developing solutions

FISCHER
MESS- UND REGELTECHNIK

II 3G Ex nA IIC T4 Gc
II 3D Ex tc IIIB T125°C Dc

CE

RoHS II COMPLIANT

Operating manual

DE90

Differential pressure transmitter
PRO-LINE ®

09015203 • BA_EN_DE90 • Rev. ST4-D • 11/19

Masthead

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Rev. ST4-C 11/19	Version 3 (corrections)
Rev. ST4-D 11/19	Version 4 (corrections) Measuring range, Accessories

Table of Content

1 Safety instructions

1.1 General

This operating manual is an integral part of the product and therefore needs to be kept close to the instrument in a place that is accessible at all times to the responsible personnel.

The following sections, in particular instructions about the assembly, commissioning and maintenance, contain important information, non-observance of which could pose a threat to humans, animals, the environment and property.

The instrument described in these operating instructions is designed and manufactured in line with the state of the art and good engineering practice.

1.2 Personnel Qualification

The instrument may only be installed and commissioned by specialized personnel familiar with the installation, commissioning and operation of this product.

Specialized personnel are persons who can assess the work they have been assigned and recognize potential dangers by virtue of their specialized training, their skills and experience and their knowledge of the pertinent standards.

For explosion-proof models the specialized personnel must have received special training or instruction or be authorized to work with explosion-proof instruments in explosion hazard areas.

1.3 Risks due to Non-Observance of Safety Instructions

Non-observance of these safety instructions, the intended use of the device or the limit values given in the technical specifications can be hazardous or cause harm to persons, the environment or the plant itself.

The supplier of the equipment will not be liable for damage claims if this should happen.

1.4 Safety Instructions for the Operating Company and the Operator

The safety instructions governing correct operation of the instrument must be observed. The operating company must make them available to the installation, maintenance, inspection and operating personnel.

Dangers arising from electrical components, energy discharged by the medium, escaping medium and incorrect installation of the device must be eliminated. See the information in the applicable national and international regulations.

Please observe the information about certification and approvals in the Technical Data section.

Devices in an explosion-protection version

The instrument must be decommissioned and secured against inadvertent re-operation if a situation arises in which it must be assumed that safe operation is no longer possible. Reasons for this assumption could be:

- evident damage to the instrument
- failure of the electrical circuits
- longer storage outside the approved temperature range.
- considerable strain due to transport

Repairs may be carried out by the manufacturer only.

A professional single conformity inspection as per DIN EN 61010, section 1, must be carried out before the instrument can be re-commissioned. This inspection must be performed at the manufacturer's location. Correct transport and storage of the instrument are required.

1.5 Unauthorised Modification

Modifications of or other technical alterations to the instrument by the customer are not permitted. This also applies to replacement parts. Only the manufacturer is authorised to make any modifications or changes.

1.6 Inadmissible Modes of Operation

The operational safety of this instrument can only be guaranteed if it is used as intended. The instrument model must be suitable for the medium used in the system. The limit values given in the technical data may not be exceeded.

The manufacturer is not liable for damage resulting from improper or incorrect use.

1.7 Safe working practices for maintenance and installation work

The safety instructions given in this operating manual, any nationally applicable regulations on accident prevention and any of the operating company's internal work, operating and safety guidelines must be observed.

The operating company is responsible for ensuring that all required maintenance, inspection and installation work is carried out by qualified specialized personnel.

1.8 Pictogram explanation

⚠ DANGER

Type and source of danger

This indicates a **direct** dangerous situation that could lead to death or **serious injury** (highest danger level).

1. Avoid danger by observing the valid safety regulations.

⚠ WARNING

Type and source of danger

This indicates a **potentially** dangerous situation that could lead to death or **serious injury** (medium danger level).

1. Avoid danger by observing the valid safety regulations.

⚠ CAUTION

Type and source of danger

This indicates a **potentially** dangerous situation that could lead to slight or serious injury, damage or **environmental pollution** (low danger level).

1. Avoid danger by observing the valid safety regulations.

NOTICE

Note / advice

This indicates useful information of advice for efficient and smooth operation.

Other symbols

This table explains how the different objects (menu, parameters, etc.) are shown in these operating instructions.

Symbol	Description
1	This symbol indicates that the switch output contact is open.
1	This symbol indicates that the switch output contact is closed.
Meas.data display	This presentation is selected for parameter or menu names.
	This symbol indicates that the administrator is still logged in.
1 2 3	This symbol indicates that one of the users is still logged in. The number corresponds to the number of the user.
1	This symbol indicates that user 1 only has one set of read rights. The respective user number (see above) is used for another user. There is no symbol for writing/read rights.
	This symbol indicates that there is a submenu
	This symbol indicates that there is a blocked submenu or parameter.
	This symbol is an indicator for the menu output at the next highest level.
	This symbol stands for an option that was not selected in a list.
	This symbol stands for a selected option from a list.
	This symbol stands for an activated property.
	This symbol stands for a deactivated property.
	This symbol stands for a short press of a button
	This symbol stands for a permanent push of a button hereinafter call 'repeat' or 'button repeat'.
	The guide stands for a collection of links that indicate the path to certain topics.

Table 1: Pictogram explanation

2 Product and functional description

2.1 Delivery scope

- Differential pressure transmitter DE90 PRO-LINE®
  version as stated on the type plate with an integrated assembly rail. Attachment screws are not included in the delivery.
- Operating Manual

2.2 Intended use

The DE90 is a differential pressure transmitter with additional switch outputs. It is suitable for measuring overpressure, under-pressure and differential pressure in neutral gaseous media.

The device may only be used for the purpose stipulated by the manufacturer. The manufacturer will not be liable for damage arising from incorrect or improper use.

2.2.1 Explosion hazard area classification

2.2.1.1 Gas explosion protection

Devices with the order code **DE90** ## ## ## # 0 # 000 **R** #### are suitable as 'Electrical equipment for use in potentially explosive areas', Zone 2 - Gases and vapours.

Designation as per Directive 2014/34/EU:

Ⓔx II 3G Ex nA IIC T4 Gc

2.2.1.2 Dust explosion protection

Devices with the order code **DE90** ## ## ## # 0 # 000 **R** ####

are suitable as 'Electrical equipment for use in areas with combustible dust', Zone 22 - dry dusts.

Designation as per Directive 2014/34/EU:

Ⓔx II 3D Ex tc IIIB T125°C Dc

-10°C ≤ T_{amb} ≤ 60°C

2.3 Function diagram

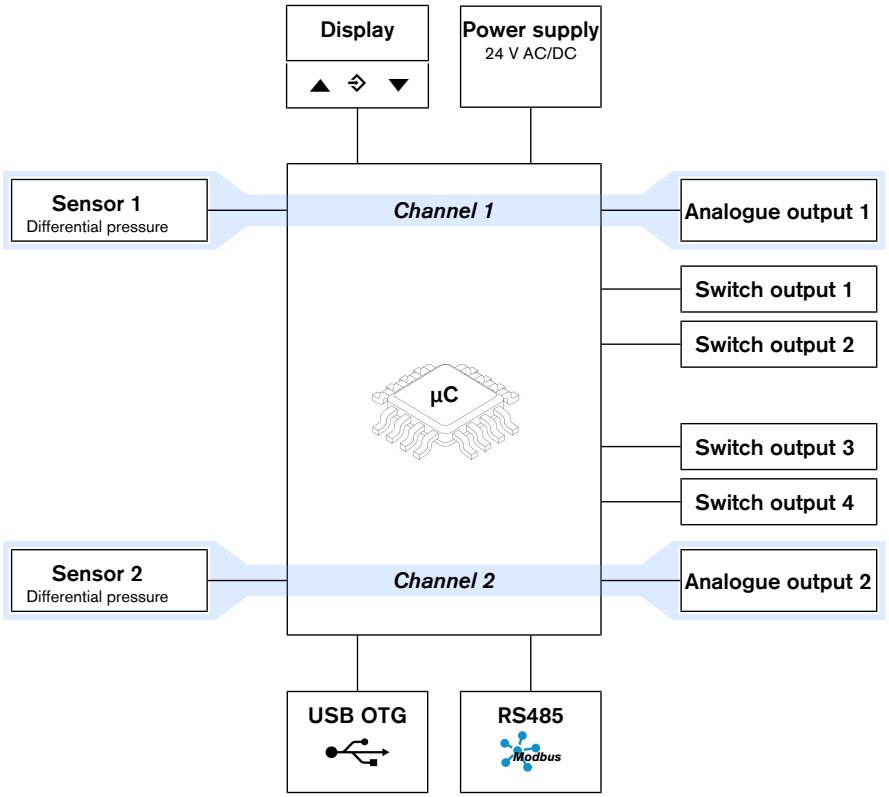


Fig. 1: Function diagram

2.4 Design and mode of operation

The device is based on a piezo-resistive sensor element that is suitable for measuring overpressure, under-pressure and differential pressure. The pressures to be compared directly act on a silicon diaphragm equipped with a measuring bridge.

When the pressure is equal, the measuring diaphragm is is in its idle state. If a pressure difference occurs, the diaphragm is deflected, causing a change in resistance of the applied measuring bridge. This change is evaluated by the electronics integrated in the instrument and converted into a display, switching contacts and output signal.

The output signal can be damped, spread, inverted and also non-linearly transformed via a table function.

In the version with only one channel, the device has one analog output and two switching outputs. In the version with two channels, the device has two analog outputs and four switching outputs. Analog and switching outputs can be freely assigned to the measuring channels.

The device can be equipped with two digital interfaces.

1. USB OTG
   All devices have a USB interface which can be used for firmware updates as well as for importing and exporting parameters. This can be done with a USB stick or by connecting a computer (e.g. laptop).
2. RS485 Modbus RTU
   The device can optionally be equipped with a Modbus interface. In this case, the analog and switching outputs are not available. The measured values can then be interrogated by the master via Modbus.

2.5 Equipment versions

Process connections

The presented connections are used for all models.

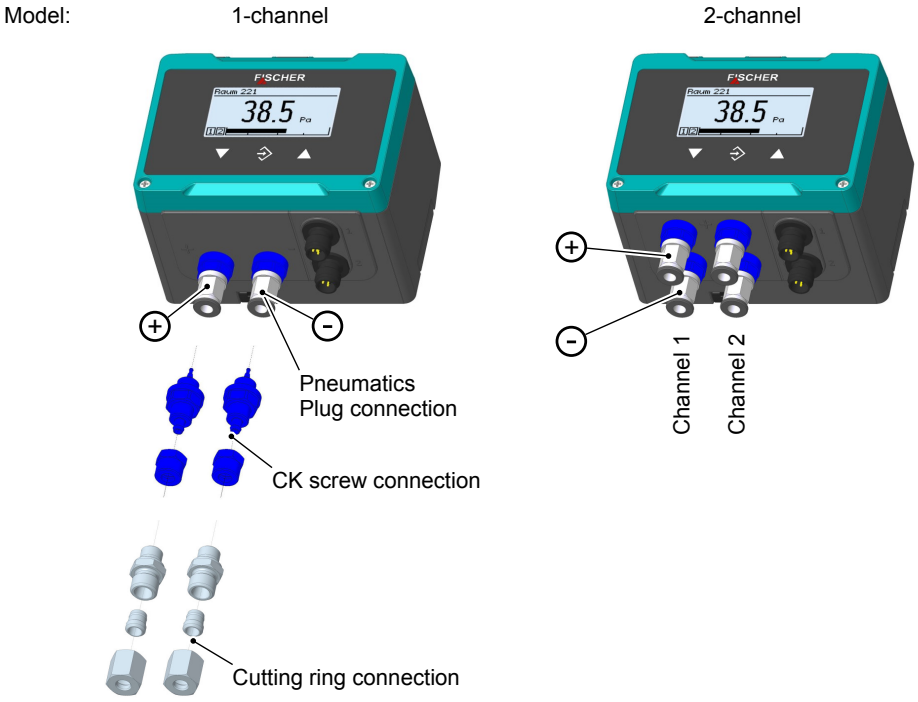


Fig. 2: Process connections

Electrical connections

Two M12 flange connectors are used for the electrical connection.

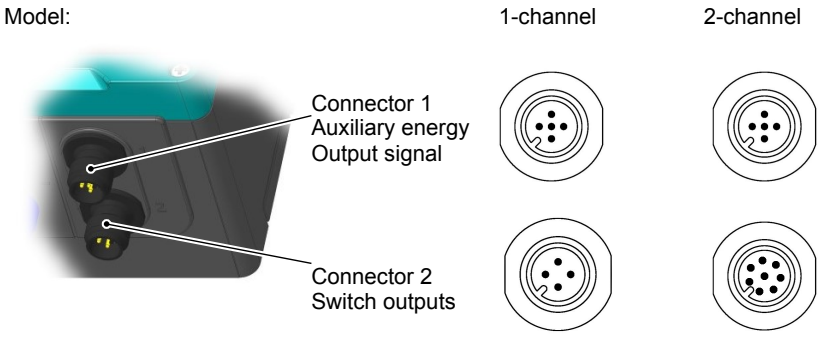


Fig. 3: Electrical connections

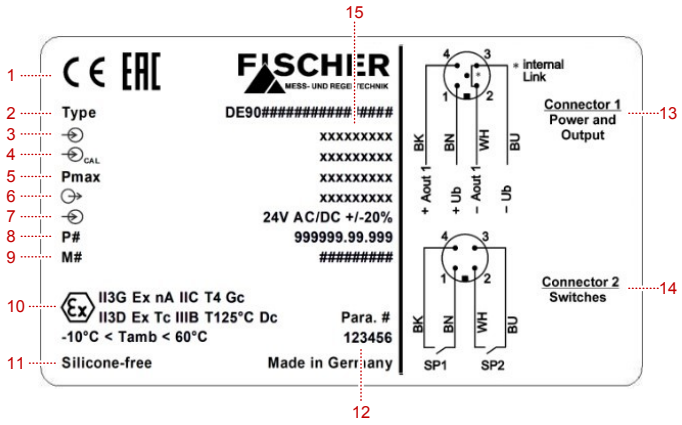
ATEX Version

Fig. 4: ATEX Version

2.5.1 Type plate

The type plates presented here serve to show an example of the information shown. Some information may not be required depending on the specific device model.

1 channel version



2 channel version

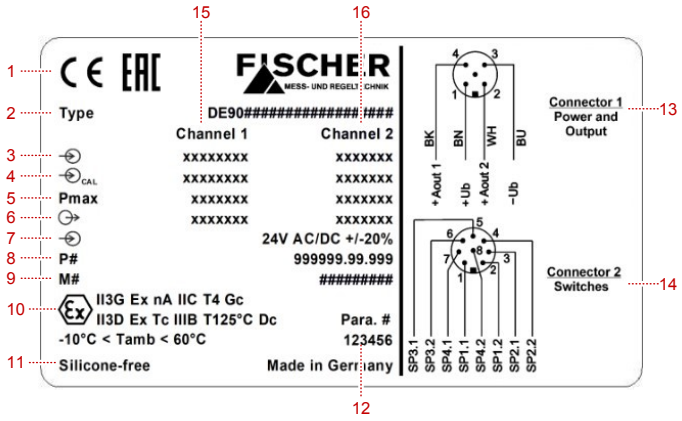


Fig. 5: Type plate

1	Conformity	**2**	Device type (order codes)
3	Basic measuring range	**4**	Set measuring range
5	Durability	**6**	Output signal
7	Auxiliary energy	**8**	Production number
9	Customer item number	**10**	ATEX marking
11	Special properties	**12**	Parameter number
13	Circuit diagram 1	**14**	Circuit diagram 2
15	Data for channel 1	**16**	Data for channel 2

Explanations of the symbols

	Input
	Output
CAL	Factory Setting
Pmax	Proof Pressure
P#	Production No.
M#	Customers Art.no.
Para. #	Parameter No.

3 Assembly

3.1 General

The device is designed for installation onto assembly plates or flat walls. To this end, a pre-mounted 35 mm plastic mounting rail is also supplied. The attachment screws are not included in the delivery.

Alternatively, the device can also be mounted to a 35mm hat rail.

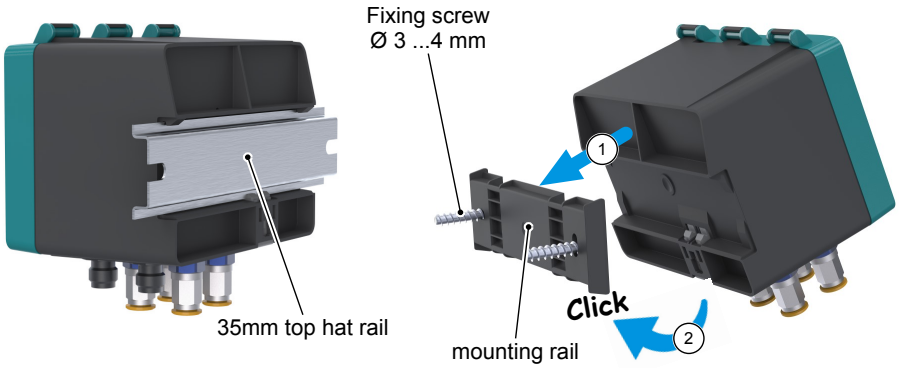


Fig. 6: Assembly

At the factory, the device is calibrated for vertical installation, but the installation position is arbitrary. For any installation positions that are not vertical, the zero-point signal can be corrected via the installed offset correction.

The enclosure protection type IP 65 is only guaranteed, if a suitable power supply cable is used (see accessories).

3.2 Mounting in explosive areas

- If operated in explosive areas, the valid local regulations and guidelines for the installation and operation of electrical systems in explosive areas must be observed.
- If units are used in potentially explosive areas, the personnel must receive additional training or briefings or have a permit to work on explosion-protected units in potentially explosive systems.

DANGER! The operator must ensure that any falling objects cannot collide with the installed unit.

Steps must be taken to prevent the impact creating sparks so that the protection class of the casing is no longer guaranteed. This can be avoided by attaching protective cover, a protective housing or similar.

3.3 Process connection

- By authorized and qualified specialized personnel only.
- The pipes need to be depressurized when the instrument is being connected.
- Appropriate steps must be taken to protect the device from pressure surges.
- Check that the device is suitable for the medium being measured.
- Maximum pressures must be observed (cf. Tech. data)

The pressure lines must be kept as short as possible and installed without any tight bends to avoid delays.

The pressure lines must be installed at an inclination so that no water pockets are created. If the required gradient is not reached, water filters need to be installed at suitable points.

The process connections are marked with (+) and (-) symbols on the device. The pressure lines must be mounted according to these symbols.

1. **Differential pressure measurement**
   - ⊕ Higher pressure
   - ⊖ lower pressure
2. **Pressure measurement**
   - ⊕ Pressure
   - ⊖ open

3.3.1 Replacement plates

Depending on the number of measuring channels, the device is equipped with various replacement plates.

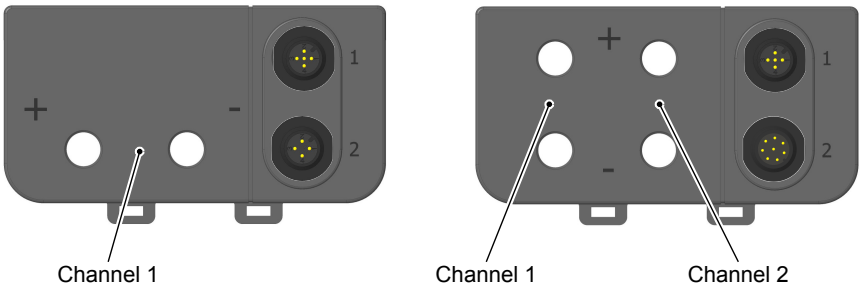


Fig. 7: Replacement plate

These replacement plates are equipped ex-works with the required process connections and the M12 flange connectors for the electrical connection. The user may not make any independent modifications.

	process connection type		size
	Pneumatic plug connection for hydraulic hoses	Polyamide hose	6 x 4 x 1 mm 8 x 6 x 1 mm
	CK quick-action screw connection for soft hoses	PVC hose TYGON®	6 x 4 x 1 mm 8 x 6 x 1 mm
	cutting ring screw connection for hydraulic tubes (stainless steel)	tube	6 mm outside 8 mm outside

Fig. 8: Process connection table

3.3.2 Cutting ring screw connections

▷ In the case of cutting ring screw connections, incorrect installation of the pressure lines can lead to a destruction of the replacement plate due to the acting forces.

▷ The cutting ring screw connection may not be mounted to the device in one work step.

1. Mount the cutting ring using a pre-assembly connecting piece.
2. Always use a conventional assembly paste [1] to avoid cold welding of the stainless steel parts.
3. Carry out the final assembly work on the device with just one counter-hold. Mount the cutting ring screw connection with a quarter or half-turn of the union nut.

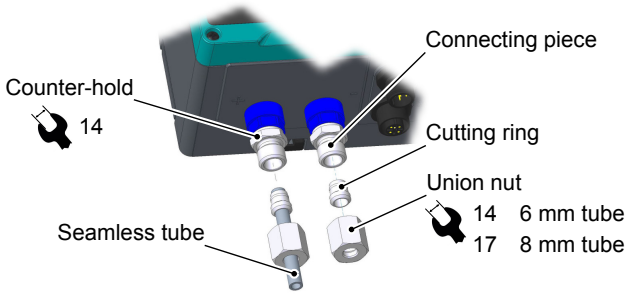


Fig. 9: Counter-hold for cutting ring screw connections

3.4 Electrical connections

- By authorized and qualified specialized personnel only.
- When connecting the unit, the national and international electro-technical regulations must be observed.
- Disconnect the system from the mains, before electrically connecting the device.
- Install the consumer-adapted fuses.
- Do not connect the connector if strained.

3.4.1 Operation in areas at risk of explosion

⚠ WARNING

Do not connect the connector if strained

Sparks can be created, the plug is mounted under tension or replaced.

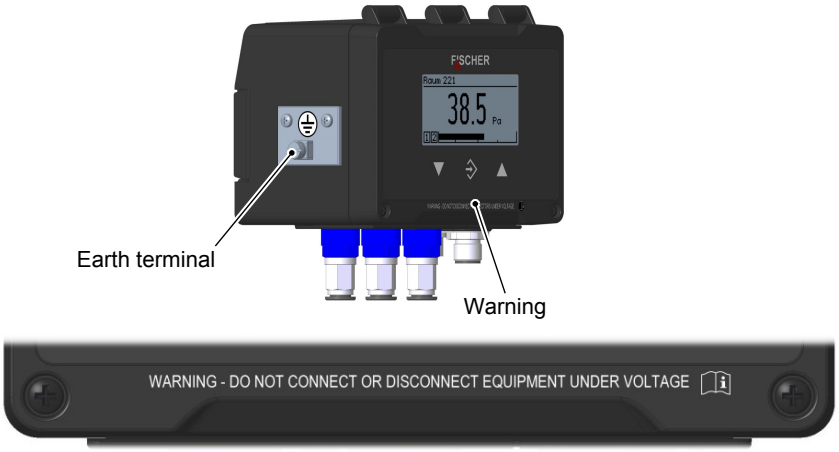
- If operated in explosive areas, the electrical data of the unit and the valid local regulations and guidelines for the installation and operation of electrical systems in explosive areas must be observed (e.g. DIN EN 60079).
- If units are used in potentially explosive areas, the personnel must receive additional training or briefings or have a permit to work on explosion-protected units in potentially explosive systems.
- A CE-conform mains adapter with a slow 200 mA fuse only may be used in the power supply circuit.

NOTICE! The outer ground connection must always be connected to the protective potential equalisation or a similar local potential equalisation.

The ground terminal is suitable for connecting fine-wire conductors up to 4 mm^2 or single-wire conductors up to 6 mm^2.

[1] The assembly past is not part of the delivery scope nor is it a part of the accessories.

The earthing connection serves to discharge static electricity.



WARNING - DO NOT CONNECT OR DISCONNECT EQUIPMENT UNDER VOLTAGE

Fig. 10: Ground connection

3.4.2 Devices with switch outputs

3.4.2.1 3-conductor circuit

The device is connected as follows in a 3-wire switch as described below. The admissible load / resistance is stated in the technical data. It is connected using a prefabricated sensor connection cable (see accessories). Alternatively, a prefabricated M12 connector can also be used.

NOTICE! The protection class of the housing can only be guaranteed, if an IP65 connecting plug is used.

1 channel version

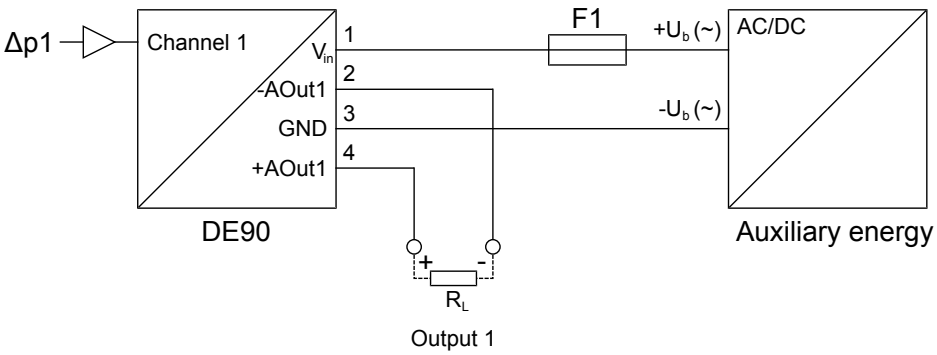


Fig. 11: 3-conductor circuit (1 channel)

2 channel version

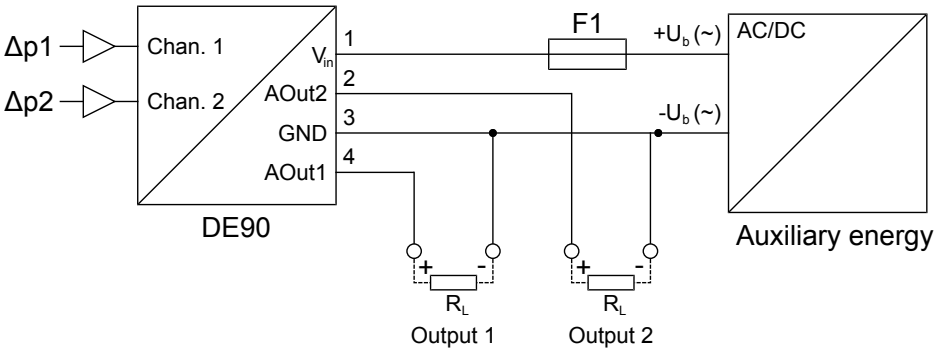


Fig. 12: 3-conductor circuit (2 channel)

3.4.2.2 M12 connector 1: auxiliary energy and analogue output

1 channel version

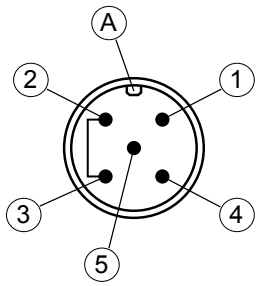


Fig. 13: M12 plug 5-pin+bridge

PIN	Signal		Cable colour
1	Operating voltage	$+U_b$	Brown
2	Analog output 1	-AOut1	White
3	Operating voltage	$- U_b$	Blue
4	Analog output 1	+AOut1	Black
5	Unused		Grey
A	Coding		

2 channel version

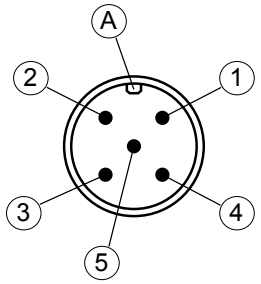


Fig. 14: M12 plug 5-pin

PIN	Signal		Cable colour
1	Operating voltage	$+U_b$	Brown
2	Analog output 2	AOut2	White
3	Operating voltage	$- U_b$	Blue
4	Analog output 1	AOut1	Black
5	Unused		Grey
A	Coding		

3.4.2.3 M12 connector 2: switch outputs

The number of switch outputs depends on the number of measuring ducts.

1 channel version

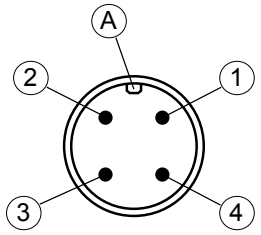


Fig. 15: M12 plug 4-pin

2 switch outputs

PIN	Signal		Cable colour
1	Switch output 1	SP1	Brown
2	Switch output 2	SP2	White
3	Switch output 2	SP2	Blue
4	Switch output 1	SP1	Black
A	Coding		

2 channel version

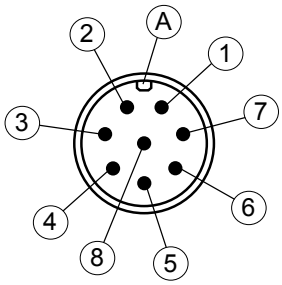


Fig. 16: M12 plug 8-pin

4 switch outputs

PIN	Signal		Cable colour
1	Switch output 1	SP1	White
2	Switch output 1	SP1	Brown
3	Switch output 2	SP2	Green
4	Switch output 2	SP2	Yellow
5	Switch output 3	SP3	Grey
6	Switch output 3	SP3	Pink
7	Switch output 4	SP4	Blue
8	Switch output 4	SP4	Red
A	Coding		

3.4.3 Device with Modbus

⚠ DANGER

Auxiliary for ATEX devices

When selecting the power supply, bear in mind that it may be a potential ignition source.

Take suitable safety precautions to prevent this risk.

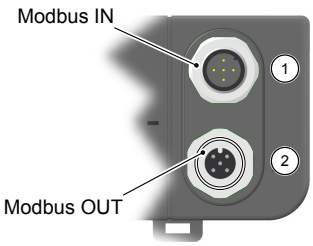


Fig. 17: Replacement plate Modbus

The devices with a Modbus interface do not have analog and switch outputs. The replacement board is equipped with a 5-pin M12 flange connector for the Modbus input and with a 5-pin M12 flange socket for the Modbus output.

The DE90 is usually connected to the Modbus RTU network as a so-called slave to the Modbus RTU network. Up to 247 devices can be addressed in one line network.

NOTICE! Star-shaped networks are not allowed.

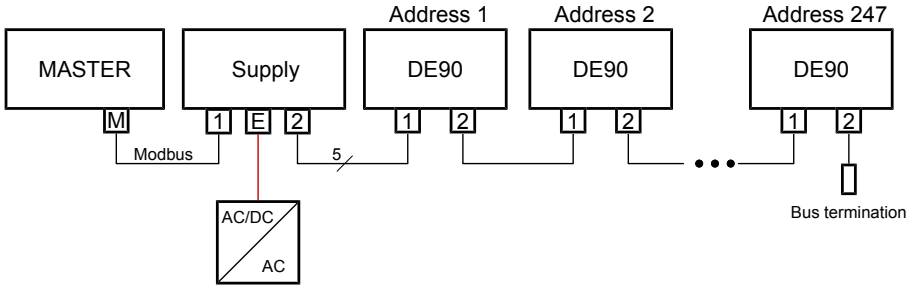


Fig. 18: Modbus RTU network

Communication is effected solely with the Modbus master. The connected slaves only react to direct commands from the master, which is why communication between the slaves is not possible.

To guarantee fault-free data transmission, we recommend terminating the end point of the Modbus RTU network with a 120 Ω resistor. This bus termination resistance is available as an accessory.

3.4.3.1 Connection to an existing Modbus RTU network

It can be connected to an existing Modbus network via a conventional T-piece (passive TAP).

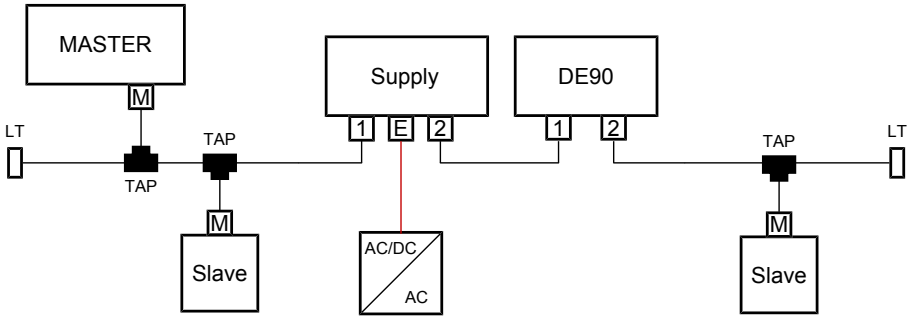


Fig. 19: Modbus connection

3.4.3.2 Auxiliary energy supply

The following illustrations explain the principle of the power supply of the DE90 in the Modbus network. However the feeder nodes are not part of the delivery scope and need to be installed by the operator himself.

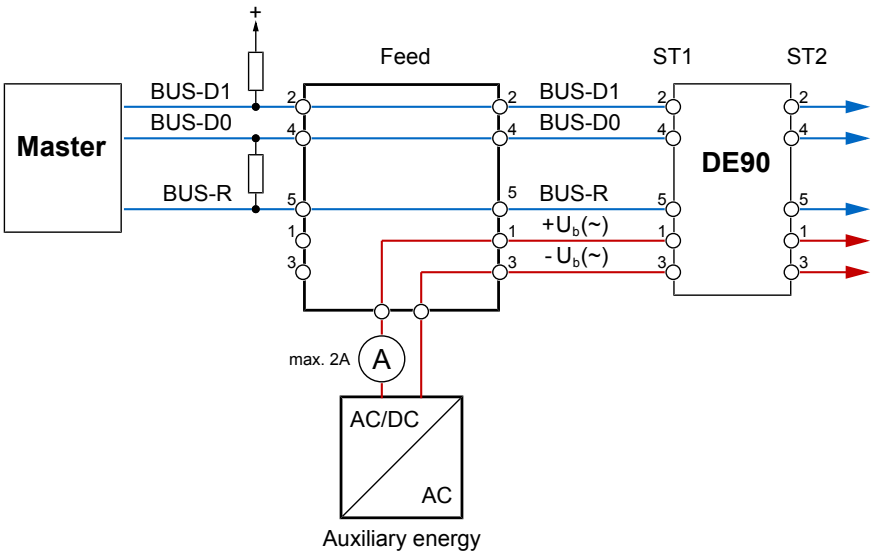


Fig. 20: Main supply

Please note that the M12 plugs are approved for max. 2A. This value may already be exceeded if there are more than 12 devices of type DE90. In this case, an intermediate auxiliary energy feed should be provided at a suitable place.

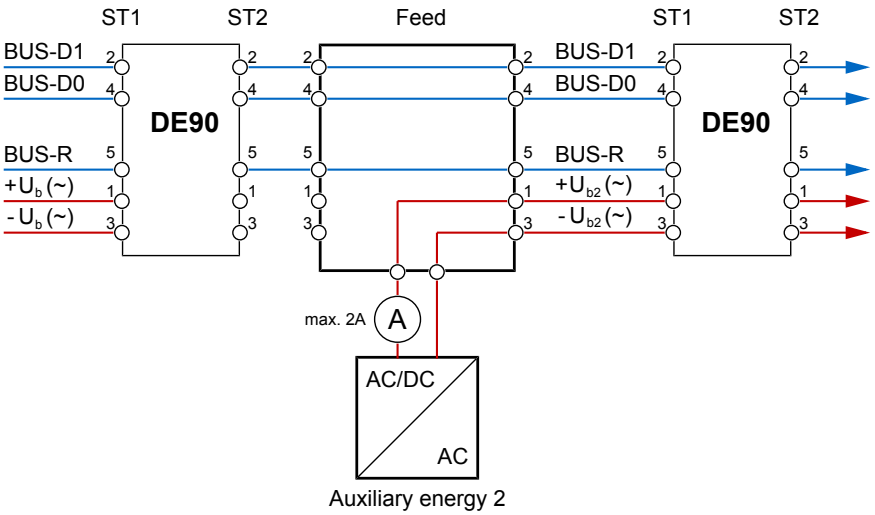


Fig. 21: Intermediate supply

3.4.3.3 M12 plug 1: Modbus IN

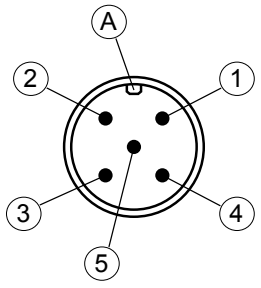
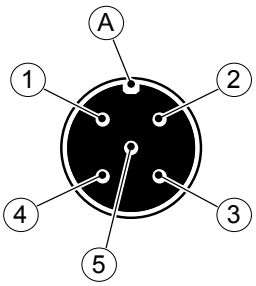


Fig. 22: M12 plug 5-pin

PIN	Signal		Cable colour
1	Operating voltage	$+U_b$	Brown
2	Modbus	BUS-D1	White
3	Operating voltage	$- U_b$	Blue
4	Modbus	BUS-D0	Black
5	Modbus	BUS-R	Grey
A	Coding		

3.4.3.4 M12 plug 2: Modbus OUT



PIN	Signal		Cable colour
1	Operating voltage	$+U_b$	Brown
2	Modbus	BUS-D1	White
3	Operating voltage	$- U_b$	Blue
4	Modbus	BUS-D0	Black
5	Modbus	BUS-R	Grey
A	Coding		

Fig. 23: M12 bush 5-pin

3.4.4 USB port

⚠ DANGER

Open the housing for ATEX devices

ATEX devices may never be opened inside potentially explosive areas.

There is a micro USB connection for a USB stick inside the housing. The parameters can be secured and loaded or the firmware can be updated via this USB interface. The device can be configured via this interface using the PC software '**inTouch**'[(2)] .

The two lid screws need to be removed to open the housing.

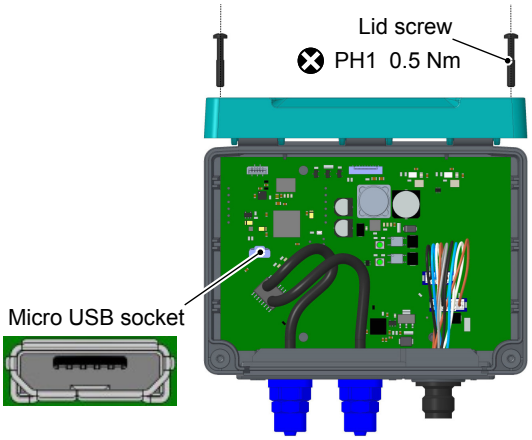


Fig. 24: USB port (fig. similar)

[(2)] see accessories

4 Start-up

NOTICE! If operated in explosive areas, the checks carried out in line with the valid local regulations and guidelines for the installation and operation of electrical systems in explosive areas must be carried out.

4.1 Installation control

Before starting the measuring device:

▷ Check that the pressure lines are mounted correctly.

1. Is the measuring device undamaged?
2. Does the measuring device fulfil the requirements of the measuring point specification?
3. Are the pressure lines mounted correctly?
4. Are the attachment screws tighten correctly?
5. Is the device adequately protected against precipitation and solar radiation?

▷ Check that all electrical supply and measuring lines are installed correctly.

1. Are the connection lines undamaged?
2. Do the cables used fulfil the requirements?
3. Is there strain relief on the mounted cables?
4. Are the connection plugs mounted correctly?
5. Is the ground connected correctly?

4.2 Switch on the measuring device

▷ The measuring device can be switched on after a success installation control.

1. The start screen is now shown on the display.

Fig. 25: Start screen (2 channel)

➥ After a successful start, the start screen switches to the measured value display.

4.2.1 Measured value display

Depending on the unit model, there are different presentation variants for the measured value display.

4.2.1.1 1 channel version

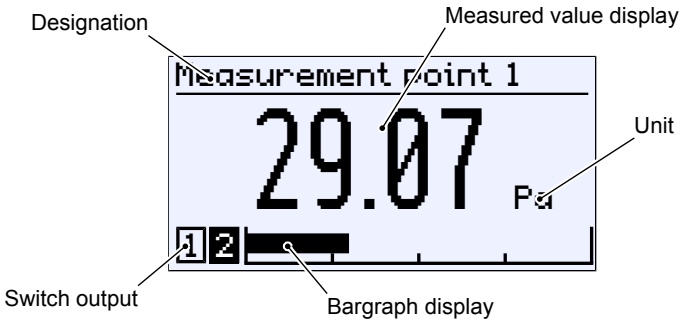


Fig. 26: Measured value display (1-channel)

4.2.1.2 2 channel version

The presentation can be modified using the `Meas.data display` menu. Both channels can be shown individually or at the same time. The bargraph display always shows the two measuring channels.

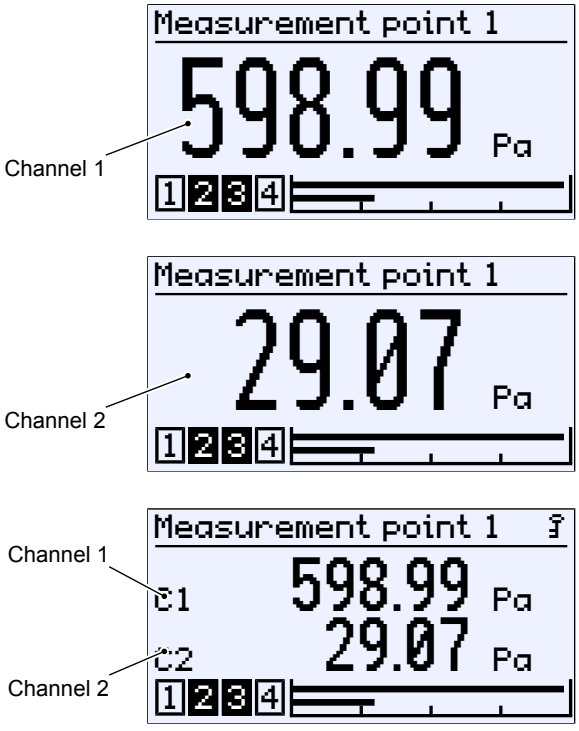


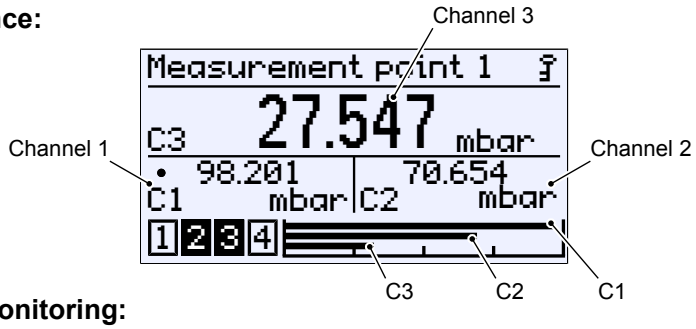
Fig. 27: Measured value display (2-channel)

4.2.1.3 3 channel version

The 3-channel display is only available for the 'Difference' and 'Dynamic filter monitoring' functions. Channel 3 is a so-called *virtual channel* '. The displayed value is calculated from the measured values of channels 1 and 2.

The display can be adapted via the Meas.data display menu. Three channels can be displayed simultaneously or individually. The bar graph display always shows all three measuring channels.

Difference:



Filter monitoring:

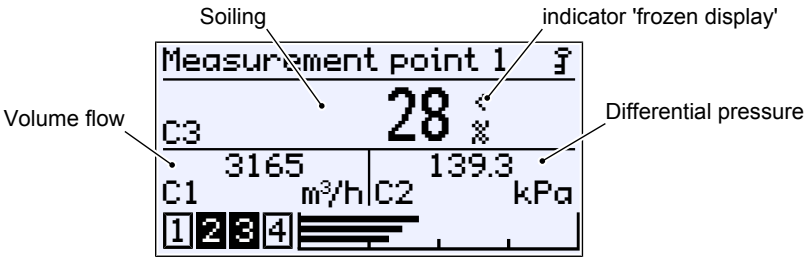


Fig. 28: Measured value display (3 channel)

4.2.1.4 Back lighting

The LC display is equipped with RGB back lighting. This allows it to create various coloured backgrounds for the measuring data display.

Also, the so-called colour changes can be configured that serve to indicate when limits have been overstepped.

For more information, please go to menu display [▷ 84] and/or colour change [▷ 62].

4.2.2 Keyboard

The basic functions of the keyboard are explained in this section. For more information about the operating concept, please see the section 'first steps'.

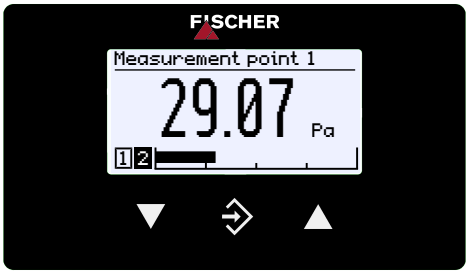


Fig. 29: Operating keys

▼	Page down menu	Decrease value	
⇳	Call up menu	Save value	Return jump
▲	Page up menu	Increase value	

The buttons are always pressed individually. Combinations, such as pressing two buttons at the same time or similar, are not used.

The button can be actuated in two ways. IN the following, the adjacent symbols indicate the actuation type.

1. Pressing briefly calls up an immediate reaction to the pushed button.

2. If the button is pressed for longer than 250 ms, the reaction is a repetition of the pressed button, hereinafter called 'Repeat'. If the button is pressed permanently, the repeat is carried out in a continuous sequence. However, there is no acceleration.
3. Automatic stop at the menu item Back : Permanent pushing of the button ▼ or ▲ returns the user to the menu item Back very quickly. The stop is automatic there.
4. Jump back to the operating display: Permanent pressing of the button ⇳ takes the user from the menu item Back into the operating screen.

4.3 Setup

The measuring device is delivered in the configuration stated in the Order code [▶ 101]. However, some parameters can be modified quickly and easily via the menu Quick access [▶ 41].

- Menu language
- Measuring point designation
- Configuration

4.3.1 Set menu language

Works setting: German or ordered national language

▷ The menu language can be changed as follows.

1. You have the right to change the configuration.
2. Log onto the device and go to the quick access.
3. Open the menu `Language` and change the menu language.

4.3.2 Measuring point designation

▷ A designation for the measuring point can be filed to identify the device within a system.

1. You have the right to change the configuration.
2. Log onto the device and go to the quick access.
3. Change the `Designation` parameter.

4.3.3 Configuration

The measuring device is delivered in the configuration stated in the Order code [▶ 101].

▷ However, some parameters can be modified quickly and easily via the quick access: unit, start of measuring range, end of measuring range and damping.

1. You have the right to change the configuration.
2. Log onto the device and call up the Quick access [▶ 41].
3. Carry out the required changes.

▷ The PC software **inTouch**® can be used for making more comprehensive changes to the configuration.

4. Carry out the changes on the PC using the inTouch software.
5. Transfer the configuration to the device via the USB interface.

NOTICE! The configuration can also be changed using the keyboard in the configuration menu.

4.4 Modbus RTU interface

The DE90 can also be delivered with a Modbus interface. This communication interface is set in the menu Modbus RTU [▶ 89].

5 Operation

5.1 First steps

5.1.1 Operating modes

Operating mode

After activation, the device automatically starts. The device works according to its configuration.

Configuration mode

Pressing the button ⇳ takes the user from the operating mode to the configuration mode. The device is still operational and works according to its configuration. All parameter changes have a direct effect on how the device operates.

If the device is configured via the USB interface, operation is interrupted when transmission starts. Operation starts with the new configuration after transmission. The transfer lasts just a few milliseconds.

5.1.2 Menu tree

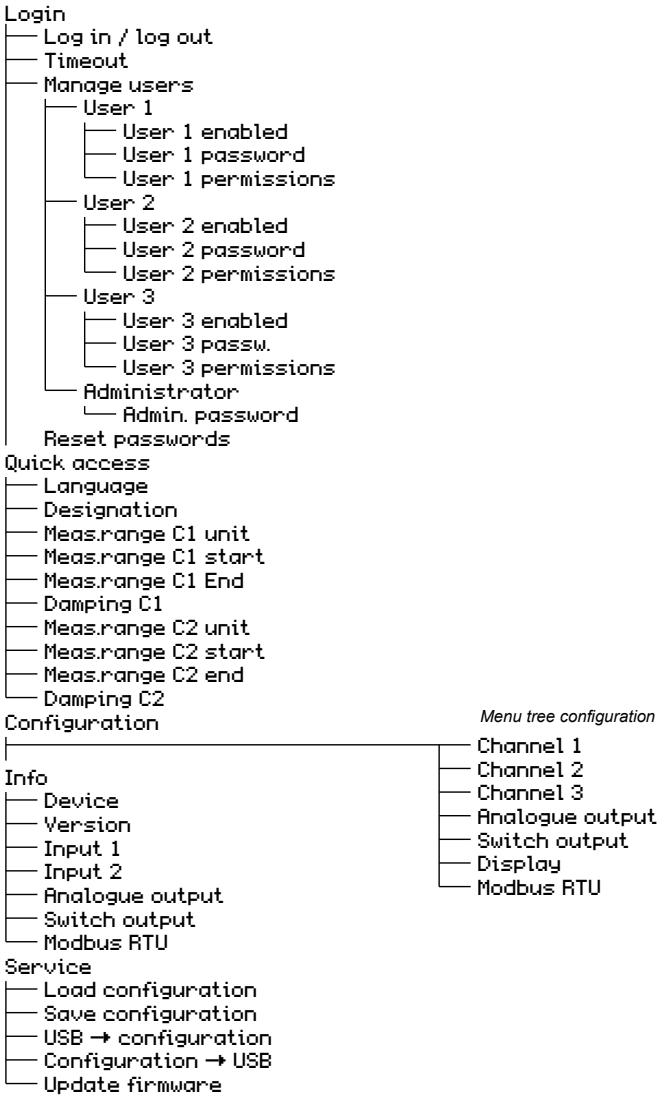
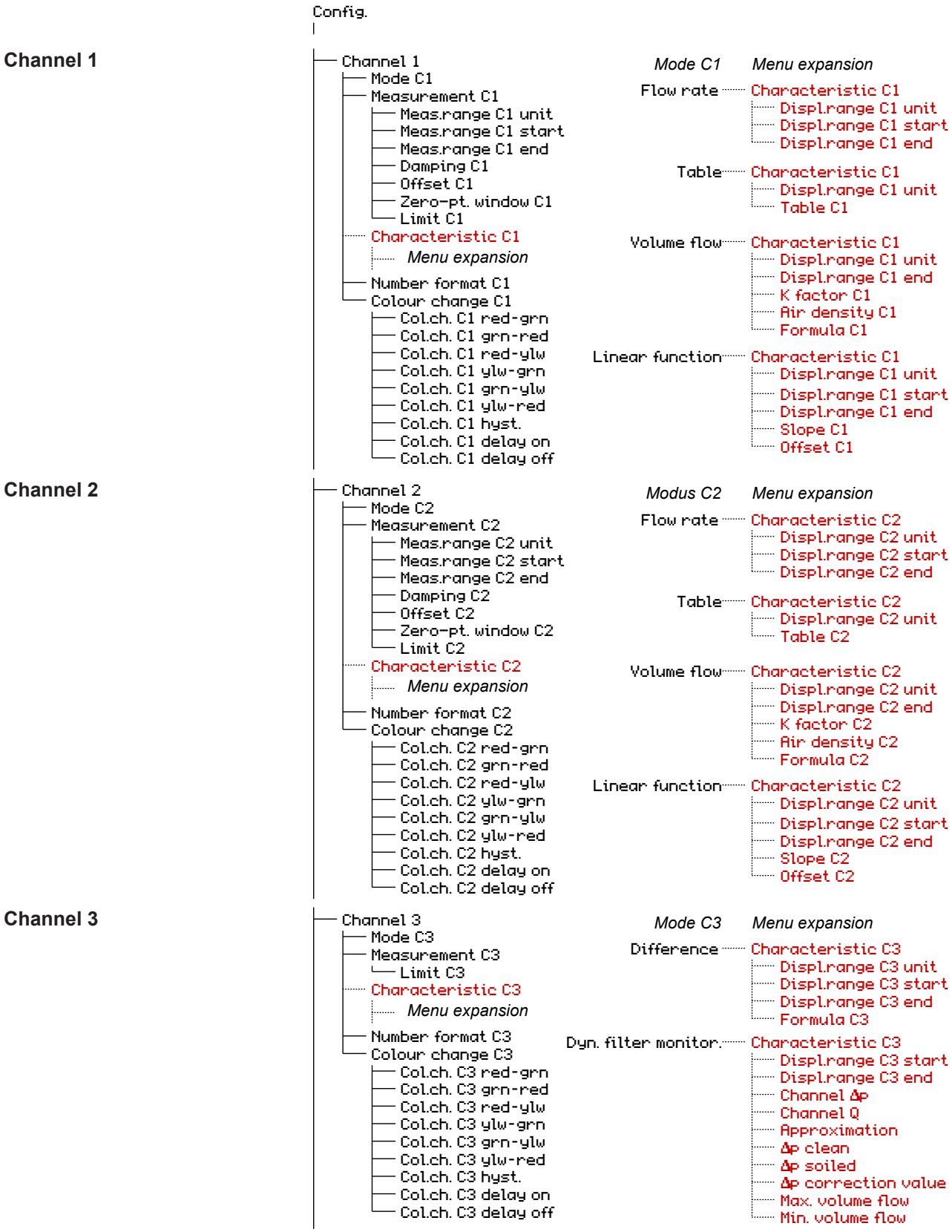


Fig. 30: Menu tree

Menu tree Parameterization



Channel 1

Channel 2

Channel 3

Analog output

Switch output

Display

Modbus RTU

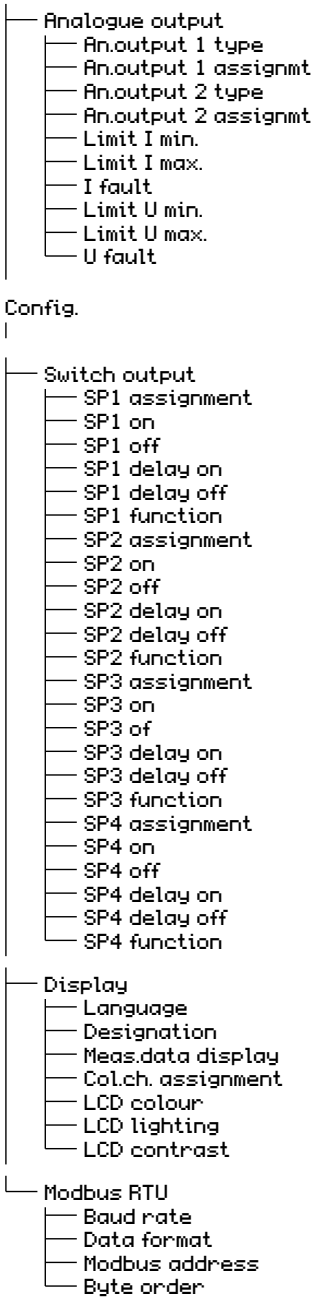


Fig. 31: Menu tree Parameterization

5.1.3 Navigation in the menu tree

Pressing the button ⇳ takes the user from the measured value display to the main menu.

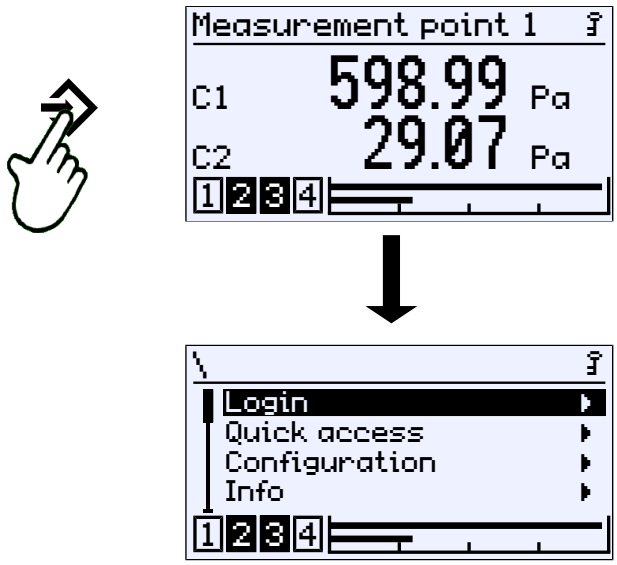


Fig. 32: Call up the main menu (Level 0)

The menu has up to five levels called 'Level' hereinafter. The levels are numbered from 0 to 4. Level 0 is the main menu. No distinction is made between the menu and the parameters in this presentation. However, a menu can be recognised on the indicator ▸ .

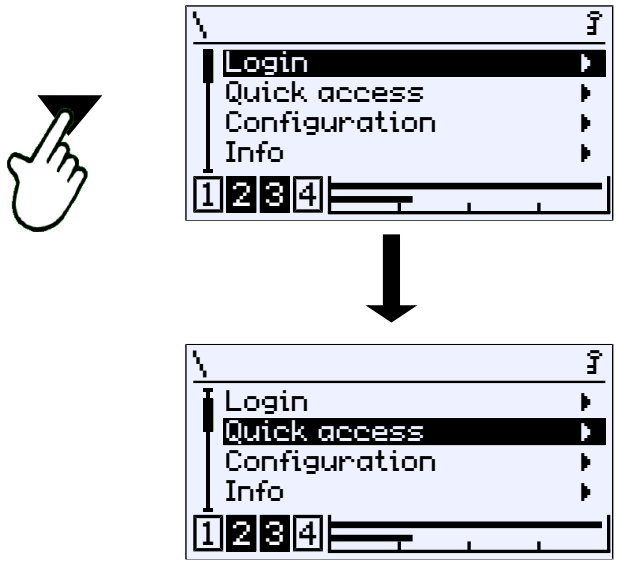


Fig. 33: Page down menu (Level 0)

The buttons ▼ and ▲ are used to move the cursor through the menu. The button ⇳ opens the menu and the submenu of the next level appears on the display.

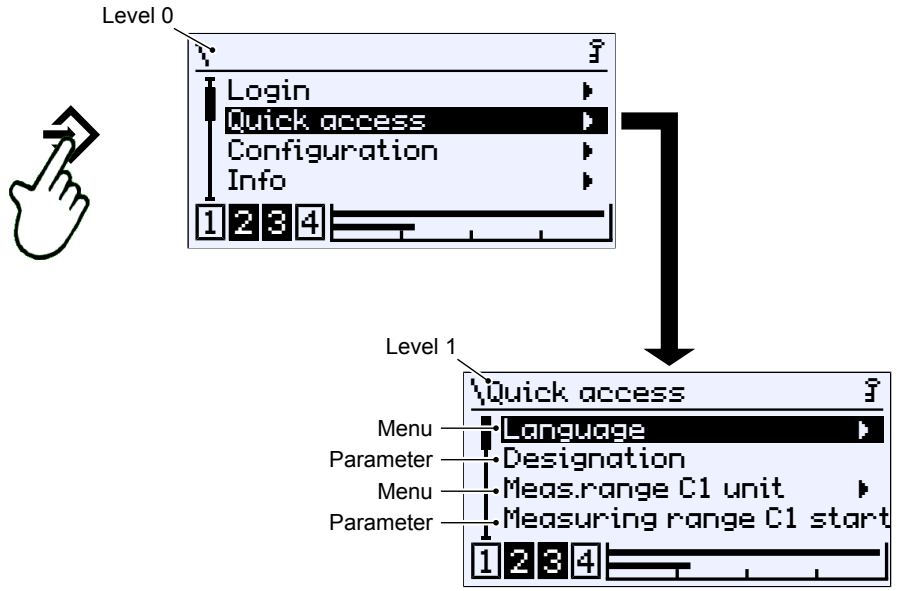


Fig. 34: Sidewards in submenu (Level 1)

To leave the menu, the cursor needs to be moved to the menu item Back . Pressing this button ⇦ returns the user to the next highest level.

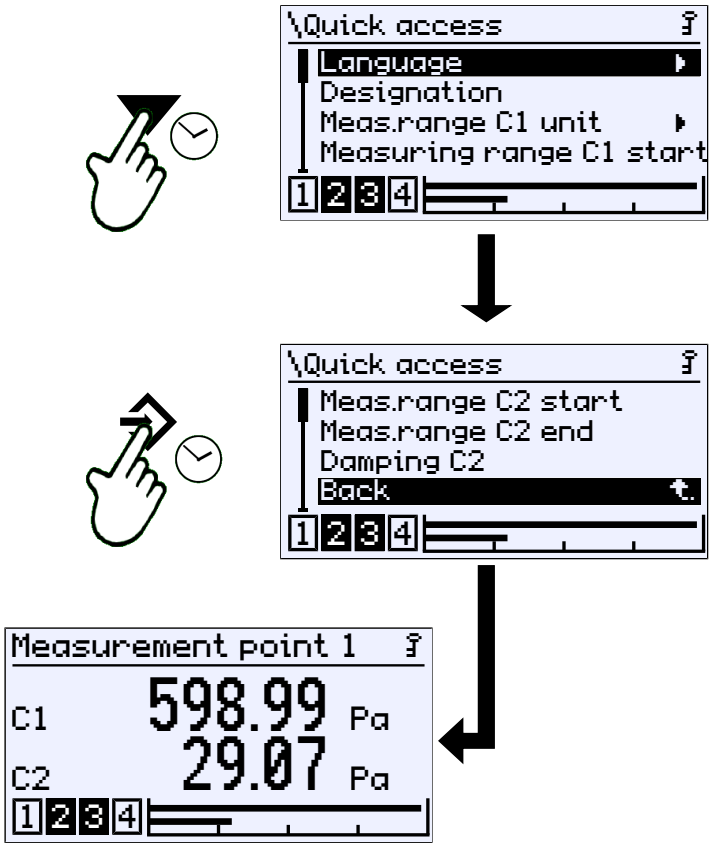


Fig. 35: Page down to output

It is of course possible to move down the menu to the menu item Back .

5.1.4 Directory details

The path information appears in the first line of the display. For space reasons, the directories cannot be shown in full. The menu level is indicated by the number if backslash symbols ‚\'. Where this is not possible, only the menu name is shown.

Directory: \ConfigurationChannel2\Measurement C2\Meas.range C1 unit
Level 0 Level 1 Level 2 Level 3

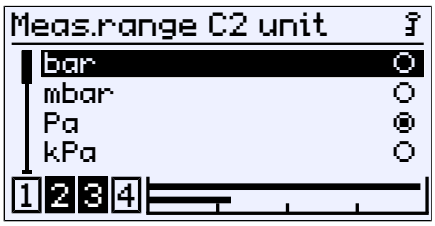


Fig. 36: Directory

5.1.5 Input

The following softkeys are used whenever text or values are entered:

- Edit
  This softkey is used to switch into the editing window for entering text or values.
- OK
  The input is completed with this softkey. The entered text or value is saved.
- Cancel
  The input is cancelled with this softkey. The originally saved text or value is retained.

A softkey is pressed by first being selected with the buttons ▼ and ▲. The softkey is shown inverted. It is realised with the button ⇳ .

5.1.5.1 Text input

For example: *Directory: \Quick access\Designation*

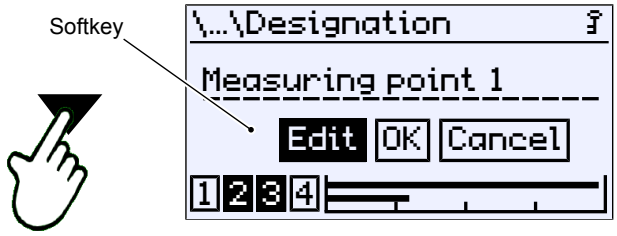


Fig. 37: Action selection

Select the softkey Edit with the buttons ▼ or ▲. The selection is confirmed with the button ⇳ . The following window opens for editing.

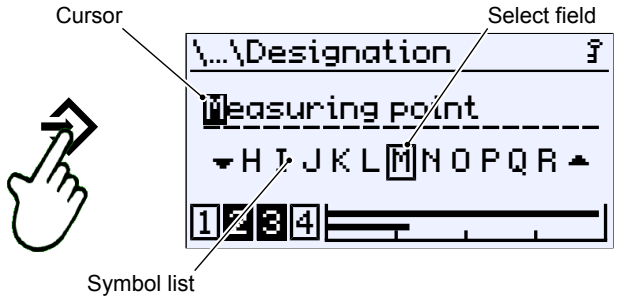


Fig. 38: Editing text

In this display, the cursor is controlled with the button ⇳ . The cursor can only be moved right. It is not possible to move back. If the cursor is moved to the edge, the display for selecting the action (see above) is displayed again.

Text is processed with the select field in combination with the latest cursor position. The button ▼ moves the list of characters[3] to the left and the button ▲ moves it to the right. If the right sign is shown in the select field, these can be accepted with the button ⇳ at the cursor position. The cursor moves one character to the right and the next character position can be edited.

5.1.5.2 Value input

For example: *Directory: \Configuration\ Channel 1\ Measurement C1\ Meas.range C1 start*

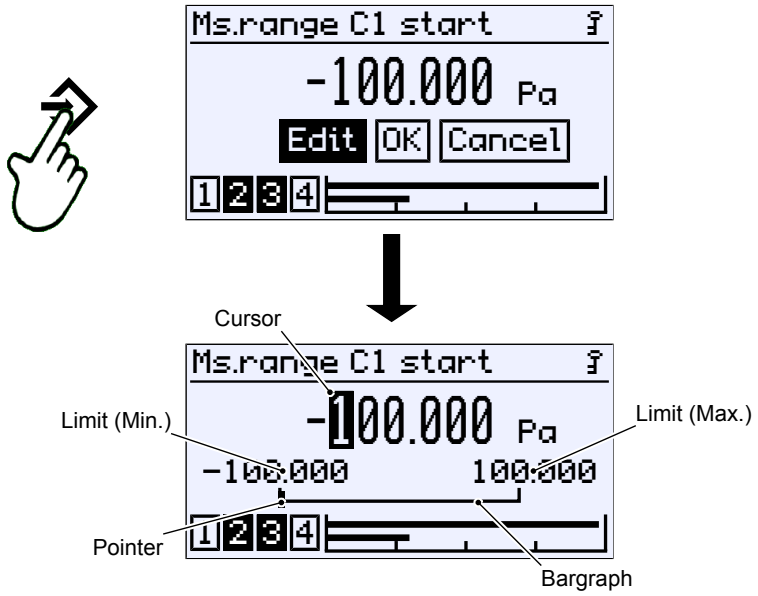
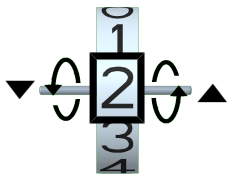


Fig. 39: Input of number values 1st place

Partial input



The number value can be entered position by position from left to right. The buttons ▼ and ▲ are used to set the numbers 0 … 9. The sign can be changed automatically by selecting the running direction. The limit values determined from the device configuration cannot be undercut or exceeded. One of the set digits ca be accepted with the button ⇳ and the cursor moves one position further to the right. The running direction of the cursor is defined and cannot be changed.

Fig. 40: Setting a figure

[3] The list of characters comprises the characters of the character set Windows 1252 (Latin 1 and Latin 9)

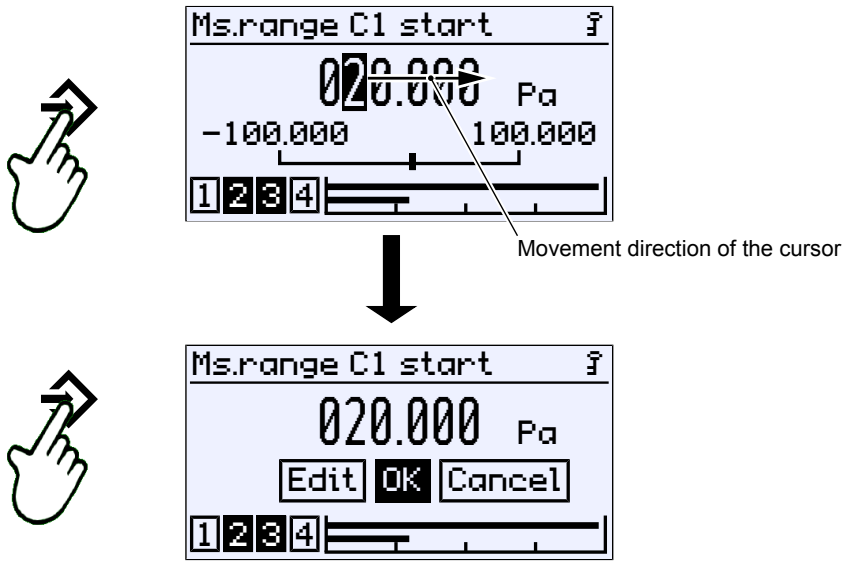


Fig. 41: Input of number values 2nd place

The button repeat ⇳ automatically returns the user to the action selection. Pressing the button again will save the value.

Number overflow

If the number 9 is set to one position and if the button ▲ is pressed again, a number overflow occurs. In this example, the value is counted up from 29 to 30. Pressing the button ▲ permanently (repeat), the value increases gradually like a counter.

Counting is realised in the opposite direction by pressing the button ▼. The value is negative after zeroisation.

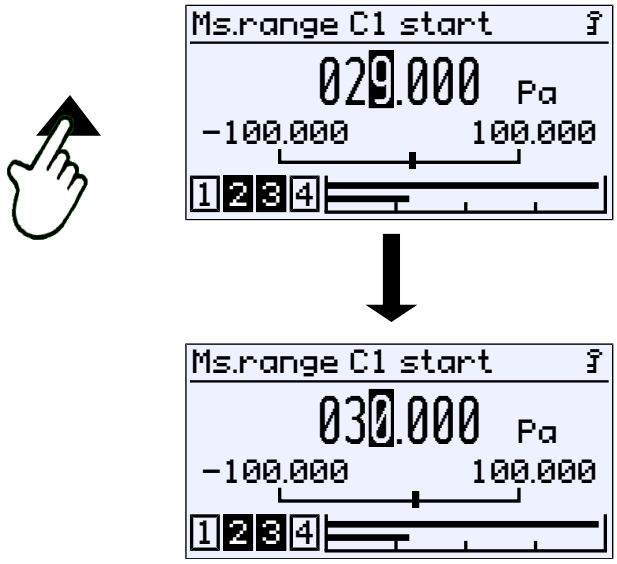


Fig. 42: Number overflow

The value is always counted upwards from the cursor position. If, for example, the cursor is on the first decimal place, the value is counted upwards from here:

29.0 → 29.1 → 29.2 …

If, in contrast, the cursor stands on the last point, counting is realised as follows.

29,000 → 29,001 → 29,002 … up to overflow 29,999 → 30,000 …

5.1.5.3 Selection of options

For example: *Directory: \ Configuration \ Channel 2\ Measurement C2\ Meas.range C2 unit*

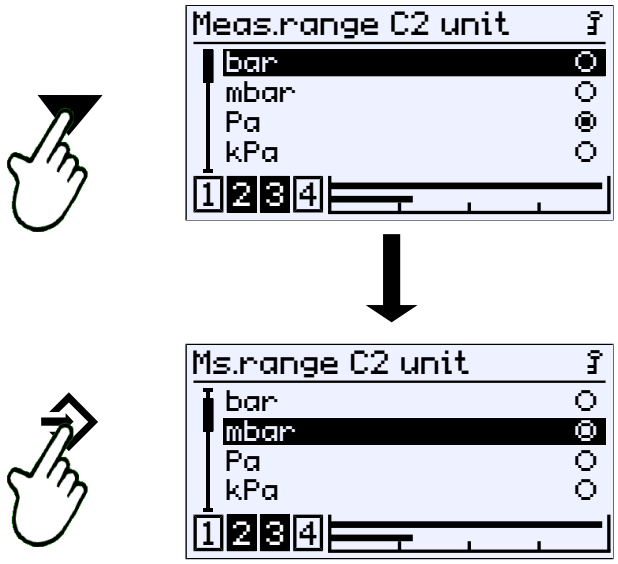


Fig. 43: Entry of options

The cursor is moved with the buttons ▼ and ▲. Only one of the offered options can be selected. The button ⇳ is used to select the option marked by the cursor.

The menu exit 'back' button is used to return to the called-up the menu. The selected option is accepted.

5.2 Main menu

Directory: \
Level: 0

Pressing the button ⇳ takes the user from the operating mode to the configuration mode. The main menu is displayed. Bargraph display and display of the switch outputs still remain visible.

NOTICE! The device also remains operational even during configuration. All parameter changes have a direct effect.

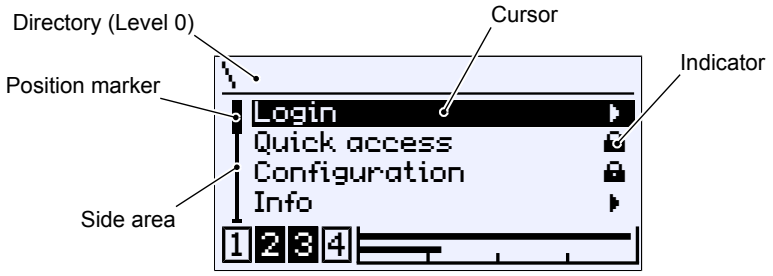
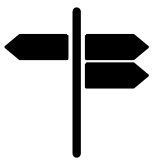


Fig. 44: Main menu

The indicator ▸ shows that there is a submenu on the following level. The main menu comprises the following menus:

Menu name		Description
Login	▸	In this menu users can log in and log off, and also manage passwords.
Quick access	▸	Quick accessThe menu contains important parameters or menus that can be reached and changed in the Quick access.
Configuration	▸	Configuration of the unit is realised with this menu. The menu levels stretch across up to four levels.
Info	▸	This menu contains information about the hardware and software of the device and its configuration.
Service	▸	The firmware of the device can be undated or parameters can be loaded and saved with this menu.
Back	↰	This represents the output (exit) of the main menu. Press 'back' to return to the measuring value display.



Signpost [▶Page]

- Login [▸ 36]
- Quick access [▸ 41]
- Configuration [▸ 43]
- Info [▸ 92]
- Service [▸ 93]

5.3 Login

Directory: \Login
Level: 1

Users that are not logged on only have access to the information menu. Users must log in to gain access to the configuration.

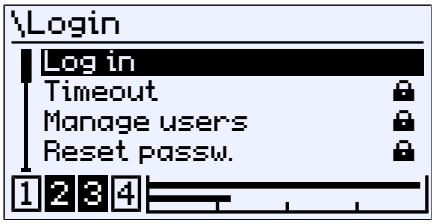


Fig. 45: Login

The login menu consists of the following parameters and submenus:

Menu name		Description
Log in / log out		Users can login and off with this menu item.
Timeout		The timeout function is defined with this parameter.
Manage users	▸	This submenu serves to manage users and passwords.
Passw. Reset		This menu item is used to reset all passwords to 000 .
Back	↰.	This represents the output (exit) of the login menu. Press 'back' to return to the main menu.

5.3.1 Log in / log out

Directory:\Login\ Log in
Level: 2

Login is realised by entering a number. After entering the correct password, the menus to which the users have access rights are unlocked.

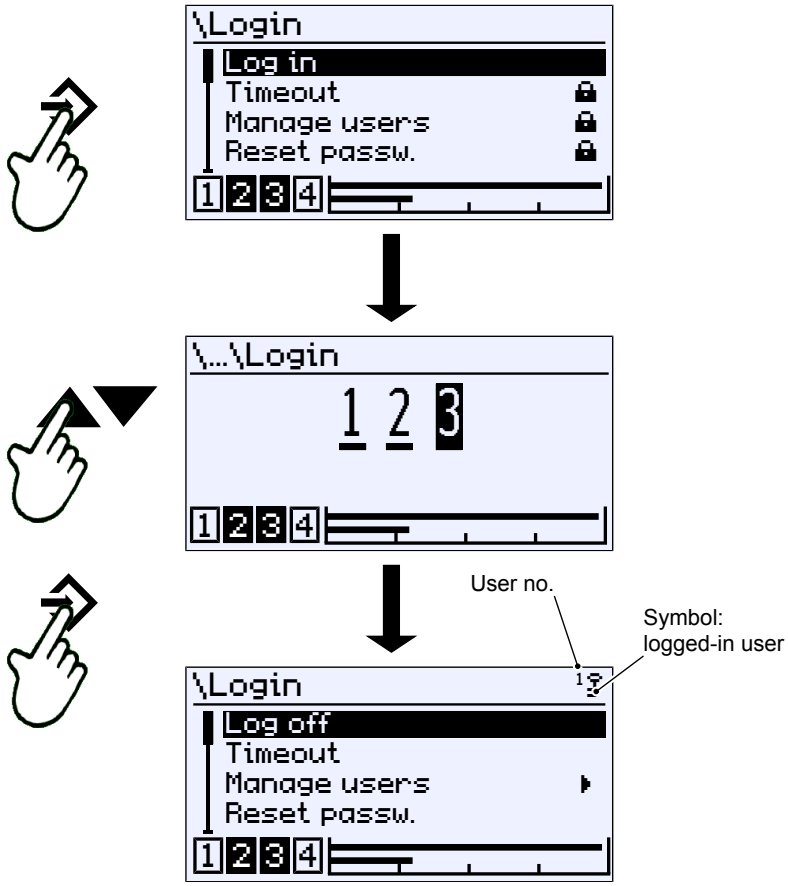


Fig. 46: Log in

Users log out by selecting the corresponding menu item and confirming with the button ⇳ . A key in the top right corner of the display signalises the logged-in user.

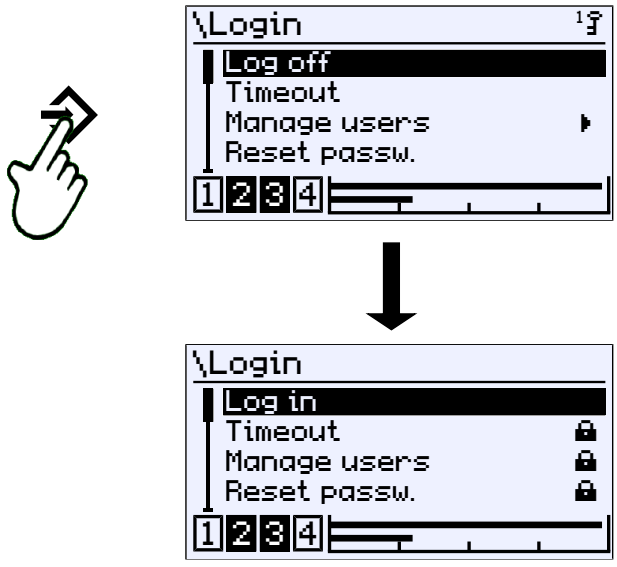


Fig. 47: Log out

5.3.2 Timeout

Directory: \Login\Timeout
Level: 2

If the device is switched to configuration mode and no button is pressed, the device returns to the operating mode after the expiry of a defined time period. This time range is set with the parameter `Timeout` .

Values entered in minutes. The value range covers 0 … 60 min. When the value 0 is entered, the timeout function is switched off.

After the set timeout time has expired, a logged in user is logged off whist the device switches to the operating mode.

If, however, the timeout function is deactivated, the user remains permanently logged in. Users must log off manually.

The key symbol should indicate this possibly undesirable status.

5.3.3 Manage users

Directory: \Login\Manage users
Level: 2

Fig. 48: Manage users

The login menu consists of the following parameters and submenus:

Menu name		Description
User 1	▸	This menu item is used to manage the rights of the respective user.
User 2	▸	
User 3	▸	
Administrator	▸	The password for the administrator is defined in this menu.
Back	↵	This represents the output (exit) of the 'Manage users' menu. Press 'back' to return to the main menu.

The menus for the users are identical, therefore the menu for user 1 is described for all.

5.3.3.1 User 1

Directory: \Login\ Manage users \ User 1
Level: 3

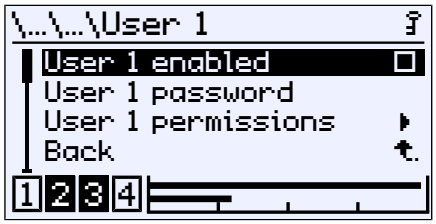


Fig. 49: User 1

Menu name		Description
User 1 enabled	☐	The user can be enabled with this parameter.
User 1 password		The password for user 1 is defined with this parameter.
User 1 permissions	▸	The permissions of user 1 is defined with this parameter.
Back	↰	This represents the output (exit) of the User 1 menu. This is used to return to the 'Manage user' menu.

The parameter User 1 enabled release user 1:

☐ User deactivated
☒ User activated

The password for the user is issued with the parameter User 1 password . A password 000 is issued with the default setting. Only numerical passwords from 000 to 999 can be used.

5.3.3.1.1 User 1 permissions

Directory: \Login\ Manage users \User 1\ User 1 permissions
Level: 4

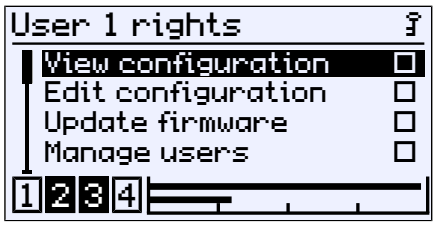


Fig. 50: User 1 permissions

Menu name		Description
View configuration	☐	The reading rights are set with this parameter.
Edit configuration	☐	The writing/reading rights are set with this parameter.
Firmware update	☐	The update rights are set with this parameter.
Manage users	☐	The user management rights are set with this parameter.
Back	↰	This represents the output (exit) of the User 1 permissions menu. Press 'back' to return to the User 1 menu.

The parameter View configuration is used to define whether the user may read the configuration. Activation of the reading rights is indicated with the symbol of a crossed-out pencil. This should display the missing writing rights.

The writing/reading rights are issued with the parameter Edit configuration . These rights allow the user to change the configuration. Access to the service menu is allowed. However, the right to manage users and update the firmware remains blocked.

The right to update the firmware is issued with the parameter Update firmware .

The right to change user rights is issued with the parameter Manage users .

A user with all rights has **no** access to the administrator menu, nor may he reset the passwords to default settings.

5.3.3.2 Administrator

Directory: \Login\ Manage users \Administrator
Level: 3

Fig. 51: Administrator

The password for the administrator is issued with the parameter Admin. password . The administrator has unlimited access to all menus and parameters.

5.3.4 Reset passwords

Directory: \Login\ Reset passwords
Level: 2

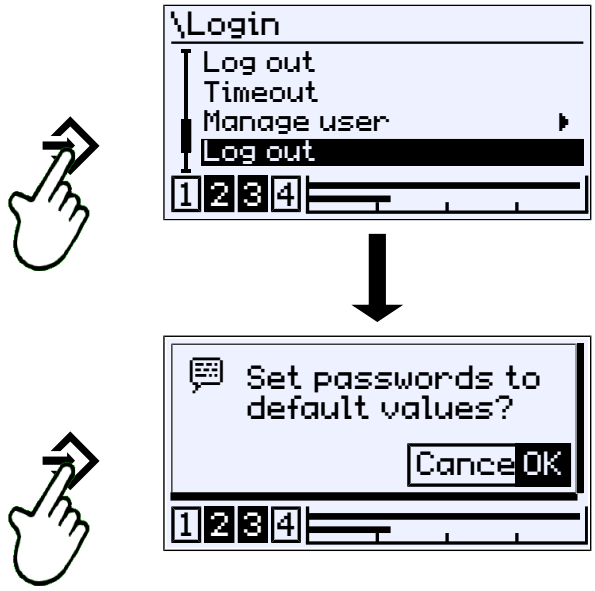


Fig. 52: Reset passwords

All passwords are set to the default value 000. Only the administrator can carry out this action. The set rights of the users are retained.

5.4 Quick access

Directory:\ Quick access
Level: 1

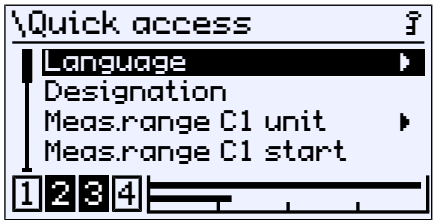
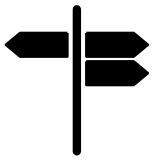


Fig. 53: Quick access

This menu allows quick access to some of the most important parameters of the two measuring channels. This shows the menu for devices with two measuring channels (C1, C2). In models with just one measuring channel, the parameters of the second channel (C2) are hidden.

Menu name	Description
Language ▸	This menu can be used to select a defined language as a menu language.
Designation	A designation for the measuring point is entered in this menu item.
Meas.range C1 unit ▸	A defined unit for the 1st measuring channel can be selected in this sub-menu.
Meas.range C1 start	The start of the measuring range of the 1st measuring channel is defined with this parameter.

Menu name		Description
Meas.range C1 end		The end of the measuring range of the 1st measuring channel is defined with this parameter.
Damping C1		This parameter can be used to set a damping for the 1st measuring channel.
Meas.range C2 unit	▸	A defined unit for the 2nd measuring channel can be selected in this submenu.
Meas.range C2 start		The start of the measuring range of the 2nd measuring channel is defined with this parameter.
Meas.range C2 end		The end of the measuring range of the 2nd measuring channel is defined with this parameter.
Damping C2		This parameter can be used to set a damping for the 2nd measuring channel.
Back	↰	This represents the output (exit) of the quick access menu. Press 'back' to return to the main menu.



Signpost [► Page]

- Language [▸ 85]
- Designation [▸ 85]
- Meas.range C1 unit [▸ 48]
- Meas.range C1 start [▸ 49]
- Meas.range C1 end [▸ 50]
- Damping C1 [▸ 50]

As all channels are configured identically, only the first channel is described. This is why the links for the second channel are missing.

5.5 Configuration

With the **inTouch®** software, parameterization can also be carried out on the PC. The finished parameter set is then transferred to the DE90 via the USB interface.

⚠ WARNING

Parameterization in hazardous areas

The housing must not be opened within the ATEX area. Therefore parameterization and firmware update via the USB interface may only be carried out outside the hazardous area.

Directory: \Configuration
Level: 1

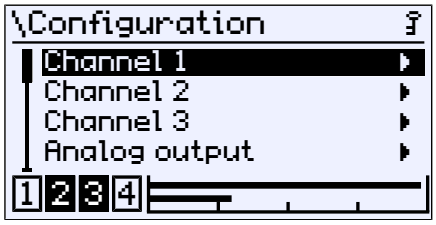


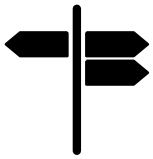
Fig. 54: Configuration

NOTICE! The device has 1 or 2 measuring channels, depending on the version. For a device with only one measuring channel, the menus for the second channel are hidden.

The parameters and menus are described for a device with two channels. The displays and descriptions shown may therefore differ for a device with only one channel.

Only devices with two channels have a third channel. This channel is a so-called 'virtual' channel whose display values are calculated by a mathematical function from the two measurement channels 1 and 2.

Menu name		Description
Channel 1	▸	With this menu the 1st measuring channel is parameterized.
Channel 2	▸	With this menu the 2nd measuring channel is parameterized.
Channel 3	▸	With this menu the 3rd measuring channel is parameterized.
Analog output	▸	This menu is used to parameterize the analog outputs..
Switch output	▸	This menu is used to parameterize the switching outputs.
Display	▸	This menu is used to parameterize the display.
Modbus RTU	▸	This menu is only available for Modbus devices and is used to configure the interface.
Back	↰	This represents the output (Exit) of the parameterization menu. This takes you 'Back' to the main menu.



Signpost [► Page]

- Channel 1 [▷ 45]
- Channel 2 [▷ 67]
- Channel 3 [▷ 68]
- Analog output [▷ 78]
- Switch output [▷ 81]
- Display [▷ 84]
- Modbus RTU [▷ 89]

5.5.1 Channel 1

Directory: \Configuration\Channel 1
Level: 2

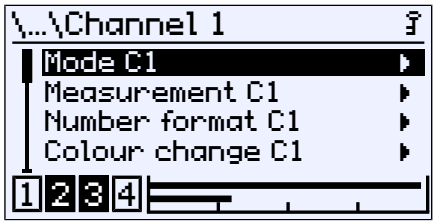


Fig. 55: Channel 1

Menu name		Description
Mode C1	▸	With this menu you can select fixed functions for the measuring channel.
Measurement C1	▸	In this menu the input of the measuring channel is parameterized.
Menu extension		
Characteristic C1	▸	This menu is hidden depending on the selected mode.
Number format C1	▸	In this menu, the decimal places for the measured value display of the measuring channel are set.
Colour change C1	▸	In this menu the color changes for the measuring channel are parameterized.
Back	↰	This represents the output (exit) of the menu. This takes you 'Back' to the parameterization menu.

The following graphic illustrates the interaction of the various parameters.

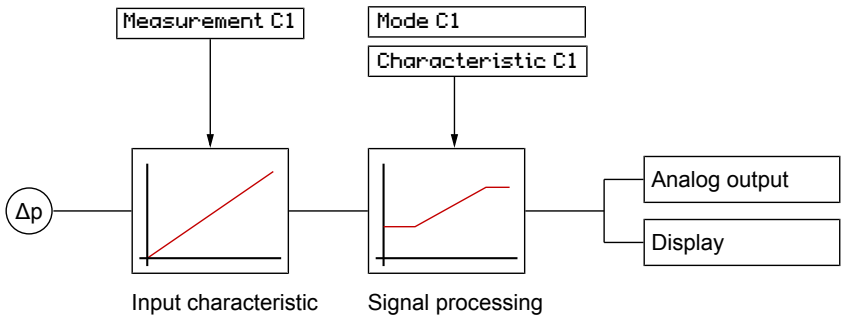


Fig. 56: Parameterization of characteristic K1

Signpost [►Page]

- Mode C1 [▸ 46]
- Measurement C1 [▸ 47]
- Characteristic curve C1 (menu extension) [▸ 54]
- Number format C1 [▸ 61]
- Colour change C1 [▸ 62]

5.5.1.1 Mode C1

Directory: \Configuration\Channel 1\Modus K1
Level: 3

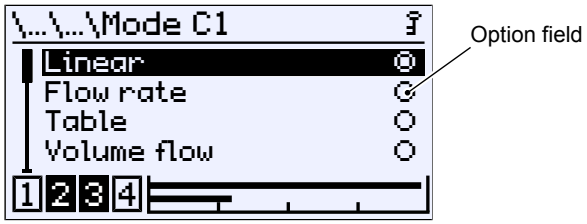


Fig. 57: Mode C1

In this menu, various modes can be selected for the first measurement channel (K1). The selected mode is indicated by the option field.

Parameter value	Description
Linear	Linear input characteristic curve
Flow rate	Flow measurements at an orifice plate
Table	Level measurements on tanks
Volume flow	Volumetric flow measurements in ventilation systems
Linear function	Mathematical function f(x) = mx + b
Back	This represents the output (exit) of the menu. It takes you back to the Channel 3 menu.

Each of these operating modes requires a different parameterization of the characteristic curve. After the exit of this menu, the calling menu will supplemented by the menu extension `Characteristic K1` , which parameterize the characteristic curve.

The Linear operating mode is an exception. In this case, the menu extension is not necessary because the parameters are only set in the `Measurement C1` menu.

See also

Characteristic curve C1 (menu expansion) [▶ 54]

5.5.1.2 Measurement C1

Directory: \Configuration\Channel 1\Measurement C1
Level: 3

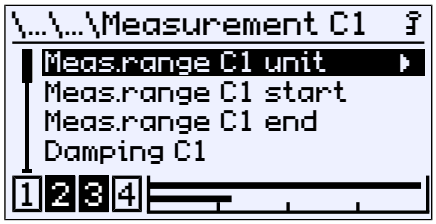


Fig. 58: Measurement C1

In this menu, the linear starting range is configured independent of the set operating mode.

Menu name		Description
Meas.range C1 unit	▸	In this menu, the measurement unit of the physical variable that is to be measured (pressure) must be defined.
Meas.range C1 start		The start of the measuring range is defined with this parameter.
Meas.range C1 end		The end of the measuring range is defined with this parameter.
Damping C1		The damping parameter serves to dampen the display.
Offset C1		The characteristic is displaced with the parameter offset.
Zero-pt. window C1		The zero point window parameter defines a range around zero in which the display value is set to zero.
Limits	☐	This property determines whether or not the set measuring range limits also act on the meas.data display.
Back	↰	This represents the output (exit) of the menu. Press 'back' to return to the channel 1 menu

5.5.1.2.1 Measuring range C1 unit

Directory: \Configuration\Channel 1\Measurement C1\Meas.range C1 unit
Level: 4

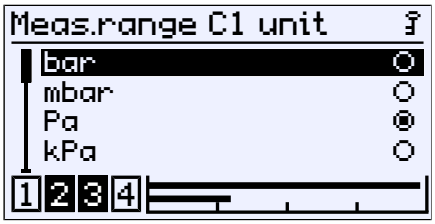


Fig. 59: Meas.range C1 unit

Implemented pressure units:

Unit		Description
bar	bar	Metric and SI units
mbar	milli bar	
Pa	Pascal	
kPa	kilo Pascal	
MPa	Mega Pascal	
psi	pound-force per square inch	Anglo-American units (Imperial Units)
inH$_2$O	inch water column	
mmH$_2$O	mm Water column	Historical units
mmHg	mm Mercury column	

If the pressure unit is changed, the conversion for all parameters takes place automatically.

5.5.1.2.2 Measuring range C1 start

Directory: \Configuration\Channel 1\Measurement C1\Meas.range C1 start
Level:4

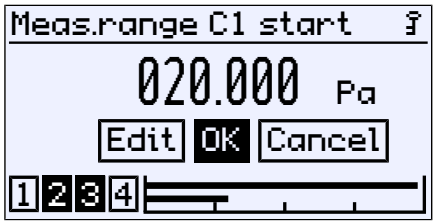


Fig. 60: Measuring range C1 start

At this point, the start value of the measuring range is entered. This input acts directly on the output signal. This does not affect the display directly.

The value range and its limits are displayed automatically.

In this works configuration, a so-called basic measuring range is defined for each device. This basic measuring range is defined by the order code and is stated on the type plate as 'Measuring range'.

With the parameters `Meas.range C1 start` and `Meas.range C1 end` the input range of measuring channel 1 is configured.

Spread (Turn down)

The characteristic can be spread within the basic measuring range. The spread is the ratio of the basic measuring range to the set measuring span and may be a maximum of 4:1. i.e. the difference of the two values `Meas.range C1 start` and `Meas.range C1 end` must be at least 25% of the basic measuring range.

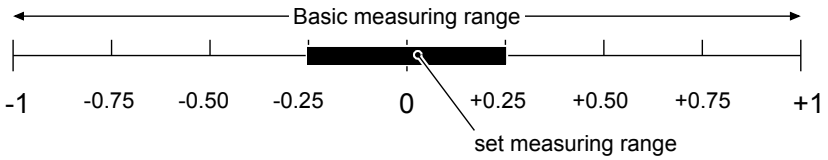


Fig. 61: Turn down

The spread of the characteristic only acts directly on the output signal. Activation of the parameter `Limit` also limits the display area to the set measuring range.

Increase in the characteristic

If the `Meas.range C1 start` < `Meas.range C1 end` leads to a rising characteristic. The output signal increases with the increasing pressure.

If the `Meas.range C1 start` > `Meas.range C1 end` , the characteristic falls. The output signal drops with the increasing pressure.

5.5.1.2.3 Measuring range C1 end

Directory: \Configuration\Channel 1\Measurement C1\Meas.range C1 end
Level: 4

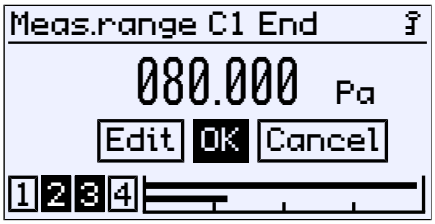


Fig. 62: Meas.range C1 end

At this point, the end value of the measuring range is entered. The value range and its limits are displayed automatically.

5.5.1.2.4 Damping C1

Directory: \Configuration\Channel 1\Measurement C1\Damping C1
Level: 4

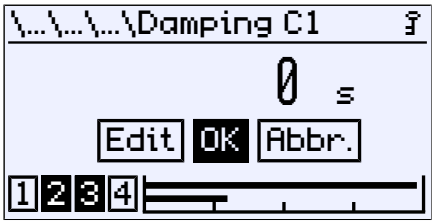


Fig. 63: Damping C1

If there are unsteady measurement readings during operation, you can use the parameter `Damping C1` to stabilise the reading.

The value range is from 0 s to 30 s.

The parameter functions like a capillary throttle. Please note that the damping only affects the signal input. The measuring cell itself is not uninfluenced. The parameter value states the time period until the amplitude reaches 90 %. A value of 0s means that no damping is carried out.

5.5.1.2.5 Offset C1

Directory: \Configuration\Channel 1\Measurement C1\Offset C1
Level: 4

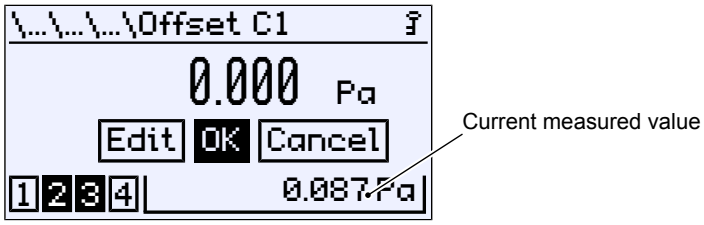


Fig. 64: Offset C1

If the measuring data display in the zero-point shows a different value, this can be corrected with the parameter `Offset C1` .

The value range is one third of the basic measuring range.

The current measurement is shown at the bottom right. During the input, the set offset parameters act immediately on the measured value. Please note that this zero-point window and the damping are not active during the offset setting.

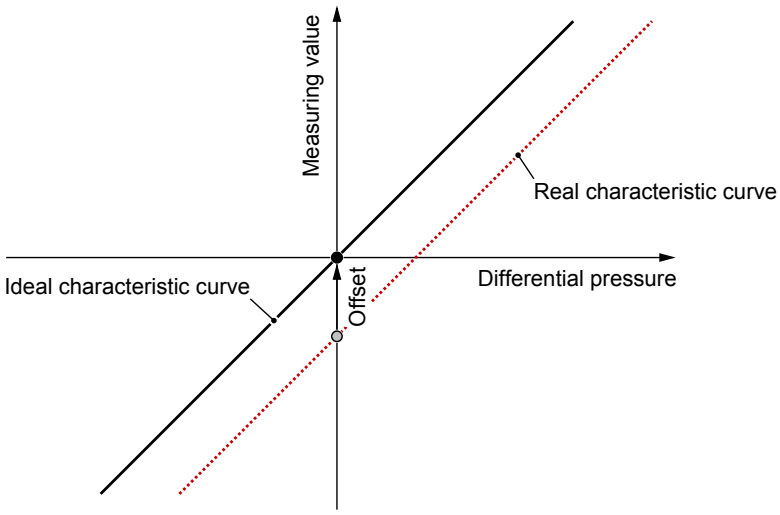


Fig. 65: Offset error

The parameter causes a shift of the entire characteristic toward the ideal characteristic.

5.5.1.2.6 Zero-point window C1

Directory: \Configuration\Channel 1\Measurement C1\Zero-pt. window C1
Level: 4

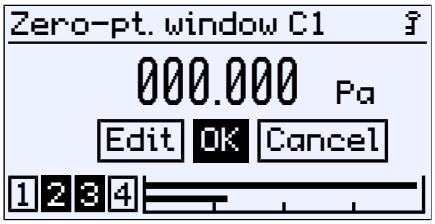


Fig. 66: Zero-point window C1

Unsteady readings are not usually a problem during normal operating mode, but this is not true for the idle state, if a measured value of zero is expected. The parameter `Zero-pt. window C1` is designed to solve this.

The value range is one third of the basic measuring range.

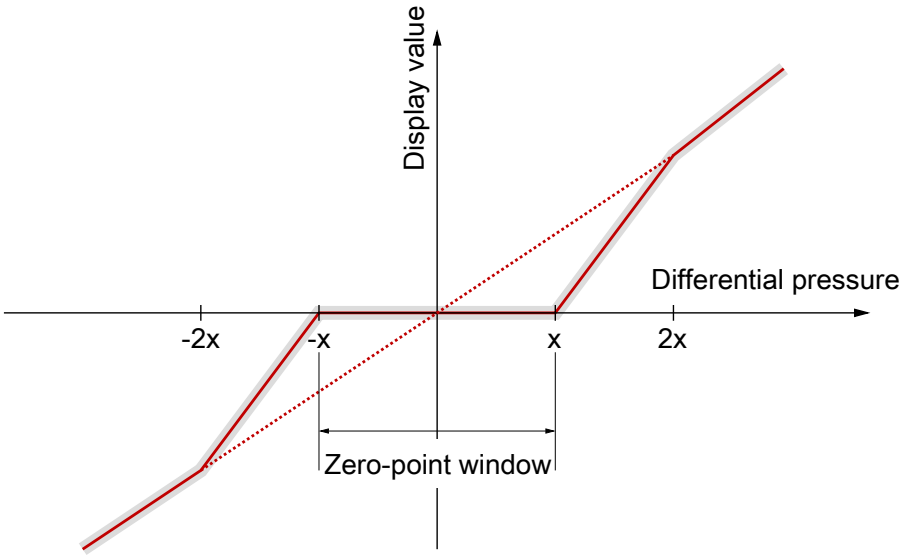


Fig. 67: Zero-point window

The parameter value (x) defines a range around zero, the so-called zero-point window. All measured values within this window are displayed as a zero value. The reading will only no longer show zero, if the pressure lies outside the set window.

In this area, approximation is linear up to twice the parameter value (2x). Only when twice the pressure is reached for the zero-point window, the measured value and the reading match again. This avoids jumps in the display.

5.5.1.2.7 Limits

Directory: \Configuration\Channel 1\Measurement C1
Level: 3

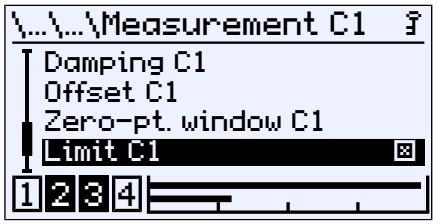


Fig. 68: Limit C1

With this property, the measuring data display can be limited to the `Meas.range C1 start` and `Meas.range C1 end` measuring range defined with the parameters. The button ◈ is used to activate and deactivate.

5.5.1.3 Characteristic curve C1 (menu expansion)

The menu changes depending on the set operating mode of the measuring channel.

NOTICE! The menu extension does not apply to devices for which the Mode parameter has been set to the linear value.

5.5.1.3.1 Characteristic C1 (flow rate)

Directory: \Configuration\Channel 1\Characteristic C1
Level: 3

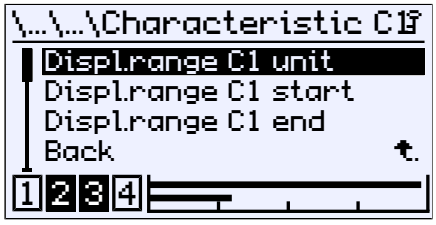


Fig. 69: Characteristic C1 (flow rate)

Menu name	Description
Displ.range C1 unit	This parameter is used to define the flow rate unit. It must have a length of at least 5 characters.
Displ.range C1 start	The start of the display range is defined with this parameter.
Displ.range C1 end	The end of the display range is defined with this parameter.
Back	This represents the output (exit) of the menu. Press 'back' to return to the Channel 1 menu.

This function allow the flow rate to be measured by means of an effective pressure procedure on a measuring panel. The differential pressure is a measure for the flow rate:

$$q = \sqrt{\Delta p}$$

q: Flow rate

Δp: Differential pressure

The root extracted input signal is shown as a signal from 0 … 100 %. The display value can be furnished with a different unit with the parameter Displ.range C1 unit ´. The display range can be scaled to this unit with the parameters Displ. C1 start and Displ.range C1 end .

5.5.1.3.2 Characteristic C1 (Table)

Directory: \Configuration\Channel 1\Characteristic C1
Level: 3

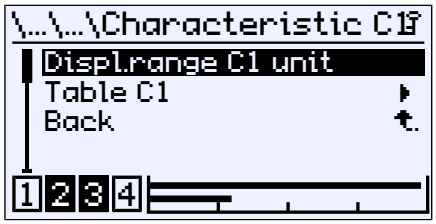


Fig. 70: Characteristic C1 (table)

Menu name	Description
Displ.range C1 unit	A unit for the display value is defined with this parameter. It must have a length of at least 5 characters.
Table C1	The table is defined in this menu.
Back	This represents the output (exit) of the menu. It is used to return to the Channel 1 menu.

The table function can be used to correct the input characteristic of the sensor at any point. The changes impact on the display value and the output signal.

5.5.1.3.2.1 Table C1

Directory: \Parametrierung\Kanal1\Kennlinie K1\Tabelle K1
Level: 4

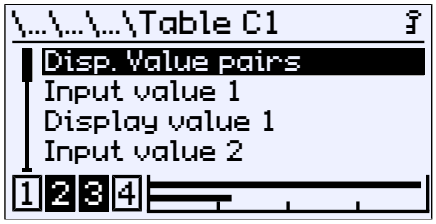


Fig. 71: Table C1

Menu name	Description
No. Value pairs	This parameter is used to define the number of value pairs. Value range: ... 2 ... 30
Input value 1	Value pair 1
Display value 1	
Input value 2	Value pair 2
Display value 2	
⋮	
Input value 30	Value pair 30
Display value 30	

Each support point is stated by a value pair comprising the `Input value x` and `Display value x`. The index `x` states the number of the value pair. At least two value pairs always need to be stated. The maximum number of value pairs is 30.

The first value pair is assigned to the start of the measuring range and the last value pair to the end of the measuring range. There is a linear interpolation of the characteristic between two values. The input values must either be continuously rising or falling. This is not mandatory for the assigned display values.

For example:

The table should have 7 value pairs [4]. Of the input signal, the range 20 … 80 Pa should be used. The basic measuring range is 0 … 100 Pa. The display should display in the start of the measuring range 20 Pa and at the end of the measuring range 80 Pa.

Basic measuring range	0…100 Pa
Measuring range	20 … 80 Pa
Display range	10 … 70 Pa
Output signal	0…20 mA

The value point 5 should be displayed so that the output delivers 12 mA. The following values are then entered in the menu `Table C1` :

Input	**E1**	**O2**	**O3**	**O4**	**O5**	**O5**	**O6**	**O7**
Value [Pa]	20	30	40	50	60	**56**	70	80
Display	**A1**	**A2**	**A3**	**A4**	**A5**	**A5**	**A6**	**A7**
Value [Pa]	10	20	30	40	50	**46**	60	70
Output [mA]	0	3.33	6.66	10	13.33	**12**	16.66	20

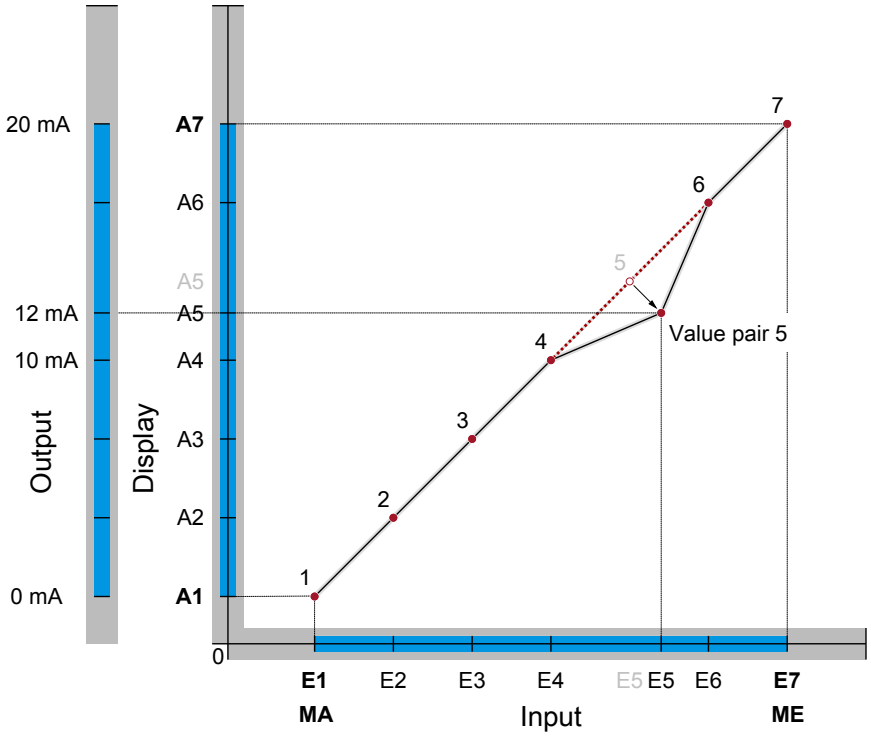


Fig. 72: Table function

[4] input values are abbreviated with E1…E7 and display values with A1…A7

5.5.1.3.3 Characteristic C1 (volume flow)

Directory: \Parametrierung\Kanal1\Kennlinie K1
Level: 3

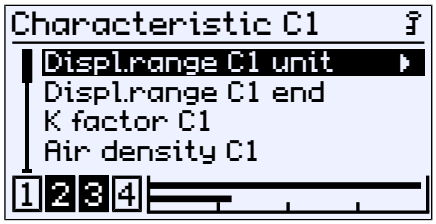


Fig. 73: Characteristic C1 (volume flow)

Menu name		Description
Displ.range C1 unit	▸	This parameter can be used to set a unit for the display.
Displ.range C1 end		The end of the display range is defined with this parameter.
K factor C1		This parameter is used to enter the specific calibration factor for the panel type.
Air density C1		This parameter can be used to enter the air density at operating temperature.
Formula C1	▸	The calculation formula is selected in this menu.
Back	↰	This represents the output (exit) of the menu. It is used to return to the Channel 1 menu.

This function allow the volume flow to be measured by means of an effective pressure procedure.

q: Volume flow
k: K factor
Δp: Differential pressure

$$q = k \cdot \sqrt{\Delta p}$$

Fig. 74: Volume flow basic formula

The ventilator is equipped with a measuring device to measure the volume flow. Each manufacturer states a K factor for his ventilator. This is filed with the parameter K factor C1 .

The calculation formula of the manufacturer can deviate from the basic formula. Therefore the manufacturer of the ventilator used in the menu Formula C1 must be selected.

Due to the fact that the volume of a gas changes with the pressure and the temperature, the air pressure at operating temperature is taken into account in the calculation. The value can be entered with the parameter Air density C1 . As standard, the density is preset with 1.2040 kg/m^3. [(5)]

[(5)] This value corresponds to the air density at 20 °C as sea level at an atmospheric pressure of 1013.25 hPa and dry air

5.5.1.3.3.1 Display range C1 unit

Directory: \Configuration\Channel 1\Characteristic C1\Displ.range C1 unit
Level: 4

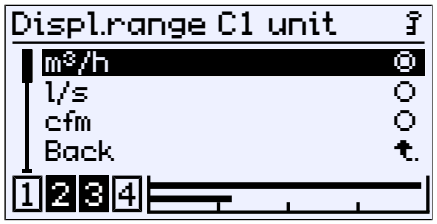


Fig. 75: Display range C1 unit

The following units are available for selection:

m^3/h	Cubic metre per hour	Default value
l/s	Litre per second	
cfm	Cubic feet per minute	

5.5.1.3.3.2 Formula C1

Directory: \Configuration\Channel 1\Characteristic C1\Formula C1
Level: 4

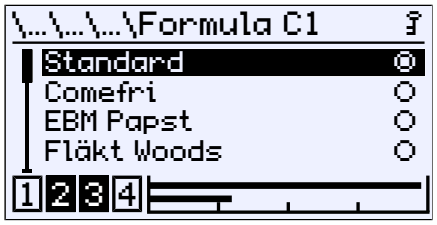


Fig. 76: Formula C1

The following table lists the formulas specified by the respective manufacturer for calculating the volume flow.

Standard **EBM Pabst** **Ziel-Abegg**	$q = k \cdot \sqrt{\Delta p}$
Comefri **Nicotra Gebhardt** **Rosenberg**	$q = k \cdot \sqrt{\frac{2}{\rho} \cdot \Delta p}$
Fläkt Woods	$q = \frac{1}{k} \cdot \sqrt{\Delta p}$

Fig. 77: Volumetric flow measurement Manufacturer's formulas

Volume flow measurement at the inlet cone

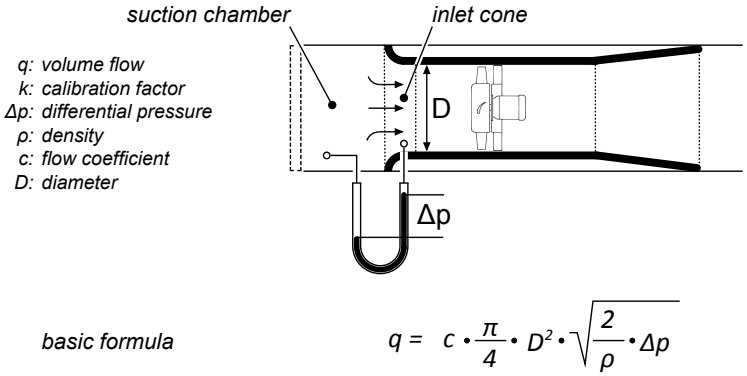


Fig. 78: Volume flow measurement

Fans are usually equipped with an inlet cone. The volume flow measurement consists of one or more measuring points in the inlet cone and one measuring point in the suction chamber of the ventilation unit. The differential pressure between the measuring points is used to calculate the volume flow.

The basic formula given applies to a frictionless and loss-free flow with constant density. In reality, therefore, a correction value caused by the design and other factors must be taken into account.

The fan manufacturers have determined the correction value for each inlet nozzle. In general, these values are called calibration factor or K-factor and can be found in the data sheet or operating instructions of the volume flow measuring device.

5.5.1.3.4 Characteristic C1 (linear function)

Directory: \Configuration\Channel 1\Characteristic C1
Level: 3

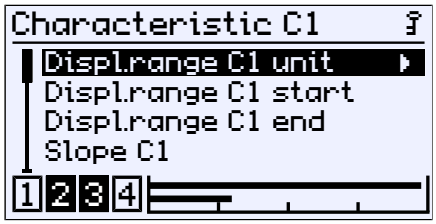


Fig. 79: Characteristic curve C1 (linear function)

Menu name	Description
Displ.range C1 unit	This parameter defines the unit of the flow measurement. A maximum of 5 characters can be used.
Displ.range C1 start	This parameter defines the beginning of the display range.
Displ.range C1 end	This parameter defines the end of the display range.
Slope C1	This parameter determines the slope (m) of the linear characteristic.
Offset C1	This parameter defines the axis section (b) of the linear characteristic.
Back	This represents the output (exit) of the menu. This takes you back to the Channel 1 menu.

With this menu, the output characteristic can be parameterized as a linear function.

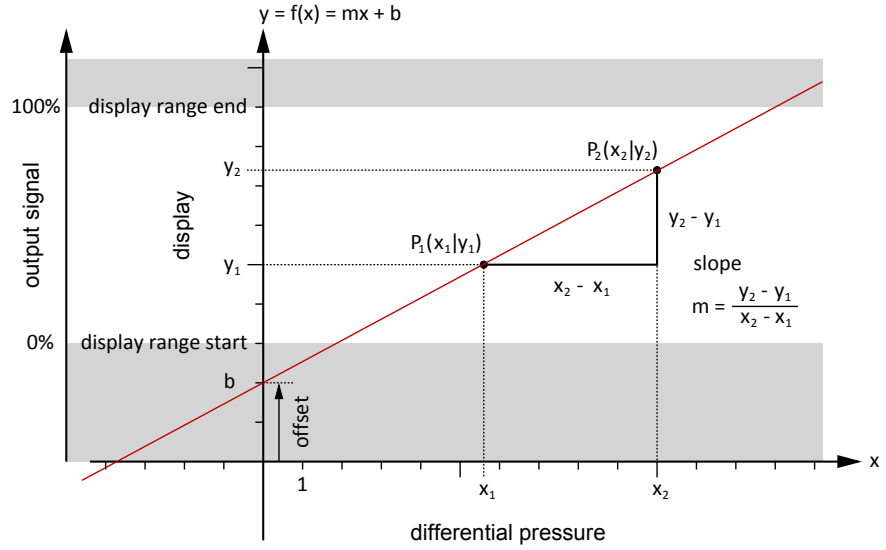


Fig. 80: Linear function

5.5.1.4 Number format C1

Directory: \Configuration\Channel 1\Number format C1
Level: 3

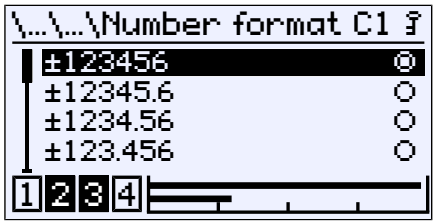


Fig. 81: Number format C1

The number of decimal places can be determined with this menu. All theoretically possible variants are made available for selection.

The decimal places are limited by the measuring range. There are 8 characters available with signs, decimal points and number value. The measuring data display can have less decimal points than set in the number format.

For example:

Set number format:	±123.456
Current measuring value:	−1234.567
Displayed measuring value:	−1234.57

Only two decimal points are shown, as otherwise the maximum number of 8 characters would be exceeded. The last decimal place is rounded.

5.5.1.5 Colour change C1

Directory: \Configuration\Channel 1\Colour change C1
Level: 3

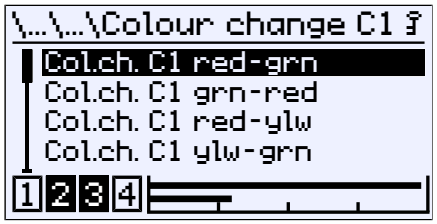


Fig. 82: Colour change C1

This menu is used to set the switch threshold for the colour change of the back lighting. A pre-requisite for the efficiency of the switch thresholds is the activation of the colour change in the menu LCD colour [▶ 87] and its assignment to measuring channel K1 in the menu Col.ch. assignment [▶ 86].

Menu name	Description
Col.ch. C1 red-grn	Switching thresholds for the named colour change
Col.ch. C1 grn-red	
Col.ch. C1 red-ylw	
Col.ch. C1 ylw-grn	
Col.ch. C1 grn-ylw	
Col.ch. C1 ylw-red	
Col.ch. C1 hyst.	This parameter can be used to set an hysteresis for all switch thresholds.
Col.ch. C1 delay on	This parameter can be used to set an activation delay for all switch thresholds.
Col.ch. C1 delay off	This parameter can be used to set a deactivation hysteresis for all switch thresholds.
Back	This represents the output (exit) of the menu. Press 'back' to return to the Channel 1 menu.

There are precisely two types of colour change that can be set in the menu LCD colour . Depending on this, certain thresholds are ignored. So, for instance, the switching threshold Col.ch. C1 ylw-grn is not relevant for the colour change type red/green.

By means of colour changes, it is possible to signalise certain operating states by the colour of the back lighting.

5.5.1.5.1 Colour change C1 type: red/green

The following switching thresholds are relevant for this colour change:

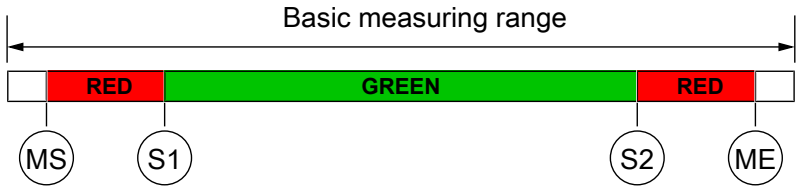


Fig. 83: Colour change red/green

MS	Meas.range C1 start	See menu Measurement C1 : [47]
S1	Col.ch. C1 red-grn	
S2	Col.ch. C1 grn-red	
ME	Meas.range C1 end	See menu Measurement C1 : [47]

For example:

Input of the threshold red/green

Directory: \Parametrierung\Kanal 1\Farbwechsel K1\Farbw. C1 red-green
Level: 4

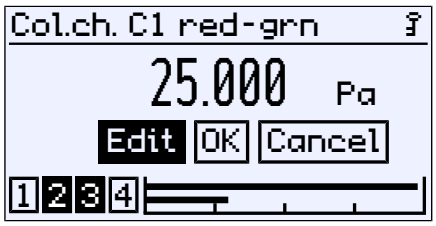


Fig. 84: Colour change C1 red-green

The other switch thresholds are entered in the same way.

5.5.1.5.2 Colour-change C1 type: red/yellow/green

The following switching thresholds are relevant for this colour change:

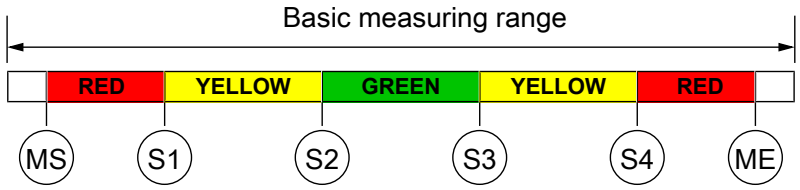


Fig. 85: Colour change red/yellow/green

MS	Meas.range C1 start	See menu Measurement C1 : [47]
S1	Col.ch. C1 red-ylw	
S2	Col.ch. C1 ylw-grn	
S3	Col.ch. C1 grn/ylw	
S4	Col.ch. C1 ylw/red	
ME	Meass.range C1 end	See menu Measurement C1 : [47]

For example:

Channel 1: Basic measuring range: 0 … 100 Pa

The measuring range is defined as 10 … 90 Pa. The green range should be 0 … 60 Pa. Then the critical range (yellow) up to 70 Pa starts. This is where the red range that ranges up to the measuring range end at 90 Pa starts. The lower colour changes red-yellow and yellow-green are switched off.

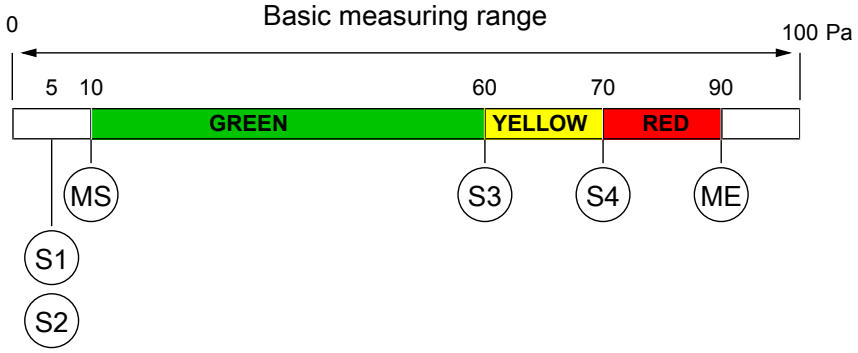


Fig. 86: Example colour-change red/yellow/green

MS	Meas.range C1 start	10 Pa	
S1	Col.ch. C1 red-ylw	5 Pa	< MS
S2	Col.ch. C1 ylw-grn	5 Pa	< MS
S3	Col.ch. C1 grn/ylw	60 Pa	
S4	Col.ch. C1 ylw/red	70 Pa	
ME	Ms.range C1 end	90 Pa	

The lower colour changes S1 and S2 are 'switched off' by placing thresholds outside the measuring range. If the threshold values were to be laid precisely at the start of the measuring range, the display would shine red in the zero-point,

Red > Yellow > Green

The cause for this lies in the priority of the colours. The red colour has priority over the yellow colour and this has priority over the green colour.

5.5.1.5.3 Colour change C1 hysteresis

Directory: \Configuration\Channel 1\Colour change C1\Col.ch. C1 hyst.
Level: 4

Fig. 87: Colour change C1 hyst.

This parameter can be used to define an hysteresis for the switch thresholds of the colour change. The set hysteresis applies to all switch thresholds at the same time. The input is a pressure value in the current unit. The allowed value range is stated automatically.

Functional principle:

The colour symbolises the following risk levels:

Colour	Risk level	Operating mode
Green	0	Normal
yellow	1	Warning
rot	2	Danger

The following colour change red/yellow/green is examined as an example for all colour changes. There are a total of four switch thresholds (S1...S4) in which a colour change is realised. This leads to the following image without hysteresis.

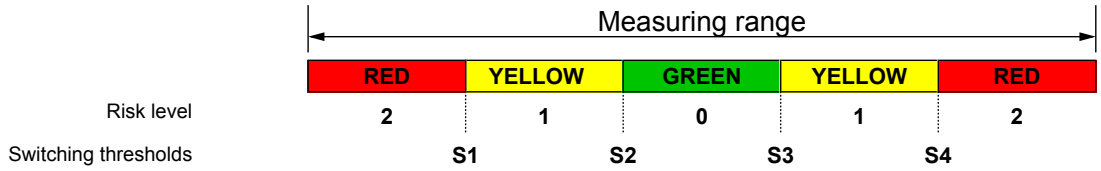


Fig. 88: Colour change (without hysteresis)

The parameter Col.ch. C1 hyst. defines a distance to the switch threshold. The colour change with hysteresis is then realised as follows:

(i) Lower switching thresholds S1 and S2

In case of a colour change from a higher to a lower risk level, the hysteresis acts with an increasing signal.

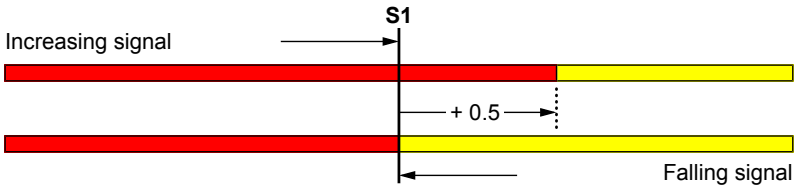


Fig. 89: Example: Hysteresis S1

(ii) Upper switching thresholds S3 and S4

In case of a colour change from a lower to a higher risk level, the hysteresis acts with an decreasing signal.

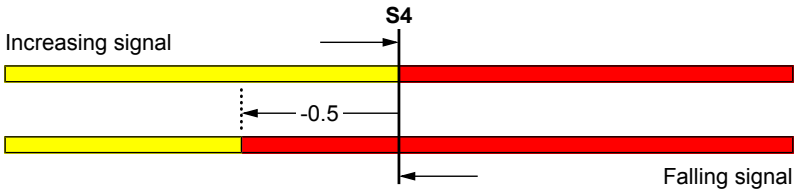


Fig. 90: Example: Hysteresis S4

5.5.1.5.4 Colour change C1 delay on

Directory: \Configuration\Channel 1\Colour change C1\Col.ch. C1 delay on
Level 4:

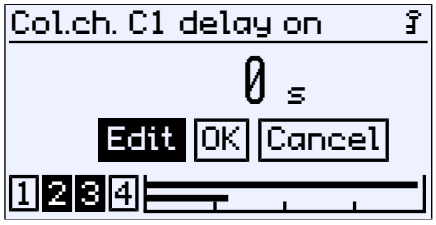


Fig. 91: Colour change C1 delay on

The activation delay acts when changing from a lower risk level to a higher risk level.

5.5.1.5.5 Colour change C1 delay off

Directory: \Configuration\Channel 1\Colour change C1\Col.ch. C1 delay off
Level: 4

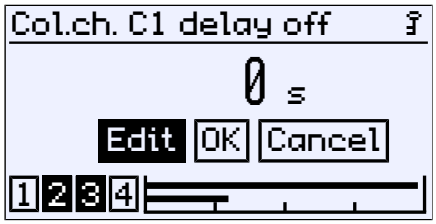


Fig. 92: Colour change C1 delay off

The deactivation delay acts when changing from a higher risk level to a lower risk level.

This results in the following connection between the delay and the colour change:

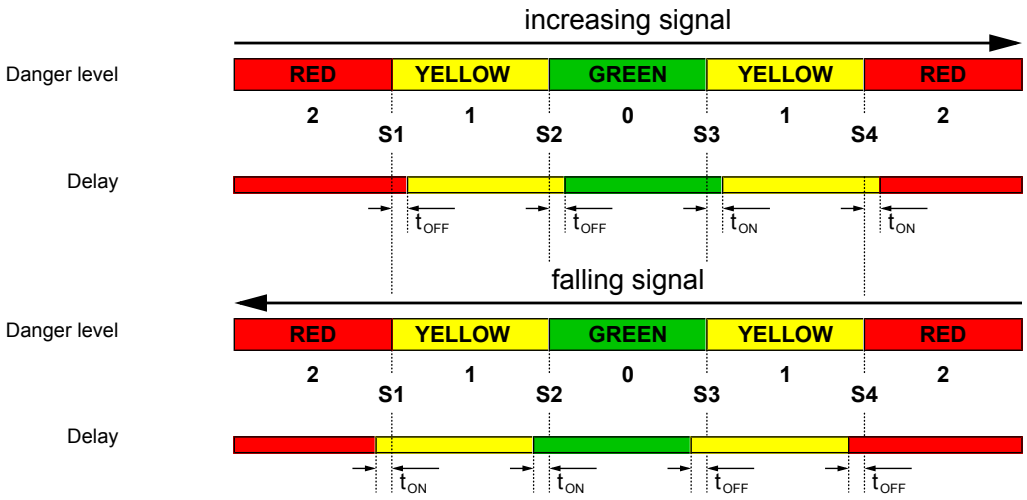


Fig. 93: Colour change delay

5.5.2 Channel 2

Directory: \Configuration\Channel 2
Level: 2

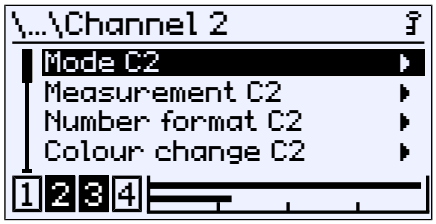


Fig. 94: Channel 2

The 2nd measuring channel is configured identically to the 1st measuring channel [▷ 45]. No explanation is provided at this point.

5.5.3 Channel 3

Directory: \Configuration\Channel 3
Level: 2

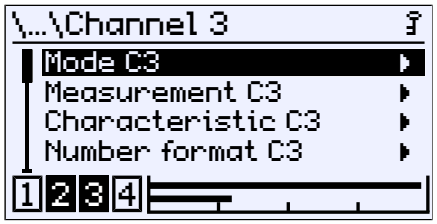
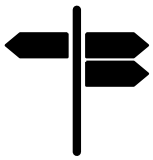


Fig. 95: Channel 3

The third channel is a 'virtual' channel, which is calculated from the two input channels 1 and 2 using a mathematical function.

Menu expansion

Menu name		Description
Mode C3	▸	With this menu you can select fixed functions for the measuring channel.
Measurement C3	▸	In this menu the input of the measuring channel is parameterized.
Characteristic C3	▸	This menu is hidden depending on the selected mode.
Number format C3	▸	In this menu, the decimal places for the measured value display of the measuring channel are set.
Colour change C3	▸	In this menu the color changes for the measuring channel are parameterized.
Back	↰	This represents the output (exit) of the menu. This takes you 'Back' to the configuration menu.



Signpost [▶ Page]

- Mode C3 [▸ 69]
- Measurement C3 [▸ 69]
- Characteristic C3 [▸ 70]
- Number format C3 [▸ 77]
- Colour change C3 [▸ 77]

5.5.3.1 Mode C3

Directory: \ Configuration/Channel 3/Mode C3
Level: 3

Fig. 96: Mode C3

Parameter value		Description
Inactive	◉	Enabled or disabled Channel 3
Difference	○	Difference of the input channels
Dyn. filter monitor.	○	Monitoring of filters in ventilation systems
Back	↰	This represents the output (exit) of the menu. It takes you back to the Channel 3 menu.

The operating modes Difference and Dyn. filter monitoring require different parameterization of the characteristic curve. Therefore, the calling menu after the exit is supplemented by the menu extension Characteristic K3 , with which the characteristic curve for the selected mode is parameterized.

See also

Characteristic C3 (menu expansion) [▶ 70]

5.5.3.2 Measurement C3

Directory: \Configuration\Channel 3\Measurement C3
Level: 3

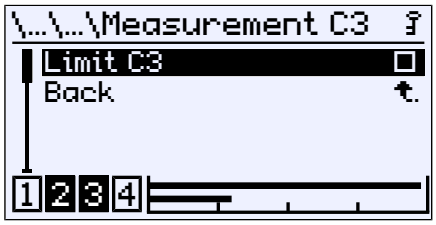


Fig. 97: Measurement C3

Menu name		Description
Limit C3	☐	This property determines whether the measured values are limited to the set limits.
Back	↰	This represents the output (exit) of the menu. This takes you 'Back' to the Channel 3 menu.

The limits of the display values are set in the Characteristic C3 menu.

5.5.3.3 Characteristic C3 (menu expansion)

The menu changes depending on the set operating mode of the measuring channel.

5.5.3.3.1 Characteristic C3 (difference)

Directory: \Configuration\Channel 3\Characteristic C3
Level: 3

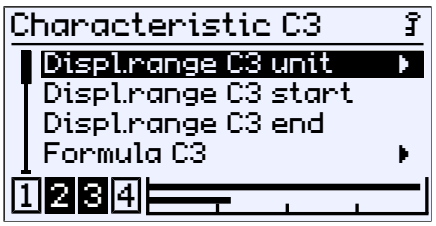


Fig. 98: Characteristic C3 (difference)

Menu name		Description
Displ.range C3 unit	▸	This parameter can be used to assign a unit to the difference.
Displ.range C3 start		This parameter defines the beginning of the display range.
Displ.range C3 end		This parameter defines the end of the display range.
Formula C3	▸	This menu is used to set Minuend and Subtrahend.
Back	↰	This represents the output (exit) of the menu. This takes you back to the Channel 3 menu.

5.5.3.3.1.1 Display C3 Unit

Directory: \Configuration\Channel 3\Characteristic C3\Displ.range C3 unit
Level: 4

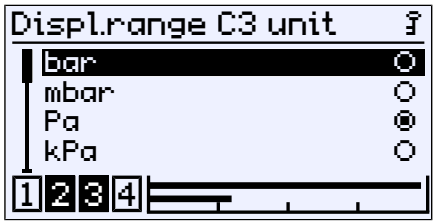


Fig. 99: Display C3 unit

Implemented pressure units:

Unit		Description
bar	bar	Metric and SI units
mbar	milli bar	
Pa	Pascal	
kPa	kilo Pascal	
MPa	Mega Pascal	
psi	pound-force per square inch	Anglo-American units (Imperial Units)
inH_2O	inch water column	
mmH_2O	mm Water column	Historical units
mmHg	mm Mercury column	

The measured values of the channels and all parameters are converted into the unit selected here. The difference is then calculated and the result displayed.

5.5.3.3.1.2 Formula C3

Directory: \Configuration\Channel 3\Characteristic C3\Formula C3
Level: 4

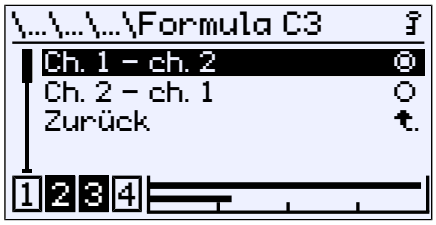


Fig. 100: Formula C3

Difference = Minuend - Subtrahend

This menu determines which channel is the minuend and which channel is the subtrahend. The difference is assigned to channel 3.

5.5.3.3.2 Characteristic C3 (dynamic filter monitoring)

Directory: \Configuration\Channel 3\Characteristic C3
Level: 3

Fig. 101: Characteristic C3 (dynamic filter monitoring)

Menu name	Description
Displ.range C3 start	This parameter defines the beginning of the display range.
Displ.range C3 end	This parameter defines the end of the display range.
Channel Δp ▸	This parameter defines the channel for differential pressure measurement at the filter.
Channel Q ▸	This parameter is used to define the channel for volume flow measurement.
Approximation ▸	This parameter defines the approximate formula for the volume flow measurement.
Δp clean	This parameter defines the limit value for the clean filter.
Δp soiled	This parameter defines the limit value for the dirty filter.
Δp correction value	This parameter can be used to set an offset for the characteristic curve.
Max. volume flow	This parameter determines the upper limit value for the volume flow.
Min. volume flow	This parameter determines the lower limit value for the volume flow. The measured value is 'frozen' when the volume flow falls below the limit value.
Back ↰	This represents the output (exit) of the menu. This takes you back to the Channel 3 menu..

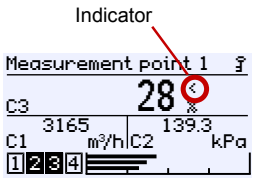


Fig. 102: Frozen Display

Frozen display

With the parameter Min. volume flow defines the lower limit for the filter monitoring. The measured value for the soiling is frozen as soon as the volume flow falls below this limit. This state is indicated in the display by the character < next to the measured value for the degree of soiling.

5.5.3.3.2.1 Explanations for dynamic filter monitoring

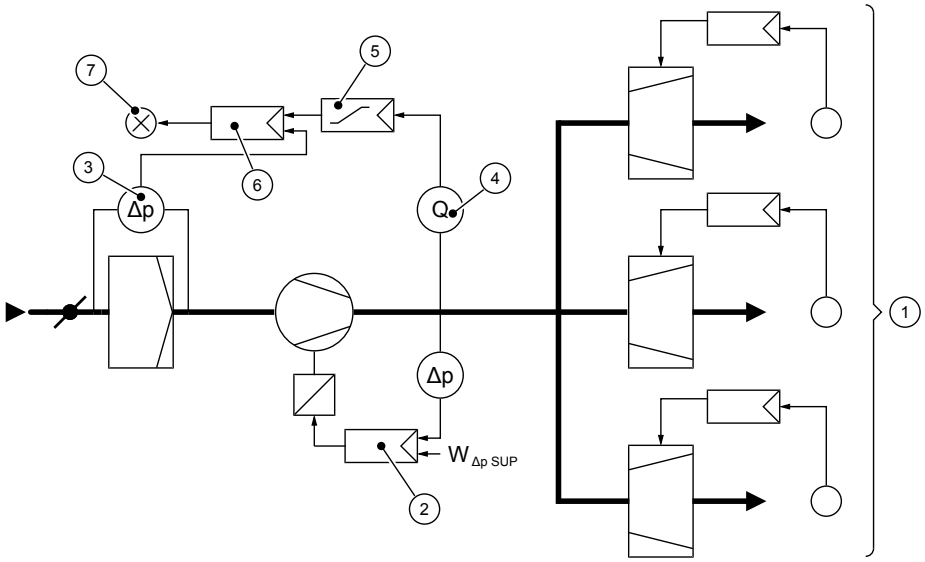


Fig. 103: Principle Diagram for Filter Monitoring

1	Zones with variable supply air volume flow rate
2	Supply air pressure control with fan speed control
3	Differential pressure sensor for filter monitoring (Channel Δp)
4	Volume flow sensor (Channel Q)
5	Setpoint encoder
6	Differential pressure regulator for filter monitoring
7	Air filter fault message

The air filter in this example has the task of retaining dust impurities from the outside air. With increasing contamination, the pressure difference measured above the filter increases. As soon as the pressure difference exceeds the set limit value, the filter monitoring system signals the contamination of the filter. This is indicated as a fault.

The volume flow control keeps the air volume flow constant despite increasing contamination by increasing the fan speed. However, the pressure drop across the air filter does not only depend on the degree of contamination, but also on the size of the volume flow.

The pressure drop changes as a square of the volume flow. Therefore a reduction of the volume flow from 100 % to 50 % means a reduction of the pressure drop across the filter element from 100 % to 25 %.

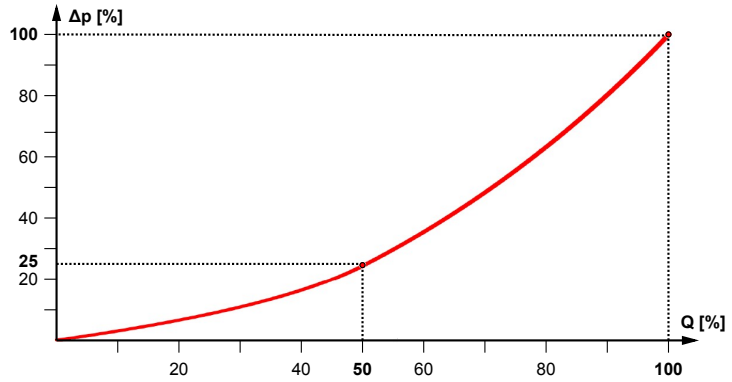


Fig. 104: General filter characteristic curve

In order to be able to determine the degree of contamination by means of differential pressure measurement, it is therefore necessary to carry out the measurement at maximum volume flow. This measurement is carried out at regular intervals.

This is not necessary for dynamic filter monitoring. An approximation of the filter characteristic curve is calculated by determining some system-specific parameters. With this approximated characteristic curve, the degree of contamination of the filter can now be determined at any time without changing the fan speed.

Parameterisation

NOTICE! The filter characteristic curves shown serve to illustrate the relationships and can only be transferred to a real characteristic curve to a limited extent.

The pressure difference in the filter increases due to the storage of dust. Approximately, this increase is quadratic for large dust filters and linear for particulate air filters. The approximation formula to be used therefore depends on the plant. This is determined by the parameter `Approximation` . Experience shows, however, that the linear approximation is sufficient in most cases.

The two input channels are assigned with the parameters `Channel Δp` (differential pressure measurement) and `Channel Q` (volume flow measurement). Please make sure that you do not assign the same channel twice and that the input channels have been parameterized according to the measurement task (see Measurement C1 [▶ 47]).

In general, the filter characteristic curve looks as follows:

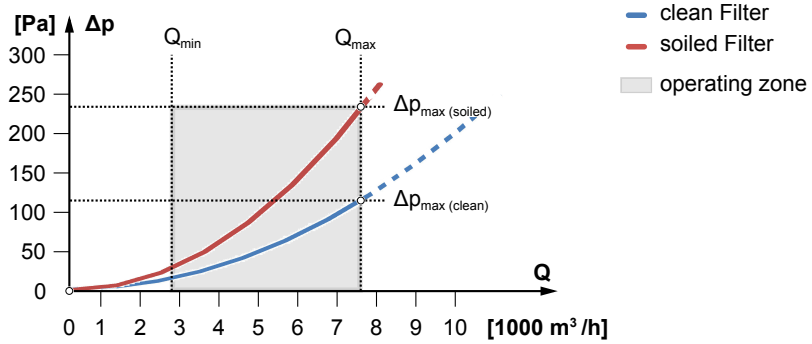


Fig. 105: filter characteristic curve

Explanation of the Quantities used:

Flowrate	$Q = \frac{dV}{dt}$	The flow rate states how much volume of a gas flows through a defined cross-section in a certain time. The flow rate is stated in m³/h.

formula symbol	*parameter*	*description*
Q_{max}	`Max. volume flow`	Maximum volume flow of the fan.
Q_{min}	`Min. volume flow`	Minimum volume flow of the fan.
Δp		Current differential pressure above the filter.
$\Delta p_{max\ (clean)}$	`Δp clean`	Differential pressure above the clean filter at a maximum flow rate.
$\Delta p_{max\ (soiled)}$	`Δp verschmutzt`	Differential pressure above the soiled filter at the maximum flow rate.

Linear approximation of the characteristic curve

Field tests have shown that the curvature of the filter characteristic curve is often very small. In these cases, a linear approximation is completely sufficient.

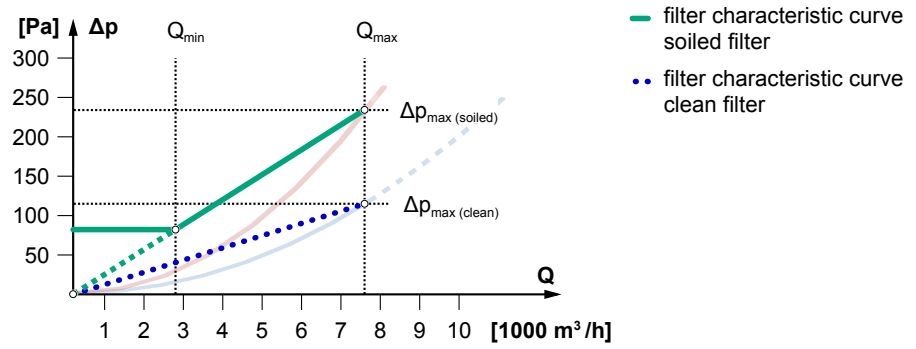


Fig. 106: Approximated linear filter characteristic curve

The **Δp correction value** parameter can be used to set an offset for the linear characteristic curve so that the deviation from the real filter characteristic curve is minimized over the entire operating range.

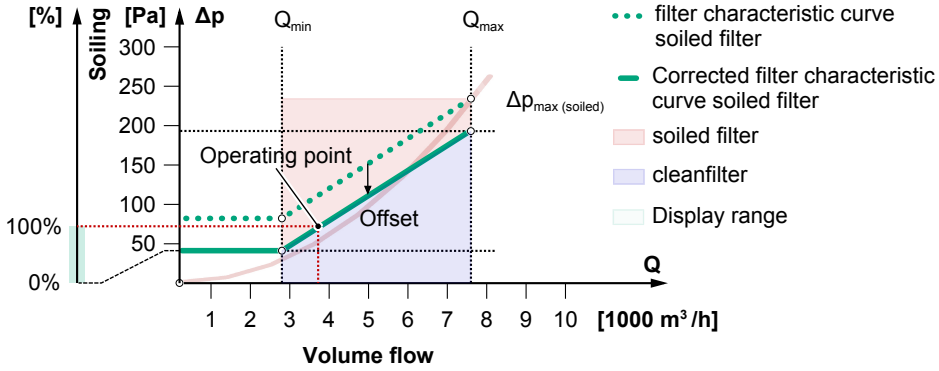


Fig. 107: Correction value Linear filter characteristic curve

The measurement errors resulting from the characteristic curve shift are much smaller than shown in the graph, since the curvature of the real characteristic curve is significantly smaller. This superelevation was chosen for reasons of presentation.

With the parameters **Displ.range C3 start** and **Displ.range C3 end** the display characteristic curve can be spread appropriately. Since the limit curve for the contaminated filter is now fixed, the degree of contamination of the filter can be determined dynamically for any operating point.

Square-root approximation of the characteristic curve

If the filter characteristic curve is strongly curved, a more exact approximation may be necessary. In this case, the Approximation parameter can be set to the ‘Square-root' value.

The software then calculates a square root characteristic from the other parameters.

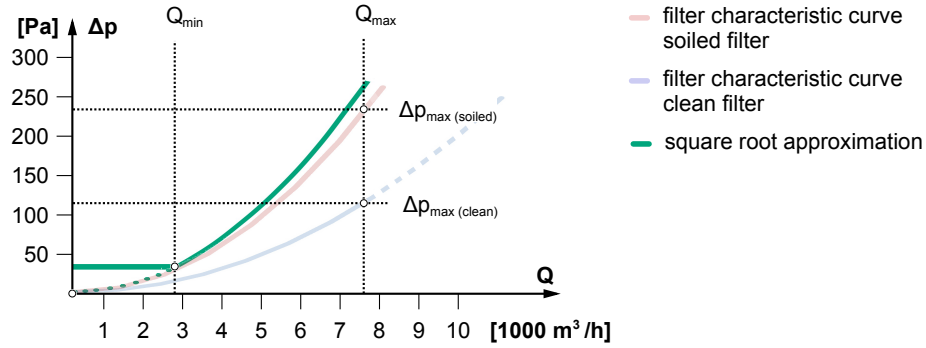


Fig. 108: Square-root approximation of the filter characteristic curve

The Δp correction value parameter can be used to set an offset for the linear characteristic curve so that the deviation from the real filter characteristic curve is minimized over the entire operating range.

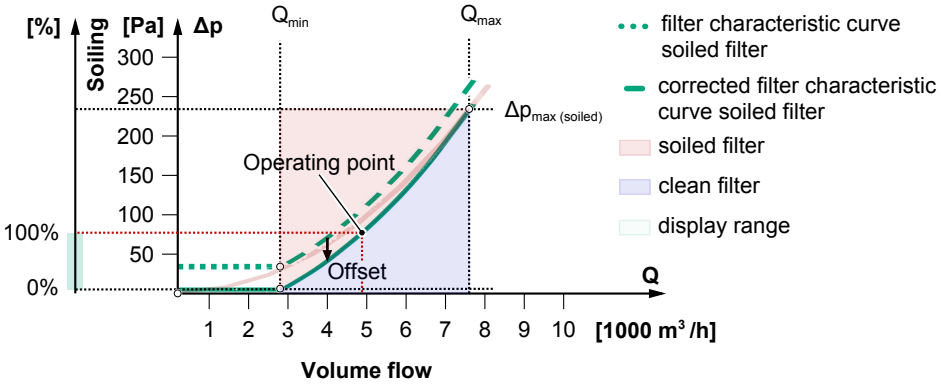


Fig. 109: Correction value square-root filter characteristic curve

With the parameters Displ.range C3 start and Displ.range C3 end the display characteristic curve can be spread appropriately. Since the limit curve for the contaminated filter is now fixed, the degree of contamination of the filter can be determined dynamically for any operating point.

5.5.3.4 Number format C3

Directory: \Configuration\Channel 3\Number format C3
Level: 3

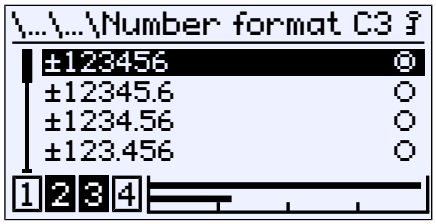


Fig. 110: Number format C3

With this menu the number of decimal places can be determined. All theoretically possible variants are available.

The decimal places are limited by the measuring range. 8 characters are available with sign, decimal point and numerical value. The measured value display can have fewer decimal places than the number format.

Example:

Set number format:	±123.456
Current measuring value:	−1234.567
Displayed measuring value:	−1234.57

Only two decimal places are displayed, otherwise the maximum number of 8 characters would be exceeded. The last digit is rounded.

5.5.3.5 Colour change C3

Directory: \Configuration\Channel 3\Colour change C3
Level: 3

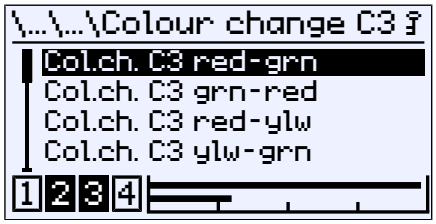


Fig. 111: Colour change C3

This menu is used to set the switching thresholds for the color change of the backlight. A prerequisite for the effectiveness of the switching thresholds is the activation of the color change in the `LCD colour` menu and its assignment to the measuring channel in the `Col.ch. assignment` menu.

For a detailed explanation of the color changes, refer to the description of channel 1.

See also

- LCD colour [▶ 87]
- Colour change assignment [▶ 86]
- Colour change C1 [▶ 62]

5.5.4 Analog output

Directory: \Configuration\Analog output
Level: 2

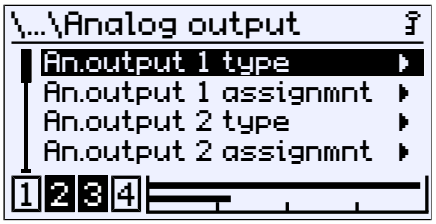


Fig. 112: Analog output

NOTICE! In devices with just one measuring channel, the parameters for the second output are not required.

Menu name		Description
An.output 1 type	▸	This menu is used to define the output signal for output 1.
An.output 1 assignmt	▸	The measuring channel of output 1 is assigned in this menu.
Output 2 type	▸	This menu is used to define the output signal for output 2.
An.output 2 assignmt	▸	The measuring channel of output 2 is assigned in this menu.
Limit I min.		Parameters for the lower limit of the current output.
Limit I max		Parameters for the upper limit of the current output.
I-error signal		Parameters for the error signal of the current output.
Limit U min.		Parameters for the lower limit of the voltage output.
Limit U max.		Parameters for the upper limit of the voltage output.
U error signal		Parameters for the error signal of the voltage output.
Back	↰	This represents the output (exit) of the menu. Press 'back' to return to the configuration menu.

The parameters for the type and assignment work for both channels identically. Therefore, the parameters for channel 1 are explained as an example.

The same also applies for limit parameters that are explained for the current signal. If the signal type is changed, the parameters that need to be entered for the previous signal are retained.

5.5.4.1 Analog output 1 type

Directory: \...\...\An.output 1 type
Level: 3

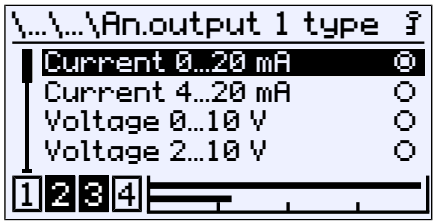


Fig. 113: Analog output 1 type

The signals can be set for output 1:

Current signals	Voltage signals
0 … 20 mA	0 … 10 V
4 … 20 mA	2 … 10 V
	1 … 5 V

5.5.4.2 Analog output 1 assignment

Directory: \Configuration\Analog output\An.output 1 assignmt
Level: 3

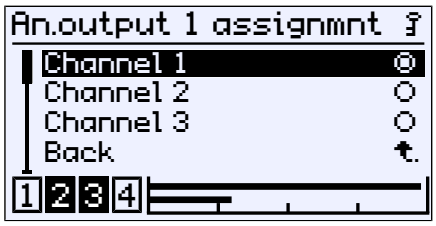


Fig. 114: Analog output 1 assignment

The assignment of the analogue outputs to the channels can be set freely. This menu item is not required for a device with just one channel.

5.5.4.3 Signal limits

NOTICE! The limit parameters apply for both output signals.

The output signal can by limited by the limit parameters. This primarily serves to prevent error messages in downstream systems caused by brief overstepping of measuring ranges. Due to the fact that the limit parameters for both signal types working the same way, they are only explained for the current signal as this point.

The parameters `limit I min.` , `limit I max.` and `I error signal` define the limits of the output signal that may not be undercut or exceeded regardless of the measured variable. These limit values take precedence over the `meas.range C1 start` and `meas.range C1 end` range defined by the parameter .[6]

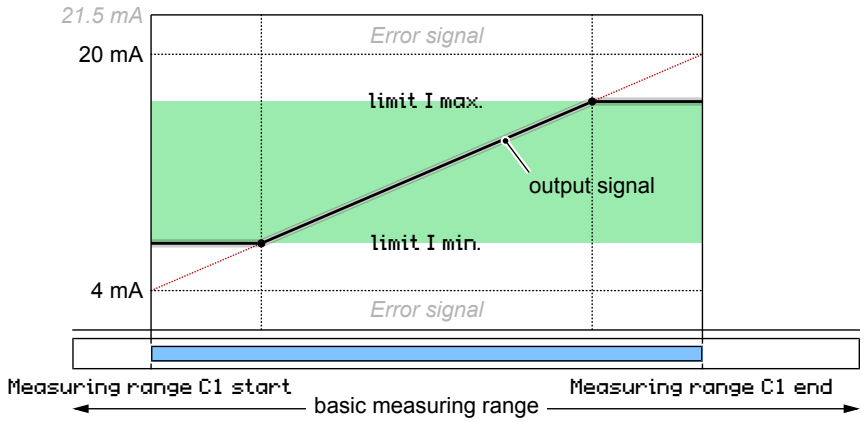


Fig. 115: Limitation of the output signal

The value defined via the parameter `I error signal` is issued if the device detects an internal error and can no longer work correctly. It should be noted here that not all potential errors and faults can be detected by the device itself.

Signal range

Current signal	0 … 21.5 mA
Voltage signal	0 … 10.5 V

[6] For the second channel, the channel number changes to C2.

5.5.5 Switch output

Directory: \Configuration\Switch output
Level: 2

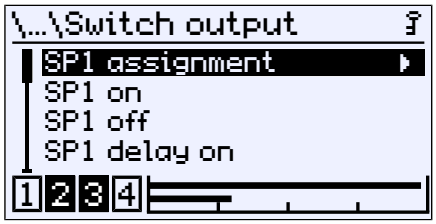


Fig. 116: Switch output

NOTICE! Depending on the model, the device has 2 or 4 switch outputs. As the configuration for each switch output is the same, only the parameters for the first switch output are shown.

Menu name		Description
SP1 assignment	▸	This menu assigns the switch output 1 to channel or switches it off.
SP1 on		The activation point is set with this parameter.
SP1 off		The deactivation point is defined with this parameter.
SP1 delay on		The activation delay is defined with this parameter.
SP1 delay off		The deactivation delay is defined with this parameter.
SP1 function	▸	The contact point is defined with this menu.
	⋮	
Back	↵	This represents the output (exit) of the menu. Press 'back' to return to the configuration menu.

5.5.5.1 SP1 assignment

Directory: \Configuration\Switch output\SP1 assignment
Level: 3

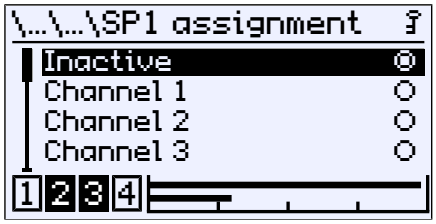


Fig. 117: SP1 assignment

This menu can be used to assign or deactivate the switch point of a channel.

5.5.5.2 SP1 function

Directory: \Configuration\Switch output\SP1 function
Level: 3

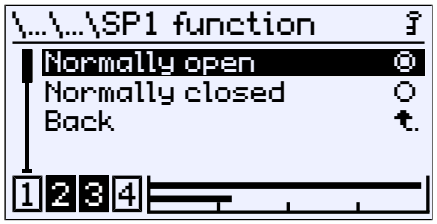


Fig. 118: SP1 function

The function of this contact is defined with this parameter.

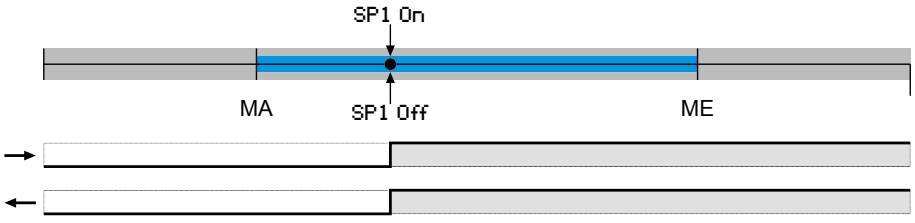
5.5.5.3 Switching function

The function of the individual parameters is explained for all switch points using Switch point 1 as an example.

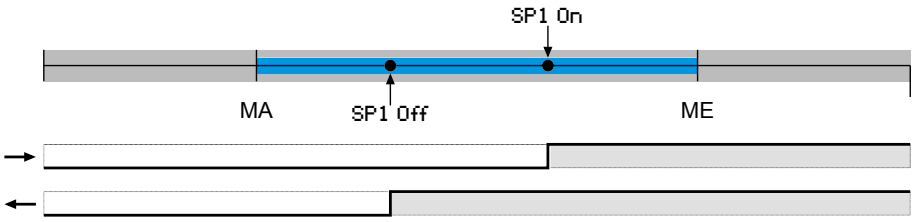
SP1 On defines the activation point, SP1 Off the deactivation point of switch output 1. The values are shown in the valid unit and set accordingly. The values are shown in the valid unit and set accordingly. Both parameters can be set independently over the entire value range.

→ Increasing input signal
← dropping input signal

If the parameter SP1 on = SP1 off, the contact pulls, if the measured value exceeds the parameter value. If the measured value undercuts the parameter value, the contact drops.



If the parameter SP1 on > SP1 off, the contact pulls, if the measured value exceeds the SP1 on. The contact only drops again if SP1 Off is undercut.



If the parameter SP1 on < SP1 off, the contact pulls, if the measured value lies between the parameter values:
SP1 on < Measured value < SP1 off. Otherwise the contact will drop.

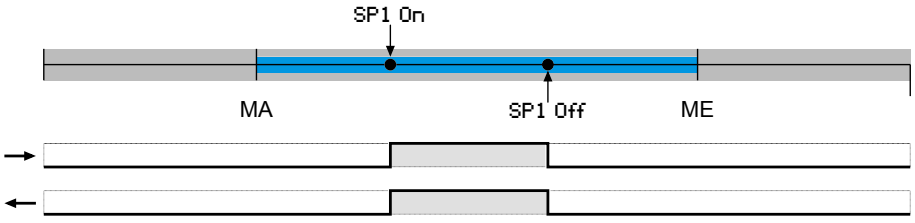


Fig. 119: Switch point setting

Delay

The switching behaviour of the contact can be delayed with the two parameters SP1 delay on and SP1 delay off .

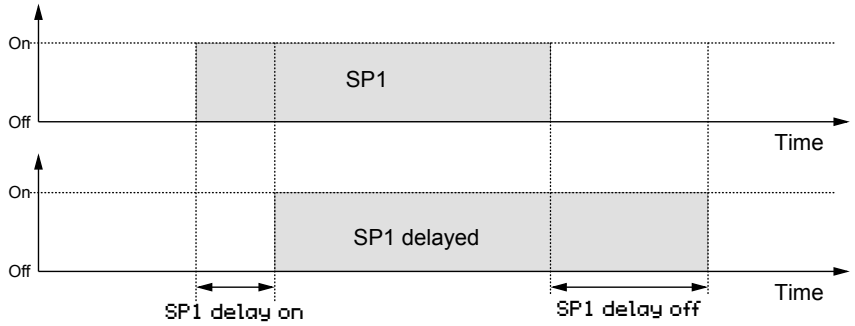


Fig. 120: Delay

5.5.6 Display

Directory: \Configuration\Display
Level: 2

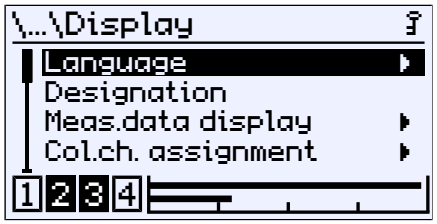


Fig. 121: Display

Menu name		Description
Language	▸	The menu language can be selected in this menu.
Designation		This parameter can be used to file the designation for the device.
Meas.data display	▸	This menu can be used to define which measuring value channel should be displayed.
Col.ch. assignmt	▸	This menu can be used to determine which measuring channel controls the colour change.
LCD col.	▸	This menu is used to determine the colour of the backlighting and/or their colour change.
LCD lighting		This parameter can be used to switch off the lighting based on a timer.
LCD contr.		This parameter is used to set the contrast for the LC display.
Back	↰	This represents the output (exit) of the menu. Press 'back' to return to the configuration menu.

5.5.6.1 Language

Directory: \Configuration\Display\Language
Level: 3

Fig. 122: Language

Parameter name	Language	
German	DE	German language
English	EN	English language
Español	ES	Spanish language
Français	FR	French language
Italiano	IT	Italian language
Magyar	HU	Hungarian language

5.5.6.2 Designation

Directory: \Configuration\Display\Designation
Level: 3

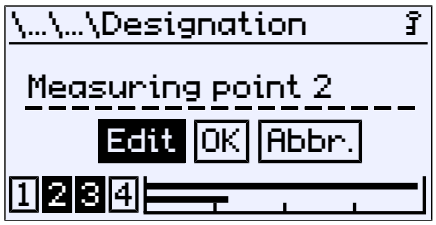


Fig. 123: Designation

At this point, a designation for the differential pressure transmitter can be issued. There are 20 digits available. The designation appears on the measured value display.

5.5.6.3 Measuring data display

Directory: \Configuration\Display\Meas.data display
Level: 3

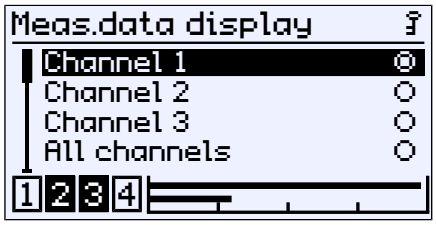


Fig. 124: Measuring data display

In this menu the channel, whose measured value is displayed, is defined. This menu item is not shown for 1-channel devices.

5.5.6.4 Colour change assignment

Directory: \Configuration\Display\Col.ch. assignment
Level: 3

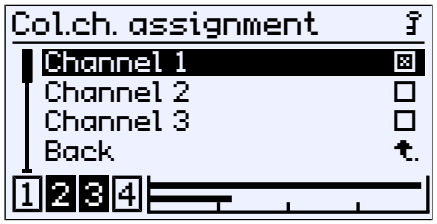


Fig. 125: Color Change Assignment

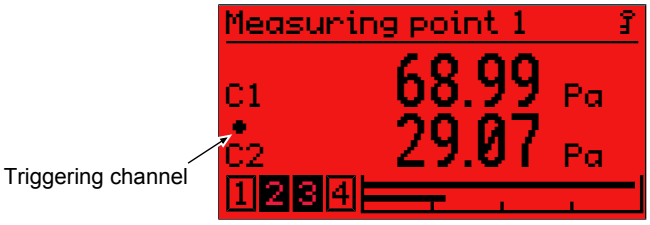
This menu is used to set the channel that controls the color change. This menu item is not displayed for 1 channel devices.

If several channels are selected, the color change takes place as soon as one of the channels triggers a color change. The 'triggering' channel is marked with a dot. When re-entering the green area, the indicators are deleted.

Example

Two channels are displayed on the power indicator. First, channel 2 triggers a green-red color change. A short time later, the same colour change is triggered by channel 1.

Event 1: Colour change green-red on channel 2



Event 2: Colour change green-red on channel 1

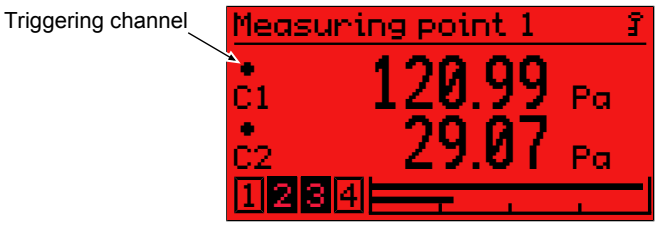


Fig. 126: Measured value display (color change)

5.5.6.5 LCD colour

Directory: \Configuration\Display\LCD-Farbe
Level: 3

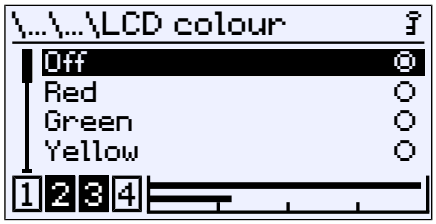


Fig. 127: LCD colour

The following colours can be selected for the back lighting.

OFF	
Red	
Green	
Yellow	
Blue	
Magenta	
Cyan	
White	
Red/green	Activation of the colour change red/green
Red/yellow/ green	Activation of the colour change red/yellow/green

The setting for the switch thresholds of the respective colour change are in the menu item Colour change [▶ 62] in the menu for the configuration of the channels.

5.5.6.6 LCD lighting

Directory: \Configuration\Display\LCD lighting
Level: 3

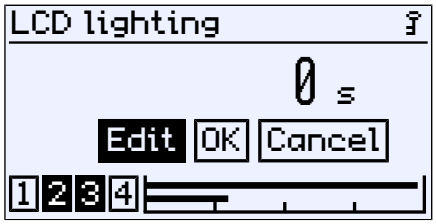


Fig. 128: LCD lighting

This parameter is used to define a time period after which the back lighting is switched off once no more input has been entered via the keyboard. The lighting can be switched on again by pressing any button.

NOTICE! The parameter also impacts in the same way on the colour change. When the lighting is switched off, a colour change is only display when a button is pressed.

Values of 0 to 600 s can be entered. The lighting can be switched on permanently with the parameter value 0s.

5.5.6.7 LCD contrast

Directory: \Configuration\Display\LCD contrast
Level: 3

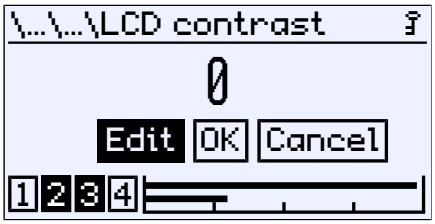


Fig. 129: LCD contrast

This parameter can be used to set the contrast for the LC display.

5.5.7 Modbus RTU

NOTICE! This menu is only available for devices with a Modbus interface.

Directory: \Configuration\Modbus RTU
Level: 2

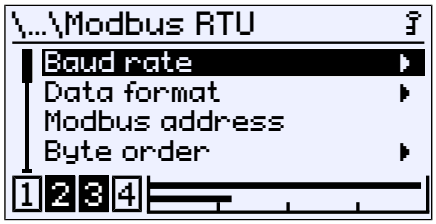


Fig. 130: Modbus RTU

Menu name		Description
Baud rate	▸	The baud rate is set with this menu.
Data format	▸	The data format (data, parity, stop-bit) is defined for the transmission with this menu.
Modbus address		The DE90 address is entered with this parameter.
Byte sequence	▸	The byte order for the floating point figure is defined with this menu.
Back	↵	This represents the output (exit) of the menu. Press 'back' to return to the configuration menu.

5.5.7.1 Baud rate

Directory: \Configuration\Modbus RTU\Baud rate
Level: 3

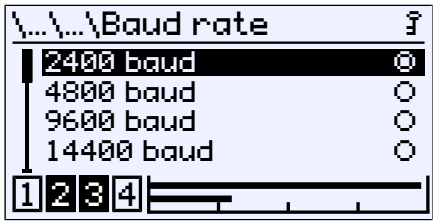


Fig. 131: Baud rate

Baud rates	Description
2400 Baud	Options for data transmission.
4800 Baud	
9600 Baud	
14400 Baud	
19200 Baud	
28800 Baud	
38400 Baud	
56000 Baud	
57600 Baud	
115200 Baud	
Back	This represents the output (exit) of the menu. Press 'back' to return to the Modbus RTU menu.

5.5.7.2 Data format

Directory: \Configuration\Modbus RTU\Data format
Level: 3

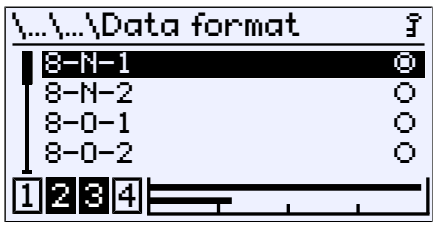


Fig. 132: Data format

Data format	Description
8-N-1	8 data-bit – No parity – 1 stop-bit
8-N-2	8 data-bit – No parity – 2 stop-bit
8-O-1	8 data-bit – Odd parity – 1 stop-bit
8-O-2	8 data-bit – Odd parity – 2 stop-bit
8-E-1	8 data-bit – Even parity – 1 stop-bit
8-E-2	8 data-bit – Even parity – 2 stop-bit
Back	This represents the output (exit) of the menu. Press 'back' to return to the Modbus RTU menu.

5.5.7.3 Modbus address

Directory: \Configuration\Modbus RTU\Modbus address
Level: 3

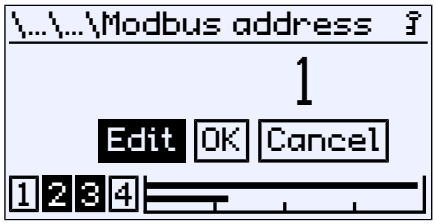


Fig. 133: Modbus address

Addresses from 1 to 247 can be used.

5.5.7.4 Byte order

Directory: \Configuration\Modbus RTU\Byte order
Level: 3

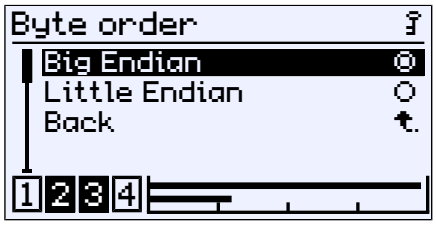


Fig. 134: Byte order

Menu name	Description
Big Endian	The highest value byte first (MSB-LSB).
Little Endian	The lowest value byte first (LSB-MSB).
Back	This represents the output (exit) of the menu. Press 'back' to return to the Modbus RTU menu.

The order for the bytes of the floating point figures is defined with this menu.

5.6 Info

Directory: \Info
Level: 1

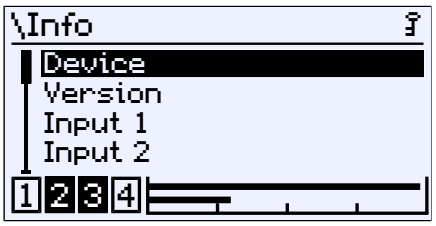


Fig. 135: Info

Various information for configuration and setting of the device is provided in this menu.

Menu name	Description
Dev.	Device type, serial number
Revision	Firmware version
Input 1	Basic measurement range, spread
Input 2	Basic measurement range, spread
Analog output	Output signal
Switch output	Assignment, contact type
Back	This represents the output (exit) of the information menu. Press 'back' to return to the main menu.

Information about the device and the configuration are provided in this menu.

5.7 Service

Directory: \Service
Level: 1

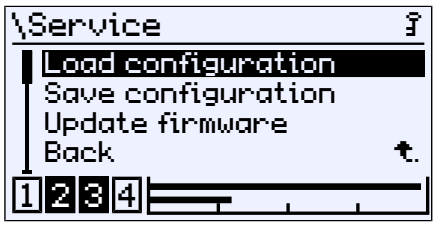


Fig. 136: Service

menu name	description
Load configuration	The parameterization saved in the flash memory of the device is loaded.
Save configuration	The parameterization is saved in the flash memory of the device.
USB → configuration	A parameterization stored on a USB stick is loaded.
Configuration → USB	The parameterization is stored on a USB stick.
Update firmware	A firmware update stored on a USB stick is executed.
Back	This represents the output (exit) of the service menu. It took you 'Back' to the main menu.

In order to be able to use a USB stick, the housing must first be opened.

⚠ DANGER

Opening the housing of ATEX devices

ATEX devices must under no circumstances be opened within the potentially explosive area.

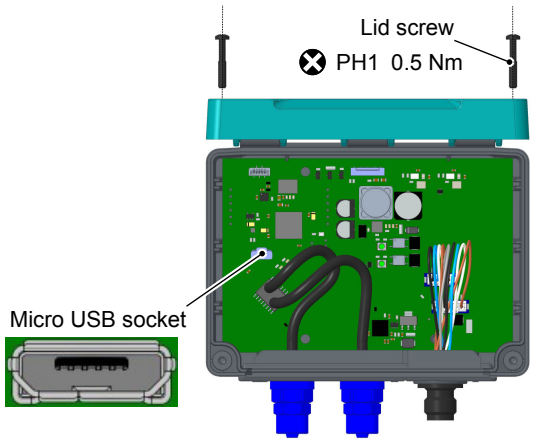


Fig. 137: USB port (similar to illustration)

6 Servicing

6.1 Maintenance

The device is maintenance-free. We recommend the following regular inspection to guarantee reliable operation and a long service life:

- Check the function in combination with downstream components.
- Check the leak-tightness of the pressure connection lines.
- Check the electrical connections.

The exact test cycles need to be adapted to the operating and environmental conditions. In combination with other devices, the operating instructions for the other devices also need to be observed.

⚠ WARNING

Dust deposits for ATEX devices

The device must be cleaned with a damp cloth a regular intervals to prevent heat build-up. Cleaning intervals depend on the amount of local dust.

6.2 Transport

The measuring device must be protected against impacts. It should be transported in the original packaging or a suitable transport container.

6.3 Service

All defective or faulty devices should be sent directly to our repair department. Please coordinate all shipments with our sales department.

⚠ WARNING

Process media residues

Process media residues in and on dismantled devices can be a hazard to people, animals and the environment. Take adequate preventive measures. If required, the devices must be cleaned thoroughly.

Return the device in the original packaging or a suitable transport container.

6.4 Disposal

Please help to protect the environment by always disposing of the work pieces and packaging materials in compliance with the valid national waste and recycling guidelines or reuse them.

7 Technical data

7.1 General

Type designation	DE90	
Pressure type	Differential pressure	
Measurement principle	Piezo-resistive	
Reference conditions (acc. to IEC 61298-1)		
Temperature	+15 … +25 °C	
Relative humidity	45 … 75 %	
Air pressure	86 … 106 kPa	860 … 1060 mbar
Installation position	vertical	

7.2 Input variables

Asymmetric measuring ranges:

Measuring range (Channel 1 2)		Overload	Bursting pressure	Sensor type	
	-20 … +80 Pa	750 mbar	1 bar	A	
	0 … 25 Pa	750 mbar	1 bar	A	
	0 … 40 Pa	750 mbar	1 bar	A	
	0 … 60 Pa	750 mbar	1 bar	A	
0 … 1 mbar	0 … 100 Pa	750 mbar	1 bar	A	
0 … 1.6 mbar	0 … 160 Pa	750 mbar	1 bar	A	
0 … 2.5 mbar	0 … 250 Pa	750 mbar	1 bar	A	
0 … 4 mbar	0 … 400 Pa	100 mbar	200 mbar	B	*
0 … 6 mbar	0 … 600 Pa	100 mbar	200 mbar	B	*
0 … 10 mbar	0 … 1 kPa	100 mbar	200 mbar	B	*
0 … 16 mbar	0 … 1.6 kPa	400 mbar	800 mbar	B	
0 … 25 mbar	0 … 2.5 kPa	400 mbar	800 mbar	B	
0 … 40 mbar	0 … 4 kPa	400 mbar	800 mbar	B	
0 … 60 mbar	0 … 6 kPa	1 bar	2 bar	B	
0 … 100 mbar	0 … 10 kPa	1 bar	2 bar	B	
0 … 160 mbar	0 … 16 kPa	2.5 bar	5 bar	B	
0 … 250 mbar	0 … 25 kPa	2.5 bar	5 bar	B	

*) Sensors can be delivered with a higher overload and bursting pressure capability with these measuring ranges (see order code/special aspects).

Symmetric measuring ranges:

Measuring range (Channel 1 2)		Overload	Bursting pressure	Sensor	
	-25 … +25 Pa	750 mbar	1 bar	A	
	-40 … +40 Pa	750 mbar	1 bar	A	
	-60 … +60 Pa	750 mbar	1 bar	A	
-1 … +1 mbar	-100 … +100 Pa	750 mbar	1 bar	A	
-1.6 … +1.6 mbar	-160 … +160 Pa	750 mbar	1 bar	A	
-2.5 … +2.5 mbar	-250 … +250 Pa	100 mbar	200 mbar	B	*
-4 … +4 mbar	-400 … +400 Pa	100 mbar	200 mbar	B	*
-6 … +6 mbar	-600 …. +600 Pa	100 mbar	200 mbar	B	*
-10 … +10 mbar	-1 … +1 kPa	100 mbar	200 mbar	B	*

Measuring range (Channel 1 2)		Overload	Bursting pressure	Sensor
-16 … +16 mbar	-1.6 … +1.6 kPa	400 mbar	800 mbar	B
-25 … +25 mbar	-2.5 … +2.5 kPa	400 mbar	800 mbar	B
-40 … +40 mbar	-4 … +4 kPa	400 mbar	800 mbar	B
-60 … +60 mbar	-6 … +6 kPa	1 bar	2 bar	B
-100 … +100 mbar	-10 … +10 kPa	1 bar	2 bar	B
-160 … +160 mbar	-16 … +16 kPa	2.5 bar	5 bar	B
-250 … +250 mbar	-25 … +25 kPa	2.5 bar	5 bar	B

*) Sensors can be delivered with a higher overload and bursting pressure capability with these measuring ranges (see order code/special aspects).

7.3 Output sizes

Analog outputs

The number of analog outputs depends on the device version. The output signal can be set by parameterization. On delivery, both analog outputs are set to the same signal (see nameplate).

Device Version	1-channel	2-channel
Number of analog outputs	1	2
Output signal	**0 … 20 mA** **4 … 20 mA**	**0 … 10 V** **2 … 10 V** **1 … 5 V**
Signal range	0.0 … 21.5 mA	0.0 … 10.5 V
Load R_L	≤ 600 Ω	≥ 2 kΩ
Turn down	4:1	4:1

Switching outputs

The number of switching outputs depends on the device version. The assignment of the switching outputs to the channels can be freely parameterised.

Device Version	1-channel	2-channel
Number of switching outputs	2	4
Assignment on Delivery	Switch output 1 Switch output 2	Switch output 3 Switch output 4
Type	Potential-free semiconductor switch (MOS-FET)	
Progr. switching function	Single pole make contact (NO) Single pole break contact (NC)	
max. switching voltage	3…32 V AC/DC	
max. switching current	0.25 A	
max. switching capacity	8 W / 8 VA R_{ON} ≤ 4 Ω	

7.4 Measuring accuracy

- The data for the measuring deviation are including linearity and hysteresis.
- All data refer to the basic measuring range (see nameplate) and a compensation range of -20 ... +70 °C.

Sensor type A

Measuring range		Measurement error [%]		TC Zero point [%/10K]		TC span [%/10K]	
		Typ.	Max.	Typ.	Max.	Typ.	Max.
	-20 … +80 Pa	0,5	1,0	0,3	0,6	0,2	0,4
	0 … 25 Pa	1.5	2.5	0.5	1.0	0.3	0.6
	0 … 40 Pa	1.0	2.0	0.5	1.0	0.2	0.4
	0 … 60 Pa	0.75	1.5	0.3	0.6	0.2	0.4
0 … 1 mbar	0 … 100 Pa	0.5	1.0	0.3	0.6	0.2	0.4
0 … 1.6 mbar	0 … 160 Pa	0.5	1.0	0.3	0.6	0.2	0.4
0 … 2.5 mbar	0 … 250 Pa	0.5	1.0	0.3	0.6	0.2	0.4
	-25 … +25 Pa	1.0	2.0	0.4	0.8	0.2	0.4
	-40 … +40 Pa	0.75	1.5	0.3	0.6	0.2	0.4
	-60 … +60 Pa	0.5	1.0	0.3	0.6	0.2	0.4
-1 … +1 mbar	-100 … +100 Pa	0.5	1.0	0.3	0.6	0.2	0.4
-1.6 … +1.6 mbar	-160 … +160 Pa	0.5	1.0	0.3	0.6	0.2	0.4

Sensor type B

Measuring range		Measurement error [%]		TC Zero point [%/10K]		TC span [%/10K]	
		Typ.	Max.	Typ.	Max.	Typ.	Max.
0 … 4 mbar	0 … 400 Pa	0.5	1.0	0.15	0.3	0.05	0.1
0 … 6 mbar	0 … 600 Pa	0.5	0.75	0.15	0.25	0.05	0.1
0 … 10 mbar	0 … 1 kPa	0.25	0.5	0.1	0.2	0.05	0.1
0 … 16 mbar	0 … 1.6 kPa	0.25	0.5	0.15	0.3	0.05	0.1
0 … 25 mbar	0 … 2.5 kPa	0.25	0.5	0.15	0.25	0.05	0.1
0 … 40 mbar	0 … 4 kPa	0.25	0.5	0.1	0.2	0.05	0.1
0 … 60 mbar	0 … 6 kPa	0.25	0.5	0.1	0.2	0.05	0.1
0 … 100 mbar	0 … 10 kPa	0.25	0.5	0.1	0.15	0.05	0.1
0 … 160 mbar	0 … 16 kPa	0.25	0.5	0.05	0.1	0.05	0.1
0 … 250 mbar	0 … 25 kPa	0.25	0.5	0.05	0.1	0.05	0.1
-2.5 … +2.5 mbar	-250 … +250 Pa	0.5	1.0	0.15	0.3	0.05	0.1
-4 … +4 mbar	-400 … +400 Pa	0.5	1.0	0.1	0.2	0.05	0.1
-6 … +6 mbar	-600 …. +600 Pa	0.5	0.75	0.1	0.15	0.05	0.1
-10 … +10 mbar	-1 … +1 kPa	0.25	0.5	0.05	0.1	0.05	0.1
-16 … +16 mbar	-1.6 … +1.6 kPa	0.25	0.5	0.1	0.2	0.05	0.1
-25 … +25 mbar	-2.5 … +2.5 kPa	0.25	0.5	0.1	0.15	0.05	0.1
-40 … +40 mbar	-4 … +4 kPa	0.25	0.5	0.05	0.1	0.05	0.1
-60 … +60 mbar	-6 … +6 kPa	0.25	0.5	0.05	0.1	0.05	0.1
-100 … +100 mbar	-10 … +10 kPa	0.25	0.5	0.05	0.1	0.05	0.1
-160 … +160 mbar	-16 … +16 kPa	0.25	0.5	0.05	0.1	0.05	0.1
-250 … +250 mbar	-25 … +25 kPa	0.25	0.5	0.05	0.1	0.05	0.1

7.5 Digital interfaces

USB interface

USB On The Go	2.0
Data rate	12 Mbit/s (Full Speed)
Port	Micro USB typee B
Communication	Host/Device mode

Modbus RTU interface

interface	RS 485
Report	Modbus RTU
Modbus specification	Application Protocol Specification V1.1b3 (April 26, 2012)
Address	1 … 255
Baud rate	2400 … 115200 Baud
Parity	Even, uneven, parity
Stopbits	1…2

7.6 Auxiliary energy

NOTICE! A CE-conform mains adapter with a slow 200 mA fuse only may be used in the power supply circuit for ATEX devices.

Nominal voltage	24 V AC/DC
Admissible operating voltage U_b	19.2 … 28.8 V AC/DC
Power consumption	Type 2W (VA) Max. 3W (VA)

7.7 Operating conditions

	Standard	ATEX
Ambient temperature range	-20 … +70 °C	-20 … +60 °C
Medium temperature range	-20 … +70 °C	-20 … +60 °C
Storage temperature range	-20 … +70 °C	-20 … +70 °C
Protection	IP65	IP65

ATEX	EN IEC 60079-0:2018 EN 60079-15:2010 EN 60079-31
EMC	EN 60730-1:2016 EN 61326-1:2013 EN 61326-2-3:2013
RoHS	EN IEC 63000:2018

7.8 Display

Display	Full graphic LC display
Resolution	128 x 64 Pixel
Backlight	RGB
Measured value display	6 digits

7.9 Construction design

Process connection		Ø outside	Ø inside
CK screw connections made of aluminium	Hose	6 mm	4 mm
	Hose	8 mm	6 mm
Pneumatic connector socket in nickel-plated brass	Hose	6 mm	4 mm
	Hose	8 mm	6 mm
Cutting ring connection in stainless steel	Pipe	6 mm	
	Pipe	8 mm	

Electrical connection	1-channel	2-channel
Connector 1 : Auxiliary energy, output	5-pin male	5-pin male
Connector 2 : Switching outputs	4-pin male	8-pin male

Installation position	User-defined
Dimensions (without connections)	120 x 81.5 x 95 mm
Weight	max. 380 g

7.9.1 Materials

Materials of the parts that come into contact with the medium
Silicon, PVC, FKM, aluminium, brass, stainless steel

Materials of the parts that come into contact with the surroundings
Polyester, PET, polyamide 6.6, aluminium, nickel-plated brass, stainless steel

7.9.2 Dimensional drawings

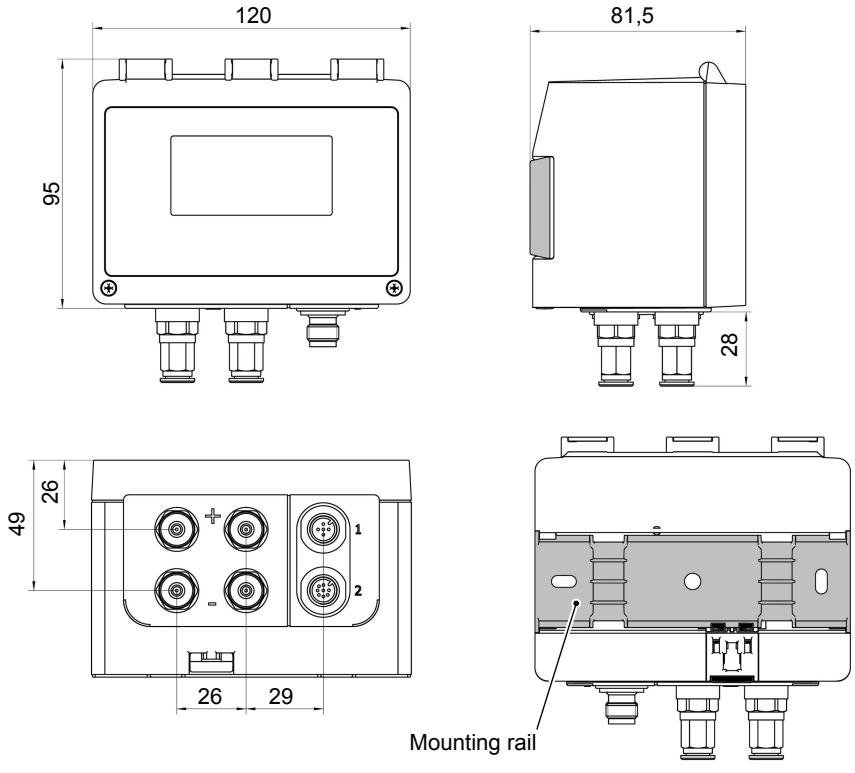


Fig. 138: Dimensional picture

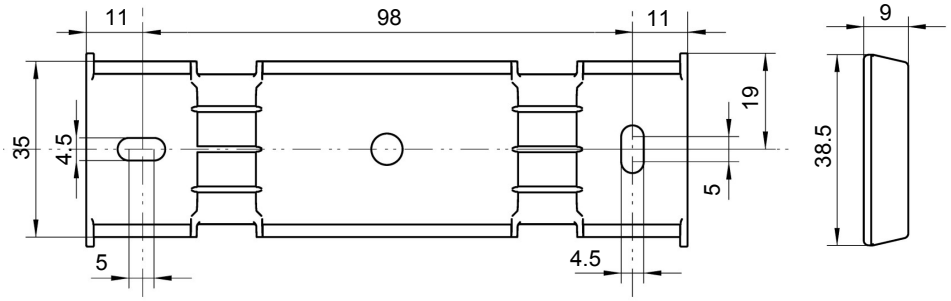
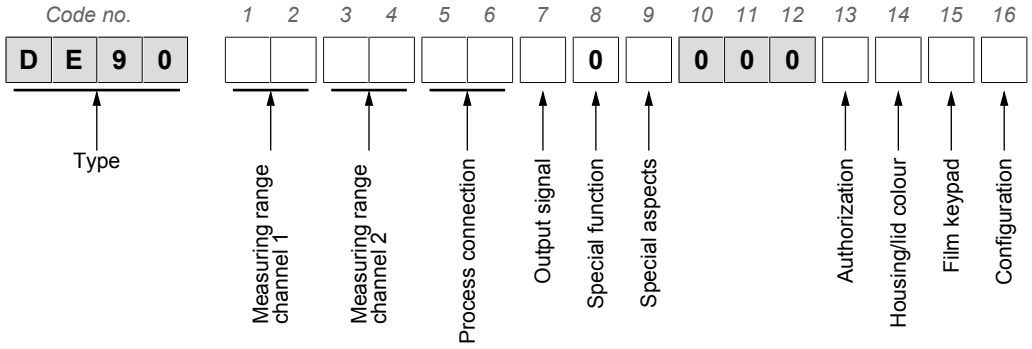


Fig. 139: Mounting rail

8 Order codes



Measuring range channel 1:

[1,2]		[1,2]	
		L0	-20 … +80 Pa
		D1	0 … 25 Pa
		D2	0 … 40 Pa
		D3	0 … 60 Pa
51	0 … 1 mbar	**D4**	0 … 100 Pa
97	0 … 1.6 mbar	**D5**	0 … 160 Pa
98	0 … 2.5 mbar	**D6**	0 … 250 Pa
52	0 … 4 mbar	**D7**	0 … 400 Pa
53	0 … 6 mbar	**D8**	0 … 600 Pa
54	0 … 10 mbar	**N1**	0 … 1 kPa
55	0 … 16 mbar	**N2**	0 … 1.6 kPa
56	0 … 25 mbar	**N3**	0 … 2.5 kPa
57	0 … 40 mbar	**N4**	0 … 4 kPa
58	0 … 60 mbar	**N5**	0 … 6 kPa
59	0 … 100 mbar	**E5**	0 … 10 kPa
60	0 … 160 mbar	**E6**	0 … 16 kPa
82	0 … 250 mbar	**E7**	0 … 25 kPa
		L5	-25 … +25 Pa
		R6	-40 … +40 Pa
		2L	-60 … +60 Pa
A4	-1 … +1 mbar	**L7**	-100 … +100 Pa
A5	-1.6 … +16 mbar	**R7**	-160 … +160 Pa
A6	-2.5 … +2.5 mbar	**L6**	-250 … +250 Pa
A7	-4 … +4 mbar	**R1**	-400 … +400 Pa
A8	-6 … +6 mbar	**R2**	-600 …. +600 Pa
A9	-10 … +10 mbar	**L8**	-1 … +1 kPa
B1	-16 … +16 mbar	**L9**	-1.6 … +1.6 kPa
B2	-25 … +25 mbar	**M6**	-2.5 … +2.5 kPa
C5	-40 … +40 mbar	**M7**	-4 … +4 kPa
B3	-60 … +60 mbar	**M8**	-6 … +6 kPa
B4	-100 … +100 mbar	**R8**	-10 … +10 kPa
R5	-160 … +160 mbar	**R9**	-16 … +16 kPa
B6	-250 … +250 mbar	**T1**	-25 … +25 kPa

Measuring range channel 2:

[3,4]		[3,4]	
00	without		
		L0	-20 … +80 Pa
		D1	0 … 25 Pa
		D2	0 … 40 Pa
		D3	0 … 60 Pa
51	0 … 1 mbar	**D4**	0 … 100 Pa
97	0 … 1.6 mbar	**D5**	0 … 160 Pa
98	0 … 2.5 mbar	**D6**	0 … 250 Pa
52	0 … 4 mbar	**D7**	0 … 400 Pa
53	0 … 6 mbar	**D8**	0 … 600 Pa
54	0 … 10 mbar	**N1**	0 … 1 kPa
55	0 … 16 mbar	**N2**	0 … 1.6 kPa
56	0 … 25 mbar	**N3**	0 … 2.5 kPa
57	0 … 40 mbar	**N4**	0 … 4 kPa
58	0 … 60 mbar	**N5**	0 … 6 kPa
59	0 … 100 mbar	**E5**	0 … 10 kPa
60	0 … 160 mbar	**E6**	0 … 16 kPa
82	0 … 250 mbar	**E7**	0 … 25 kPa
		L5	-25 … +25 Pa
		R6	-40 … +40 Pa
		2L	-60 … +60 Pa
A4	-1 … +1 mbar	**L7**	-100 … +100 Pa
A5	-1.6 … +1.6 mbar	**R7**	-160 … +160 Pa
A6	-2.5 … +2.5 mbar	**L6**	-250 … +250 Pa
A7	-4 … +4 mbar	**R1**	-400 … +400 Pa
A8	-6 … +6 mbar	**R2**	-600 …. +600 Pa
A9	-10 … +10 mbar	**L8**	-1 … +1 kPa
B1	-16 … +16 mbar	**L9**	-1.6 … +1.6 kPa
B2	-25 … +25 mbar	**M6**	-2.5 … +2.5 kPa
C5	-40 … +40 mbar	**M7**	-4 … +4 kPa
B3	-60 … +60 mbar	**M8**	-6 … +6 kPa
B4	-100 … +100 mbar	**R8**	-10 … +10 kPa
R5	-160 … +160 mbar	**R9**	-16 … +16 kPa
B6	-250 … +250 mbar	**T1**	-25 … +25 kPa

Process connection:

[5,6]	
40	CK aluminum screw connection for 6/4 mm hose
41	CK aluminum screw connection for 8/6 mm hose
P6	Pneumatic plug connector MS nickel-plated for 6/4 mm hose
P8	Pneumatic plug connector MS nickel-plated for 8/6 mm hose
24	Cutting ring connection in stainless steel for 6 mm pipe
25	Cutting ring connection in stainless steel for 8 mm pipe

Output signal:

[7]	Default setting*)
C	0 … 10 V
A	0 … 20 mA
B	4 … 20 mA
M	RS485 Modbus RTU

Special functions:

[8]	
0	None

Special aspects:

[9]				
0	None			
1	Sensor with increased overload and burst pressure resistance 1 bar only for the pressure ranges:			
	52	0 … 4 mbar	**D7**	0 … 400 Pa
	53	0 … 6 mbar	**D8**	0 … 600 Pa
	54	0 … 10 mbar	**N1**	0 … 1 kPa
	A6	-2.5 … +2.5 mbar	**L6**	-250 … +250 Pa
	A7	-4 … +4 mbar	**R1**	-400 … +400 Pa
	A8	-6 … +6 mbar	**R2**	-600 …. +600 Pa
	A9	-10 … +10 mbar	**L8**	-1 … +1 kPa

Approval:

[13]	
0	None
R	ATEX Zone 2 and 22

Housing/lid color:

[14]	
0	Anthracite/Green
1	Black/Black (conductive housing)

For devices in ATEX version, the conductive housing is mandatory.

Foil keypad:

[15]	
0	FISCHER
1	Neutral

Parameterization:

[16]	Default setting *)
0	'Standard' configuration
1	'Linear characteristic curve' configuration
2	'Flow rate' configuration
3	'Table' configuration
4	‘Volume flow’ configuration with K-factor
5	'Equation' configuration
6	'Dynamic filter monitoring' configuration
7	'Difference' configuration
Z	'Customer-specific' configuration

*) The configuration can be changed on the device at any time. The delivery condition is defined by the order code. For more information about this, please refer to the operating instructions.

8.1 Accessories

Connection cable M12

Designation	No. of Poles	length	Order no.
PUR connection cable with M12 connector	4-pin	2 m	06401993
		5 m	06401994
		7 m	06401563
		10 m	06401572
	5-pole	2 m	06401995
		5 m	06401996
		7 m	06401564
		10 m	06401573
	8-pole	2 m	09001844
		5 m	09011146
		10 m	09011016

USB interface

Designation		Order no.
Connection cable, USB-A on USB Micro-B connector	2 m	09007340
Stick USB 2.0, USB-A/Micro-B plug	8 GB	09007316

Modbus

Designation		Order no.
Terminating resistor Modbus	120 Ohm bush	04491119
	120 Ohm plug	04491120

Connection set

For connecting the differential pressure transmitter to ventilation ducts consisting of

- PVC hose
- ABS measuring socket incl. fixing screws.

Designation	Hose	Length	Order no.
Plastic connection set	2 x 6/4 mm	1 m	04005129
		2.5 m	04005148
		5 m	04005163
		10 m	04005216
	2 x 8/6 mm	1 m	04005217
		5 m	04005218

Comments:
For 2-channel devices, two connection sets may be required in some circumstances.

Complete connection set

For connecting the differential pressure transmitter to ventilation ducts consisting of

- PA hose,
- ABS measuring socket incl. fixing screws
- two M12 connectors (4pin/5pin socket) that can be assembled.

Designation	Hose	Length	Order no.	Designation
Complete connection set	1channel	4/6 mm	1 m	06411560
		6/8 mm	1 m	06411561
	2 Channel	4/6 mm	1 m	06411562
		6/8 mm	1 m	06411563

Software

The configuration software inTouch is available to the fischermesstechnik.de as a download.

9 Attachments

9.1 EU Declaration of Conformity

FISCHER MESS- UND REGELTECHNIK

(Translation) CE

EU Declaration of Conformity

For the product described as follows

Product designation **Differential Pressure Transmitter**

Type designation **DE90**

it is hereby declared that it corresponds with the basic requirements specified in the following designated directives:

2014/30/EU	*EMC Directive*
2011/65/EU	*RoHS Directive*

The products were tested in compliance with the following standards.

Electromagnetic compatibility (EMC)

DIN EN 61326-1:2013-07 *EN 61326-1:2013*	*Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements*
DIN EN 61326-2-3:2013-07 *EN 61326-2-3:2013*	*Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning*

RoHS Directive (RoHS 2)

DIN EN IEC 63000:2019-05 *EN IEC 63000:2018*	*Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*

Also they were subjected to the conformity assessment procedure „**Internal production control**".

Sole responsibility for the issue of this declaration of conformity in relation to fulfilment of the fundamental requirements and the production of the technical documents is with the manufacturer.

Manufacturer
FISCHER Mess- und Regeltechnik GmbH
Bielefelder Str. 37a
32107 Bad Salzuflen, Germany
Tel. +49 (0)5222 974 0

Documentation representative
Mr. Torsten Malischewski
B.Sc.
Development department

The devices bear the following marking: CE

Bad Salzuflen
23 Aug 2019

G. Gödde
Managing director

09010391 • CE_EN_DE90 • Rev. ST4-A • 08/19 1 / 1

Fig. 140: CE_DE_DE90

FISCHER MESS- UND REGELTECHNIK

(Translation) CE

EU Declaration of Conformity

For the product described as follows

Product designation **Differential Pressure Transmitter**

Type designation **DE90 ## ## ## # 0 # 000 R ####**

it is hereby declared that it corresponds with the basic requirements specified in the following designated directives:

2014/30/EU	*EMC Directive*
2014/34/EU	*ATEX Directive*
2011/65/EU	*RoHS Directive*

The products were tested in compliance with the following standards.

Electromagnetic compatibility (EMC)

DIN EN 61326-1:2013-07 *EN 61326-1:2013*	*Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements*
DIN EN 61326-2-3:2013-07 *EN 61326-2-3:2013*	*Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning*

Explosive atmospheres (ATEX)

DIN EN IEC 60079-0:2019-09 *EN IEC 60079-0:2018*	*Explosive atmospheres - Part 0: Equipment - General requirements*
DIN EN 60079-15:2011-02 *EN 60079-15:2010*	*Explosive atmospheres - Part 15: Equipment protection by type of protection "n"*
DIN EN 60079-31:2014-12 *EN 60079-31:2014*	*Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"*

RoHS Directive (RoHS 2)

DIN EN IEC 63000:2019-05 *EN IEC 63000:2018*	*Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*

Also they were subjected to the conformity assessment procedure „**Internal production control**“.

Sole responsibility for the issue of this declaration of conformity in relation to fulfilment of the fundamental requirements and the production of the technical documents is with the manufacturer.

Manufacturer

FISCHER Mess- und Regeltechnik GmbH
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The devices bear the following marking:

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G. Gödde
Managing director

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Fig. 141: CE_DE_DE90_ATEX

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