

Operating Manual



4 - MODULAR - ECONOMIC - FLOW -

MEFS-K

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● 1 General Information

Read this operating manual before mounting and start-up of the flow sensor. Keep this operating manual in a place that is accessible at any time to all users. The following mounting and operating instructions have been compiled with great care, but it is not feasible to take all possible applications into consideration. If questions remain regarding a specific application, please contact the device supplier.

With special models please comply with specifications in the delivery note.

If the serial number becomes illegible (e. g. by mechanical damage), the retraceability of the instrument becomes impossible. The flow sensors as described in this operating manual are carefully designed and manufactured using state-of-the-art technology. Every component undergoes strict quality inspection in all stages of manufacture.

Intended Use

Use the flow sensor to convert the flow velocity into an electrical signal.

Required Knowledge

Mounting and start-up of the flow sensor requires familiarity with the relevant regulations and directives of your country and the necessary qualification. You have to be acquainted with the rules and regulations on measurement and control technology and electric circuits, since this flow sensor is “electrical equipment” as defined by EN 50178. Depending on the operation conditions of your application, other corresponding knowledge may be required, e. g. of corrosive media.

● 2 Overview

Further product and safety information can be found in chapters *Signs, Abbreviations* (Chap. 3) and *Storage, Disposal* (Chap. 5), *Safety Instructions* (Chap. 7) and *Start-Up, Operation* (Chap. 9).

Read these chapters in any case.

● 3 Signs, Abbreviations



Warning!

Non-compliance can cause injuries to persons and/or the demolition of the device. There can be a danger to life.



Attention!

Non-compliance can cause faulty device operation or lead to property damage.



Information!

Non-compliance can influence device operation or cause unintentional device reactions.

U+: Positive supply connection
U-: Negative supply connection
SIG (+): Output signal
SP1: Switching point 1
SP2: Switching point 2

● 4 Maintenance, Accessories



The MEFS-K flow sensors are maintenance-free.
Only the manufacturer should conduct repairs.
For necessary accessories please contact your supplier.

● 5 Storage, Disposal



Please remove all rest media before storing the device after operation. Rest media in dismantled pressure transmitters can be hazardous to persons, the environment and the installation. A suitable and thorough cleaning is recommended.



Disposal

Dispose instrument components and packaging materials as per the respective waste treatment and disposal regulations of the region or country to which the sensor is supplied to.

● 6 Function

By means of a sensor element and auxiliary energy a temperature difference is used to convert the actual flow velocity into an electrical standard signal. This electric signal changes in proportion to the flow velocity and can be further processed.

● 7 Safety Instructions



Select the appropriate flow sensor with regards to measurement range, type and specific measurement conditions prior to mounting and start-up of the device.

Please comply with your country-specific norms and regulations. Hazardous materials like oxygen, acetylene, inflammable or toxic media, as well as refrigerating systems, compressors etc. make it necessary to comply with relevant regulations beyond the general rules.

Non-compliance can cause heavy injuries and damage!

- **Open process connections only when the system is unpressurized!**
- Make sure to keep flow sensor operation inside the overload limit at all times.
- Comply with environmental and operation parameters as outlined in chapter *Technical Data* (page 24).
- Please comply with chapter *Technical Data* (page 24) for sensor application in conjunction with corrosive media and to avoid mechanical hazards.
- Ensure that the flow sensor is only operated as per the provisions as described in this operating manual.
- Do not conduct changes at the flow sensor or interfere with the device in ways which deviate from the descriptions in this operating manual.
- If faults can not be eliminated, shut down the sensor and mark it to avoid accidental start-up.
- Rest media in dismantled flow sensors can be hazardous to persons, the environment and the installation.
Use sufficient safety measures!
- Only the manufacturer should conduct repairs.
- Create dead voltage condition on device before removing plug or cover.

● 8 Before Mounting



Check if a completely assembled flow sensor is supplied.

Inspect the flow sensor for possible damage during transportation. Should there be any obvious damage, inform the transport company and supplier without delay.

Keep the packaging, as it offers optimal protection during transportation.

Ensure the pressure connection thread and the connection contacts will stay undamaged.

9 Start-Up, Operation

9.1 Product Label (Example)

Logo	OU 0003-100-000	
Contact	SN : 774.04/10-4.0-001	Art.Nr.: 1500-00422
Flow : 0...50 m/s	OUT : 4...20 mA	U+ : 1
SP : 1xPNP	SUP. : 12...40 VDC	U- : 3
Date : 44/12	Made in Germany	SIG (+) : 2

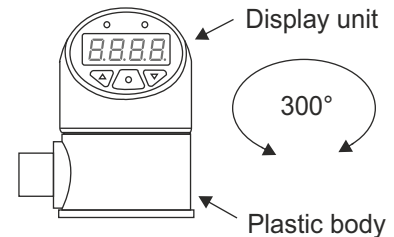
OP... : Product code
 Flow : Sensor input
 U+ : Supply/Loop +
 U- : Supply/Loop -
 SIG (+): Output signal

Art.Nr.: Part number
 SN : Serial number
 Date : Date of QC
 OUT : Current signal
 SUP : Voltage range

9.2 Display Unit Adjustment

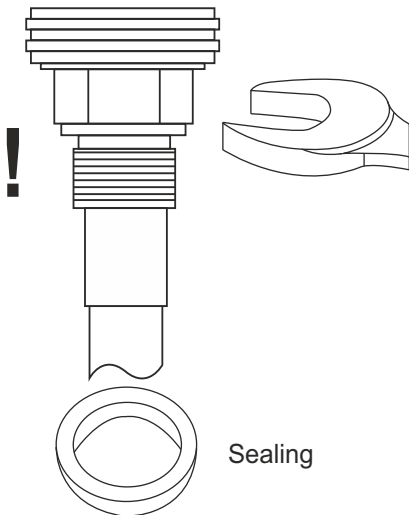
The display unit can be rotated by ca. 300° for better reading. To turn the unit, hold down the plastic body with one hand and turn the display unit into the desired position using the other hand.

The turning angle is restricted by a stopper inside the device. Do not overwind past the stopper. This could destroy the device.



9.3 Mounting Process Connection

Tools: wrench (width A/F 27), screwdriver



A sealing element is necessary for mounting, exceptions are instruments with self-sealing threads (e. g. NPT thread).

When mounting the instrument, ensure the sealing surfaces at sensor and measurement point are clean and undamaged.

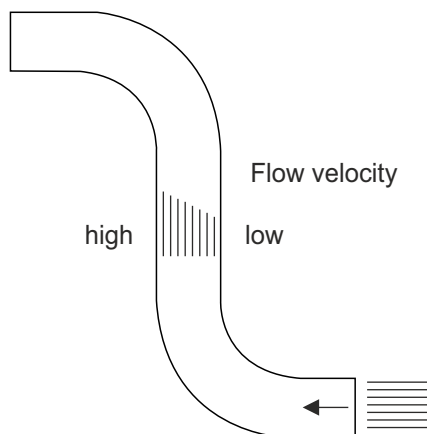
When screwing in, only use suitable tools and only screw in via wrench flats. Please comply with the specified torque. The right torque is dependent on process connection dimensions and the type of seal used (form/material). Do not use the casing as a working surface for screwing in.

Don not tilt the threads when screwing in.

Please comply with specifications for female threads and welding sockets!

9.4 Notes for Mounting and Installation

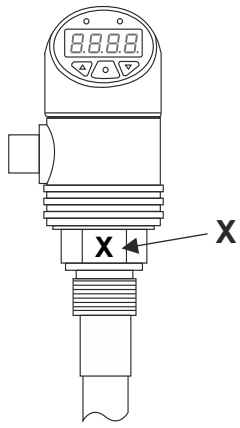
9.4.1 Fitting position when considering different flow velocities



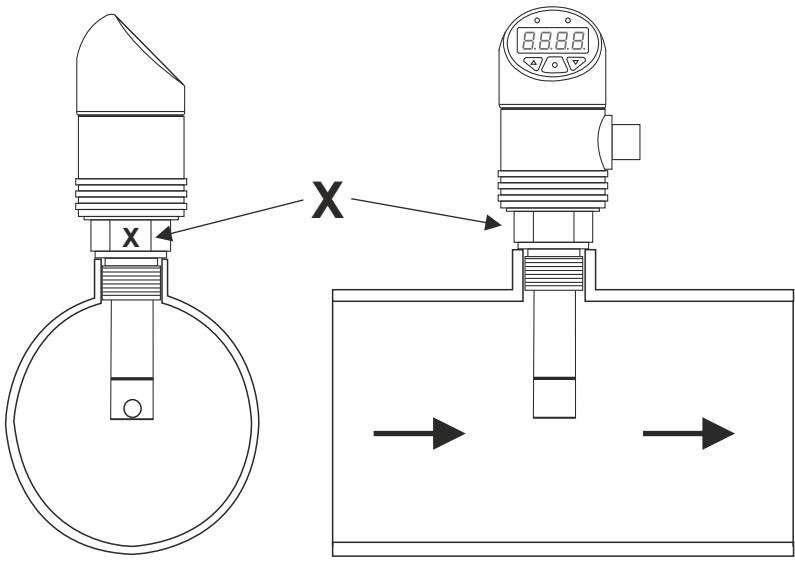
● 9 Start-Up, Operation (Continued)

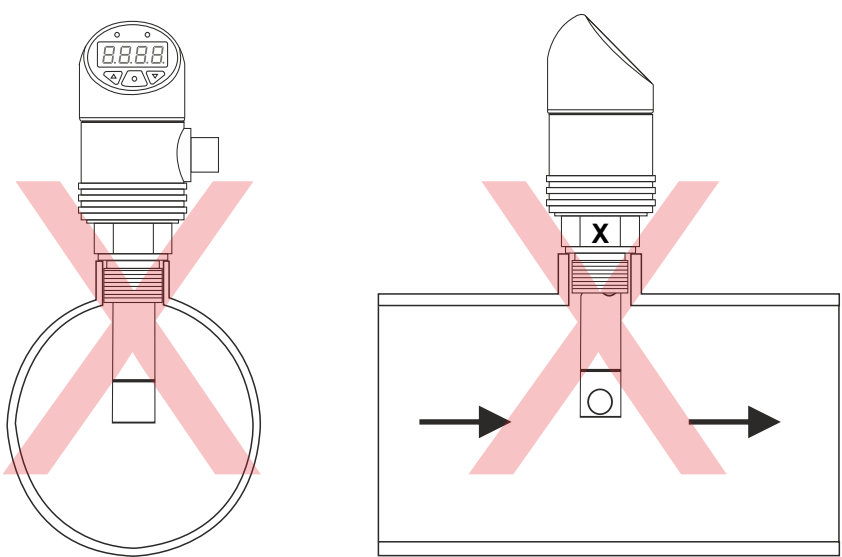
9.4 Notes for Mounting and Installation

9.4.2 Mark for Sensor Fitting Position

	<p>Every process connection has a mark for the sensor fitting position.</p> <p>For optimal performance, the mark should point against flow direction.</p>
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9.4.3 Fitting Position for Sensor and Flow Direction

	<p>When mounting the sensor it is important that the fitting position mark points against the flow direction.</p>
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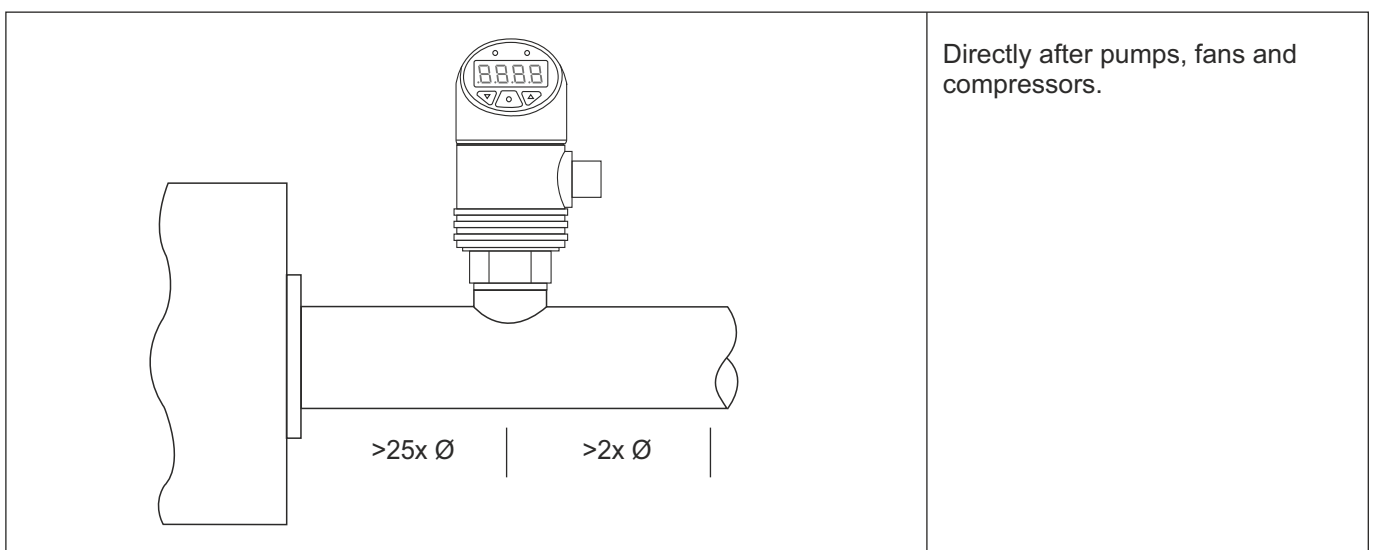
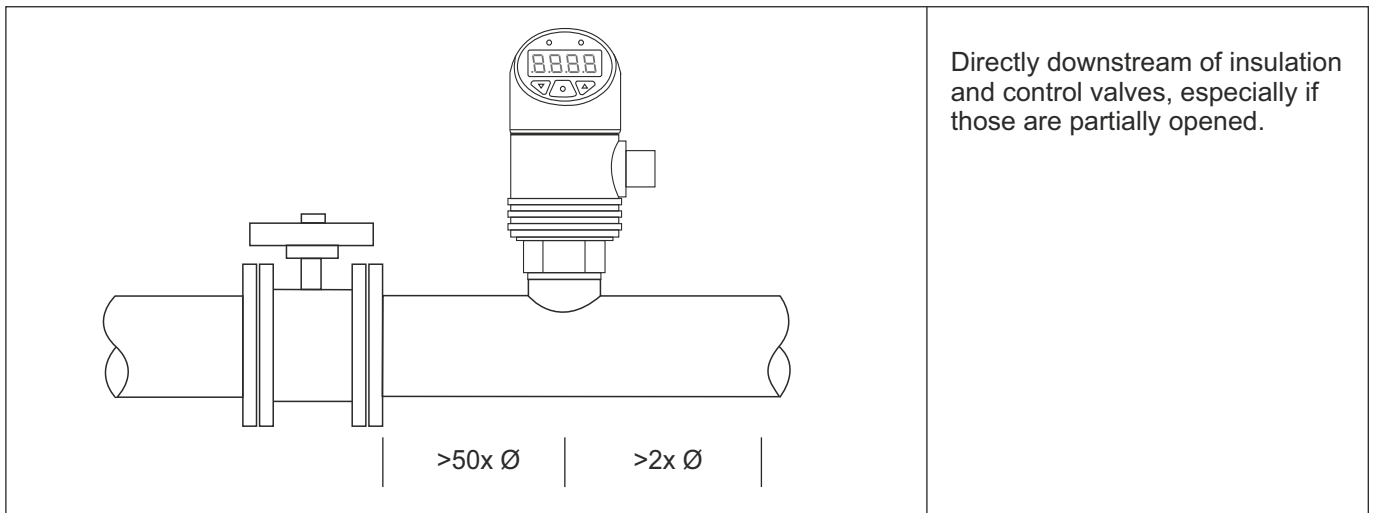
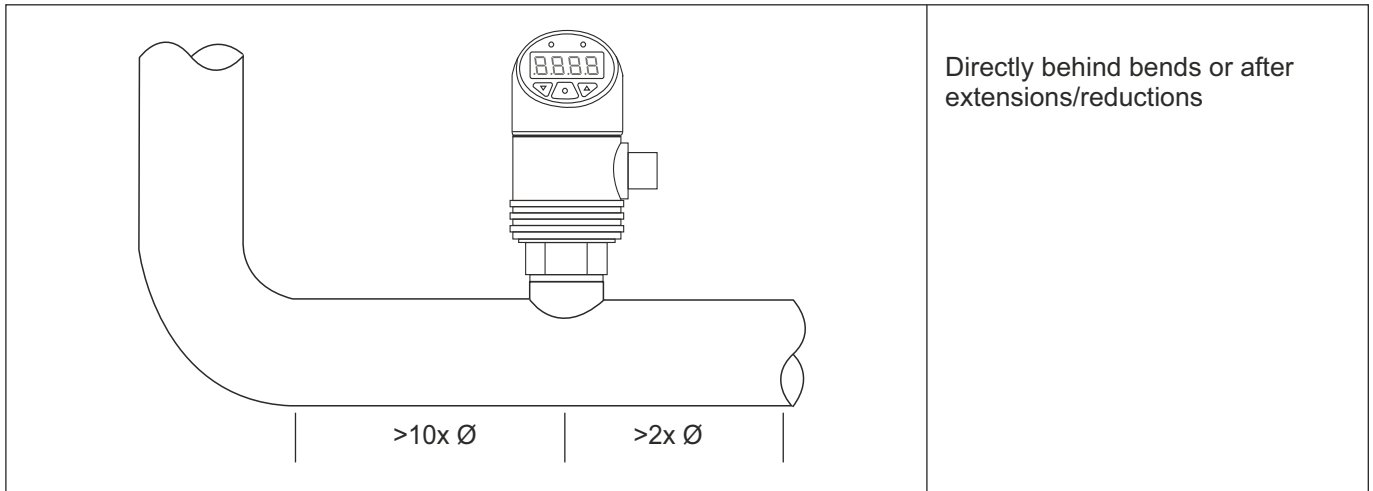
	<p>Do not mount the device as shown left, or the performance of the device will be greatly reduced.</p>
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● 9 Start-Up, Operation (Continued)

9.4 Notes for Mounting and Installation (Continued)

9.4.4 Select a Suitable Installation Site

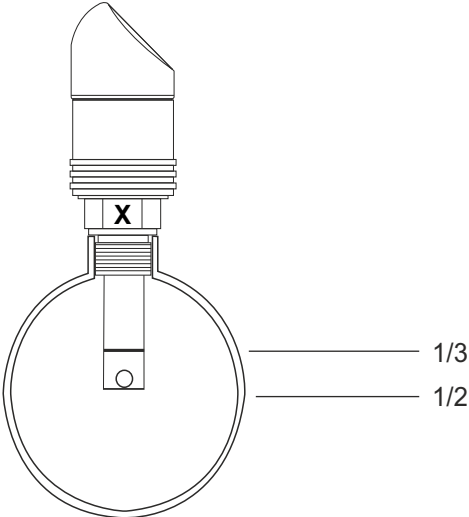
Avoid mounting in areas of extreme flow turbulence. All downstream dimensions are only provided as a guideline and whenever possible, larger spacing should be considered.



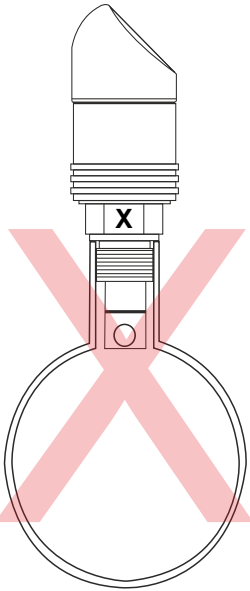
● 9 Start-Up, Operation (Continued)

9.4 Notes for Mounting and Installation

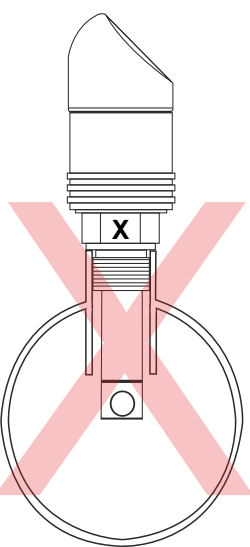
9.4.5 Sensor Insertion Depth



For optimum measuring performance the active area should be positioned anywhere between $1/3$ and $1/2$ of the internal pipe diameter.



The screwed socket is too long, the sensor element does not extend deep enough into the pipe.



The screwed socket extends too far into the pipe. This causes an additional pressure drop.

● 9 Start-Up, Operation (Continued)

9.5 Electrical Connection

Ground the device via process connection.



The specified protection class only applies in plugged condition with a socket connector with corresponding protection class.

Select a suitable cable diameter for the cable bushing of your plug. Check that the cable gland of the mounted plug is fitted correctly. Check that the seals are present and undamaged. Tighten the threaded connection and check that seals are fitted correctly. Otherwise, the protection class can not be guaranteed.

When using cable outlets, make sure no moisture can seep in at the end of the cable.

Cables have to be laid in a way which avoids forces or torque to affect the device.

9.6 Pin Assignment

Connection	Supply		Out SIG (+)	Limit Contacts			Program- ming
	U+	U-		Common	SP 1	SP 2	
M12x1, 5-pole	1	3	2	(1)	4		5
M12x1, 8-pole	1	3	6	5	4	2	
Super Seal, 3-pole**	1	3	2				
Deutsch DT04, 3-pole**	A	B	C				
Deutsch DT04, 4-pole	1	3	2	(1)	(4)		4*
Bayonet DIN, 4-pole	1	2	3	(1)	(4)		4*
Valve (L-Plug), 4-pole	1	2	3	(1)	(GND)		GND*
MIL, 6-pole	A	C	F	E	D	B	

Details in brackets: U+ is also common for limit value

* The wire terminal can be used either for a limit value or for programming. When the wire terminal is used for a limit value, changing the measuring range is impossible after sensor assembly.

** When using 3-pole connectors, changing the measuring range is impossible after sensor assembly.

View: Plug pins (at device)

M12, 5-pole	M12, 8-pole	Super Seal, 3-pole	Deutsch DT04, 3-pole	
Deutsch DT04, 4-pole	Bayonet DIN, 4-pole	Valve, 4-pole	MIL, 6-pole	Cable, 4-, 6-pole
				LIYCY 4 or 6x0,25 mm ² grey

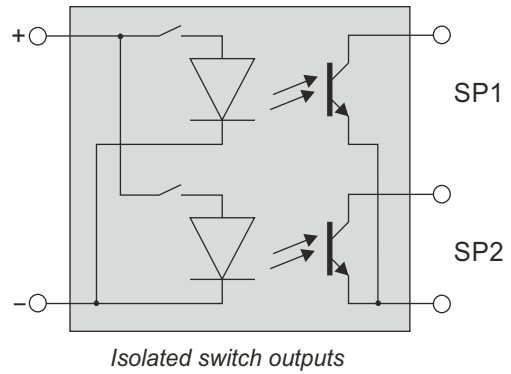
● 9 Start-Up, Operation (Continued)

9.7 Connecting Switch Outputs

The switch outputs are floating outputs. They are electrically isolated from the current loop (see right).

If only one switch point is used, it is possible to connect the load on both sides of the contact, e. g. in NPN implementation: Load connected to high or low side (see below).

Use a suitable snubber diode if you want to switch inductive loads.



Switch outputs with common mass (low side, NPN)		
Two outputs are used	One output is used, load on high side	One output is used, load on low side

Switch outputs with common supply (high side, PNP)		
Two outputs are used	One output is used, load on high side	One output is used, load on low side

Switch output with supply out of sensor supply (PNP)		
		1 output, load on low side

● 9 Start-Up, Operation (Continued)

9.8 Function Test



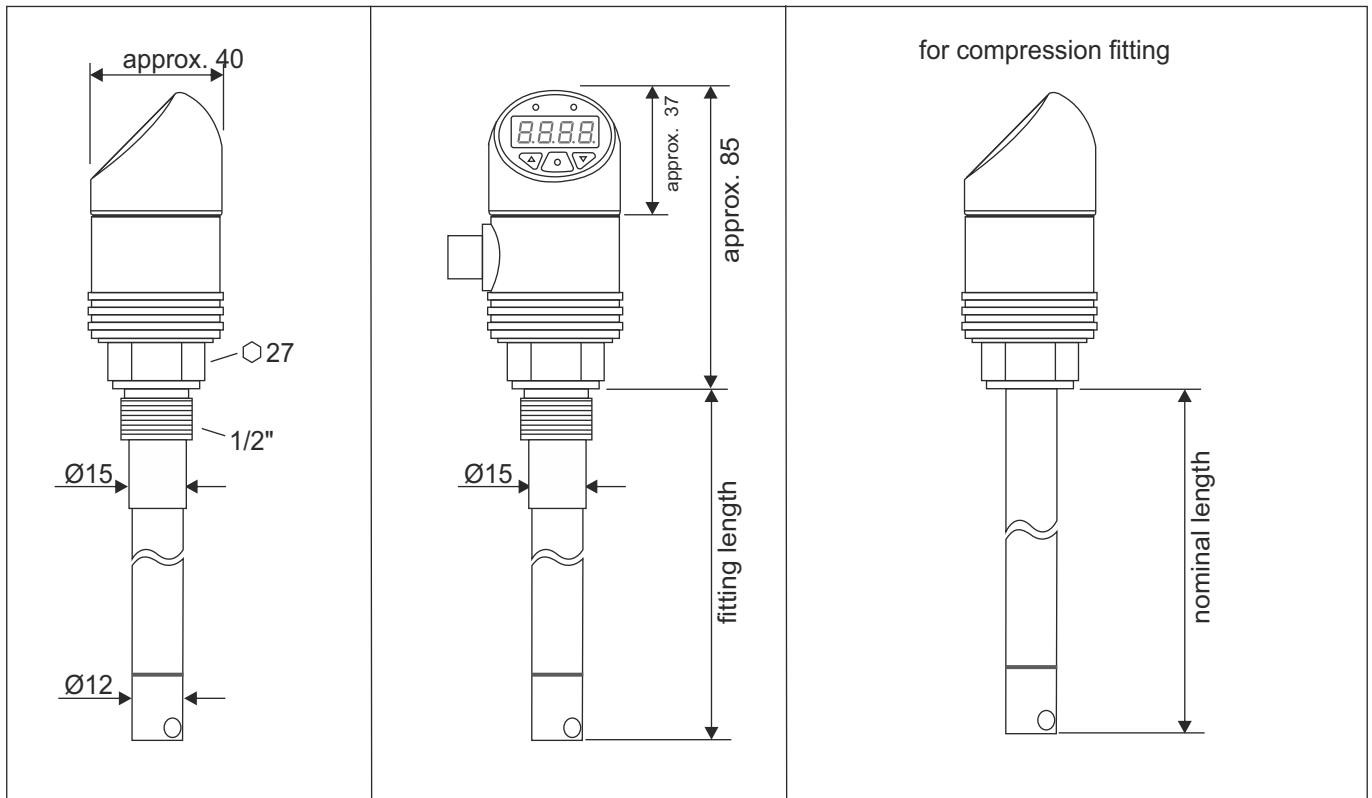
The output signal must be proportional to the flow velocity. If not, this might point to sensor damage. In that case refer to chapter *Fault Recovery* (page 23).



Warning

- Please open the process connections only when unpressurized.
- Attention: Please comply with the operating parameters as per chapter *Technical Data* (page 24).
- Please ensure the flow sensor is always operating within the load limit.
- Surfaces of instrument components may heat up during operation. Please exercise caution before touching the device.

● 10 Dimensions (in mm)



● 11 Handling and Configuration

Description of handling and configuration of the display device.

An overview of the menu tree is shown on page 23.

The 3 buttons on the display head operate by capacitive principle with no mechanical components: When pressing a button, there is no key drop. The buttons are reacting to the approach of a finger via sensing its electromagnetic field. Withdraw your finger at least 1 cm after pressing a button. This is useful for proper keypress detection.

The following description is for a device configuration using capacitive buttons.

11.1 Basics of System Operation

11.1.1 Key Recognition System Feedback

The LEDs for switch outputs are used to give operator feedback when buttons are pressed. This does not affect the switch outputs themselves. When no button is pressed the LEDs are showing the state of switch outputs.

Button		Feedback
▼	Arrow button down (left)	Left LED is flashing
▲	Arrow button up (right)	Right LED is flashing
▲ + ▼	Both arrow buttons simultaneously	Both LEDs are flashing
●	Center button	Both LEDs are flashing rapidly

Button feedback

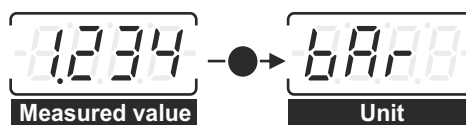
11.1.2 Display Mode / Measured Value Indication

After power up the device starts in display mode. The current measured value is displayed or is displayed alternately with the unit (see 11.4.1).

The displayed value is flashing when the measured value is greater than the maximal presentable value. This can be caused by a fixed decimal point (see 11.4.3).

As long as the center button is pressed the selected unit will be displayed.

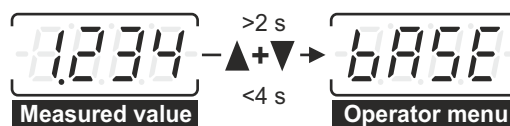
A single arrow button has no function in display mode.



Unit indication

11.1.3 Configuration Mode Activation

After pressing both arrow keys simultaneously and holding them for at least 2 s, the device enters configuration mode. The first entry of the operator menu appears on the display (bASe). If both buttons are not released within 4 s, the device switches back to display mode, showing the current measured value again.



Activating the configuration mode

● 11 Handling and Configuration (Continued)

11.1.4 Configuration Mode / Operator Menu

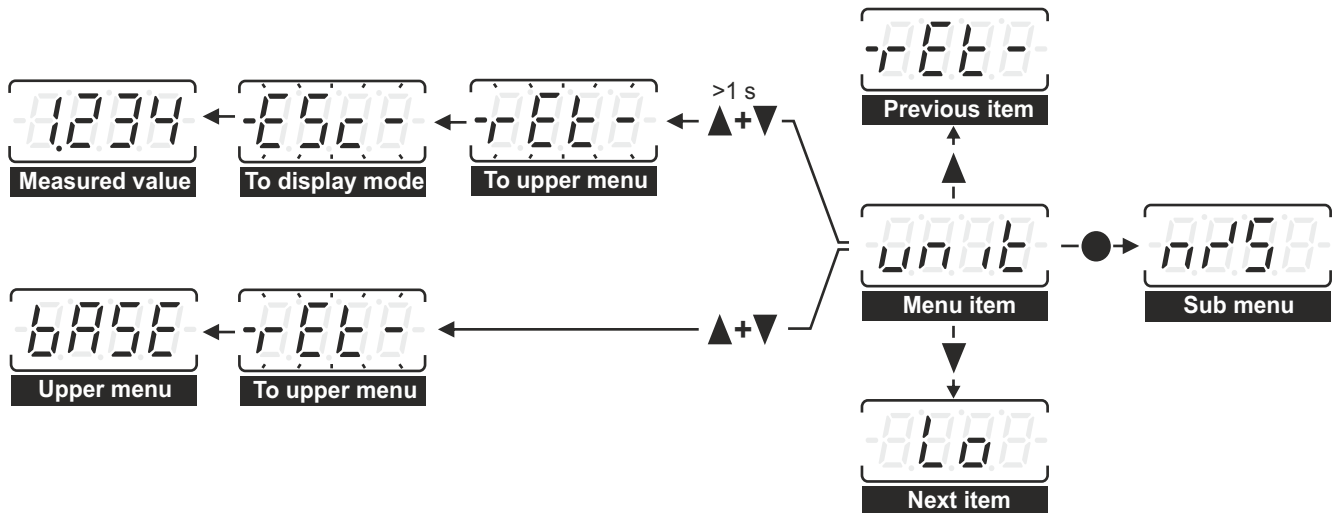
The configuration mode always starts with the first item of the main menu (bASE). Within the menu you navigate with the arrow buttons. The center button selects a menu item respectively enters a submenu. Menu items which just show a value (e. g. maximum pointer) can be exited to the next upper menu item with the center button.

Every menu has the item „-ret-“ (return) which allows you to go back to the next upper menu. In the main menu it goes back to the display mode.

At the end of a menu (typically „-ret-“) you return to the first menu item when pressing the down arrow button again. Similarly, you jump to the end of the menu when pressing the up arrow in the first menu item.

In each menu item it is possible to return to the next upper menu by pressing both arrow buttons simultaneously. The feedback is a flashing „-ret-“. When holding the buttons for longer than 1 s, the device returns to display mode, giving a flashing „-ESc-“ (escape) as feedback.

If no button is pressed for 5 minutes in configuration mode, the device automatically switches back to display mode.



Configuration mode: Example operator menu

11.1.5 Setting Values

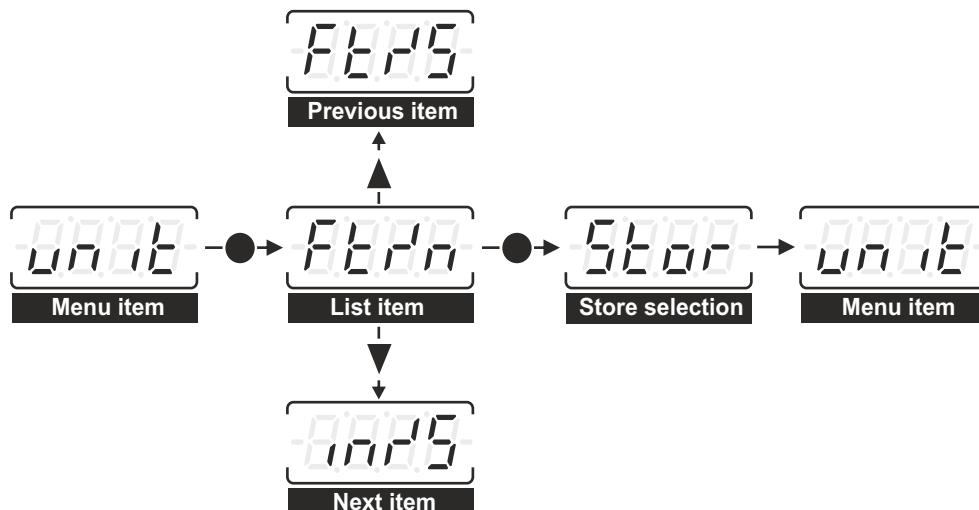
There are 2 types of values that can be altered:

- values which can be selected from a predefined parameter list
- numerical values

Selecting a value from a list

Parameter lists are used, e. g. for units. Within the list you navigate with the arrow buttons. With the center button a selected value is stored and confirmed by indicating „Stor“. After that the device is in the next upper menu.

The list can be left by pressing both arrow buttons simultaneously. This jumps back to the next upper menu without changing the present value.



Configuration mode: Example to select a value from a list

● 11 Handling and Configuration (Continued)

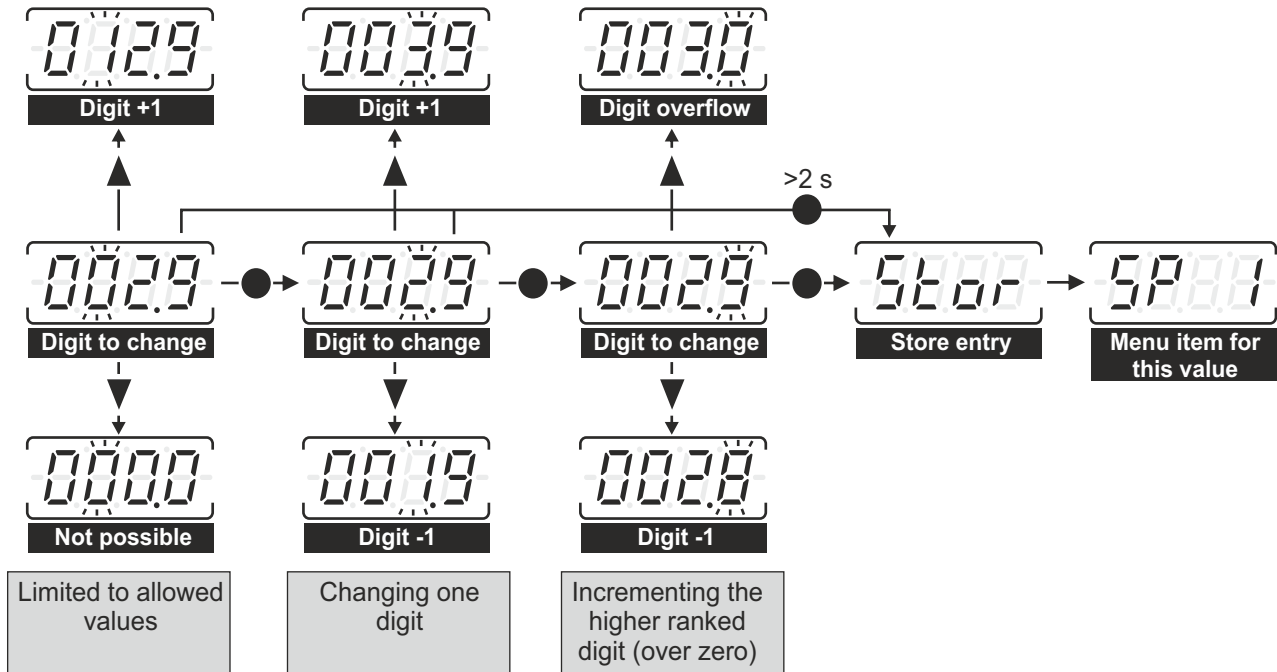
Setting a numerical value

Numerical values are entered digit by digit. The selected digit flashes and is incremented with the up arrow button and decremented with the down arrow button. When zero value is reached, the higher ranked digit will be incremented or decremented too. If a change to the active digit would exceed the allowed value (e. g. the lower or upper range limit) only the highest allowed value will be shown. With the opposite arrow button you can return to the previous value.

The center button confirms the selected digit and jumps to the next digit. You can cancel the value input at any time by pressing both arrow buttons simultaneously. The device will then switch back to the corresponding menu entry. The partially edited value will not be saved.

When the right-most digit is selected, the center button confirms the whole value. "Stor" appears on the display to confirm that the value has been stored and the device will switch back to the value's menu item.

You can store a partially edited value at any digit position by holding the center button until "Stor" appears on the display (approx. 2 s).



Button functions for entering numerical values (Example)

11.2 Main Menu

The main menu has the following functions

Display	Designation	Description
	Basic functions	Setting of unit, lower and upper range value, minimum and maximum pointer
	Display functions	All settings relating to the display
	Switch point settings	Configuration of switch outputs (option)
	System data	Reset to factory settings, loop test, Displaying of: hardware version, software version, serial number
	Return	Return to display mode

● 11 Handling and Configuration (Continued)

11.3 Base Menu (bASE)

The base menu has the following functions

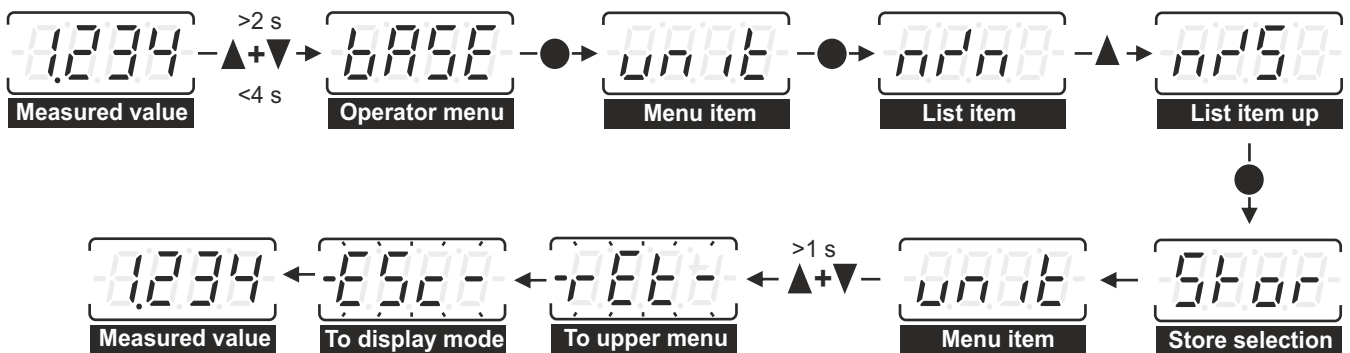
Display	Designation	Description
	Measuring unit	Setting the measuring unit (parameter list)
	Trailing pointer minimum (low)	Display and/or delete the minimum trailing pointer
	Trailing pointer maximum (high)	Display and/or delete the maximum trailing pointer
	Return	Return to main menu

11.3.1 Setting the Measuring Unit (unit)

A selected unit applies to data entries (e. g. switching points) and to the displaying of numerical values (e. g. the trailing pointers). Possible are the following units:

Display	Unit	Display	Unit
	m/s		Inch/s
	m/min		Inch/min
	Foot/s		% of measuring range
	Foot/min		mA
			Return to Base Menu

Example for the steps needed to change the unit from psi to bar:



Steps to change the unit

● 11 Handling and Configuration (Continued)

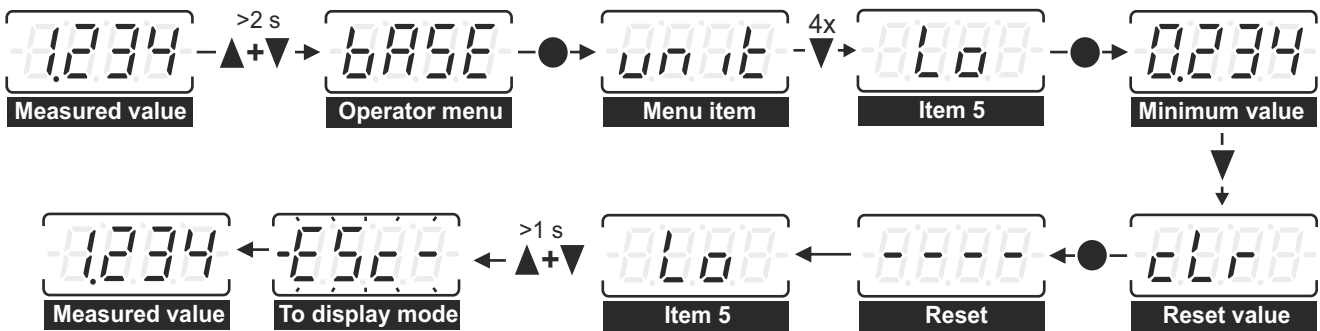
11.3.2 Trailing Pointers (Lo / Hi)

The trailing pointers for minimum and maximum values can be displayed or reset. A reset is confirmed with „----“ on the display.

The trailing pointer shows „Er.Lo“ respectively „Er.Hi“ if the current output has been set to an error current.

Display	Designation	Description
	Value of min/max pointer	Value of the min/max pointer in the selected measuring unit
	Clear	Reset the stored pointer value
	Return	Return to „Lo“ or „Hi“

The steps to reset the minimum pointer are shown below.



Steps to reset the minimum pointer

● 11 Handling and Configuration (Continued)

11.4 Display Menu (diSP)

The display menu has the following functions

Display	Designation	Description
	Display period for measured value (time data)	Setting between 0,5...99,9 s possible
	Display period for unit (time unit)	Setting between 0,0...99,9 s possible
	Rotate 180°	Rotate screen by 180° when the device is mounted upside down
	Decimal places	Setting the decimal places (0...3 fixed decimal places or automatic)
	Return	Return to „diSP“

11.4.1 Display Period for Measured Value/Unit (td / tu)

The unit can be shown either by pressing the center button in display mode or alternately with the measured value. The display periods of measured value and unit can be configured independently of one another.

If the unit period is set to 0.0, only the measured value will be displayed.

11.4.2 Rotating the Display by 180° (rot)







When the device is mounted upside down, the 7-segment display and buttons can be rotated by 180°, so that reading and operation can continue as usual.

Display	Designation	Description
	Standard (0°)	Resets display back to normal. Has no function otherwise.
	Upside down (180°)	Display rotated by 180° for upside down operation
	Return	Return to „rot“

● 11 Handling and Configuration (Continued)

11.4.3 Decimal Point Setting (dEcP)

Possible is a fixed or an automatic positioning of the decimal point.







Display	Designation	Description
	Automatic	The decimal point is set so that all digits are fully used
	No decimal place	
	One decimal place	
	Two decimal places	
	Three decimal places	
	Return	Return to „dEcP“

Please note that when the decimal point is fixed the measured value may not be displayed if there are insufficient digits left of the decimal point. In this case the maximum number that can be shown on the display will appear flashing, e. g. "99.99", when two decimal places are set for a measured value of 110 °C.

If the "Add unit" function is enabled (see 11.4.1), the parameter list will be modified to reflect the available options for displaying measured value and unit simultaneously.

11.5 Switch Point Menu (SP)

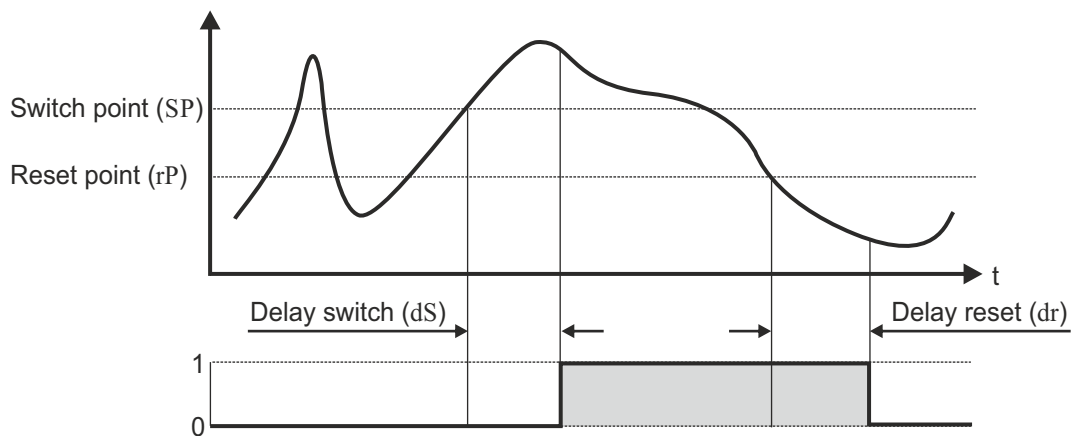
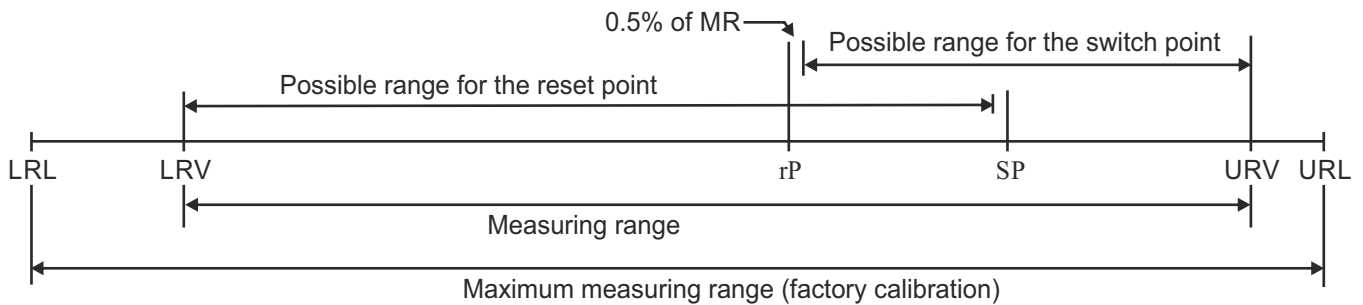
The menu has items for the settings of the two switch points. The output behavior can be a hysteresis or a frame function where the menu items are different. The switching delays can be defined independently from the output function.

Display	Designation	Description
	Switch point	Switch point in the selected measuring unit
	Reset point	Reset point in the selected unit
	Delay switch	Output delay at switch point
	Delay reset	Output delay at reset point
	Output function	Configuring the output behaviour (normally open, normally close, hysteresis / frame function)
Menu items for switch point 2		
	Return	Return to „SP“

● 11 Handling and Configuration (Continued)

The switch point (SP) must be set between the upper range value (URV) and the reset point. The reset point (rP) must be set between the lower range value (LRV) and the switch point. The minimum hysteresis (difference between switch point and reset point) is 0,5% of the measuring range (MR).

It is possible to define a delay for the switch point as well as the reset point, e. g. to avoid short pressure peaks triggering the switch.



When the frame function is used, the menu items for switch point and reset point are replaced by the upper and lower frame limits. The minimum difference of the frame limits is 0,5% of the measuring range (MR).

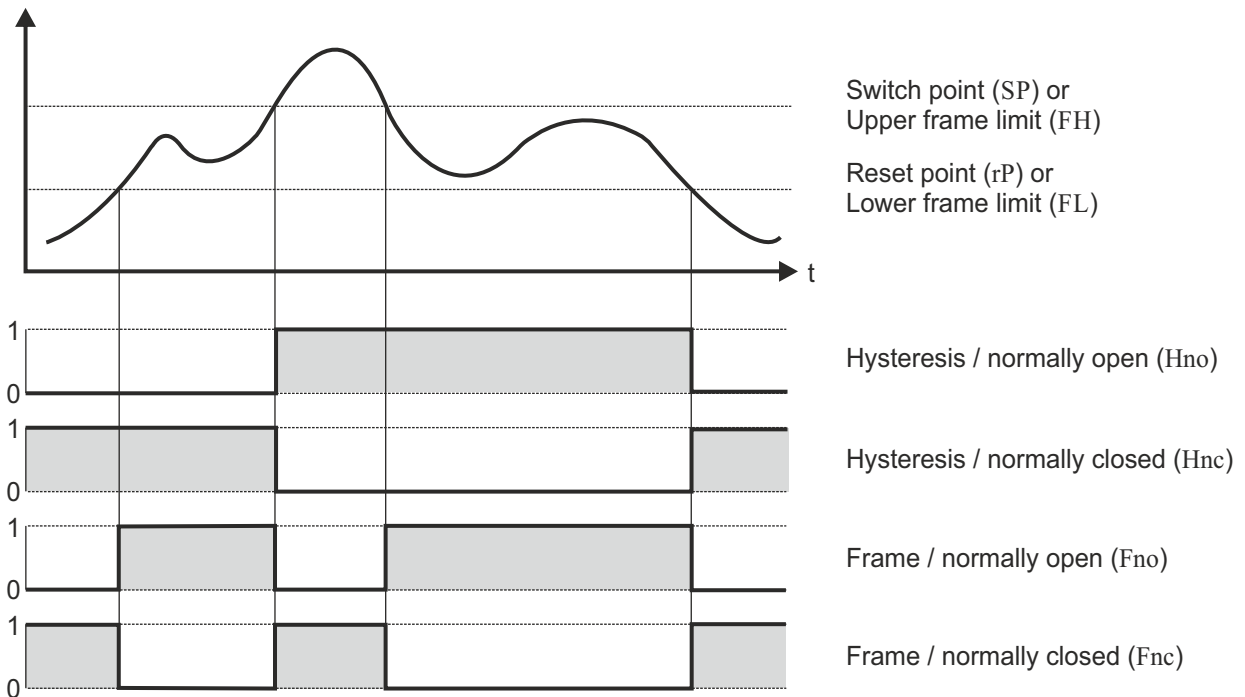
Display	Designation	Description
FA00	Frame high	Upper frame limit in the selected measuring unit
FL00	Frame low	Lower frame limit in the selected measuring unit
dS00	Delay switch	Output delay when entering the frame
dr00	Delay reset	Output delay when leaving the frame
0000	Output function	Configuring the output behavior (normally open, normally closed, hysteresis / frame function)
Menu items for switch point 2		
-rEE-	Return	Return to „SP“

● 11 Handling and Configuration (Continued)

11.5.1 Configuring the Output Function (out 1 / 2)




Possible are hysteresis or frame functions and the output as normally open or closed contacts.

Display	Designation	Description
	Hysteresis, normally open	If the pressure is above the switch point, the switch is closed. At the lower range limit the switch is open.
	Hysteresis, normally closed	If the pressure is above the switch point, the switch is open. At the lower range limit the switch is closed.
	Frame, normally open	Inside of the frame the switch is closed. At the lower range limit the switch is open.
	Frame, normally closed	Inside of the frame the switch is open. At the lower range limit the switch is closed.
	Return	Return to „out 1" or „out 2"










11.6 System Menu (SYS)

The system menu has the following functions

Display	Designation	Description
	Information	Indicating of hardware and software version, serial number
	Reset	Reset to factory settings
	Return	Return to „SYS“

11.6.1 Information (inFo)

The information menu has the following functions



Display	Designation	Display	Designation
	Hardware version 1 (HW1)		Software version 2 (SW2)
	Hardware version 2 (HW2)		Serial number 1 (Sn 1)
	Software version 1 (SW1)		Serial number 2 (Sn 2)
	Return	Return to „InFo“	

Due to the limited number of alphanumerical segments on the display the values for these items are split.

11.6.2 Reset to Factory Settings (rES)

It is possible to reset the device to the configuration as delivered with the menu item „Reset“ (rES). When entering the menu the entry points to „rEt“. To confirm the reset, use one of the arrow buttons to go to „YES“ and press the center button. After this final confirmation all parameters will be changed to the factory settings.

When confirming with the center button „donE“ appears on the display, which confirms that the device has been reset to factory settings. Then the device will switch back to the initial menu item („rES“).

Display	Designation	Description
	Return	Return to „rES“
	Yes	Resetting the device to factory settings

11.7 Menu Tree Overview

BASE

unit
Lo
Hi

Menu with basic functions

Setting the measuring unit (mbar, bar, psi, kPa, MPa, %, mA)

Display and/or delete the minimum trailing pointer

Display and/or delete the maximum trailing pointer

dISP

td
tu
rot
DECP

All settings relating to the display

Setting the display period for the measured value (only when „AddU“ is disabled)

Setting the display period for the unit (only when „AddU“ is disabled)

Display direction (0° = standard, 180° = turned)

Display the decimal places (0...3 fixed decimal places or automatically)

SP

SP 1 FH 1
rP 1 FL 1
dS 1
dr 1
out 1

Configuring the switching outputs (when available)

Switch point or upper frame limit of switching output 1

Reset point or lower frame limit of switching output 1

Output delay at the switch point of switching output 1

Output delay at the reset point of switching output 1

Output functions of switching output 1 (Hno, Hnc, Fno, Fnc)

Menu items for switch point 2 are identical.

SYS

Loop
info
rES

System functions

Setting a fixed current for test of the loop

Versions of hardware and software, serial number

Reset to factory settings

● 12 Fault Recovery



- Open connections only after the system is unpressurized.
- Take precautions regarding rest media in removed flow sensors. Rest media can endanger personnel, environment and installation.
- If the flow sensor is damaged or becomes unsafe for operation, remove it from service and mark it to prevent accidental start-up.
- Only the manufacturer should conduct repairs.



- Do not use any pointed or hard objects for cleaning to prevent damage to the sensor element.
- Verify in advance if pressure is being applied (valves / ball valve etc. open) and if the correct voltage supply and wiring type has been chosen.

Failure	Possible Cause	Procedure
No output signal	Cable break No/incorrect voltage supply or surge voltage	Check passage Adjust voltage supply as per this operating manual
No/false output signal	Wiring error	Check pin assignment (see product label / operating manual)
Output signal unchanged after change in flow	Sensor element damaged	Replace device, if failure repeats, inform the manufacturer
Signal span dropping off / too small	Sensor element is damaged by e. g. impacts, abrasive / corrosive media, sensor corrosion Sensor not aligned in flow direction	Replace device, if failure repeats inform the manufacturer Align sensor in direction of flow as per marking
Signal span fluctuates / is inaccurate	Electromagnetic interference source in the vicinity, e. g. converter Turbulences / cross flows caused by wrong mounting location Flow sensor not grounded Violent fluctuations of process media	Shield sensor, shield cables, remove interference source Mount the flow sensor on a suitable location Ground flow sensor Damping, consult the supplier

Note: In case of unjustified reclamation an additional charge is possible.

Ensure the sensor is working properly after every system change. In case the fault persists, send the instrument in for repair or replacement.

Returns: Purge / clean dismantled instruments before returning them in order to protect personnel and the environment from any hazards caused by rest media.

● 13 Technical Data

Input

Flow:	10 m/s / 20 m/s / 30 m/s (Reference conditions: 20 °C, 1013 hPa)
Medium:	Air, non-corrosive gases
Measuring principle:	Calorimetric

Output

Current signal:	4...20 mA
Load:	500 Ω maximum

Performance Parameters

Sensor unit:	Measurement uncertainty:	±5% of final value, dependent on construction (within range 10...100%)
	Reference section:	10x Ø for inflow and outflow
Indicator / limit values:	Repeating accuracy:	±2
	Reaction time:	approx. 2 s
	Dependence on temperature:	±0,01% / 1K
	Transient response:	linear to flow velocity
	Resolution:	-9999...9999 digit
	Error in measurement:	±0,2% of range, ±1 digit
	Temperature drift:	100 ppm/K
	Features, operation:	according VDMA 24574-1 up to 24574-4

Programmable Features

See chapter 11

Indication

Display:	7 segment, 8,5 mm, red, 4 digits, representation mirror-inverted 180° possible		
Display head:	rotatable approx. 330°		
Memory:	minimum / maximum values		
Indication:	- measuring value	- unit of measurement	- control menu
Decimal point:	automatically or manually, dependent on measuring range / unit		
	Representation: xxxx / xxx.x / xx.xx / x.xxx		

Limit Contacts

Electronically:	2x PNP or NPN (30 VDC, 200 mA) Option: 2x PNP or NPN (30 VDC, 1000 mA)
Indication:	1 LED red for each limit value
Voltage across:	<1 V
Settings:	with 3 keys (TouchM-Technology)
Setting range:	switch point and hysteresis: any value within measuring range
Switching delay:	0,0...999,9 s
Failsafe function:	adjustable
Galvanical insulation:	switching outputs are separated from measuring amplifier

Supply

Voltage:	24 VDC, ±10%
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Environmental Conditions

Temperature:	Operating range:	0...+60 °C
	Storage:	-20...+80 °C
	Medium:	-20...+70 °C
Condensation:	uncritical	

Mechanics

Dimensions:	see page 11		
Process connection:	without / 1/2" / 3/4" / 1" / 1,5" / 1/2NPT		
Fitting, Nominal length:	80...400 mm		
System pressure:	10 bar with threaded connection		
Electrical connection:	see page 9		
Material:	Sensor:	Process connection:	stainless steel
		Sensor tube:	stainless steel
		Sensor element:	Al ₂ O ₃ with glassivation
		Sensor retainer:	FKM
		Potting:	epoxy resin
		Body:	PBT GF30
		Display head:	polycarbonate (makrolon)
Weight:	approx. 180 g (1/2", 100 mm, M12)		
Fitting position:	any		
Protection class:	Sensor:	IP67	
	Electronics:	at least degree IP65 (when electrical connection is plugged)	

Subject to change, version 43-544