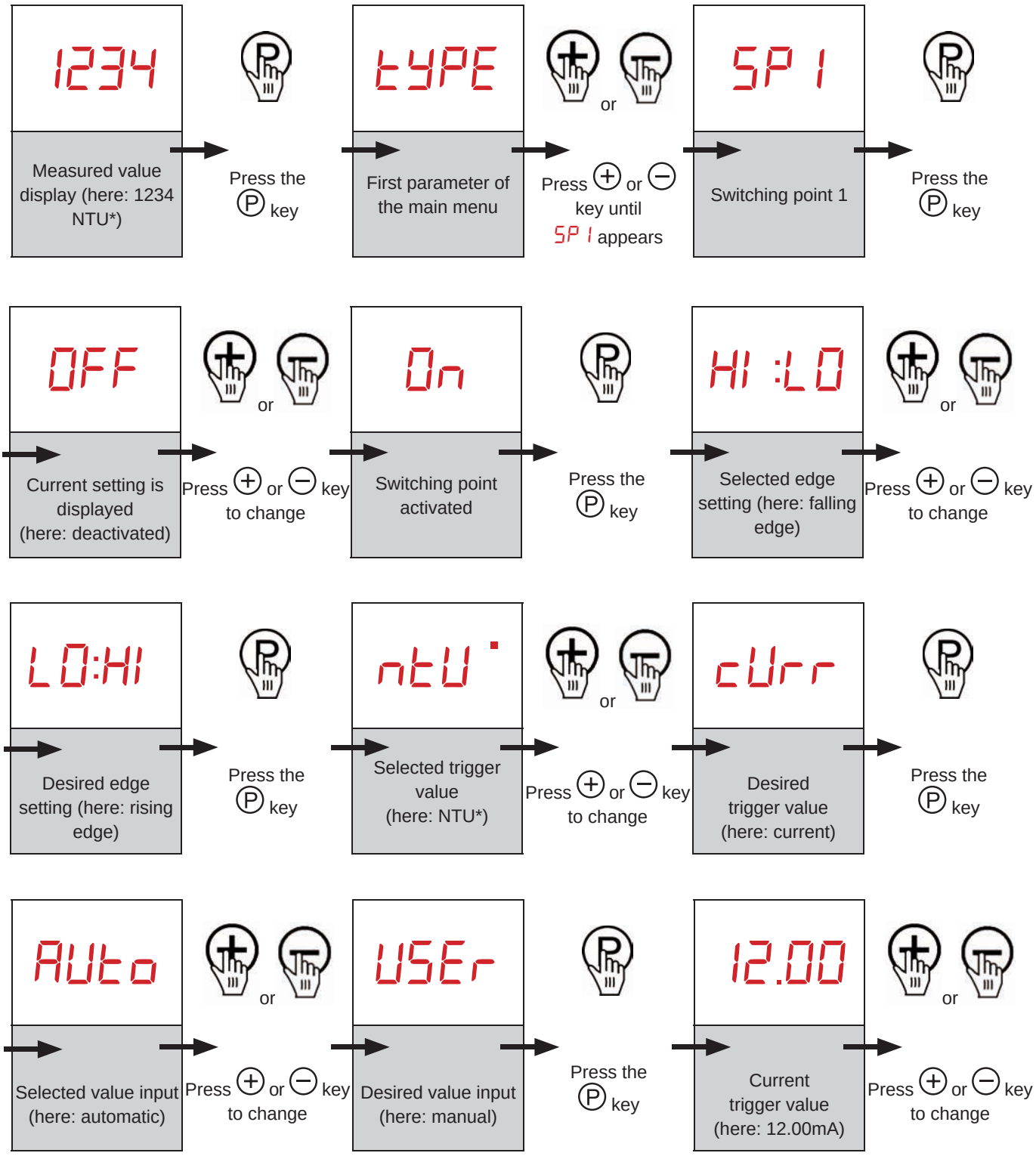
10.2.3 Manually setting a switching point to loop current

To manually set a switching point by defining an loop current, proceed as follows (here: shown taking switching point 1 as an example – procedure is identical for switching point 2):



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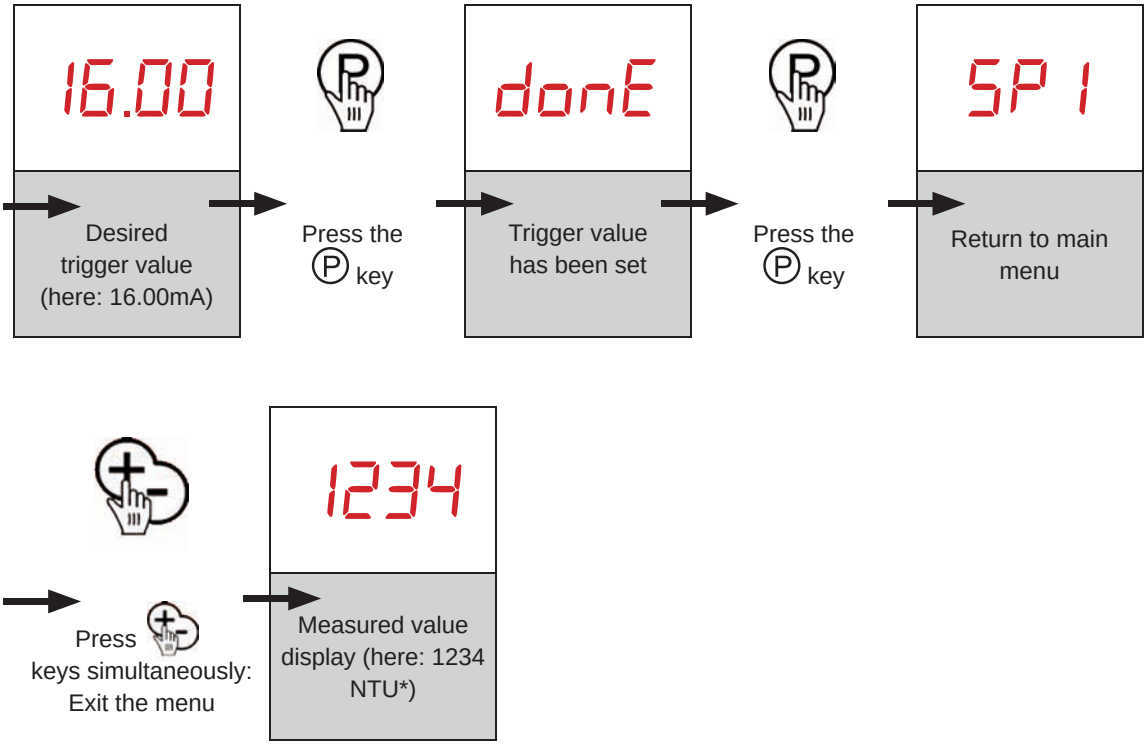

Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

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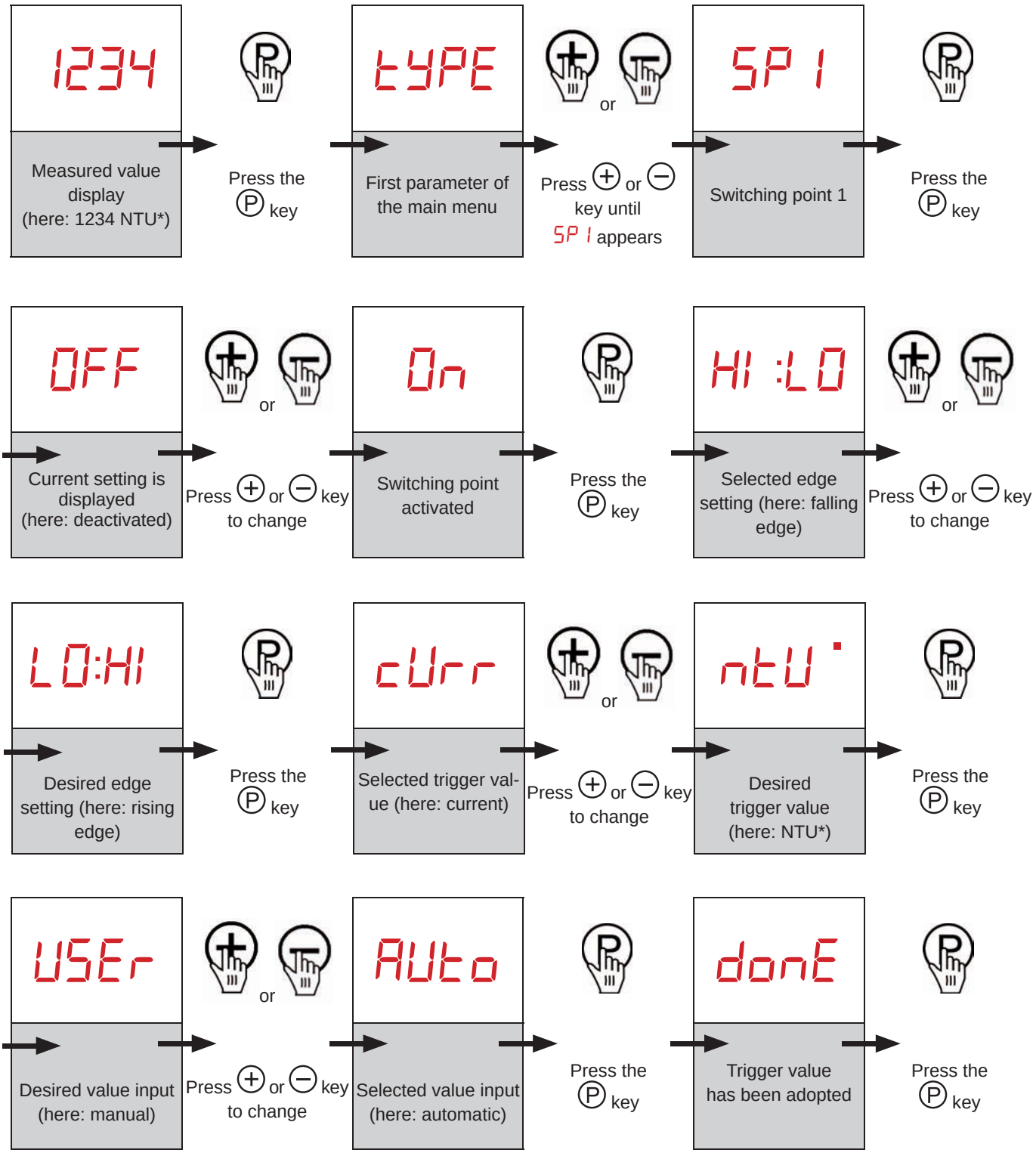
10.2.4 Automatically setting a switching point to present NTU value*

To automatically set a switching point by adopting the present NTU* value, proceed as follows (here: shown taking switching point 1 as an example – procedure is identical for switching point 2):



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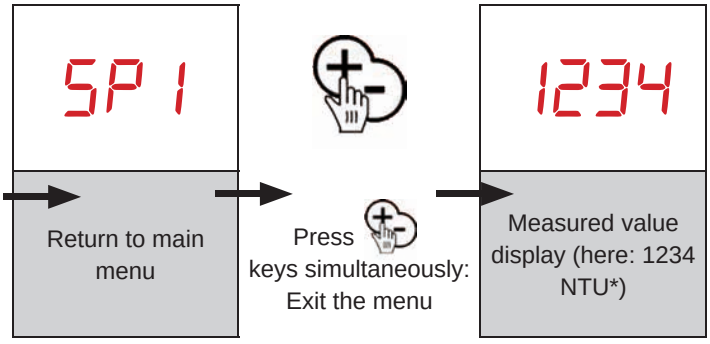

Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ()simultaneously.

	If, instead of donE, the FAIL error message is displayed, the transmitter is not able to adopt the present value. The present measured value is outside of the factory-set thresholds for the device.

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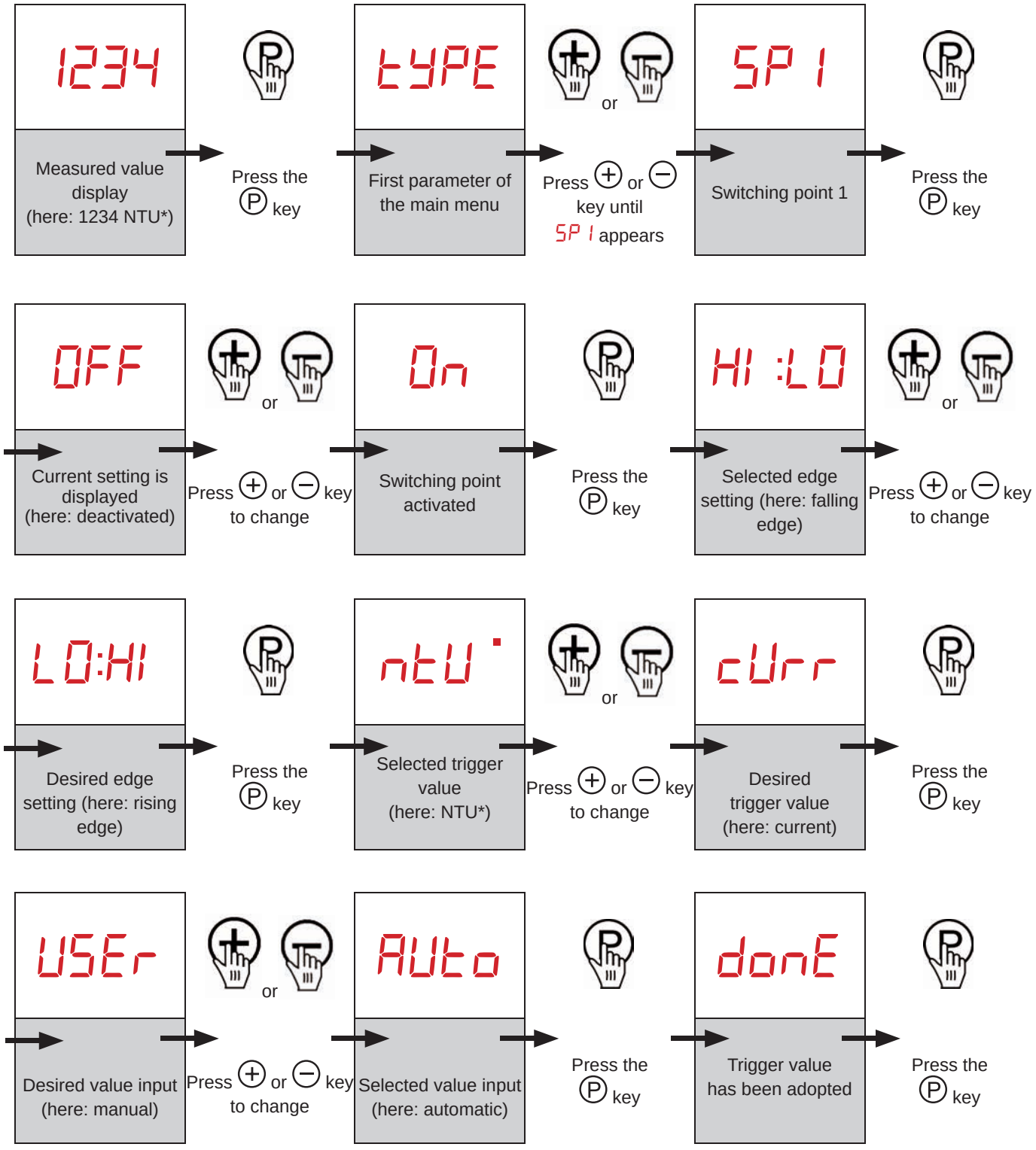
10.2.5 Automatically setting a switching point to present loop current

To automatically set a switching point by adopting the present loop current, proceed as follows (here: shown taking switching point 1 as an example – procedure is identical for switching point 2):



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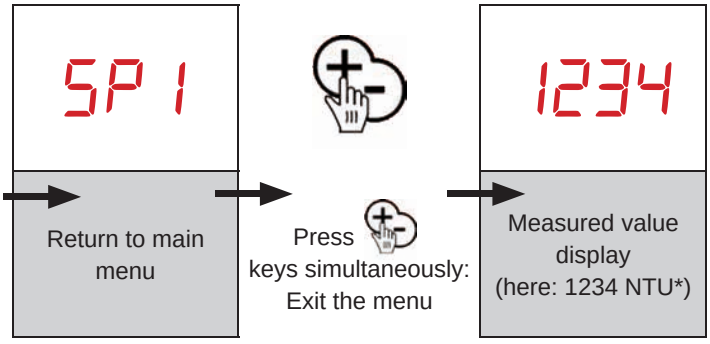

Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

	If, instead of donE, the FAIL error message is displayed, the transmitter is not able to adopt the present value. The present measured value is outside of the factory-set thresholds for the device.

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10.3 Reference point mode

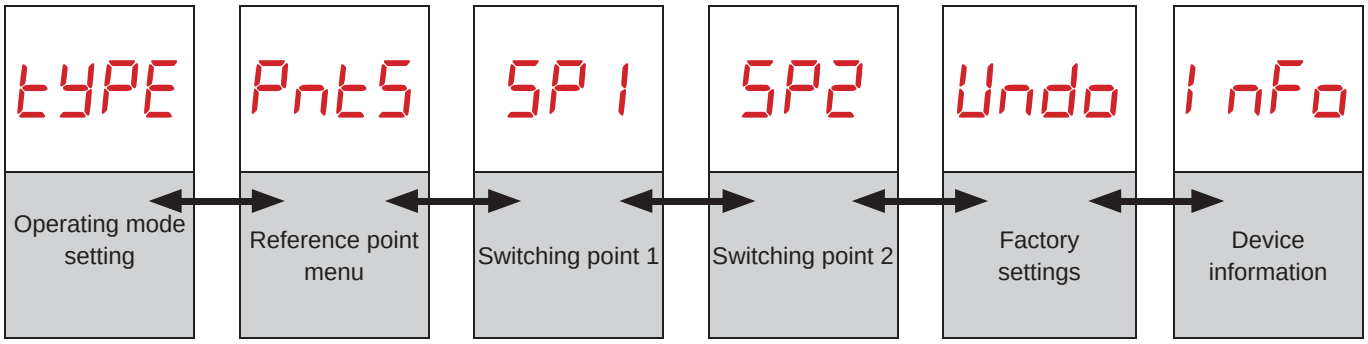
In reference point mode, freely configurable reference points can be set on the device. The start and end points are given by the loop current of 4…20mA. Reference points are set in between these values at small intervals connected in a linear manner.

Reference points can be viewed, replaced, added, edited or deleted. The number of points ranges from a minimum of two to a maximum of nine; in the factory settings, when changing from NTU* mode to reference point mode, the calibration points for 0, 1000 and 4000 NTU* serve as the reference points. You can replace or change these by adding your own reference points. When entering a reference point, the present measured turbidity value is adopted and assigned to a specific loop current.

A reference point's loop current can also be edited at a later time.

Within the measuring range, two switching points can be freely configured independent of one another. A switching point can be set either by entering a specific loop current or by adopting the present value as the switching point.

In reference points mode, the main menu is structured as follows:



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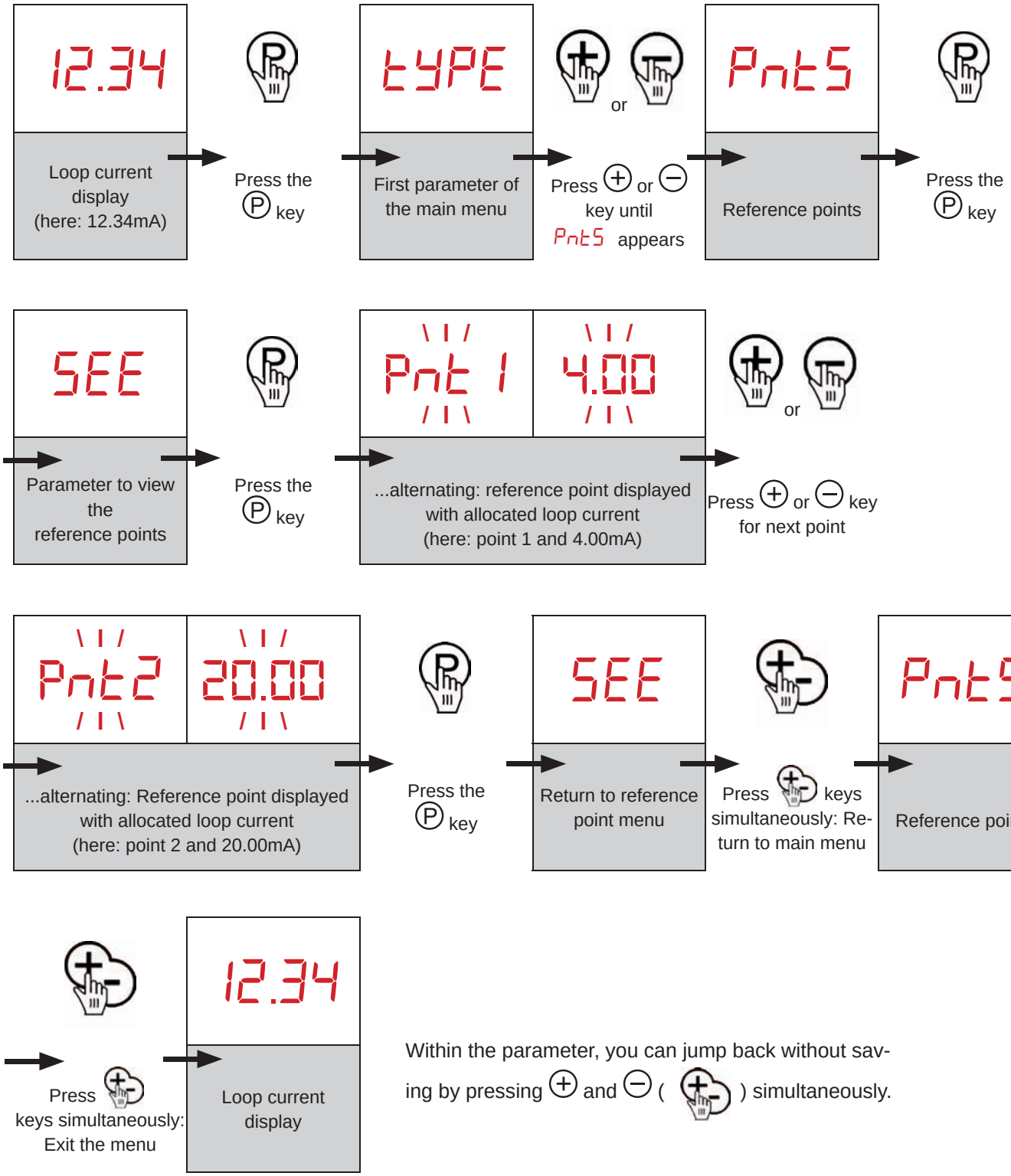
10.3.1 Viewing set reference points and their loop currents

To view the reference points that have been set, proceed as follows:



Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

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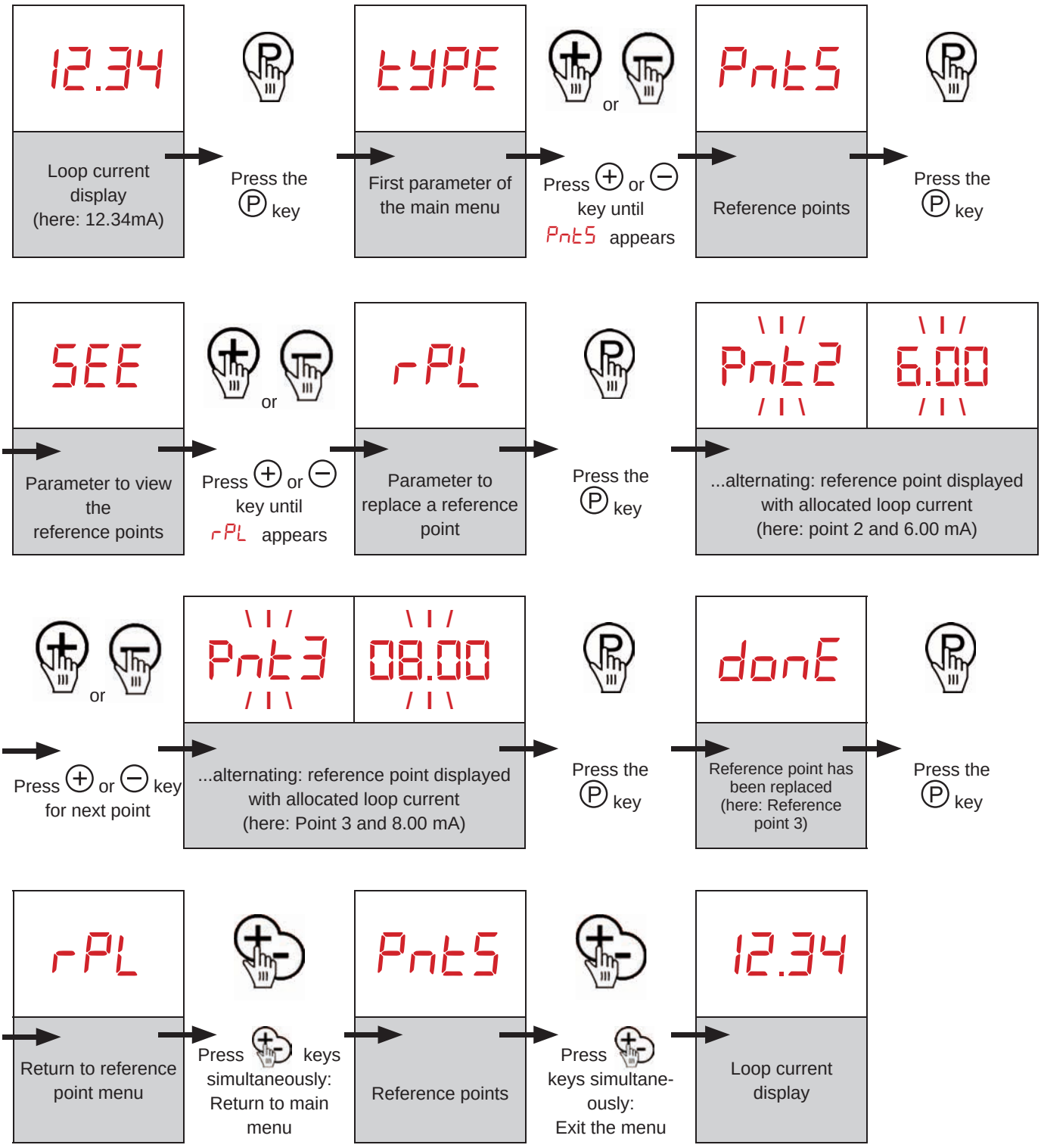
10.3.2 Replacing a reference point

Existing reference points can be replaced by new measured values. The new reference point is always the present value as measured by the transmitter – so you should introduce the desired medium before doing so. If the present value is between two reference points, you can choice of the two points to be replaced. To do so, proceed as follows:



Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

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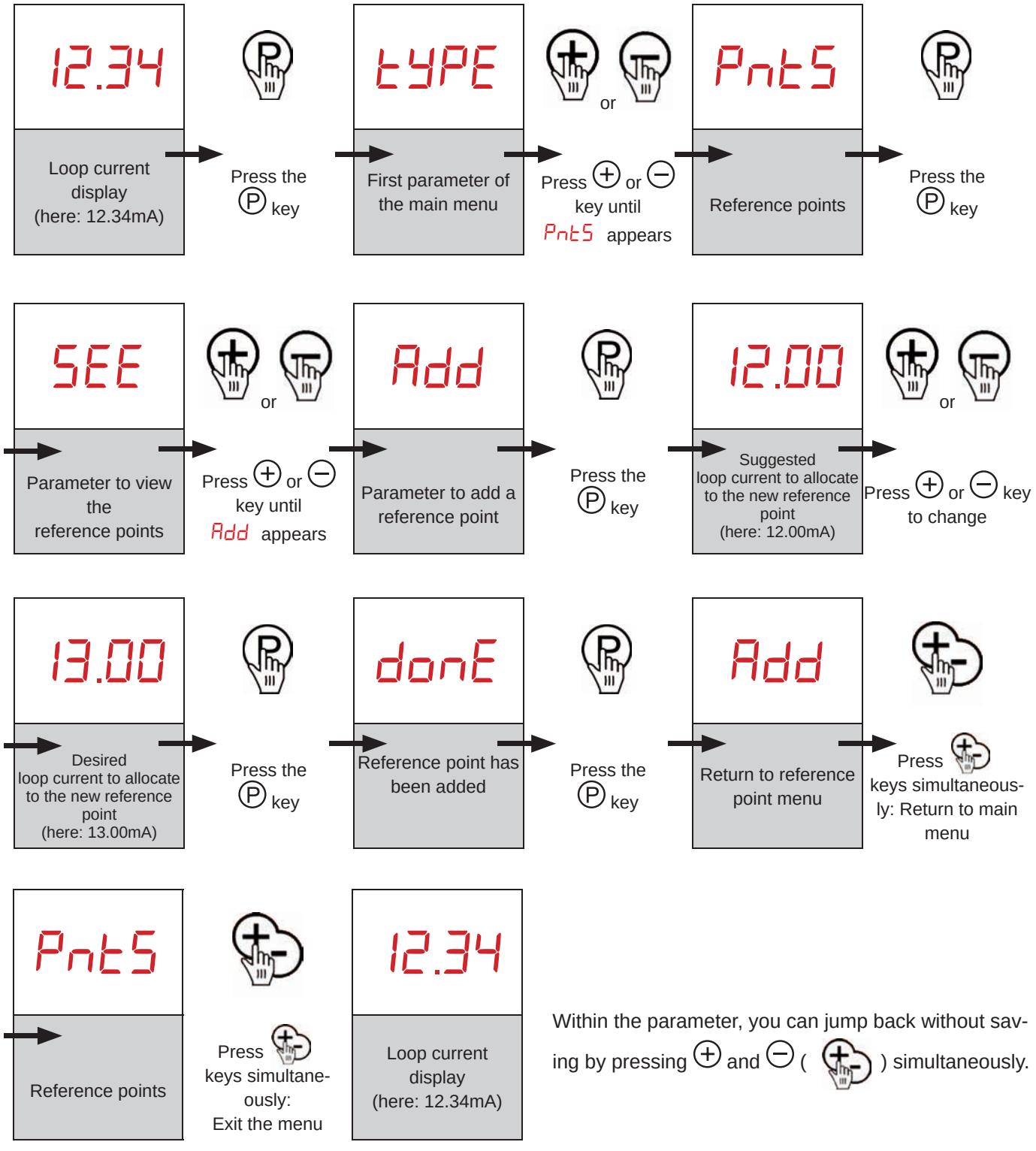
10.3.3 Adding a reference point

New reference points can be added in addition to to the existing reference points. The maximum permitted number of reference points is nine. The new reference point is always the present value as measured by the transmitter – so you should introduce the desired medium before doing so. Depending on the measured value and the reference points that have already been set in the transmitter, you can allocate the new reference point a loop current within the limits of the surrounding reference points. To do so, proceed as follows:



Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

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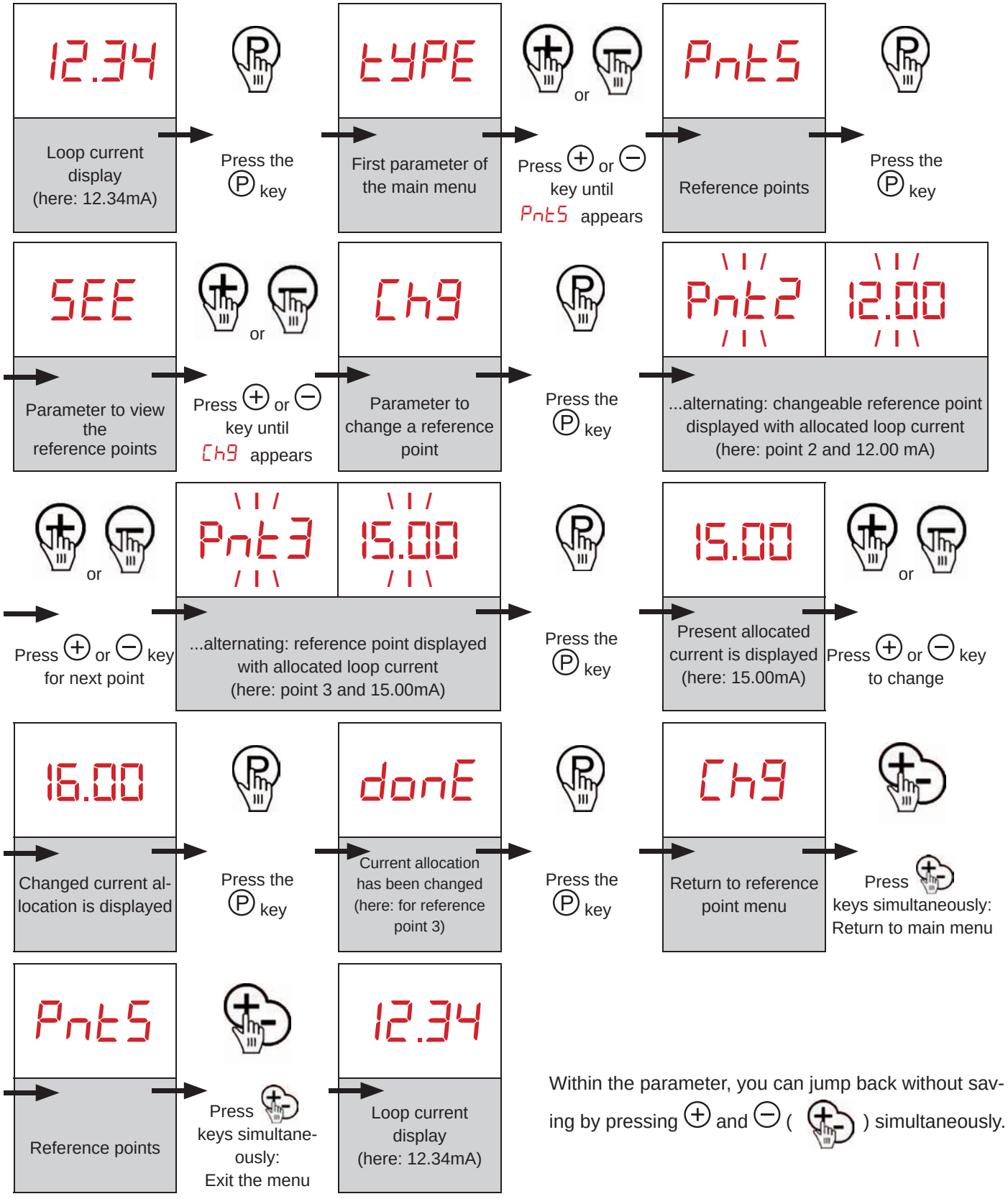
10.3.4 Changing a reference point

The currents allocated to existing reference points can be changed. Please note that the end points of 4.00mA and 20.00mA cannot be changed and, consequently, at least three reference points must be set for a point to be changed. To change existing current allocations, proceed as follows:



Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

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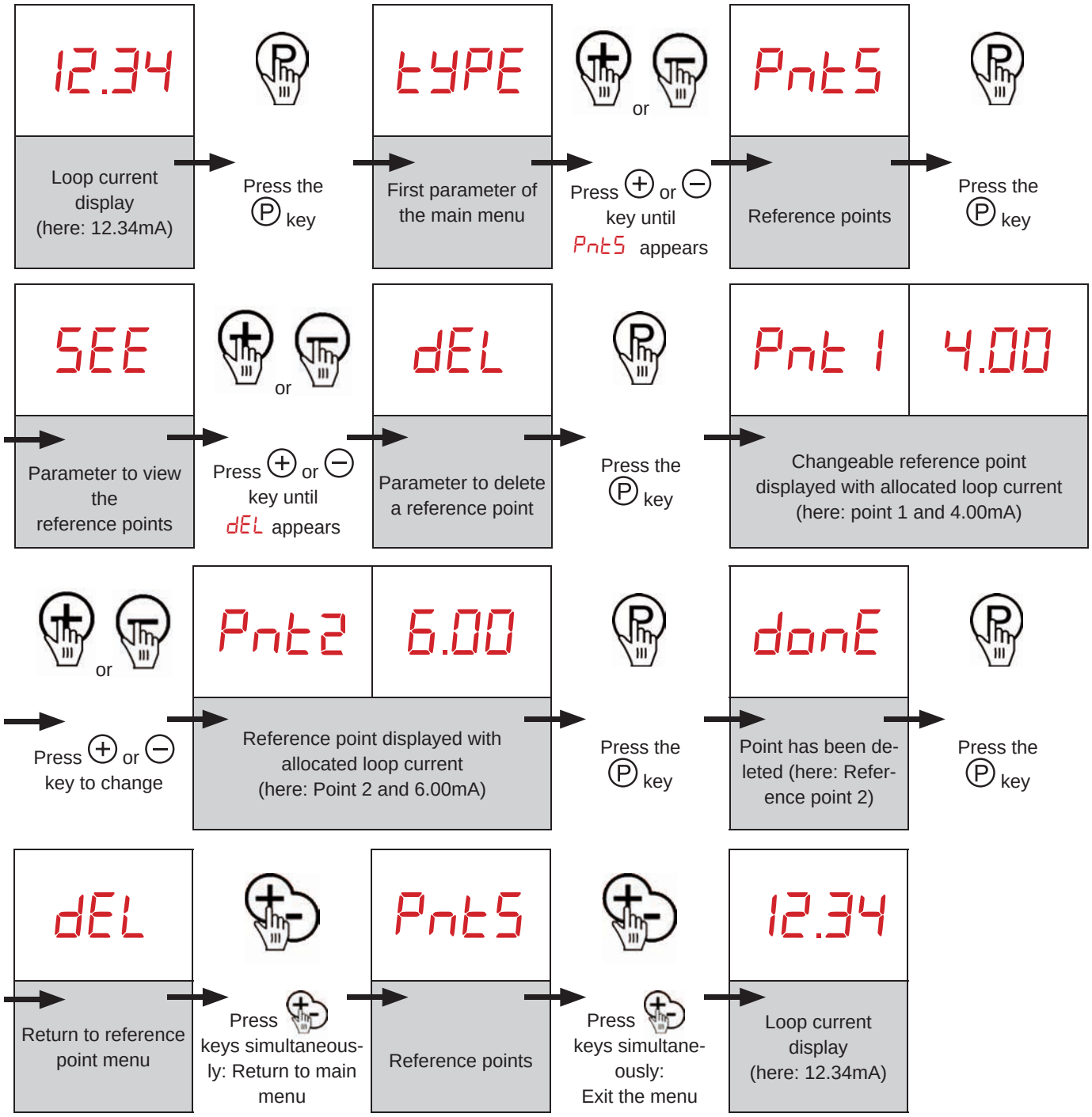
10.3.5 Deleting a reference point

Existing reference points can be deleted – provided at least two other reference points will remain. Reference points between 4.00mA and 20.00mA can be removed. If more than two reference points are present and one of the outer thresholds of 4.00mA or 20.00mA is to be deleted, the next closest reference point automatically shifts to take the place of the deleted threshold. To delete reference points, proceed as follows:



Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ (⊕⊖) simultaneously.

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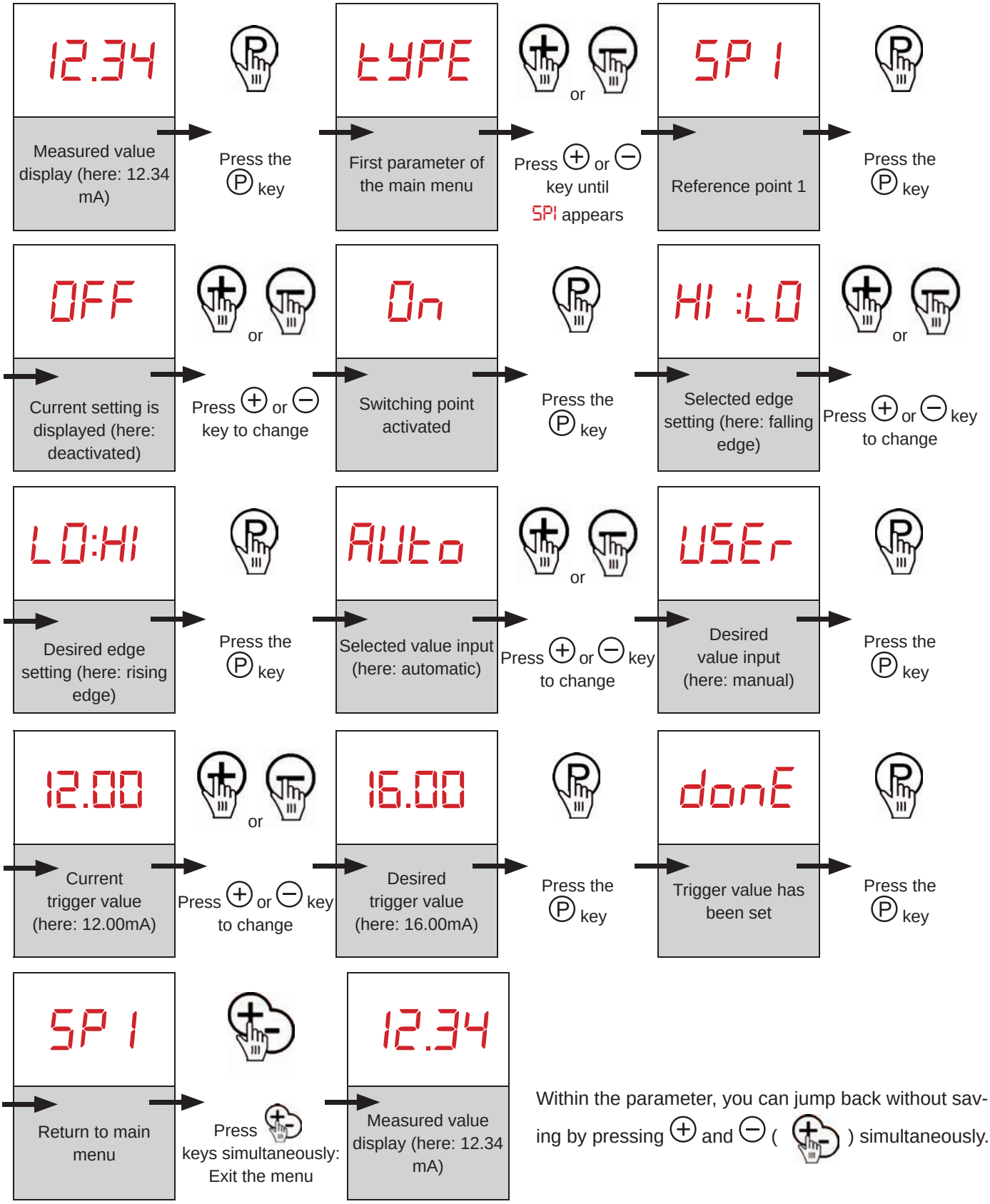
10.3.6 Manually setting a switching point to loop current

To manually set a switching point by defining an loop current, proceed as follows (here: switching point 1 taken as an example – procedure is identical for switching point 2):



Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

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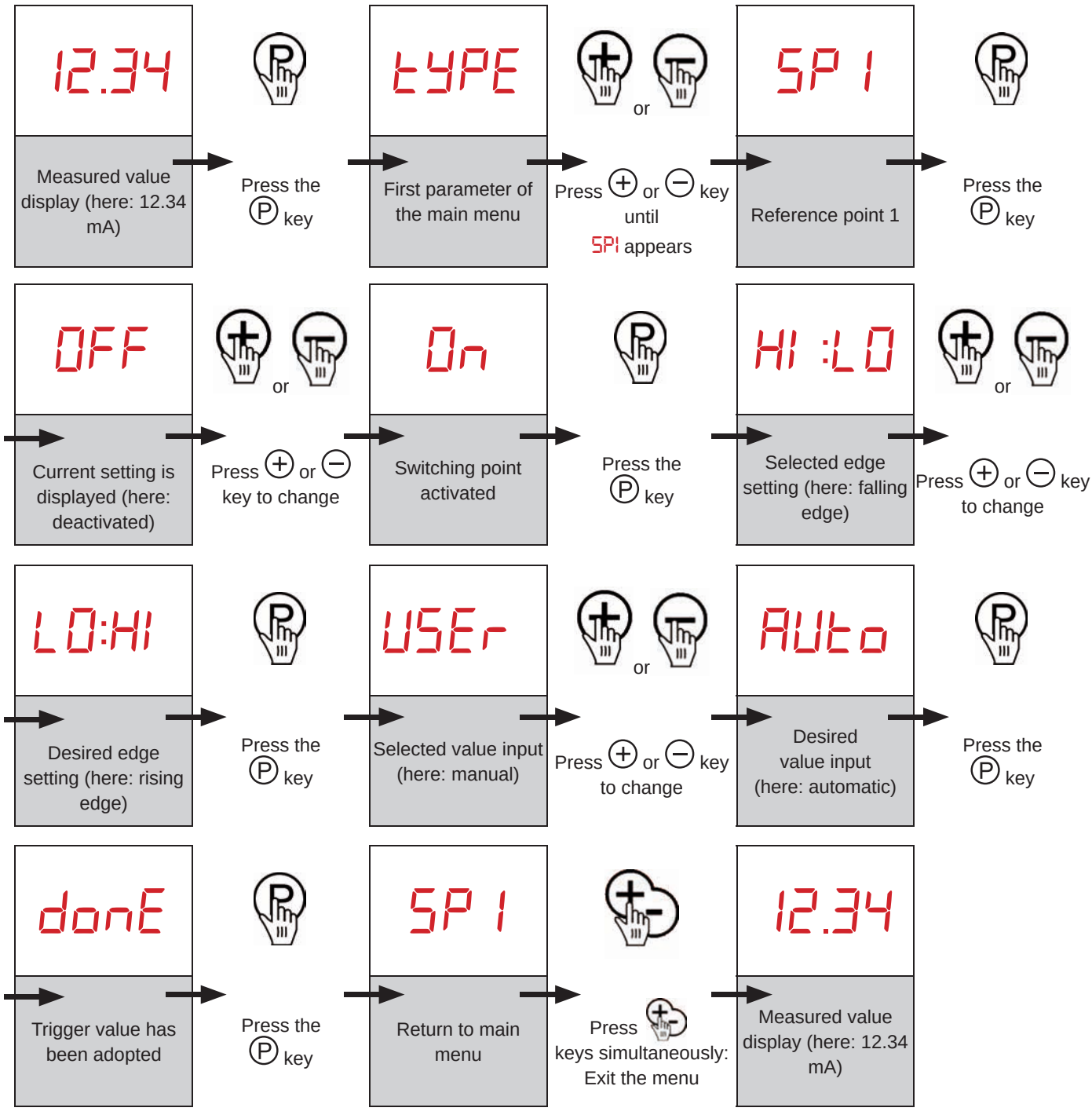
10.3.7 Automatically setting switching point to loop current

To automatically set a switching point by adopting the present loop current, proceed as follows (here: shown taking switching point 1 as an example – procedure is identical for switching point 2):



Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ (⊕⊖) simultaneously.

	If, instead of donE, the FAIL error message is displayed, the transmitter is not able to adopt the present value. The present measured value is outside of the factory-set thresholds for the device.

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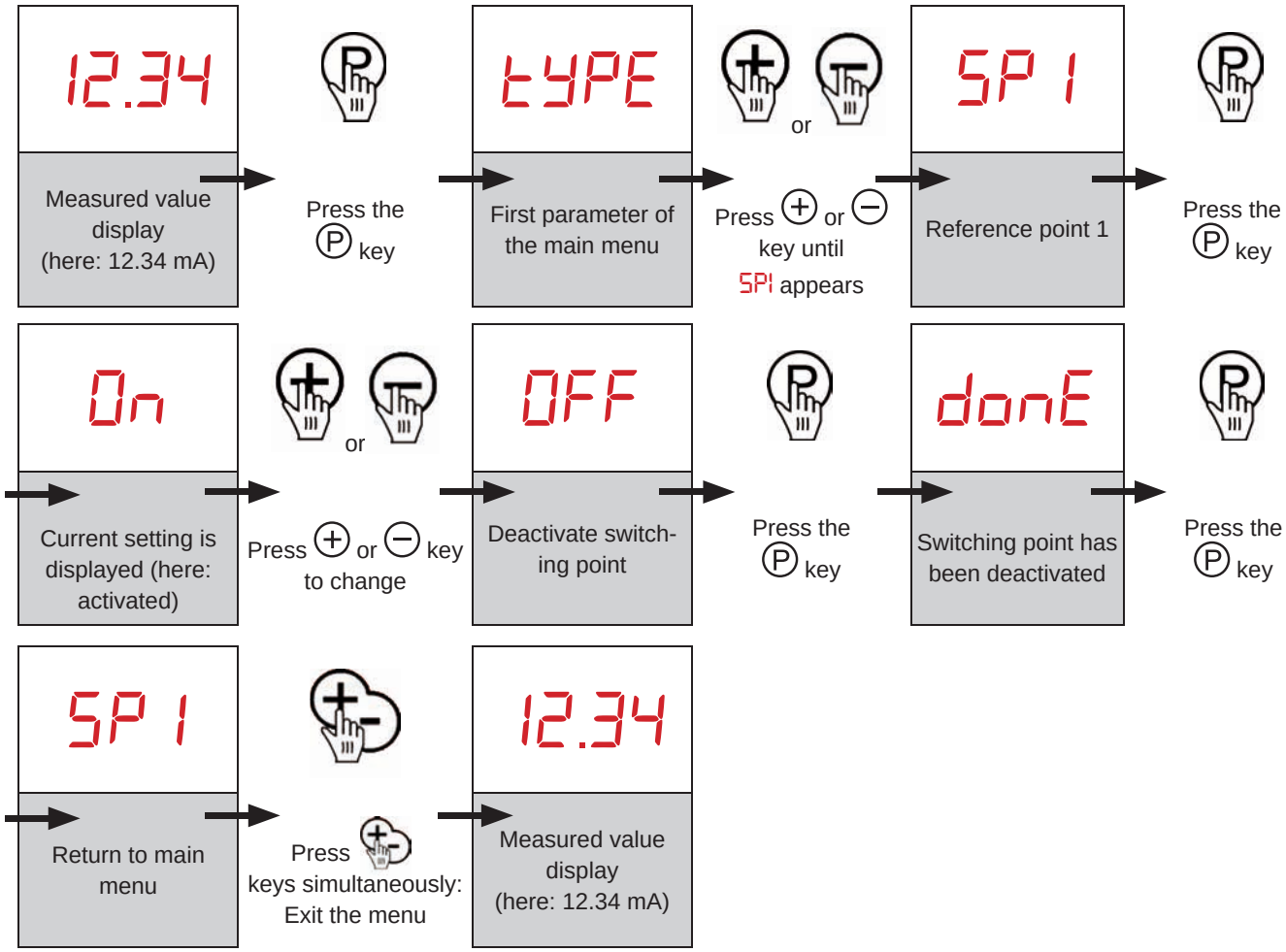
10.4 Reference point mode / NTU* mode: Deactivating a switching point

To deactivate a switching point, proceed as follows (here: switching point 1 taken as an example – procedure is identical for switching point 2):



Within the parameter, you can jump back without saving by pressing ⊕ and ⊖ ( ) simultaneously.

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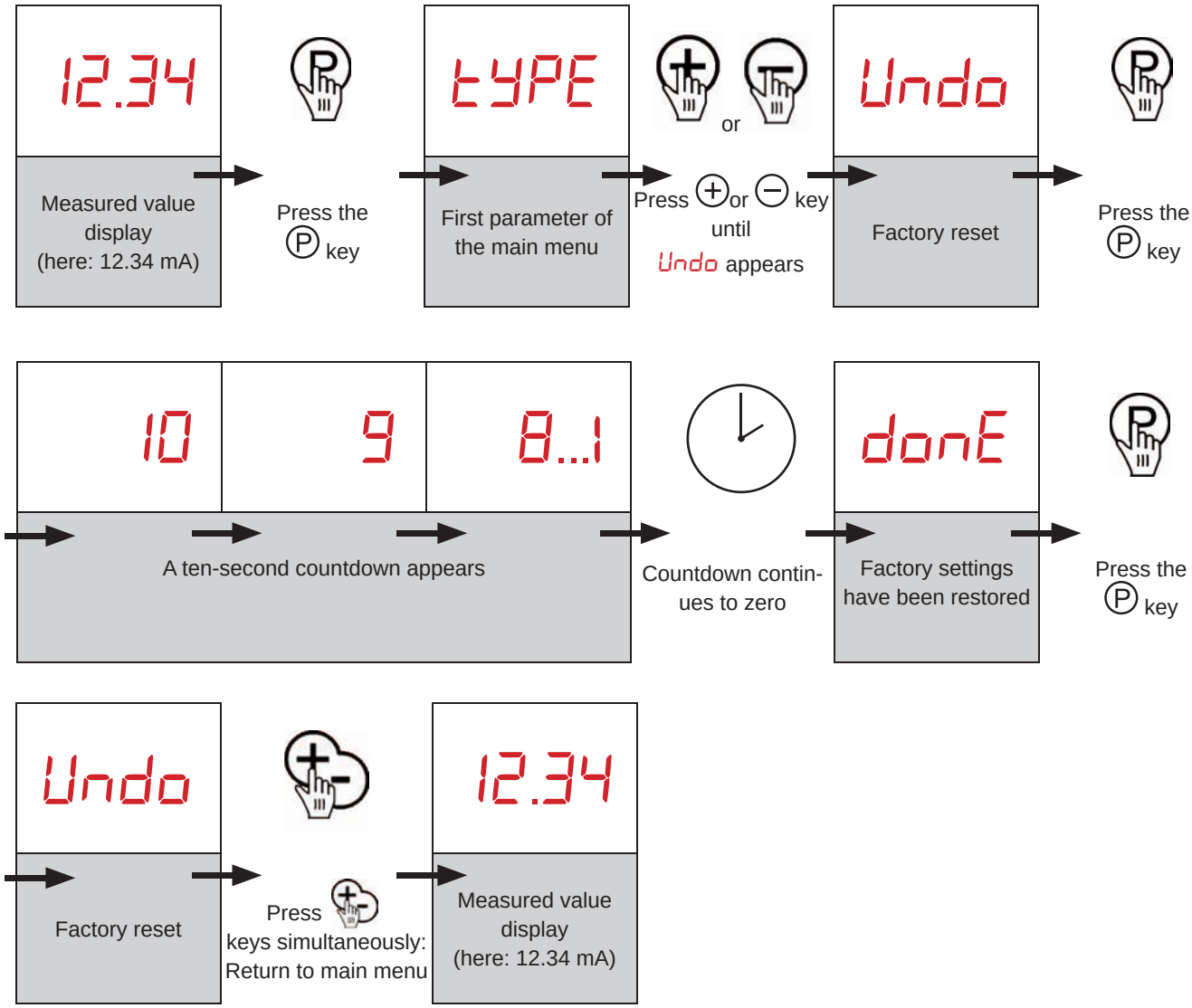
10.5 Restoring factory settings (factory reset)

The device features a function to reset all changes made and thereby return the transmitter to its delivery state. Please note that restoring the factory settings is a function that cannot be reversed. To perform a factory reset, proceed as follows:



The countdown can be aborted and the factory reset cancelled at any time by pressing any button – doing so returns the user to the main menu.

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10.6 Information parameters

The information parameters are summarised in the main menu under the InFo parameter. To open this parameter, press the (P) key. You can return to the main menu by pressing the (+) and (−) keys in at the same time. Use the (+) or (−) keys to navigate between the parameters. Pressing the (P) key opens the displayed parameter.

The following list provides an overview of the parameters and their functions.

Parameter	Description	Function
Edtn	Software edition	Displays the device's software edition. No settings can be changed here. To exit, press any button.
ntU*	NTU* calibration points	Indicates the calibration points used by the manufacturer for NTU* mode. The corresponding NTU* value determines the sensor voltage in mV. No settings can be changed here. To exit, press any button.
PntS	Reference points	Shows the sensor voltages of the calibrated points for reference point mode. The voltages are shown in mV. No settings can be changed here. To exit, press any button.
rUnt	Device run time	Displays the device run time in hours. No settings can be changed here. To exit, press any button.
dEg°C	Sensor temperature	Displays the temperature of the sensor in °C. No settings can be changed here. To exit, press any button.
U On	Light measurement	Displays the sensor voltage with the transmitter diode switched on. The voltage is shown in mV. The difference between the light and dark measurements is the result of the sensor signal used by the transmitter. No settings can be changed here. To exit, press any button.
U OFF	Dark measurement	Displays the sensor voltage with the transmitter diode switched off. The voltage is shown in mV. The difference between the light and dark measurements is the result of the sensor signal used by the transmitter. No settings can be changed here. To exit, press any button.
tESt	Sensor voltage current output	The present sensor voltage is shown as a loop current. 10,000mA to 20,000mA correspond to a sensor voltage of 0,000V bis 1,000V. An output current of 10,850mA corresponds to a sensor voltage of 85,0mV. No settings can be changed here. To exit, press any button. While the output does not reflect the loop current of the present configuration, the control system can interpret the current incorrectly. After leaving the parameter, the transmitter will resume operation as usual.

*The device is calibrated using NTU Standard (Formazin solution). The measurement procedure of the TURBIMESS NG is close to the NTU measurement procedure.

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11 Error diagnosis and remedy

Fault	Potential causes	Check / correction
Device does not start OR no current in the loop OR the display does not illuminate.	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 the supply voltage is being supplied by the supply line.
	The supply line has a broken cable.	
The current value is outside the range of 4...20 mA. OR measured values do not correspond to the process conditions	Sensor is measuring a turbidity value outside of the set measurement range.	Return the turbidity meter to its set measuring range.
	Medium-contacting density gauge is soiled.	Clean the medium-contacting density gauge. Under NO circumstances should you use abrasive cleaning agents or agents which could cause mechanical damage to the glass.

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12 Technical data and ordering information

TECHNICAL DATA

General details	
Device type	TURBIMESS NG
Measuring principle	Backscatter from transmitted emitted infra-red light beam
Input	
Measuring ranges	Factory setting: Linearised turbidity > 50 to 4000 NTU* 9 freely configurable reference points *Configuration using NTU Standard, measurement procedure approximated
Maximum process pressure	PN16
Output	
Output signal	4…20mA, 2-wire
Signal range	3.8...20.5mA as per Namur NE043
Fault signal	22mA
Switched output	2x PNP, each of max. 50mA Factory setting: Not activated
Measuring accuracy	
Accuracy	± ≤ 0.2% from measuring range end value
Reproducibility	± ≤ 0.1% from measuring range end value
Thermal influence	± ≤ 0.2% / K from measuring range end value
Setting time after input leap	≤ 3s
Activation time	< 2s (The device will carry out a self-test.)
Conditions of use	
Installation position / calibration position	Optimal installation position is in risers (ascending pipes) or, if not possible, to the side of other pipes (to avoid product residues and incorrect measurements due to gas bubbles); device must not be installed in downpipes (descending pipes).
Medium temperature	0...125°C / up to 150°C for brief periods (max. 30 mins)
Ambient/storage temperature	-10...85°C
Protection class acc. to EN60529	IP 67
Electromagnetic compatibility	acc. to DIN EN 61000 and DIN EN 61326-1
Construction	
Electrical connection	Round plug-in connector M12x1, 5-pin, nickel-plated brass (stainless steel available on request)
Process connection	- Clamp connection acc. to DIN 32676, DN50/2" - Varivent flange Type F (d50) and Type N (d68) - Conical couplings with groove union nuts acc. to DIN 11851, DN50 and DN65 *>> Scope of delivery not incl. seals and, where applicable, clamps*
Materials	- Field housing / lid: Stainless steel 1.4301 (AISI 304) - Inspection gauge in lid: Polycarbonate (PC) - Housing seal: FPM (Viton®) - Process connection / connection adapter: Stainless steel 1.4404 (AISI 316L) - Medium-contacting density gauge: Sapphire glass - Seal on gauge: Silicone rubber, approved by FDA
Weight	approx. 1.5kg
Display and operation	
Display	4-figure, 7-segment display, incl. decimal point, 2x status LED for switching points
Operation	3 input keys
Auxiliary energy resources	
Power supply / burden	24...30V DC, max. burden: 600 Ω
Accessories	
Certificates	EG Declaration of Conformity Conformity acc. to Regulation (EC) 1935/2004 Acceptance test certificate 2.2 in acc. with EN 10204 for parts which come into contact products
Recommendation	
We recommend calibrating the device regularly. The device must be returned to use for this purpose.	

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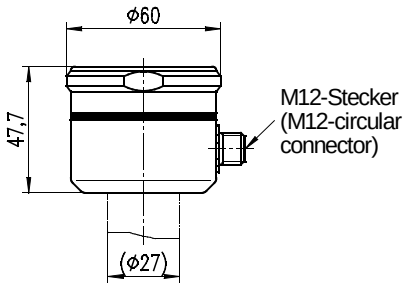
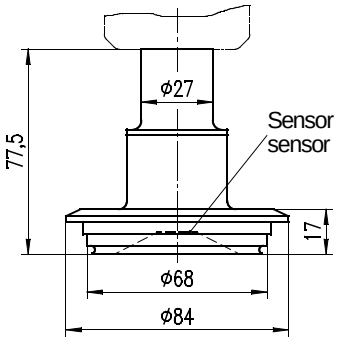
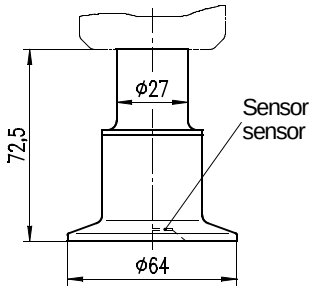
DIMENSIONAL DRAWINGS for TURBIMESS NG (dimensions in mm)



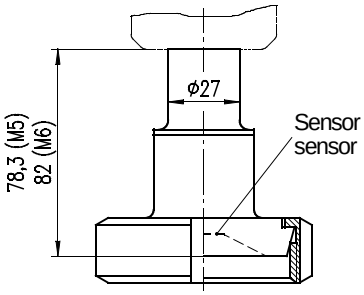
Prozessanschlussadapter: (weitere Ausführungen auf Anfrage)
adapters for process connection: (other constructions on request)



VARIVENT-Flansch Ø68 (V8)
VARIVENT-flange Ø68 (V8)



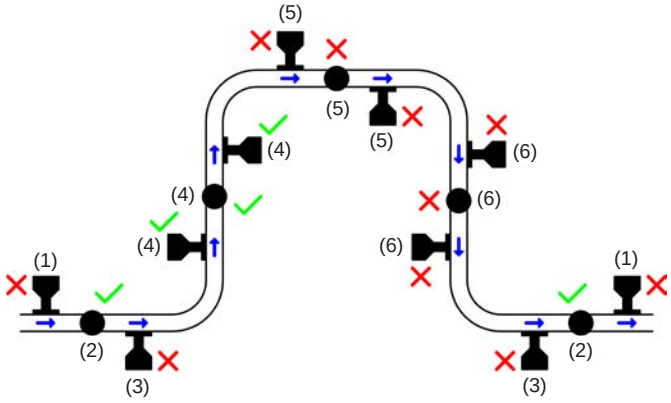
Clamp DIN 32676-DN50 / 2" (C5)



Kegelstutzen DIN 11851
conical nozzle DIN 11851
DN50 (M5), DN65 (M6)

INSTALLATION POSITION OF THE TURBIDITY METER

The following overview shows both favourable transmitter installation positions and those that should be avoided:



Installation on the side of the pipe (2) should be favoured. The device can be installed in any position in risers (4).

If possible, the transmitter should not be installed vertically on the pipe (1) as gas bubbles could collect in the curved section of the density gauge, which would affect the backscatter of light. Installing the device below the pipe (3) is also not recommended because, depending on the medium, deposits can form on the density gauge over time.

If possible, avoid installing the device in elevated pipe sections (5) where it cannot be ensured that the pipe is always completely full. In such cases, however, installation on the side of the pipe should again be favoured.

Installation in downpipes (6) should also be avoided as it cannot be ensured that the pipe volume flow is at full capacity at all times. The device can, however, be installed at any point around sections of pipe.

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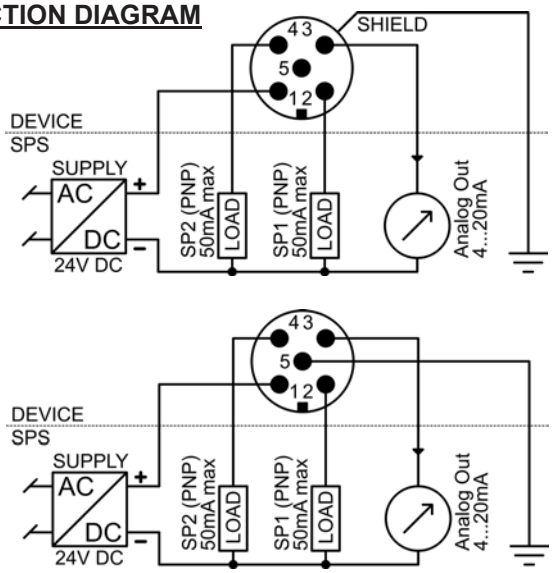
CONNECTION DIAGRAM



- Connection when earthing is ensured at installation location (e.g. earthed stainless steel tank)
- When connection cable features earthed shielding. The shield must be connected to the housing of the M12 connector by an electrical connection.

Alternatively: Earth pin 5 at the supply point.

ELECTRICAL CONNECTION

Pin 1: Positive supply (24…30V DC)

Pin 2: PNP switched output SP1, 50mA max.

Pin 3: Negative supply and current measurement output (4…20mA)

Pin 4: PNP switched output SP2, 50mA max.

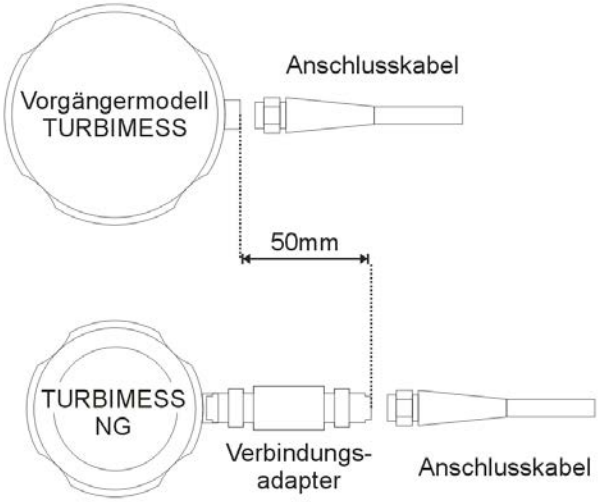
Pin 5: Earth (use only if no earth connection at installation location or via cable shielding)

Note:
If neither switching point is used, the loop current can also be measured in the forward conductor (pin 1); otherwise, the current must be measured in the return conductor (pin 3).

COMPATIBILITY AND ADAPTION OF PREVIOUS MODEL

The measuring characteristics of the TURBIMESS NG turbidity sensor is similar to those of its predecessor, the TURBIMESS. Scaling and switching thresholds may therefore require adjustment.

The TURBIMESS NG (2-wire) can use the electrical connection of its predecessor, the TURBIMESS (3-wire) by simply inserting a connection adapter (Z-AEL1FTNG). The adapter extends the supply cable by 50mm. It is not possible to connect the adapter incorrectly.



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ORDERING INFORMATION for TURBIMESS NG

Process connection	
C5	Clamp connection acc. to DIN32676, DN50/2"
V5	Varivent flange Type N, d50
V8	Varivent flange Type N, d68
M5	Conical couplings with groove union nuts acc. to DIN 11851, DN50
M6	Conical couplings with groove union nuts acc. to DIN 11851, DN65

Measuring range	
HF	High turbidity levels

TURBIMESS NG_ [ ] [ ]

ORDERING INFORMATION for TURBIMESS NG accessories (please order separately)

	Item number
Adapter piece to connect a cable for the previous model, TURBIMESS, to the new TURBIMESS NG turbidity meter M12 plug connector on M12 coupling, length 56mm, protection class IP67	Z-AEL1FTNG

INTENDED USE

	**The device is <u>not</u> intended for operation in safety-related areas.**
	**The device is <u>not</u> intended for operation in potentially explosive atmospheres.**

The operator is responsible for ensuring adherence to all applicable regulations throughout the entire system.

CLEANING / SERVICING

	**Observe the maximum permitted temperatures when cleaning. Sustained excess temperature can destroy both the electronics and attachments to the housing.**
	**Make sure that the the medium-contacting density gauge does not come into contact with any items that could damage its surface.**

DISPOSAL

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

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