bürkert
FLUID CONTROL SYSTEMS

Type 8045

Insertion electromagnetic flowmeter
Magnetisch-induktives Durchflussmessgerät, Insertion
Débitmètre électromagnétique à insertion

Operating Instructions

Bedienungsanleitung
Manuel d'utilisation

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

Operating Instructions 2304/05_EU-ML 00559778 / Original EN

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

1 ABOUT THESE OPERATING INSTRUCTIONS

These Operating Instructions describes the entire life cycle of the device. Please keep these Operating Instructions in a safe place, accessible to all users and any new owners.

These Operating Instructions contains important safety information.

Failure to comply with these instructions can lead to hazardous situations. Pay attention in particular to the chapters 3 Basic safety information and 2 Intended use.

- Whatever the version of the device, these Operating Instructions must be read and understood.
- When the symbol ⚠ is marked inside or outside the device, carefully read the Operating Instructions.

1.1 Symbols used

DANGER

Warns against an imminent danger.

- Failure to observe this warning can result in death or in serious injury.

WARNING

Warns against a potentially dangerous situation.

- Failure to observe this warning can result in serious injury or even death.

CAUTION

Warns against a possible risk.

- Failure to observe this warning can result in substantial or minor injuries.

NOTICE

Warns against material damage.

Indicates additional information, advice or important recommendations.

Refers to information contained in these Operating Instructions or in other documents.

- Indicates an instruction to be carried out to avoid a danger, a warning or a possible risk.

→ Indicates a procedure to be carried out.

1.2 Definition of the word "device"

The word "device" used within these Operating Instructions refers to the insertion electromagnetic flowmeter type 8045.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

2 INTENDED USE

Use of the device that does not comply with the instructions could present risks to people, nearby installations and the environment.

The insertion electromagnetic flowmeter type 8045 is intended exclusively to measure flow rate in liquids.

- This device must be used in compliance with the characteristics and commissioning and use conditions specified in the contractual documents and in these Operating Instructions.
- Never use this device for security applications.
- This device must be protected against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of climatic conditions.
- Only operate a device in perfect working order.
- Requirements for the safe and proper operation of the device are proper transport, storage and installation, as well as careful operation and maintenance.
- Only use the device as intended.

3 BASIC SAFETY INFORMATION

This safety information does not take into account:

- any contingencies or occurrences that may arise during installation, use and maintenance of the devices.
- the local safety regulations for which the operating company is responsible including the staff in charge of installation and maintenance.

Risk of injury due to high pressure in the installation.

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Danger due to electrical voltage.

- If a 18...36 V DC powered version is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Disconnect the electrical power for all the conductors and isolate it before carrying out work on the system.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to high fluid temperatures.

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.

Risk of injury due to the nature of the fluid.

- Respect the prevailing regulations on accident prevention and safety relating to the use of aggressive fluids.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

Various dangerous situations

To avoid injury take care:

- not to use the device in explosive atmospheres.
- not to use the device in an environment incompatible with the materials it is made of.
- not to use fluid that is incompatible with the materials the device is made of.
- not to subject the device to mechanical loads.
- not to make any modifications to the device.
- to prevent any unintentional power supply switch-on.
- to carry out the installation and maintenance work by qualified and skilled staff with the appropriate tools.
- to guarantee a defined or controlled restarting of the process, after a power supply interruption.
- to observe the general technical rules when installing and using the device.

NOTICE

The device may be damaged by the fluid in contact with.

- Systematically check the chemical compatibility of the component materials of the device and the fluids likely to come into contact with it (for example: alcohols, strong or concentrated acids, aldehydes, alkaline compounds, esters, aliphatic compounds, ketones, halogenated aromatics or hydrocarbons, oxidants and chlorinated agents).

NOTICE

Elements / Components sensitive to electrostatic discharges

- This device contains electronic components sensitive to electrostatic discharges. They may be damaged if they are touched by an electrostatically charged person or object. In the worst case scenario, these components are instantly destroyed or go out of order as soon as they are activated.
- To minimise or even avoid all damage due to an electrostatic discharge, take all the precautions described in the EN 61340-5-1 norm.
- Also ensure that you do not touch any of the live electrical components.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

4 GENERAL INFORMATION

4.1 Manufacturer's address and international contacts

To contact the manufacturer of the device, use following address:

Bürkert SAS

Rue du Giessen

BP 21

F-67220 TRIEMBACH-AU-VAL

You may also contact your local Bürkert sales office.

The addresses of our international sales offices are available on the internet at: country.burkert.com

4.2 Warranty conditions

The condition governing the legal warranty is the conforming use of the device in observance of the operating conditions specified in these Operating Instructions.

4.3 Information on the Internet

You can find the user manuals and technical data sheets regarding the type 8045 at: country.burkert.com

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

5 DESCRIPTION

5.1 Area of application

The insertion electromagnetic flowmeter type 8045 is intended exclusively to measure flow rates in liquids.

The device makes it possible to switch a solenoid valve or activate an alarm thanks to a transistor output and, for some versions, by means of two relay outputs, fully configurable and to establish a control loop thanks to a 4...20 mA current output.

The versions also equipped with a digital input make it possible to remotely activate a function.

5.2 General description

The device comprises both a flow sensor operating on Faraday's law and a transmitter with display.

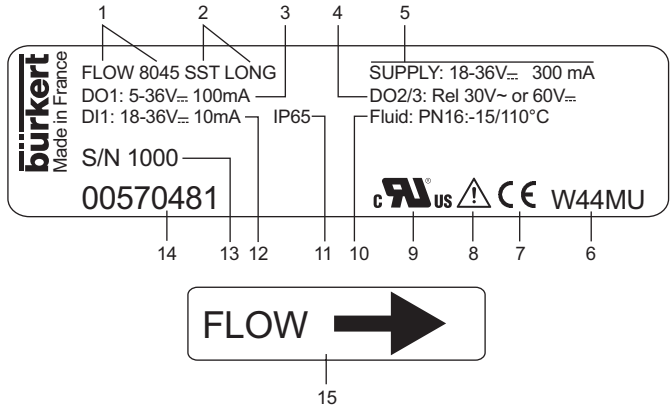
The device is equipped with a 4...20 mA current output (analogue output, called AO1), a digital output (configured as a pulse output by default, called DO1) and two totalizers.

Some versions are equipped with two relay outputs (called DO2 and DO3) and one digital input (called DI1).

The device operates on a 3 wire system and needs a 18...36 V DC power supply.

The electrical connection is made on the terminals blocks of the electronic board within the transmitter, through two M20x1.5 cable glands.

5.3 Description of the rating plate



1. Measured value and type of the device
2. Specification of the flow sensor
3. Specification of the DO1 digital output
4. Specification of the relay outputs DO2 and DO3
5. Electrical power supply and current consumption
6. Manufacturing code
7. Conformity marking
8. Warning: Before using the device, take into account the technical specifications described in these Operating Instructions.
9. Certification
10. Fluid nominal pressure and fluid temperature range
11. Protection class of the device
12. Specification of the DI1 digital input
13. Serial number
14. Article number
15. Shows the flow direction

Fig. 1: Rating plate of the device (example)

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

5.4 Symbols on the device

Symbol	Description
	Direct current
	Alternating current
	Earth terminal
	Protective conductor terminal

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

6 TECHNICAL DATA

6.1 Conditions of use

Ambient temperature	–10...+60 °C
Air humidity	< 85 %, non condensated
Height above sea level	≤ 2000 m
Operating conditions	Continuous
Equipment mobility	Fixed
Use	Indoor and outdoor (Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, against the effects of climatic conditions)
Installation category	Category I according to UL/EN 61010-1 (UL devices)
	Category II according to UL/EN 61010-1 (non-UL devices)
Degree of pollution	Degree 2 according to UL/EN 61010-1
Protection class according to IEC / EN 60529	IP65 [1], if the device is wired and if the cable glands are tightened and the cover lid is screwed tight.

[1] not evaluated by UL

6.2 Standards and directives

The device complies with the relevant EU harmonisation legislation. In addition, the device also complies with the requirements of the laws of the United Kingdom.

The harmonised standards that have been applied for the conformity assessment procedure are listed in the current version of the EU Declaration of Conformity/UK Declaration of Conformity.

Conformity to the Pressure Equipment Directive

→ Make sure the device materials are compatible with the fluid.

→ Make sure the pipe DN is adapted for the device.

The device conforms to Article 4, Paragraph 1 of the Pressure Equipment Directive 2014/68/EU under the following conditions:

- Device used on a pipe (PS = maximum admissible pressure in bar; DN = nominal diameter of the pipe in mm)

Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.c.i	DN ≤ 25
Fluid group 2, Article 4, Paragraph 1.c.i	DN ≤ 32 or PSxDN ≤ 1000
Fluid group 1, Article 4, Paragraph 1.c.ii	DN ≤ 25 or PSxDN ≤ 2000
Fluid group 2, Article 4, Paragraph 1.c.ii	DN ≤ 200 or PS ≤ 10 or PSxDN ≤ 5000

UL certification

The devices with variable key PU01 or PU02 are UL-certified devices and comply also with the following standards:

- UL 61010-1
- CAN/CSA-C22.2 n°61010-1

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

Identification on the device	Certification	Variable key
c UL us	UL-recognized	PU01
c UL us LISTED Measuring Equipment EXXXXXX	UL-listed	PU02

6.3 Mechanical data

Part	Material (8045 with flow sensor in PVDF)	Material (8045 with flow sensor in stainless steel)
Housing / seal	PC / NBR	Black PPA / NBR
Cover with lid / seal	PC / silicone	PSU / silicone
Front foil	Polyester	
M20x1.5 cable glands / seal	PA / neoprene	
Screws	Stainless steel	
Nut	PC	PPA
Flow sensor (exposed to the fluid)	PVDF	Stainless steel 316L (DIN 1.4404)
Seal	FKM	8045 with a G2" nut: FKM
Earth ring of the flow sensor	Stainless steel 316L (DIN 1.4404) or Alloy C22	-
Electrodes holder	-	PEEK
Electrodes	Stainless steel 316L (DIN 1.4404) or Alloy C22	
Rating plate	Polyester	

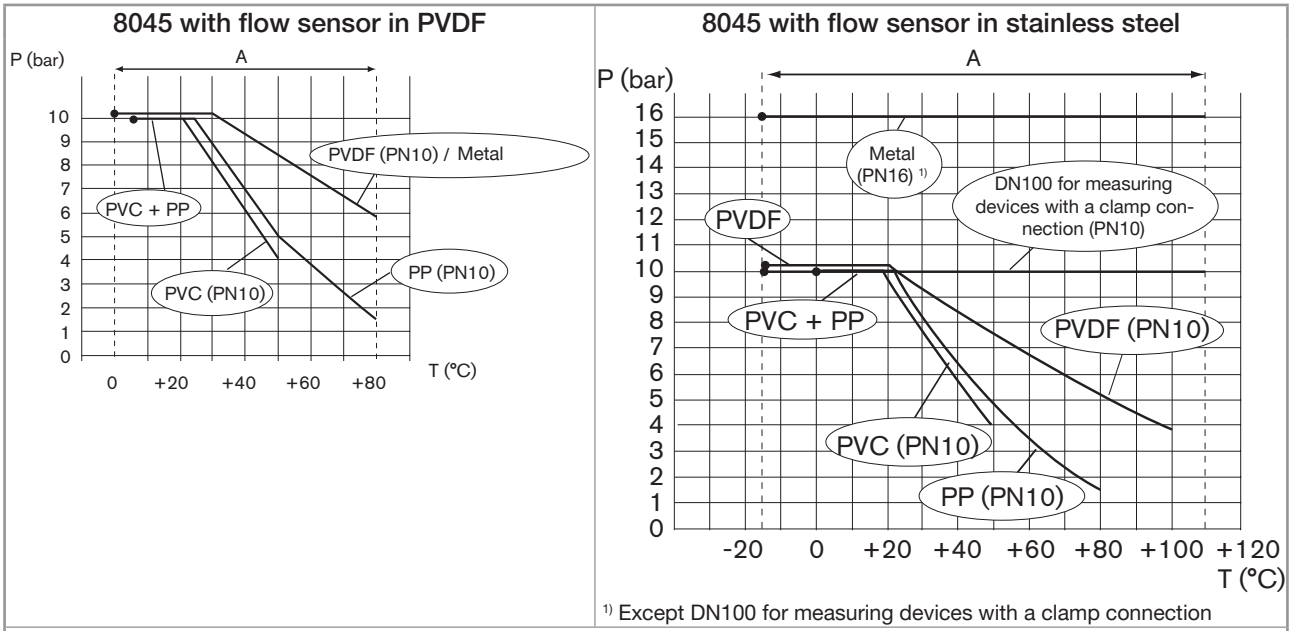


Fig. 2: Fluid pressure / fluid temperature dependency for a 8045 with PVDF flow sensor or stainless steel flow sensor and a fitting S020 in metal, PVC, PVDF or PP

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

6.4 Fluid data

Pipe diameter	DN6 to DN400
Type of fitting	S020
Fluid conductivity	Min. 20 µS/cm
Fluid viscosity	< 1000 mPa.s
Fluid temperature	The fluid temperature may be restricted by the fluid pressure, the material the flow sensor is made of and the material the S020 fitting used is made of. See Fig. 2.
• 8045 with flow sensor in PVDF	• 0...+80 °C
• 8045 with flow sensor in stainless steel	• –15...+110 °C
Fluid pressure	The fluid pressure may be restricted by the fluid temperature, the material the flow sensor is made of, the material the S020 fitting used is made of and the DN of the S020 fitting. See Fig. 2.
• 8045 with flow sensor in PVDF	• PN10 [1]
• 8045 with flow sensor in stainless steel	• PN16 [1]
Flow rate measurement	
• Measurement range	• 0.2...10 m/s
• Measurement deviation ("measurement bias", as defined in the standard JCGM 200:2012):	
- with K-factor determined with a Teach-In procedure	- ±0.5 % of the measured value [2] (at the value of the Teach-In flow rate)
- with standard K-factor	- ±3.5 % of the measured value [2]
• Linearity	• ±0.5 % of the full scale [2]
• Repeatability	• ±0.25 % of the measured value

[1] not evaluated by UL

[2] Determined in the following reference conditions: fluid = water, water and ambiant temperatures = 20 °C, upstream and downstream distances respected, appropriate pipe dimensions.

6.5 Electrical data

Operating voltage	• 18...36 V DC, • Filtered and regulated • Oscillation rate: ±5 % • Limited power source according to UL/EN 62368-1, Appendix Q • or limited energy circuit according to UL/EN 61010-1, Paragraph 9.4 • SELV/PELV with UL-approved overcurrent protection designed according to UL/EN 61010-1, Table 18
Current consumption	300 mA max. (at 18 V DC)

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

Transistor output DO1	
• Type	• NPN / PNP (wiring dependent), open collector
• Function	• Pulse output (by default), user configurable
• Frequency	• 0...250 Hz
• Electrical data	• 5...36 V DC, 100 mA max.
• Duty cycle if f > 2 Hz	• 0.5
• Min. pulse duration if f < 2 Hz	• 250 ms
• Protections	• Galvanically isolated, and protected against over-voltages, polarity reversals and short-circuits
Relay outputs (DO2 and DO3)	
• Operating	• Hysteresis (by default), configurable, normally open
• Electrical data of the load (non U-recognized devices)	• 230 V AC / 3 A or 40 V DC / 3 A (resistive load)
• Electrical data of the load (U-recognized devices)	• Max. 30 V AC and 42 V peak / 3 A or max. 60 V DC / 1 A To use the relay outputs in a wet location, observe the following DANGER safety instruction.
• Max. breaking capacity	• 750 VA (resistive load)
• Life span	• Min. 100000 cycles
Current output AO1	
• Specification	• 4...20 mA, sink or source (wiring dependent), 22 mA to indicate a fault
• Max. loop impedance	• 1300 Ω at 36 V DC, 1000 Ω at 30 V DC, 700 Ω at 24 V DC, 450 Ω at 18 V DC
Digital input DI	
• Supply voltage	• 18...36 V DC
• Input impedance	• 15 kΩ
• Min. pulse duration	• 200 ms
• Protections	• Galvanically isolated, and protected against polarity reversals and voltage spikes

DANGER

Danger due to the operation of the relay outputs of a UL device in a wet location.

▸ If a UL device is used in a wet location:

- energize the relay outputs with an alternating voltage of max. 16 Vrms and 22.6 Vpeak.
- or energize the relay outputs with a direct voltage of max. 35 V DC.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

6.6 Electrical connection

Type of connection	Through two M20x1.5 cable glands
Cable specifications	
• Cable type	• Shielded
• Cross section	• 0.5...1.5 mm²
• Diameter of each cable:	
- if only one cable is used per cable gland	- 6...12 mm
- if two cables are used per cable gland	- 4 mm, with the supplied multi-way seal

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

7 INSTALLATION AND COMMISSIONING

7.1 Safety instructions

DANGER

Risk of injury due to high pressure in the installation.

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Danger due to electrical voltage.

- If a 18...36 V DC powered version is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Disconnect the electrical power for all the conductors and isolate it before carrying out work on the system.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to high fluid temperatures.

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.

Risk of injury due to the nature of the fluid.

- Respect the prevailing regulations on accident prevention and safety relating to the use of aggressive fluids.

WARNING

Risk of injury due to non-conforming installation.

- The electrical and fluid installation can only be carried out by qualified and skilled staff with the appropriate tools.
- Observe mounting instructions of the fitting or sensor-fitting.
- Install appropriate safety devices (correctly rated fuse and/or circuit-breaker).
- Install the circuit breaker or switch in a place which is easy to reach.
- Identify the circuit breaker or switch as the electrical power cut-off system for the device.
- It is imperative that devices be used that provide adequate protection against overloads.
- Do not power a device, version 18...36 V DC, with an alternating voltage or with a direct voltage in excess of 36 V DC.
- Respect standard NF C 15-100 / IEC 60364.

Risk of injury due to unintentional switch on of power supply or uncontrolled restarting of the installation.

- Take appropriate measures to avoid unintentional activation of the installation.
- Guarantee a set or controlled restarting of the process subsequent to any intervention on the device.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

WARNING

Risk of injury if the fluid pressure/fluid temperature dependency is not respected.

- Take account of fluid pressure/fluid temperature dependency according to the nature of the materials the fitting is made of (see the technical data and the Operating Instructions of the fitting used).
- Comply with the Pressure Equipment Directive 2014/68/EU.

WARNING

Danger due to non-conforming commissioning.

Non-conforming commissioning could lead to injuries and damage the device and its surroundings.

- Before commissioning, make sure that the staff in charge have read and fully understood the contents of the manual.
- In particular, observe the safety recommendations and intended use.
- The device / the installation must only be commissioned by suitably trained staff.

Protect this device against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of the climatic conditions.

7.2 Fluid installation onto the pipe

DANGER

Risk of injury due to high pressure in the installation.

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Risk of injury due to the nature of the fluid.

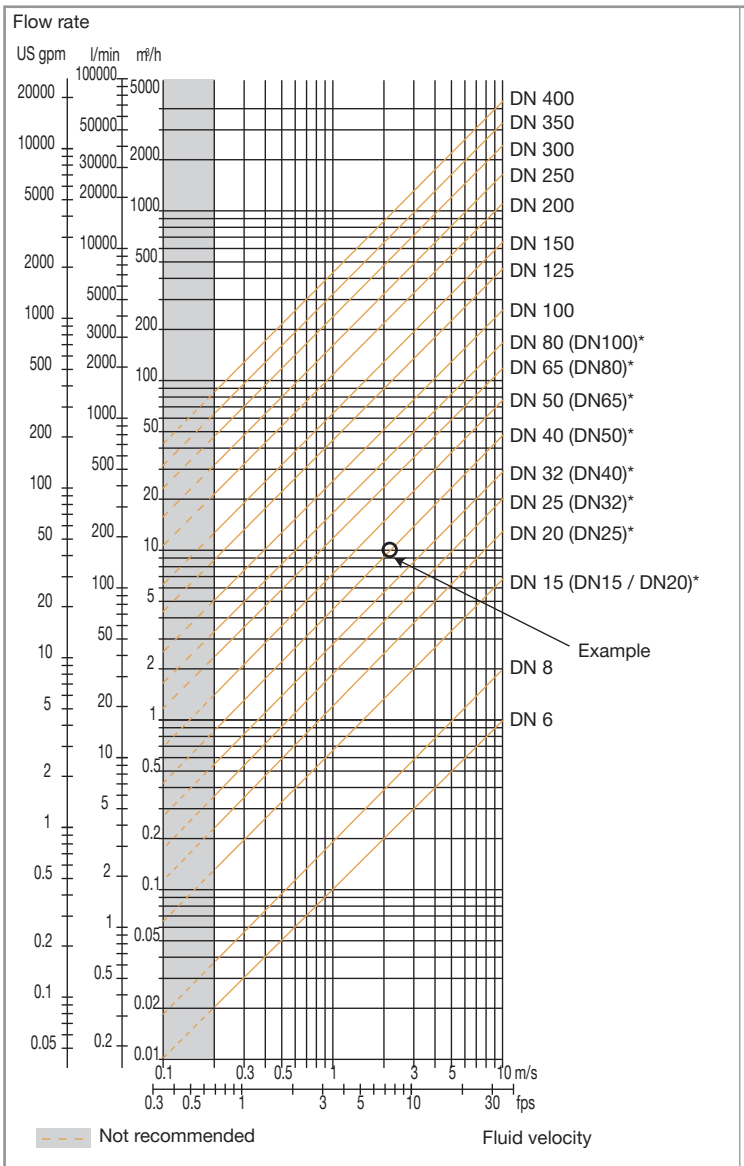
- Respect the prevailing regulations on accident prevention and safety relating to the use of aggressive fluids.

The insertion electromagnetic flowmeter type 8045 has to be inserted into an S020 fitting mounted on a pipe.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

7.2.1 Recommandations for installing the 8045 on the pipe

→ Choose an S020 fitting appropriate to the velocity of the fluid inside the pipe: refer to the graphs below:



Example:

- Specification: if the nominal flow rate is 10 m³/h, the ideal flow velocity is between 2 and 3 m/s.
- Solution: intersection between flow rate and flow velocity in the graph gives the appropriate pipe diameter, DN40 (or DN50 for the asterisked fittings).

* For the fittings:

- with external thread connections acc. to SMS 1145
- with welding end connections acc. to SMS 3008,
  DIN 11866 Series C / BS 4825-1 / ASME BPE
  or
  DIN 11850 Series 2 / DIN 11866 Series A / EN 10357 Series A
- with Clamp connections acc. to SMS 3017,
  BS 4825-3 / ASME BPE
  or
  DIN 32676 Series A

→ Install the device on the pipe in such a way that the upstream and downstream distances are respected according to the design of the pipes, refer to standard EN ISO 5167-1 and Fig. 3:

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

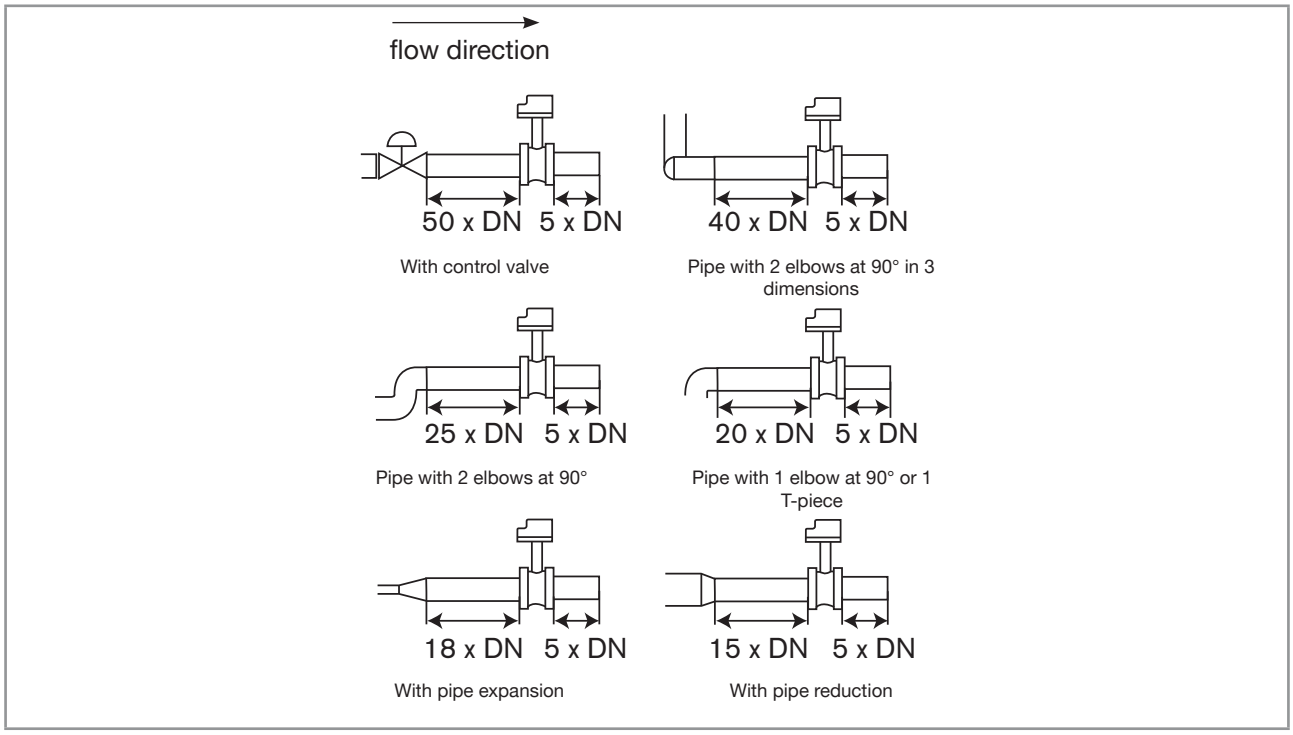


Fig. 3: Upstream and downstream distances depending on the design of the pipes.

→ Respect the following additional mounting conditions to ensure that the measuring device operates correctly:

- Preferably install the device at a 45° angle to the horizontal centre of the pipe to avoid having deposits on the electrodes and false measurements due to air bubbles (see Fig. 4);

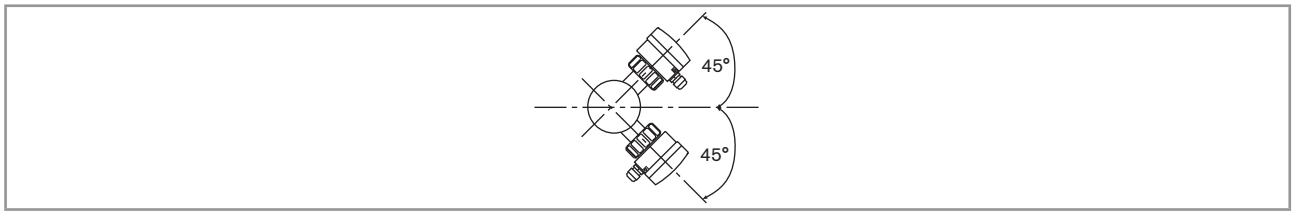


Fig. 4: Mounting angle on the pipe

- Ensure that the pipe is always filled in the section around the device (see Fig. 5).
- When mounting vertically ensure that the flow direction is in an upward direction (see Fig. 5).

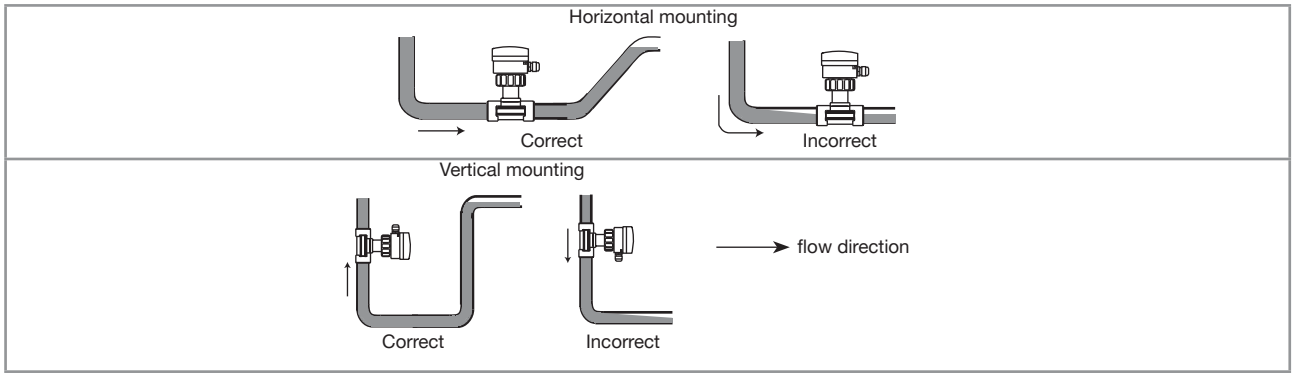


Fig. 5: Filling of the pipe

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

- Prevent the formation of air bubbles in the pipe in the section around the device (see Fig. 6).
- Always mount the device upstream a possible injection point in the pipe of a high-conductivity fluid (for example: acid, base, saline,...).

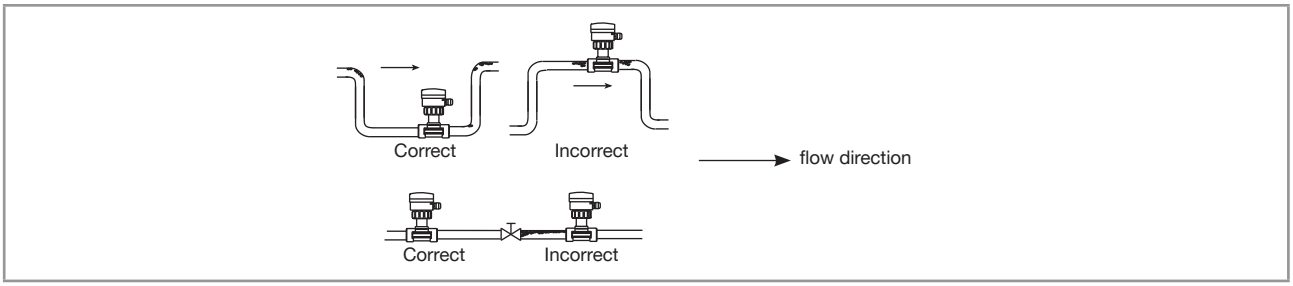
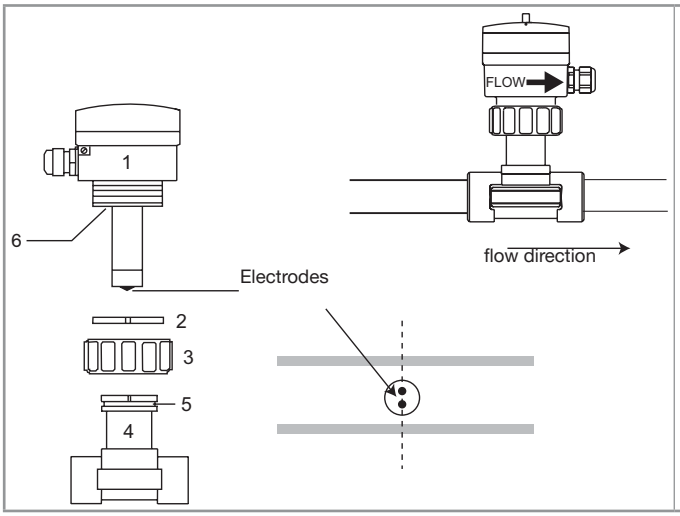


Fig. 6: Air bubbles within the pipe

→ If necessary, use a flow conditioner to improve measurement precision.

7.2.2 Installation into the pipe of a 8045 with a G2" nut

In order to ensure a high accuracy of the measurements and good stability of the „flow zero“ point, install the device into the processed medium at least 24 hours before calibration.



→ Install the fitting (see mark 4, Fig. 7) into the pipe taking into account the recommendations in chapter 7.2.1.

→ Check that there is a seal 6 on the device 1.

→ Insert the nut 3 on the fitting 4.

→ Insert the snap ring 2 into the groove 5.

→ Position the device 1 in order the arrow on the side of the housing indicates the direction of the flow. The totalizers will increment.

→ Insert the device 1 into the fitting 4.

→ Tighten the nut 3 by hand on the device 1.

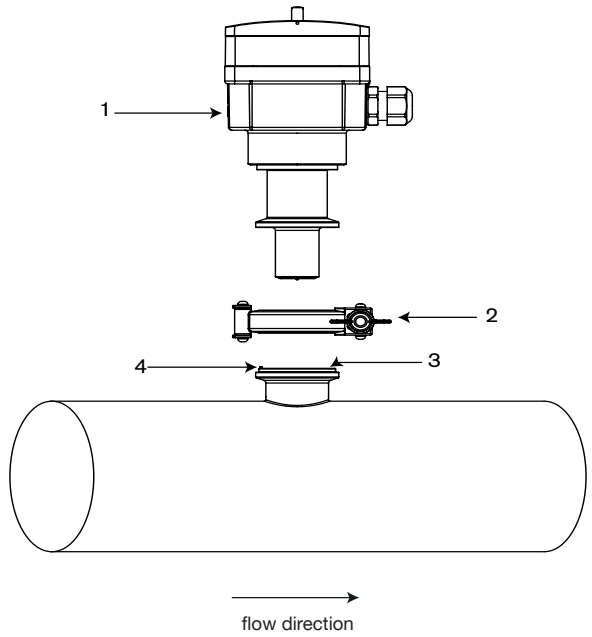
Fig. 7: Installation into the pipe of a 8045 with a G2" nut

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

7.2.3 Installation into the pipe of a 8045 with a clamp connection

Observe the installation recommendations described at chapter 7.2 and in the Operating Instructions of the S020 fitting.

In order to ensure a high accuracy of the measurements and good stability of the „flow zero“ point, install the device into the processed medium at least 24 hours before calibration.



→ Install the S020 fitting on the pipe.

→ Install the seal (mark 3 Fig. 8) on the S020 fitting.

→ Make sure that the polarizing pin 4 is on the fitting.

→ Insert the device 1 into the fitting. Position the device 1 in order the arrow on the side of the housing indicates the direction of the flow: the totalizers will increment.

→ Tighten by hand the clamp collar 2.

→ Charge the pipe to make sure the installation is tight.

Fig. 8: Installation into the pipe of a 8045 with a clamp connection

7.3 Wiring

DANGER

Risk of injury due to electrical voltage.

- If a 18...36 V DC powered version is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Disconnect the electrical power for all the conductors and isolate it before carrying out work on the system.
- Observe all applicable accident protection and safety regulations for electrical equipment.

DANGER

Danger due to the operation of the relay outputs of a UL device in a wet location.

- If a UL device is used in a wet location:
  - energize the relay outputs with an alternating voltage of max. 16 Vrms and 22.6 Vpeak.
  - or energize the relay outputs with a direct voltage of max. 35 V DC.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

NOTICE

The device is not tight if at least one cable gland is not used

▸ Seal the unused cable gland with the supplied blanking plug:

→ Loosen the nut of the unused cable gland.

→ Remove the transparent disk.

→ Insert the supplied blanking plug.

→ Screw the nut of the cable gland.

- Use a high quality electrical power supply (filtered and regulated).
- Make sure the installation is equipotential. See chapter 7.3.1.
- Use shielded cables with a temperature limit of 80 °C minimum.
- Do not install the cables near high voltage or high frequency cables; If this cannot be avoided, observe a min. distance of 30 cm.
- Protect the power supply by means of a 300 mA fuse and a switch.
- Protect the relays by means of a max. 3 A fuse and a circuit breaker (depending on the process).
- Do not apply both a dangerous voltage and a safety extra-low voltage to the relays.

If two cables are used in the same cable gland, first insert the supplied multi-way seal.

To wire the device:

→ Loosen the screw from the lid.

→ Flip the lid.

→ Loosen the 4 screws from the cover of the housing.

→ Remove the cover.

→ Loosen the nuts of the cable glands.

→ Insert the cable through the nut then through the cable gland.

→ Make sure the earth cable coming from the housing and, on a version with stainless steel sensor, the cable coming from the flow sensor, are connected as shown in Fig. 15, chapter 7.3.3.

→ Wire acc. to chapters 7.3.1 to 7.3.7.

7.3.1 Equipotentiality of the installation

To ensure the equipotentiality of the installation (power supply – device – fluid):

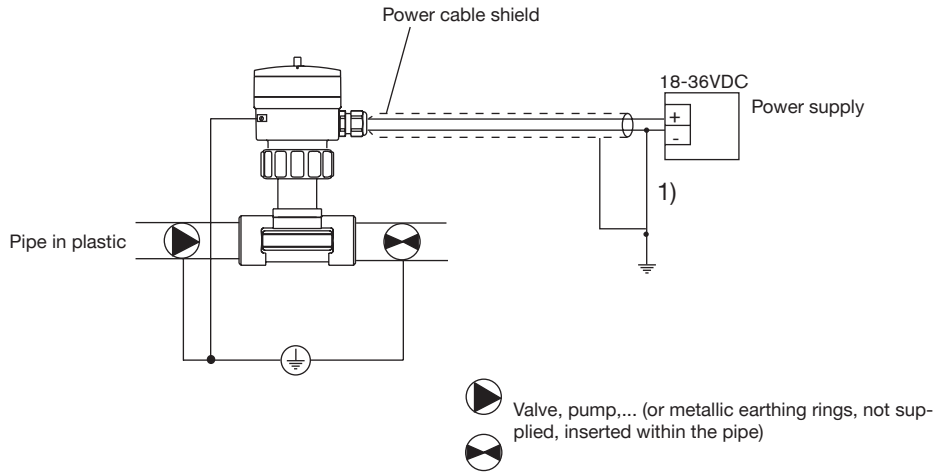
→ Connect together the various earth spots in the installation to eliminate the potential differences that may occur between different earthes.

→ Observe faultless earthing of the shield of the power supply cable, at both ends.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

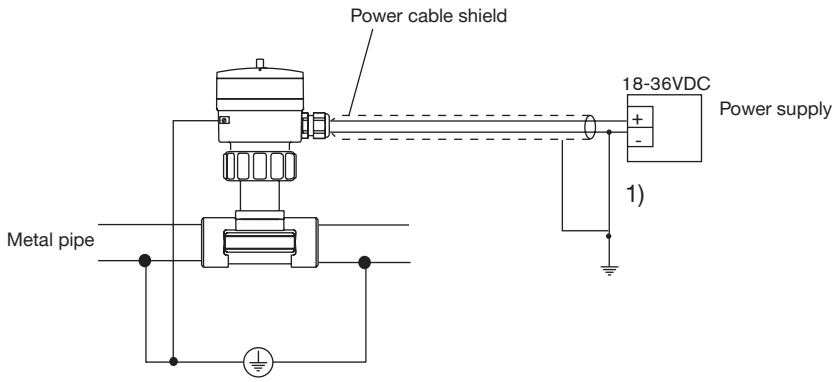
→ Connect the negative power supply terminal to the earth to suppress the effects of common mode currents. If this connection cannot be made directly, a 100 nF / 50 V capacitor can be fitted between the negative power supply terminal and the earth.

→ Special attention has to be paid if the device is installed on plastic pipes because there is no direct earthing possible. Proper earthing is performed by earthing together the metallic instruments such as pumps or valves, that are as close as possible to the device. If no such instrument is near the device, insert metallic earth rings inside the plastic pipes upstream and downstream the device and connect these parts to the same earth. The earth rings must be in contact with the fluid.



[1]If a direct earth connection is not possible, fit a 100 nF / 50 V capacitor between the negative power supply terminal and the earth.

Fig. 9: Equipotentiality skeleton diagram with pipes in plastic

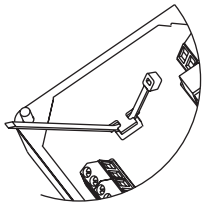


[1]If a direct earth connection is not possible, fit a 100 nF / 50 V capacitor between the negative power supply terminal and the earth.

Fig. 10: Equipotentiality skeleton diagram with pipes in metal

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

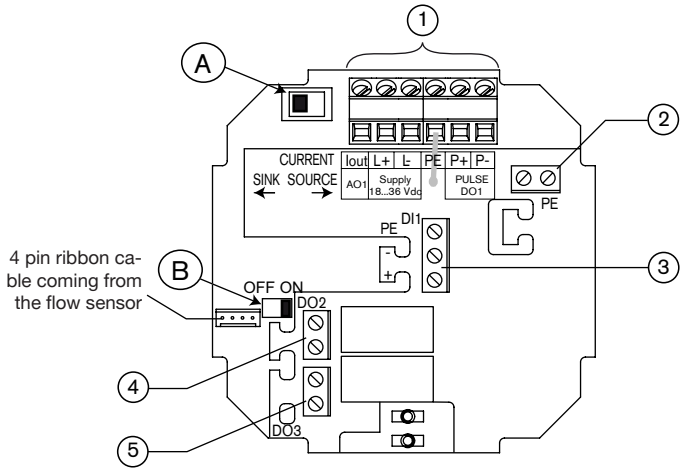
7.3.2 Mounting the cable clamp



→ Before wiring the device, insert the supplied cable clamp into the notches of the electronic board.

Fig. 11: Mountign the cable clamp

7.3.3 Terminal assignment and use of the selectors



Selector Ⓐ: see Fig. 13
Selector Ⓑ: see Fig. 14

Terminal block 1
Iout: 4...20 mA output (AO1)
L+: V+ (positive voltage)
L–: 0V (power supply ground)
PE: functional earth, wired in the factory (see Fig. 15)
P+: positive transistor output (DO1)
P–: negative transistor output (DO1)

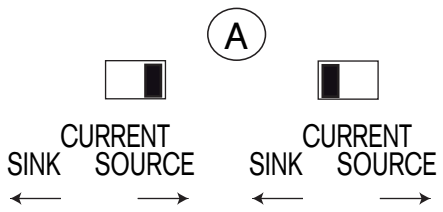
Terminal block 2
PE: shieldings of both the power supply cable and the AO1 and DO1 output cables

Terminal block 3
PE: functional earth of the DI1 digital input
–: negative signal of the DI1 input
+: positive signal of the DI1 input

Terminal block 4 wiring the DO2 relay output
Terminal block 5 wiring the DO3 relay output

Fig. 12: Terminal assignment

Use switch Ⓐ to configure the wiring of the 4...20 mA current output in sinking or sourcing mode.



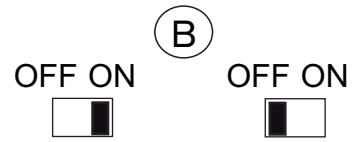
Wire the current output in sourcing mode.

Wire the current output in sinking mode.

Fig. 13: Using the sink/source switch

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

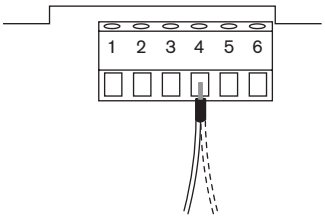
Use the switch Ⓑ to lock/unlock the ENTER key to prevent unauthorized access to the configuration of the device.



The ENTER key is unlocked (default position).

The ENTER key is locked.

Fig. 14: Using the ENTER key lock/unlock switch



Earth cable coming from the housing.

On a version with stainless steel flow sensor, a second cable is coming from the sensor.

Fig. 15: Terminal block 1 connecting the earth wire coming from the housing (made in the factory)

7.3.4 Wiring the AO1 current output

For safety reasons, secure the cables using a non-conducting cable clamp.

The 4...20 mA output can be wired in either sourcing or sinking mode.

Position the Ⓐ switch to "SOURCE".

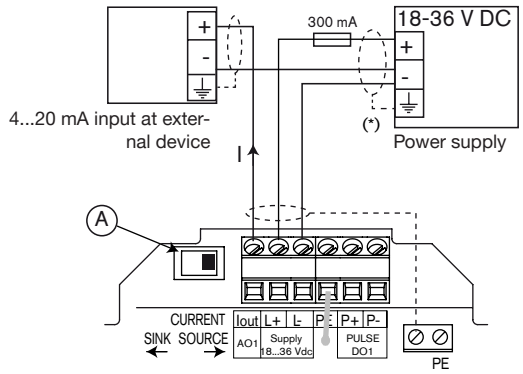


Fig. 16: Wiring of the 4...20 mA output (AO1) in sourcing mode

Position the Ⓐ switch to "SINK".

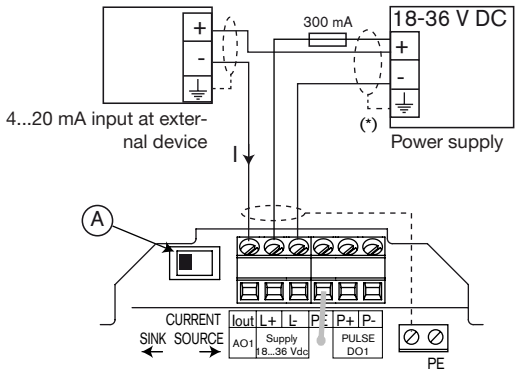


Fig. 17: Wiring of the 4...20 mA output (AO1) in sinking mode

*) If a direct earth connection is not possible, fit a 100 nF / 50 V capacitor between the negative power supply terminal and the earth

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

7.3.5 Wiring the DO1 transistor output

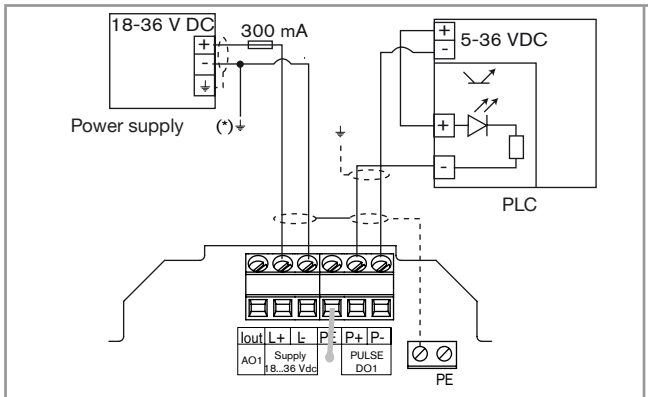


Fig. 18: NPN wiring of the DO1 transistor output

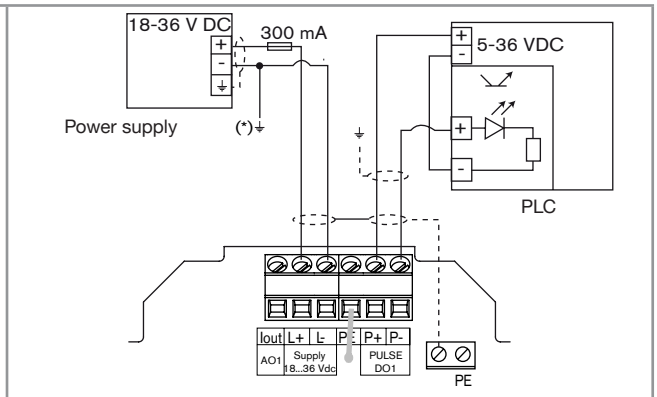


Fig. 19: PNP wiring of the DO1 transistor output

*) If a direct earth connection is not possible, fit a 100 nF / 50 V capacitor between the negative power supply terminal and the earth

7.3.6 Wiring the DI1 digital input

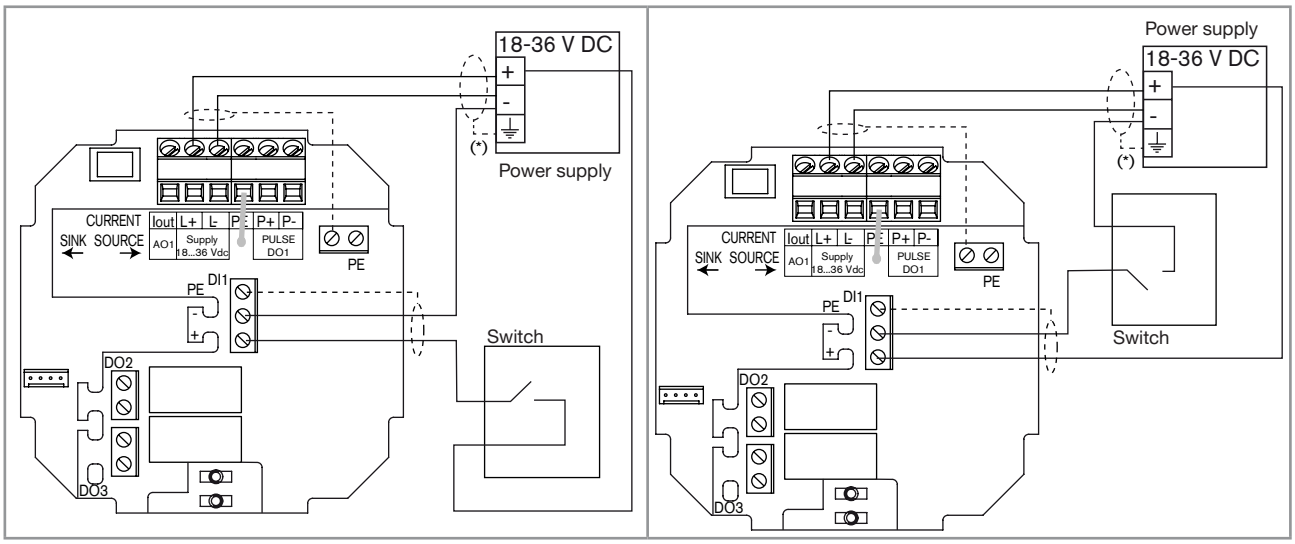


Fig. 20: Possible wirings of the DI1 digital input

*) If a direct earth connection is not possible, fit a 100 nF / 50 V capacitor between the negative power supply terminal and the earth

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

7.3.7 Wiring the DO2 and DO3 relay outputs

DANGER

Danger due to the operation of the relay outputs of a UL device in a wet location.

▸ If a UL device is used in a wet location:

- energize the relay outputs with an alternating voltage of max. 16 Vrms and 22.6 Vpeak.
- or energize the relay outputs with a direct voltage of max. 35 V DC.

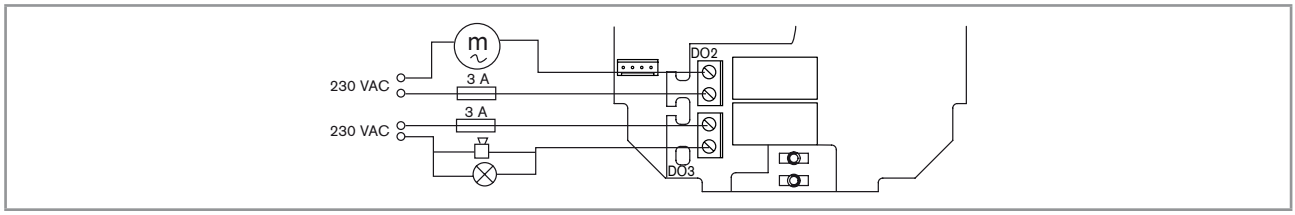


Fig. 21: Wiring of the DO2 and DO3 relay outputs

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8 OPERATING AND FUNCTIONS

8.1 Safety instructions

WARNING

Risk of injury due to non-conforming operating.

Non-conforming operating could lead to injuries and damage the device and its surroundings.

- ▸ The operators in charge of operating must have read and understood the contents of this manual.
- ▸ In particular, observe the safety recommendations and intended use.
- ▸ The device/installation must only be operated by suitably trained staff.

8.2 Operating levels of the device

The device has two operating levels: the Process level and the Configuration level.

The Process level makes it possible:

- to read the flow rate measured by the device, the value of the current transmitted on the 4...20 mA analogue output, the values of both the daily and main totalizers.
- to reset the daily totalizer.
- to access the Configuration level.

The Configuration level comprises three menus (Parameters, Test and Information) and makes it possible:

- to set the device parameters.
- to test some device parameters.
- to calibrate the device.
- to read, when the status LED of the device is orange or red, the warning and fault messages generated by the device.
-

Tab. 1: Default settings of the device

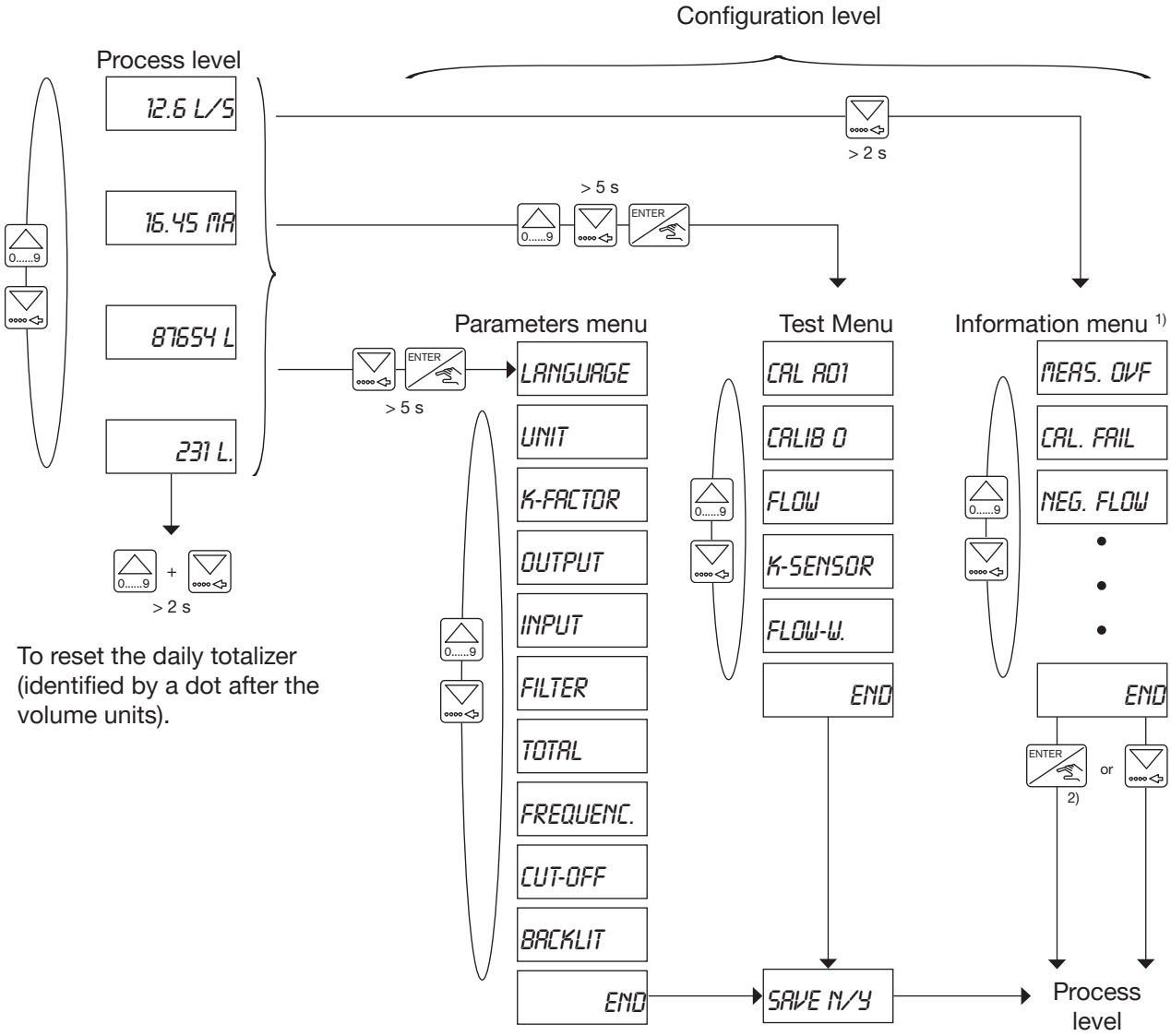
Function	Default value
LANGUAGE	English
UNIT of the flow rate	l/min.
UNIT of the totalizers	litre
K-FACTOR	1.000
OUTPUT AO1	4 mA= 0.000
	20 mA= 0.000
OUTPUT DO1	pulse
	PU= 0.00 litre

Function	Default value
OUTPUT DO3	Hysteresis
	3–= 0.000
	3+= 0.000
	Not inverted
	time delay = 0
INPUT DI1	disable
FILTER	5, slow
FREQUENC.	50 Hz

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

Function	Default value
OUTPUT DO2	Hysteresis
	2–= 0.000
	2+= 0.000
	Not inverted
	time delay = 0

Function	Default value
CUT-OFF	0.000
BACKLIT	level 9, activated for 30 s
K-SENSOR	Kw= 1.000
FLOW-W.	W–= 0.000
	W+= 0.000

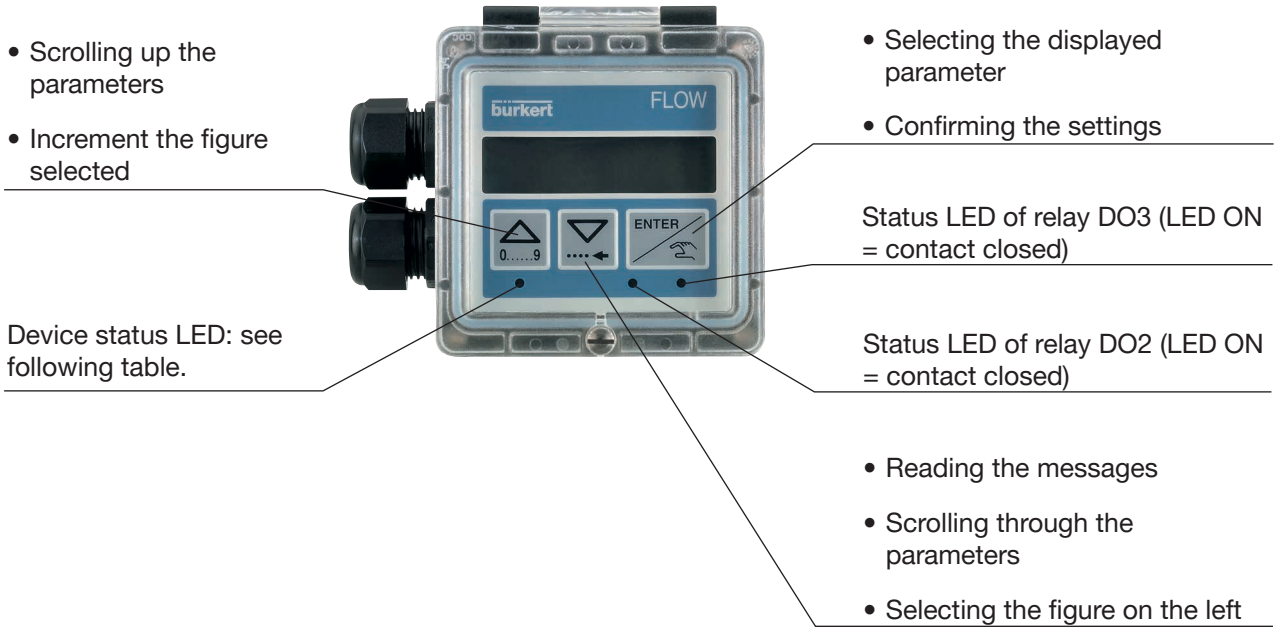


1) Accessible when the device status LED is orange or red (see chapter 8.3).

2) If the ENTER key is unlocked.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.3 Description of the navigation keys and the status LEDs



Device status LED	Status of the device
Green	The device operates correctly.
Orange	A warning message is generated. → Press the key for 2 seconds in the Process level to access the message. See chapter 9.5.5 for the meaning of the message. Furthermore, a relay output (DO2 or DO3) or the transistor output DO1 switches if it is configured in the "WARNING" mode (see Fig. 35 or Fig. 38).
Red	A fault message is generated and a 22 mA current is sent on the current output. → Press the key for 2 seconds in the Process level to access the message. See chapter 9.5.4 for the meaning of the message.
Blinking, whatever the colour	• the DI1 digital input is active, • or a check for the correct behaviour of the outputs is running (see chapter 8.7.3), • or a flow zero point calibration procedure is running (see chapter 8.7.2), • or the daily totalizer is kept at zero.

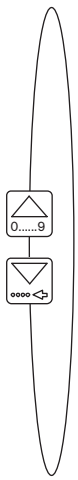
MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.4 Using the navigation keys

You want to...	Press...
move between parameters within a level or a menu.	• ▽ to go the next parameter • △ 0.....9 to go to the previous parameter
access the Parameters menu	ENTER + ▽ simultaneously for 5 s, in the Process level
access the Test menu	△ 0.....9 + ▽ + ENTER simultaneously for 5 s, in the Process level
access the Information menu	▽ for 2 s, in the Process level, when the device status LED is orange or red.
reset the daily totalizer	△ 0.....9 + ▽ simultaneously for 2 s, when the daily totalizer is displayed in the Process level
select the displayed parameter	ENTER
confirm the displayed value	ENTER
modify a numerical value	• △ 0.....9 to increase the blinking digit. • ▽ to select the digit at the left of the blinking digit. • △ 0.....9 + ▽ to move the decimal point.

8.5 Details of the Process level

This level is active by default when the device is energized.



12.6 L/S or 0 L/S. The displayed flow rate is set to 0 (a dot is displayed after the flow rate units if the "CUT-OFF" function is active) because the measured flow rate is below the threshold value defined in the "CUT-OFF" parameter of the Parameters menu. See chapter 8.6.16.

Value of the measured flow rate, displayed in the unit chosen in the "UNIT" parameter of the Parameters menu.

16.45 mA Value of the current output, proportional to the measured flow rate.

87654 L Value of the main totalizer, volume of fluid counted by the device since the last reset.

231 L. Value of the daily totalizer (identified by a dot after the volume units), volume of fluid counted by the device since the last reset.

△ 0.....9 + ▽ > 2 s → Resetting the daily totalizer.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6 Details of the Parameters menu

To access the Parameters menu, simultaneously press keys  for at least 5 s.

This menu comprises the following configurable parameters:

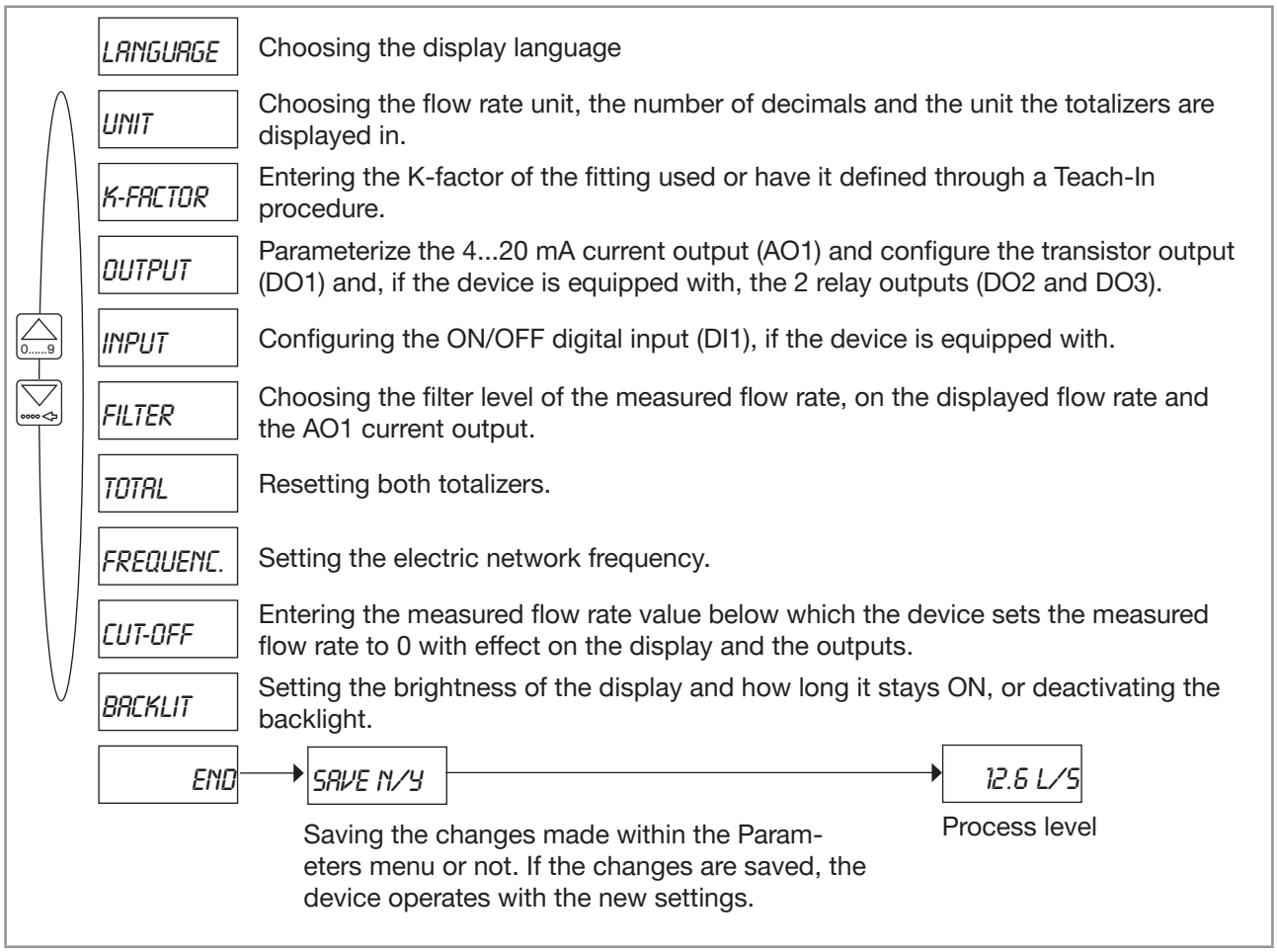


Fig. 22: Diagram of the Parameters menu

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.1 Choosing the display language

When the device is energized for the first time, the display language is English.

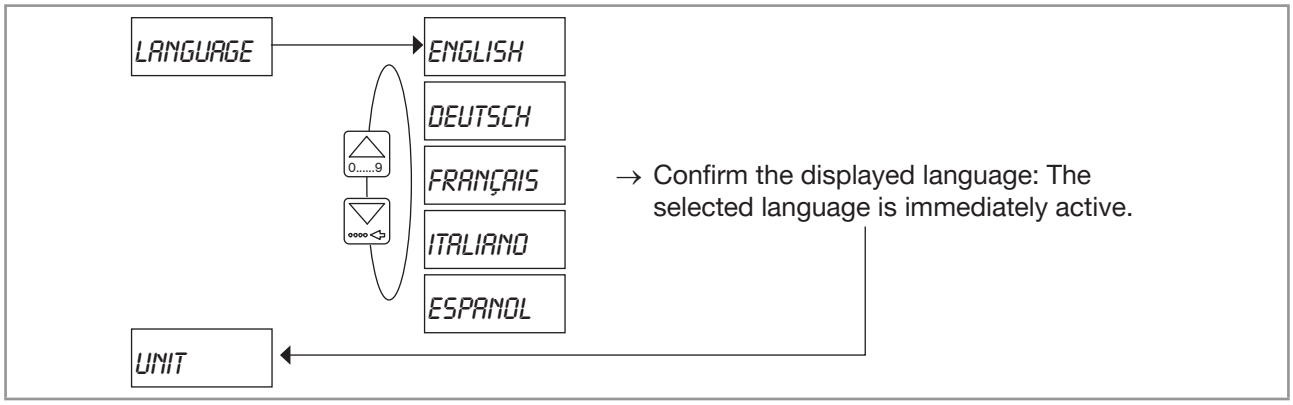


Fig. 23: Diagram of the "LANGUAGE" parameter of the Parameters menu

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

8.6.2 Choosing the flow rate units, the number of decimals and the units of the totalizers

When changing the flow rate unit, only the totalizers are automatically converted.

- If necessary, manually convert the parametered flow rate values.

The max. flow rate that can be displayed depends on the number of decimals chosen:

- 9999 if the number of decimals = 0 or AUTO,
- 999.9 if the number of decimals = 1,
- 99.99 if the number of decimals = 2,
- 9.999 if the number of decimals = 3.

The "UNIT" parameter makes it possible to choose:

- the flow rate units.
- a fixed number of decimals (choose 0, 1, 2 or 3) to display the flow rate in the Process level, or a floating decimal point (choose "AUTO"): the device automatically adjusts the position of the decimal point depending on the chosen unit and the measured flow rate.
- the volume units of the totalizers if the unit previously chosen is in litres or in m^3.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

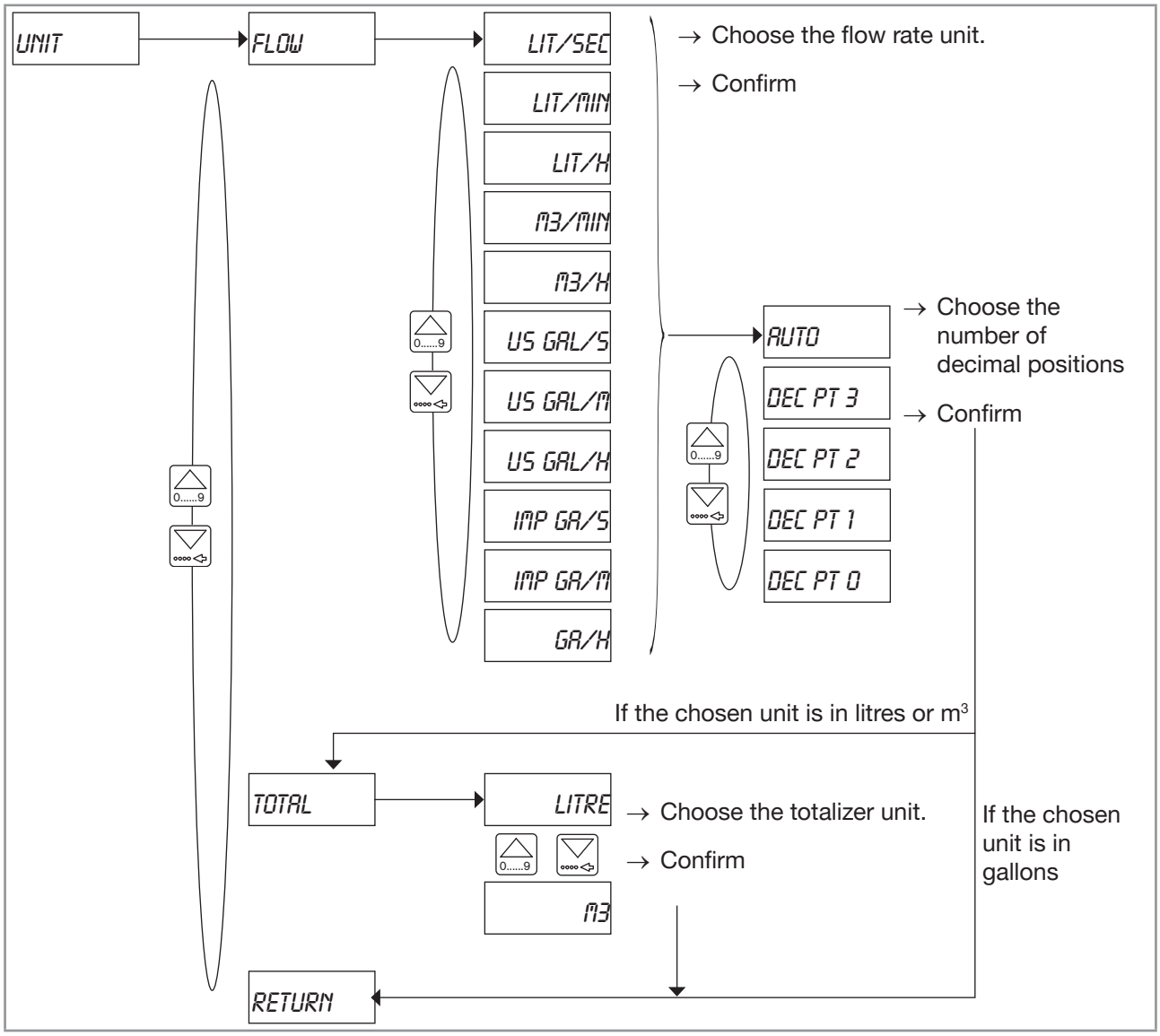


Fig. 24: Diagram of the "UNIT" parameter of the Parameters menu

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.3 Entering the K-factor of the fitting used

The device determines the flow rate in the pipe using the fitting K-factor.

The K-factor of the fitting used can be entered here. The device may also determine the K-factor using a Teach-In procedure: see chapter 8.6.4.

The device will use the new K-factor as soon as "SAVE YES" is confirmed when leaving the Parameters menu.

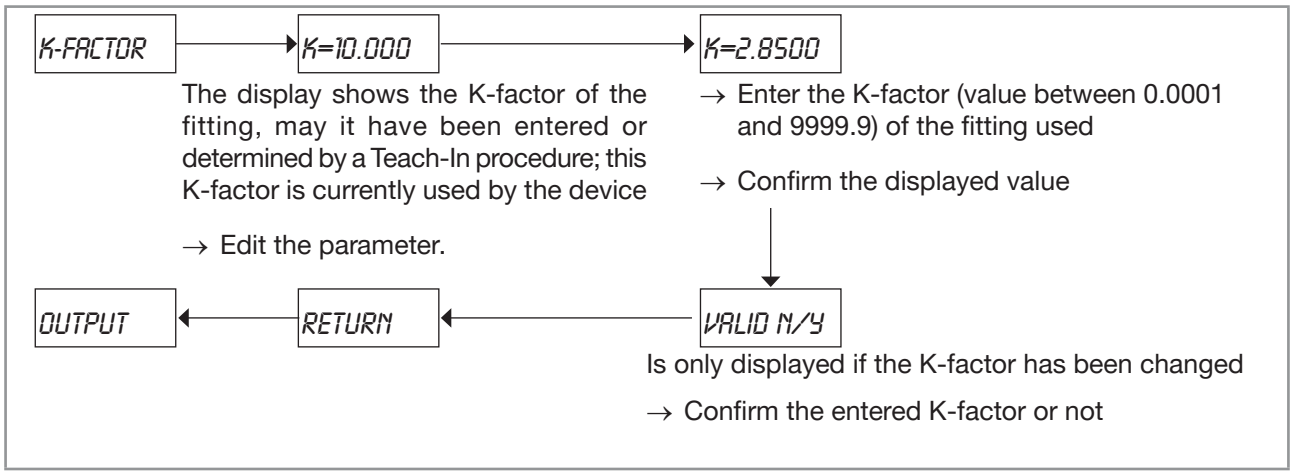


Fig. 25: Entering the K-factor of the fitting used

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

8.6.4 Determining the fitting K-factor using a Teach-In procedure

Before any Teach-In procedure, do the following:

- Calibrate the flow zero point of the device. See chapter 8.7.2.
- Check that the Kw coefficient of the sensor has not been disturbed. See chapter 8.7.4.

The device determines the flow rate in the pipe using the fitting K-factor.

The "TEACH V." or "TEACH F." parameter allows the device to determine the fitting K-factor using a Teach-In procedure. The K-factor may also be directly entered: see chapter 8.6.3.

The Teach-In can be done either depending on a known volume ("TEACH V.") or depending on the flow rate ("TEACH F.") in the pipe that has been measured with a reference device.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

Determine the fitting K-factor using a Teach-In procedure depending on a volume ("TEACH V.")

The device will use the new K-factor as soon as "SAVE YES" is confirmed when leaving the Parameters menu.

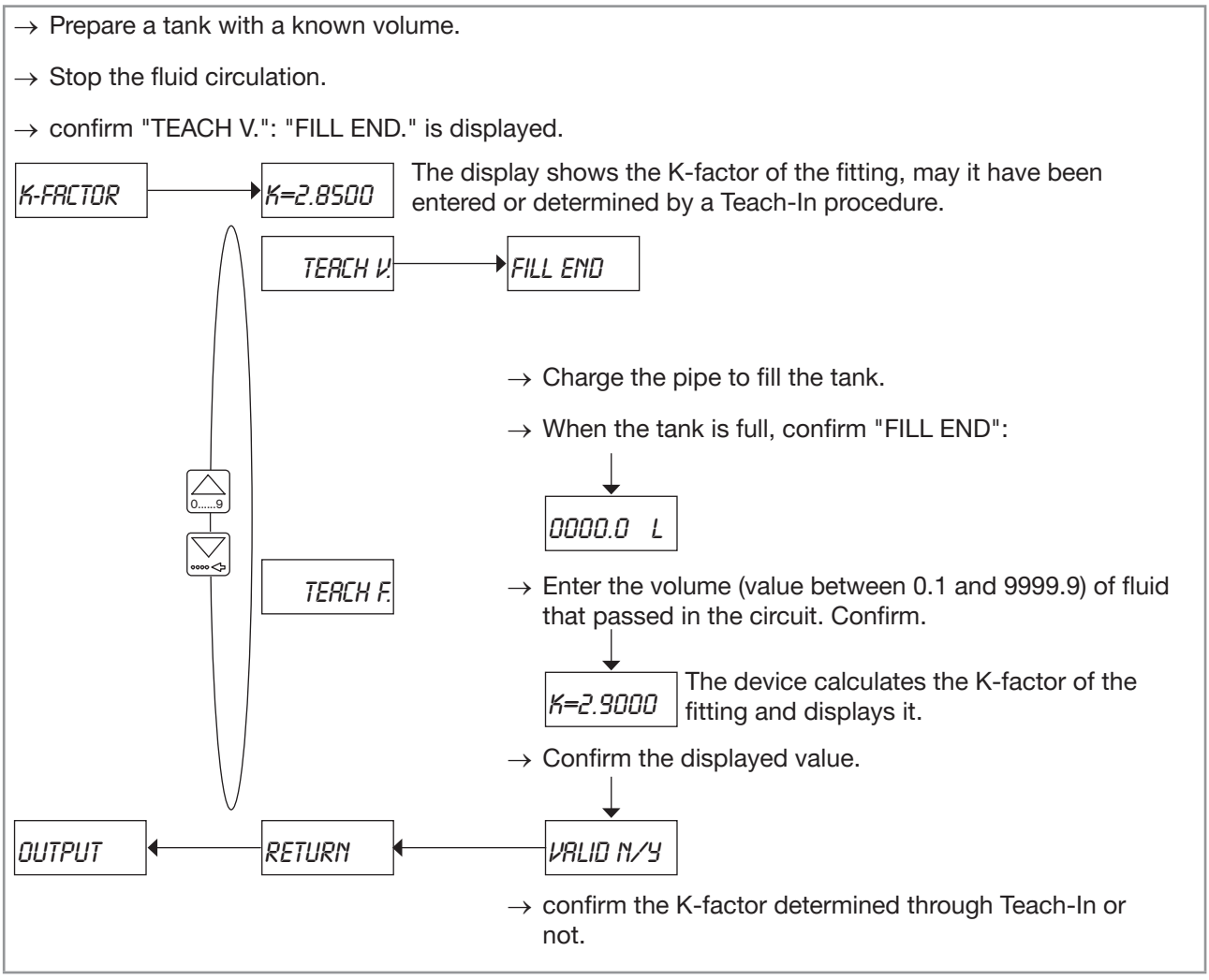


Fig. 26: Teach-In procedure depending on a volume

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

Determine the fitting K-factor using a Teach-In procedure depending on a volume ("TEACH F.")

The device will use the new K-factor as soon as "SAVE YES" is confirmed when leaving the Parameters menu.

→ Charge the pipe.

→ Wait for the flow rate to be stable.

→ confirm "TEACH F.": "MEASURE \" is displayed.

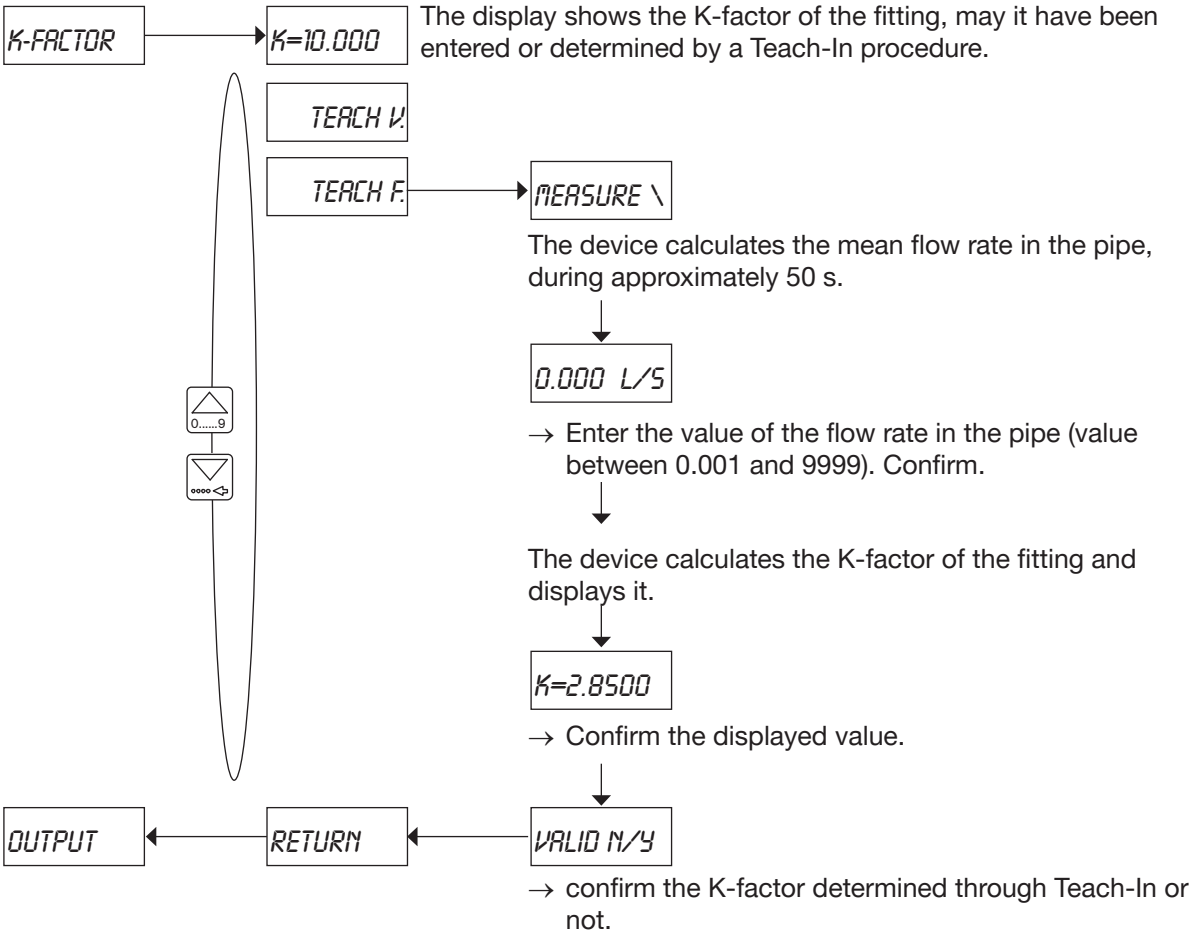


Fig. 27: Teach-In procedure depending on the flow rate

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.5 Configuring the outputs (general diagram)

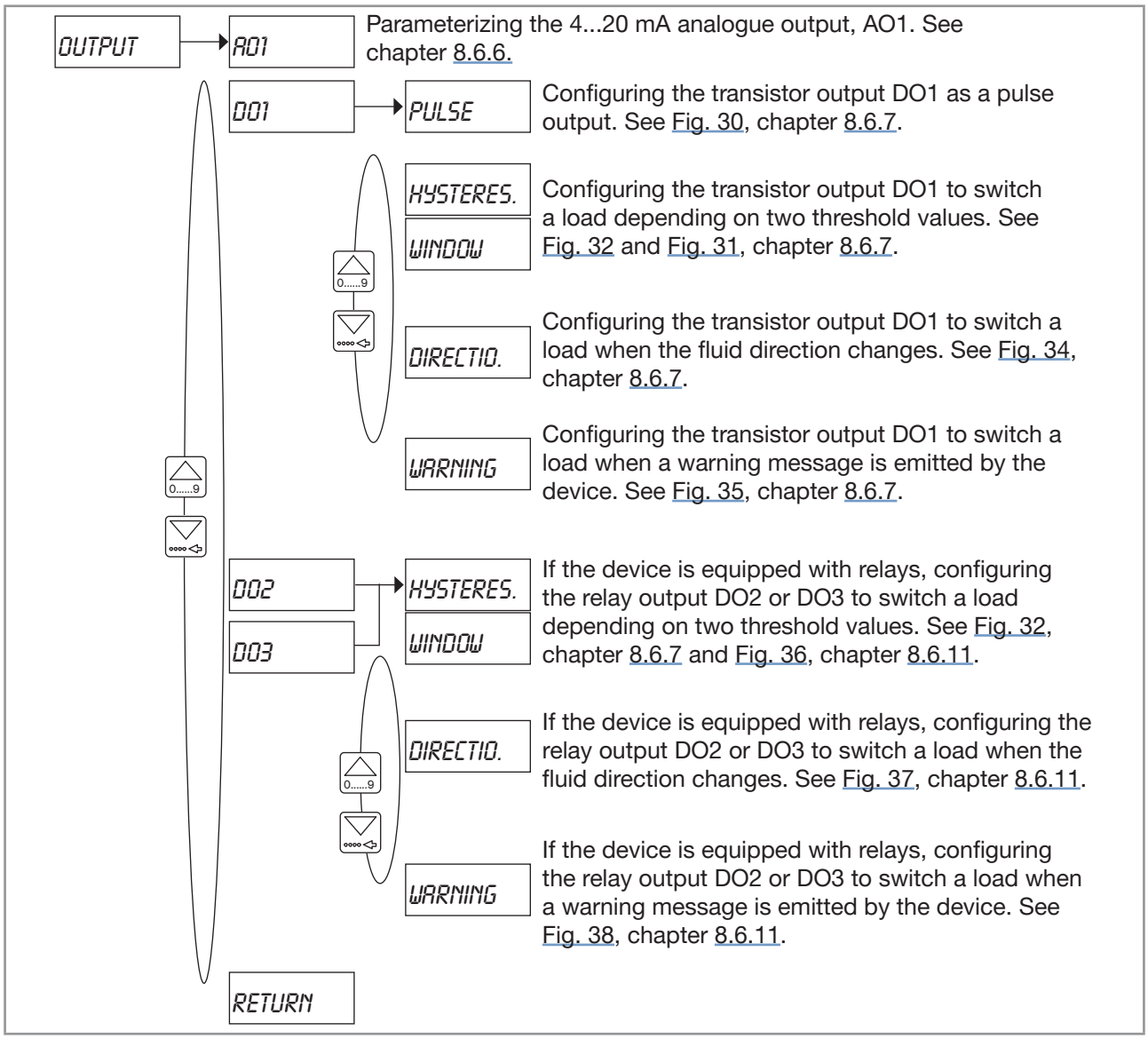


Fig. 28: Diagram of the "OUTPUT" parameter of the Parameters menu

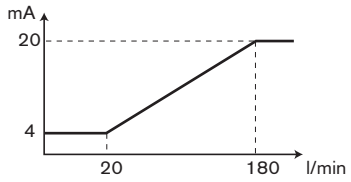
MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.6 Configuring the AO1 current output

The current output gives a 22 mA current when the device shows an operation fault, even if the current output is disabled.

The 4...20 mA output provides an electrical current, the value of which reflects the flow rate measured by the device.

Example of relation between the measuring range and the current output:



→ To invert the output signal, give a lower flow rate value to the 20 mA current value than to the 4 mA current value.

→ To disable the current output, set both range bounds, 4 and 20 mA, to zero. In this case the output delivers a constant current of 4 mA.

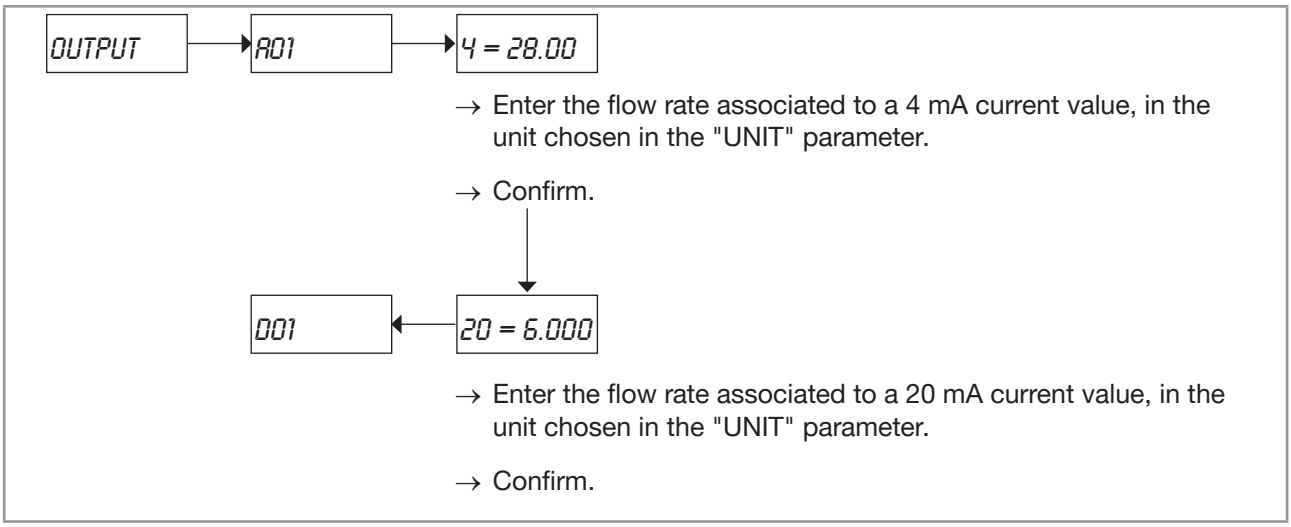


Fig. 29: Parameterizing the current output

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.7 Configuring the transistor output DO1 as a pulse output

When the DO1 transistor output is configured as a pulse output, a pulse is transmitted on the output each time the parametered volume of fluid has been measured by the device.

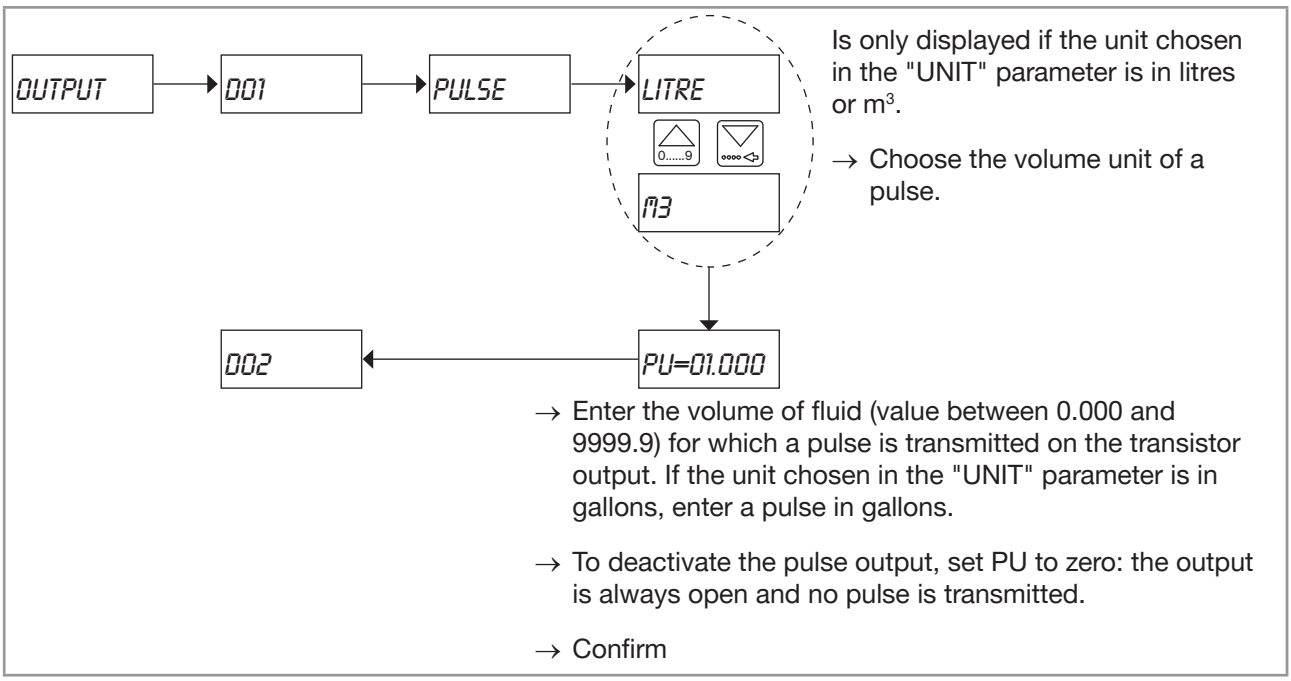


Fig. 30: Configuration of the transistor output DO1 as a pulse output

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.8 Configuring the transistor output DO1 to switch a load depending on two threshold values

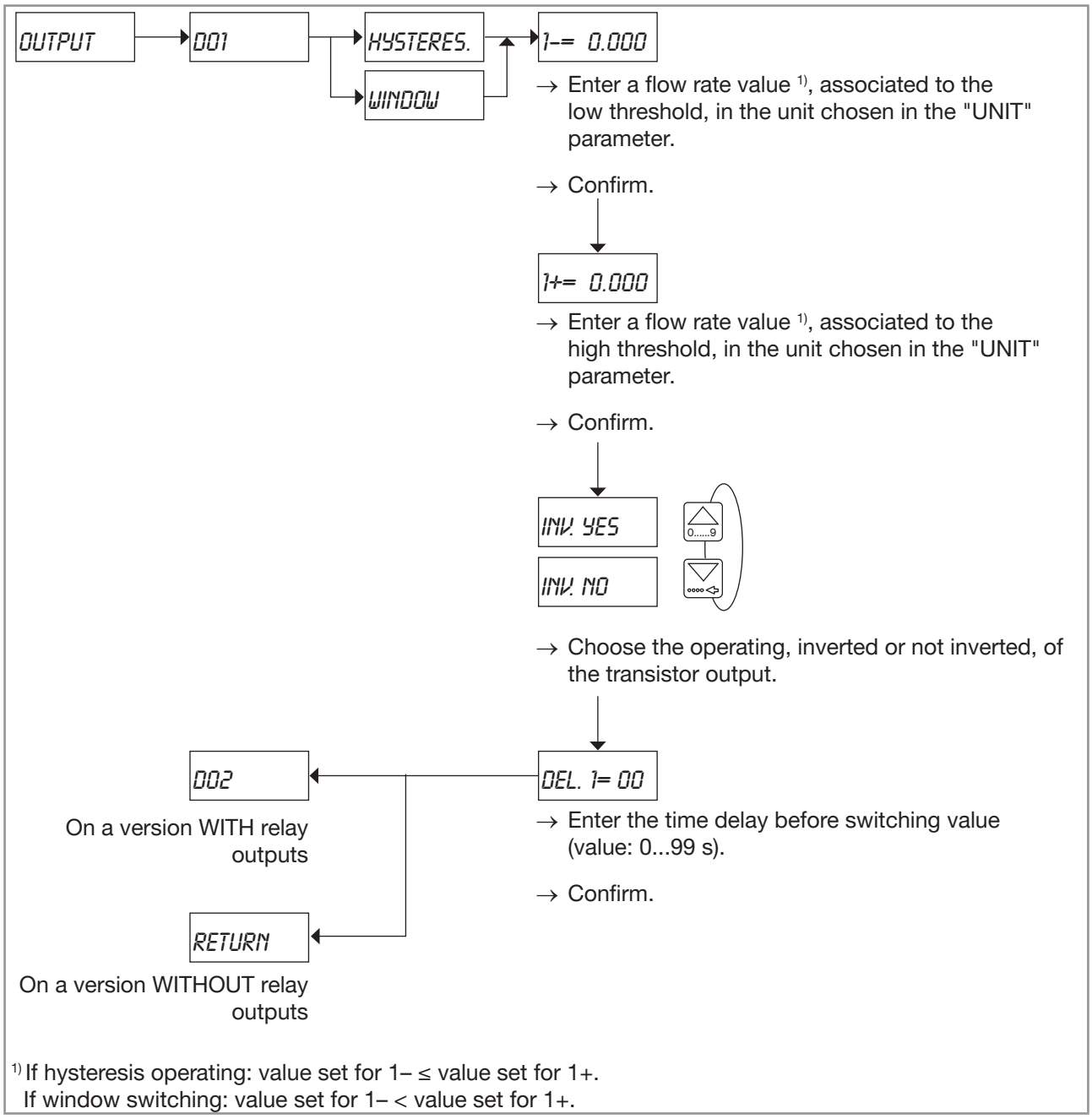


Fig. 31: Configuration of the DO1 transistor output with switching thresholds

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

Hysteresis switching

The output status changes when a threshold is reached:

- by increasing flow rate, the output status changes when the high threshold X+ is reached.
- by decreasing flow rate, the output status changes when the low threshold X– is reached.

X– = low switching threshold of the transistor or the relay (1–, 2– or 3–)

X+ = high switching threshold of the transistor or the relay (1+, 2+ or 3+)

Window switching

The output status changes as soon as any threshold (X– or X+) is reached.

X– = low switching threshold of the transistor or the relay (1–, 2– or 3–)

X+ = high switching threshold of the transistor or the relay (1+, 2+ or 3+)

Fig. 32: Window or hysteresis switching

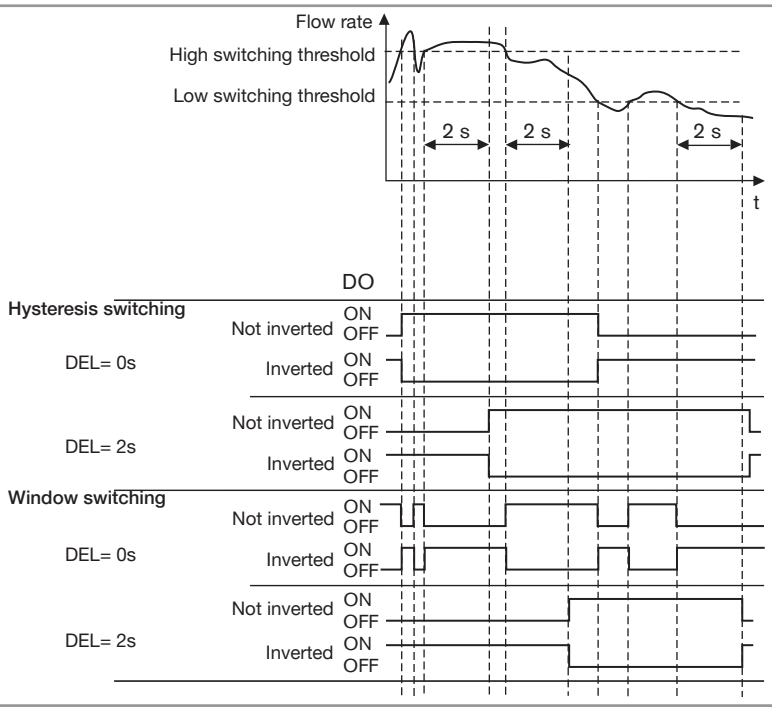


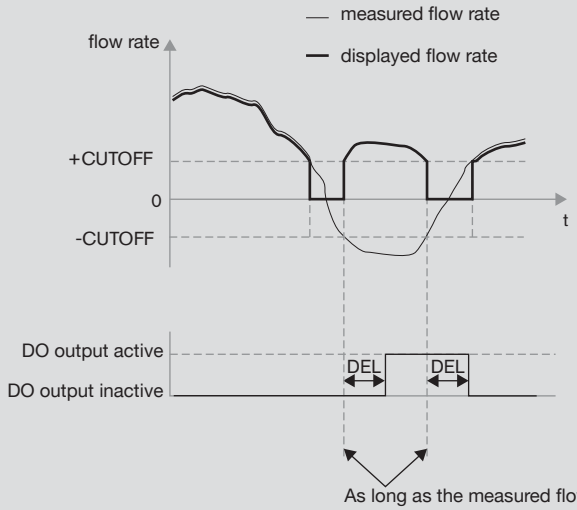
Fig. 33: Operation example of the transistor output with switching thresholds

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.9 Configuring the transistor output DO1 to switch a load when the fluid direction changes

The DO1 transistor output can be configured to indicate the fluid circulation change.

When the measured flow rate is in the cut-off flow range (see chapter 8.6.16), the flow rate is set to 0 and positive. The following diagram shows the behaviour of the DO output when it is configured to indicate the fluid circulation changes, when the CUT-OFF function is used.



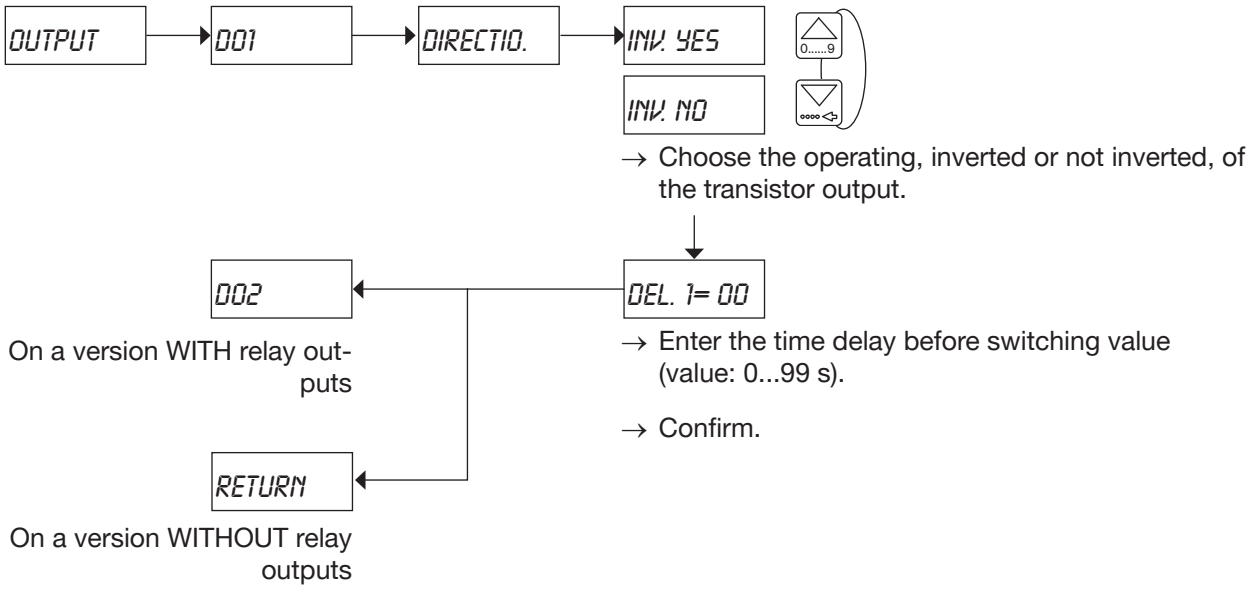


Fig. 34: Configuration of the DO1 transistor output to indicate the fluid circulation changes

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.10 Configuring the transistor output DO1 to switch a load when a warning message is emitted by the device

When the device generates a warning message, the device status LED is orange.

The generation of a warning message can also be indicated by the switching of the transistor output.

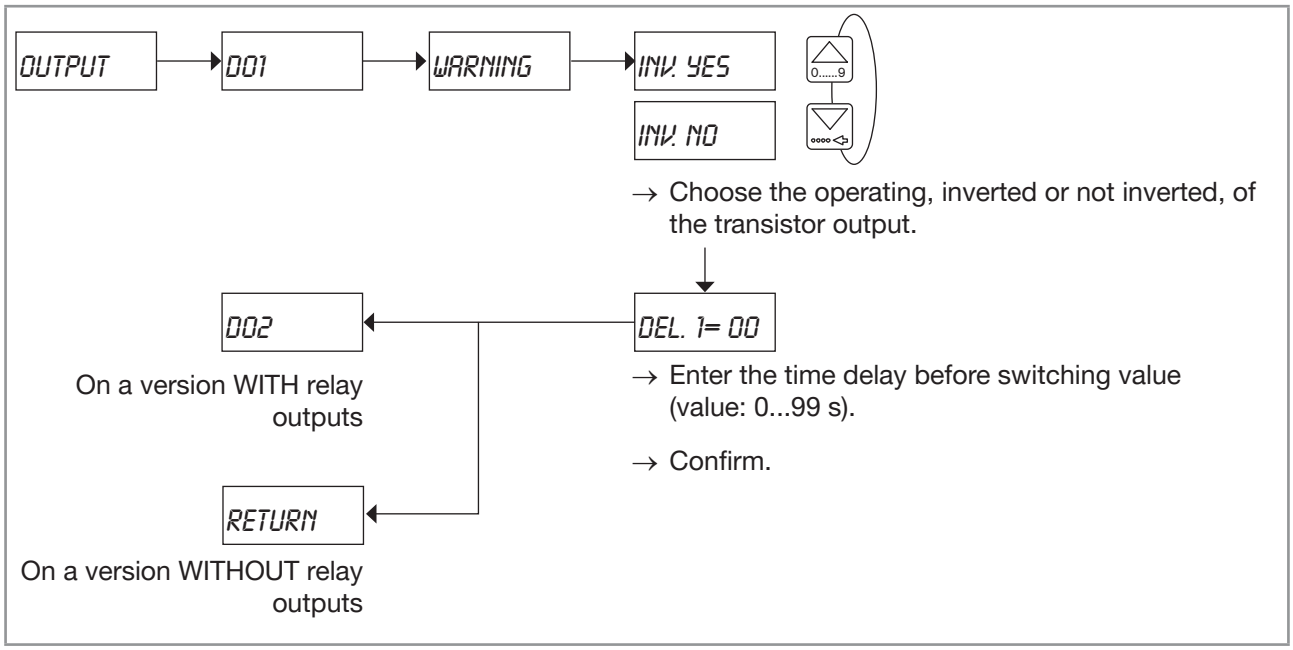


Fig. 35: Configuration of the DO1 transistor output to indicate the generation of a warning message

8.6.11 Configuring the DO2 and DO3 relay outputs

Any DO relay output can be configured either:

- to switch a load depending on two thresholds. See Fig. 32, chapter 8.6.7 and Fig. 36.
- to switch a load to indicate the fluid circulation changes. See Fig. 37.
- to switch a load when a warning message is generated by the device. See Fig. 38.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

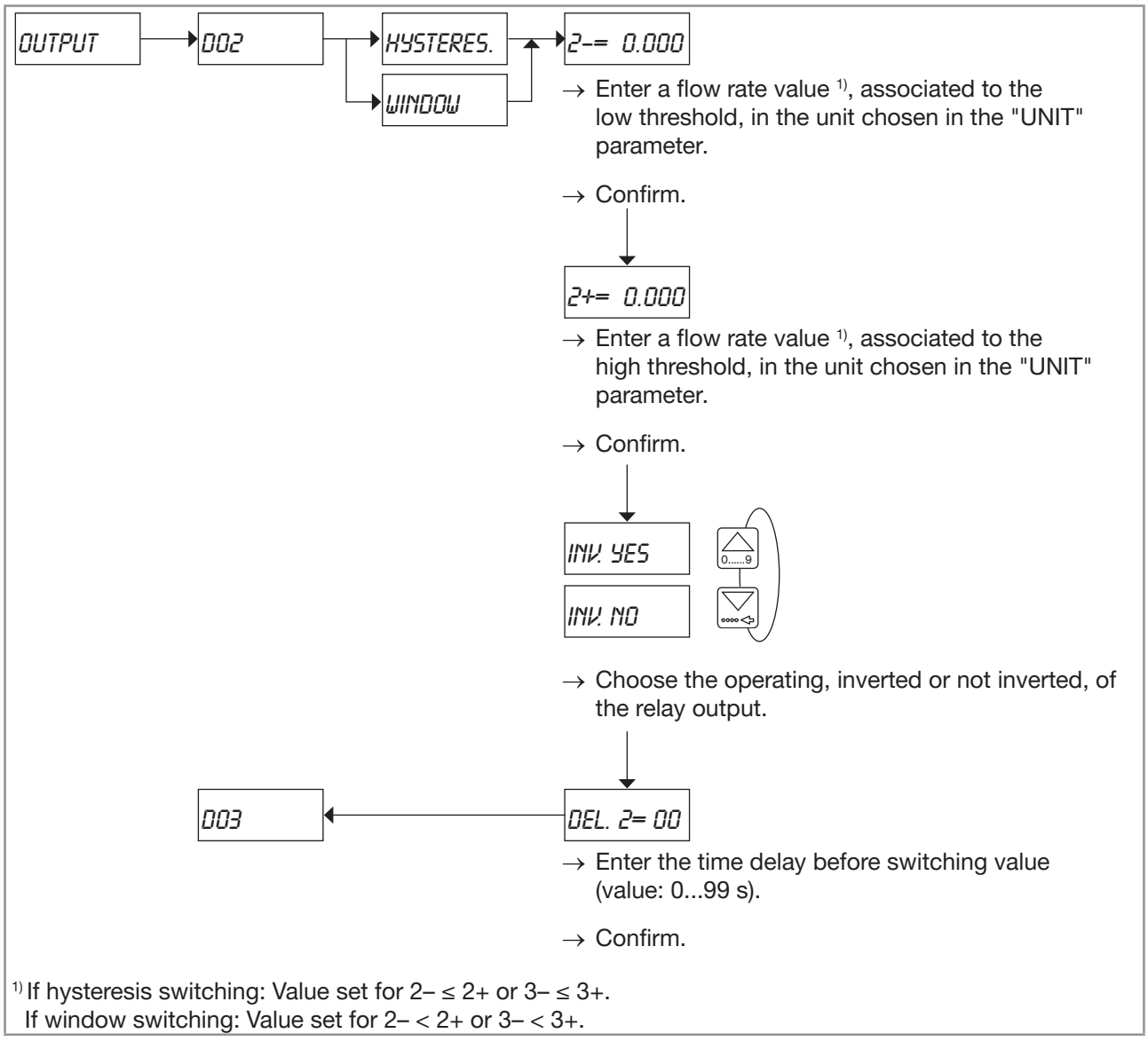
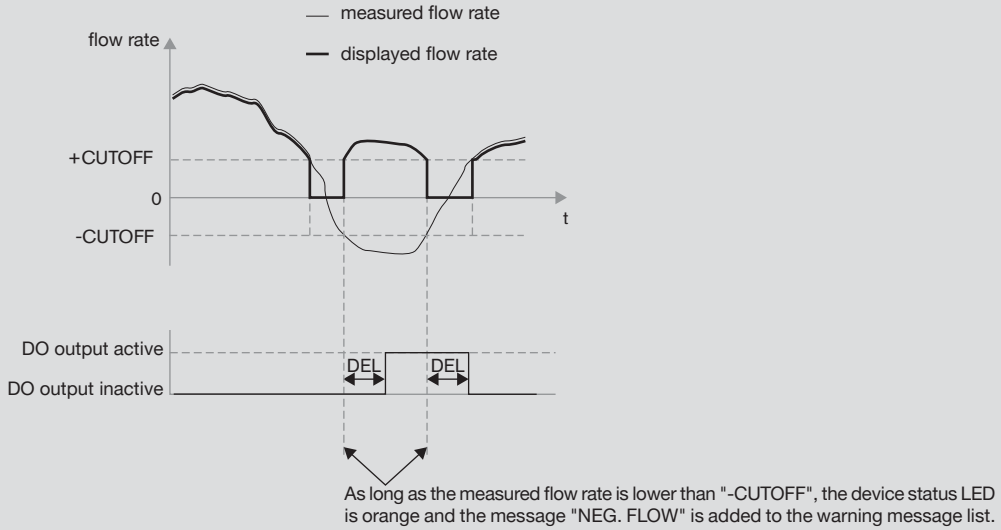


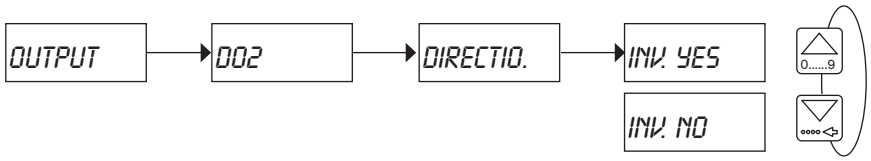
Fig. 36: Configuration of the DO2 or DO3 relay output with switching thresholds

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

When the measured flow rate is in the cut-off flow range (see chapter 8.6.16), the flow rate is set to 0 and positive. The following diagram shows the behaviour of the DO output when it is configured to indicate the fluid circulation changes, when the CUT-OFF function is used.



The DO2 or DO3 relay output can be configured to indicate the fluid circulation change.



→ Choose the operating, inverted or not inverted, of the relay output.

→ Enter the time delay before switching value (value: 0...99 s).

→ Confirm.

Fig. 37: Configuration of the DO2 or DO3 relay output to indicate the fluid circulation changes

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

When the device generates a warning message, the device status LED is orange.

The generation of a warning message can also be indicated by the switching of the relay output.

→ Choose the operating, inverted or not inverted, of the relay output.

→ Enter the time delay before switching value (value: 0...99 s).

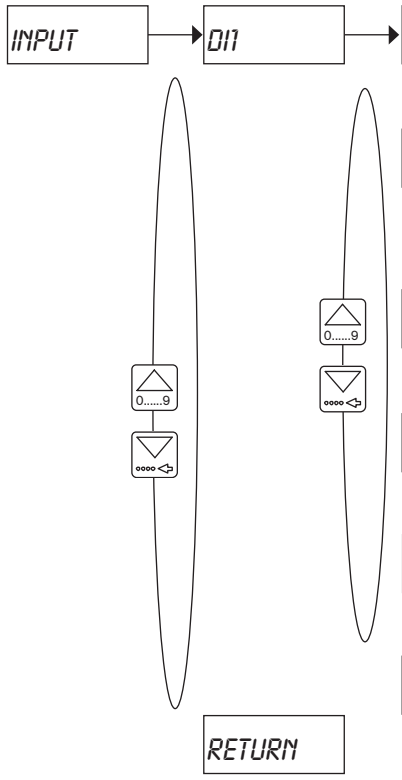
→ Confirm.

Fig. 38: Configuration of the DO2 or DO3 relay output to indicate the generation of a warning message

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

8.6.12 Configuring the DI1 digital input

The DI1 digital input makes it possible to remotely trigger one out of four device functions.



Choosing not to use the digital input.

Configuring the digital input to trigger the calibration of the flow zero point. The calibration can also be done in the Test menu. See Fig. 40.

Configuring the digital input to freeze the flow rate measurements. See Fig. 41.

Configuring the digital input to control the status of the outputs and the display depending on a preset flow rate. See Fig. 42.

Configuring the digital input to freeze the totalizers. See Fig. 43.

Configuring the digital input to trigger the reset of the daily totalizer. See Fig. 44.

Fig. 39: Diagram of the "INPUT" parameter of the Parameters menu

Calibration of the flow zero point is described in chapter 8.7.2.

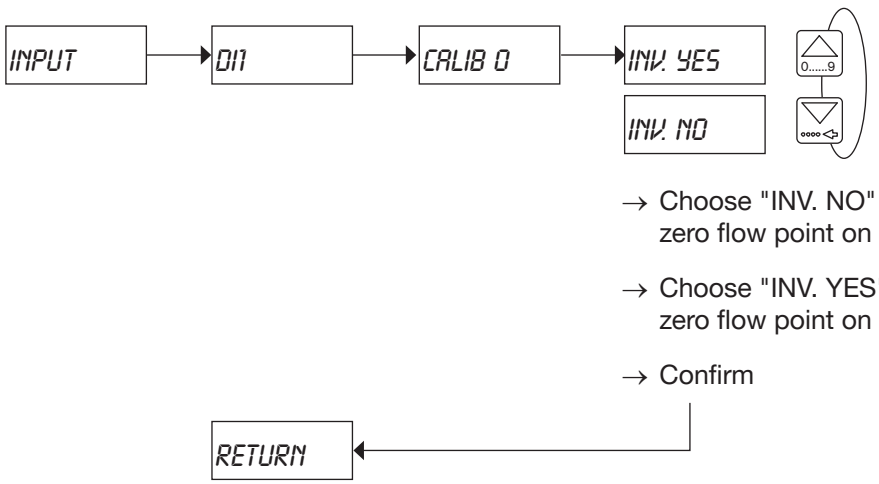


Fig. 40: Configuration of the digital intput to trigger the calibration of the flow zero point

The HOLD mode is ignored if there is a running check for the correct behaviour of the outputs (see chapter 8.7.3).

The Hold mode is used to carry out maintenance work without interrupting the process.

In practice, when the device is in Hold mode:

- the device status LED flashes.
- the current transmitted on the 4...20 mA is frozen to the value of the last measured flow rate.
- the displayed flow rate is frozen to the value of the last measured flow rate.
- each relay or transistor output is frozen to the status it had when the Hold mode was activated.
- the totalizers do not increment any more.
- the device is in the Hold mode until the digital input switches again.

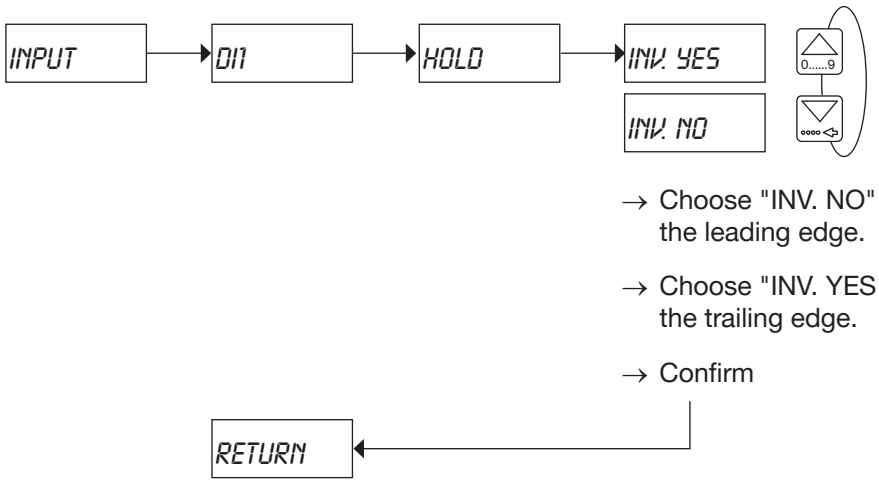


Fig. 41: Configuration of the digital input to trigger the Hold mode of the device

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

The preset flow rate is ignored if there is a running check for the correct behaviour of the outputs (see chapter 8.7.3).

This function makes it possible, like the Hold mode, to freeze the flow rate measure, but to a preset value set by the user.

When the digital input is activated:

- the device status LED flashes.
- the current transmitted on the 4...20 mA is frozen to the preset value of the flow rate.
- the displayed flow rate is frozen to the preset value of the flow rate.
- each transistor or relay output behaves depending on the preset flow rate.
- the totalizers do not increment any more.
- the preset flow rate is active until the digital input switches again.

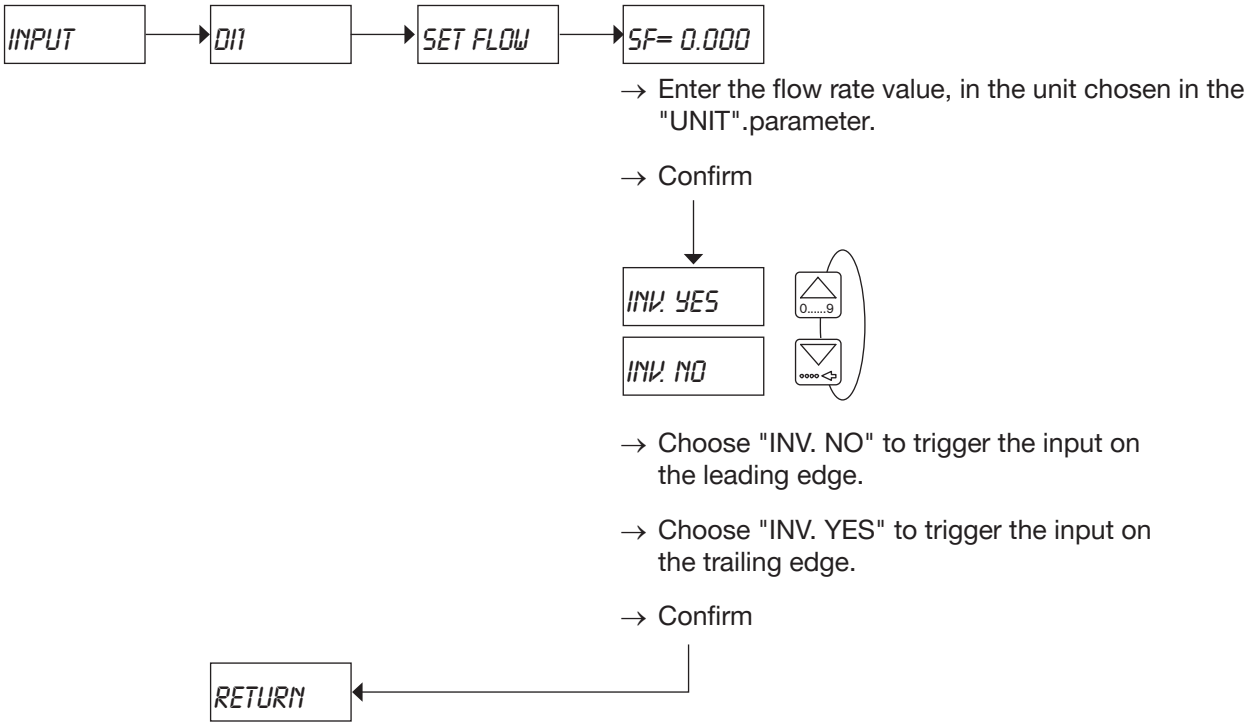


Fig. 42: Configuration of the digital input to trigger the status of the outputs depending on a preset flow rate

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

The Hold Tot. mode is used to freeze the totalizers while carrying out maintenance work.

In practice, when the device is in Hold Tot. mode:

- the totalizers do not increment any more.
- the device status LED flashes.
- the displayed flow rate, the current transmitted on the 4...20 mA and each transistor or relay output behaviours correspond to the normal value of the measured flow rate.
- the device is in the Hold Tot. mode until the digital input switches again.

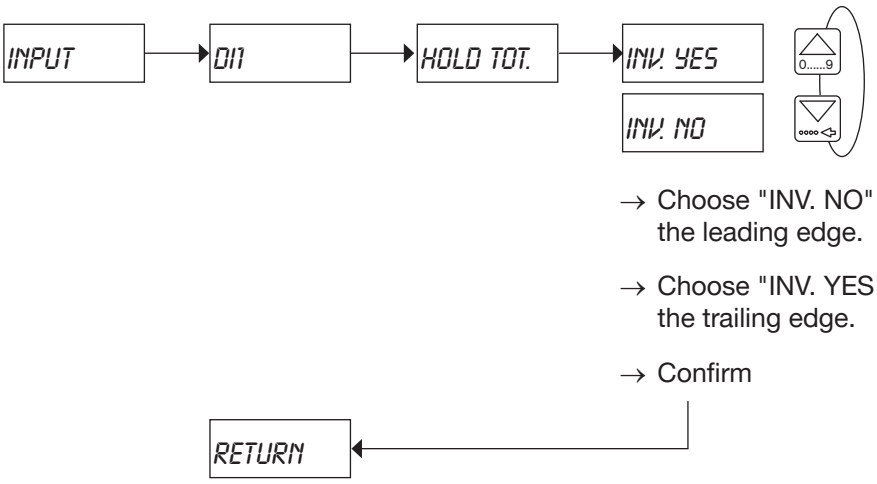


Fig. 43: Configuration of the digital input to freeze the totalizers

The daily totalizer is maintained to zero until the digital input switches again.

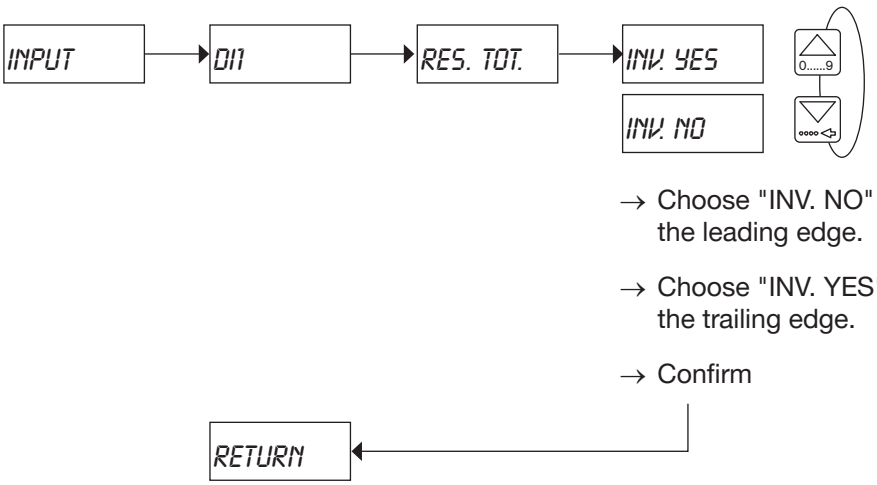


Fig. 44: Configuration of the digital input to trigger the reset of the daily totalizer

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.13 Configuring the filter of the measured flow rate

This parameter makes it possible to dampen the fluctuations:

- of the display,
- of the AO1 current output.

Ten filters are available.

When the "fast" filter is active and the flow rate varies for ±30 % (for example when charging the pipe or stopping the flow), the filter is disabled: the new flow rate is immediately taken into account by the device.

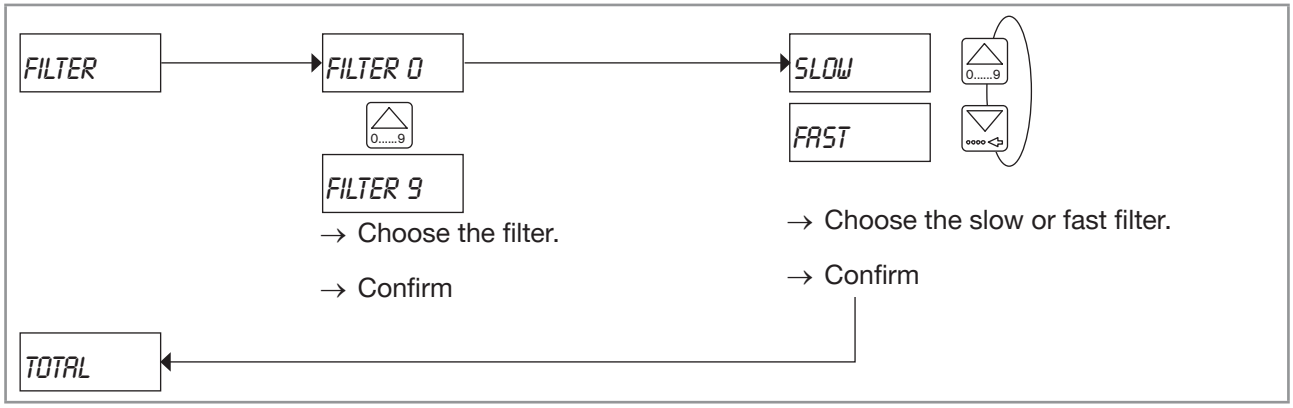


Fig. 45: Diagram of the "FILTER" parameter of the Parameters menu

The following table shows for each filter, the response times (10 %...90 %):

Filter	Response time
0	1 s
1	2 s
2	3 s
3	4 s
4	5 s

Filter	Response time
5	8 s
6	15 s
7	28 s
8	70 s
9	145 s

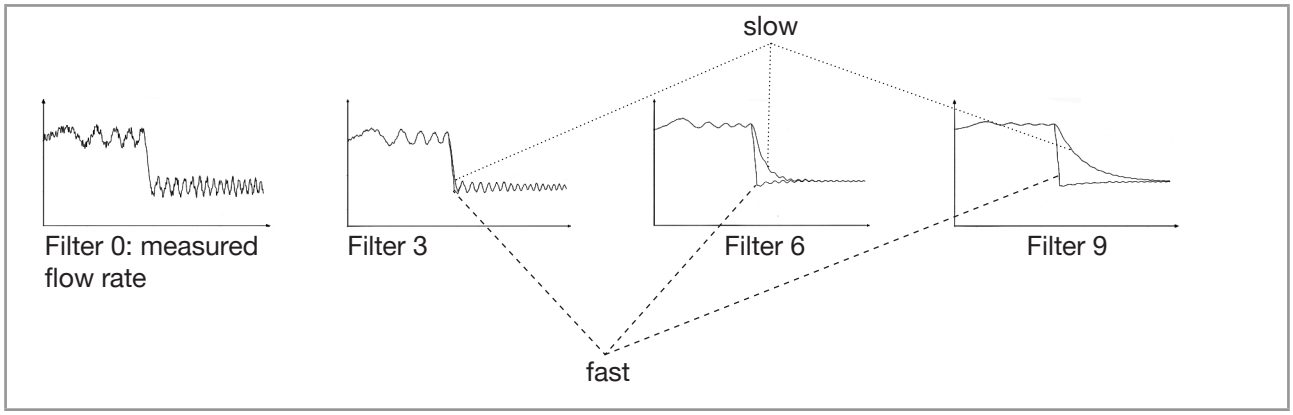


Fig. 46: Available filters

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.14 Resetting both totalizers

This parameter makes it possible to reset both totalizers.

Both totalizers are reset upon confirmation of "SAVE YES" when leaving the Parameters menu.

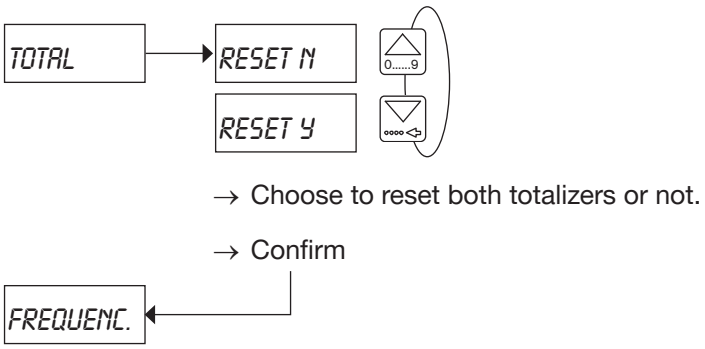


Fig. 47: Diagram of the "TOTAL" parameter of the Parameters menu

The daily totalizer can be reset from the Process level or via the digital input.

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

8.6.15 Configuring the electric network frequency

This parameter makes it possible to configure the electric network frequency so that the device can filter the interfering signals of the power supply.

Adjust this parameter even if the device operates with a DC voltage.

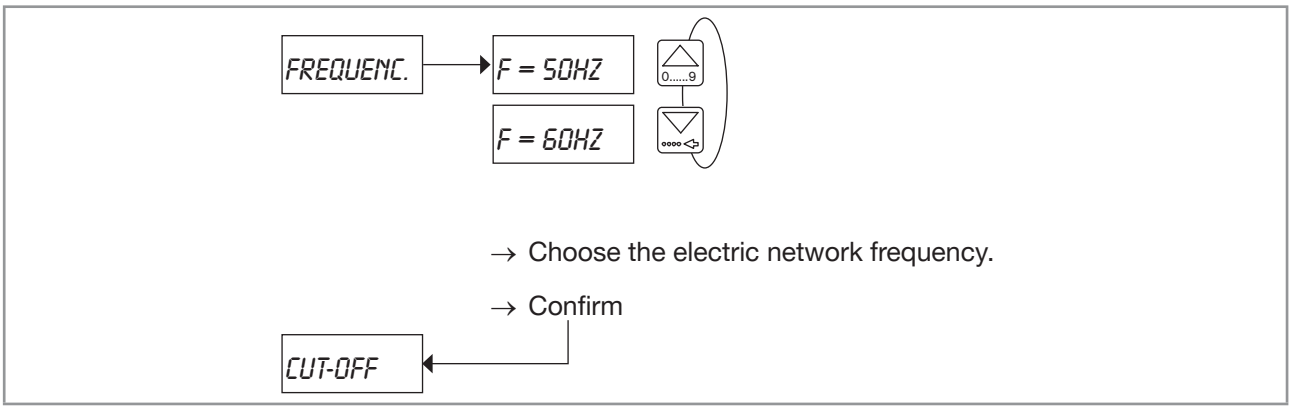


Fig. 48: Diagram of the "FREQUENC." parameter of the Parameters menu

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.16 Parameterizing the cut-off flow rate

This parameter makes it possible to set the flow rate value to 0 if the measured value is less than the set cut-off value:

- the display then shows a flow rate = 0 (a dot is displayed after the flow rate units).
- the outputs and the totalizers react as if the actual flow rate was = 0.

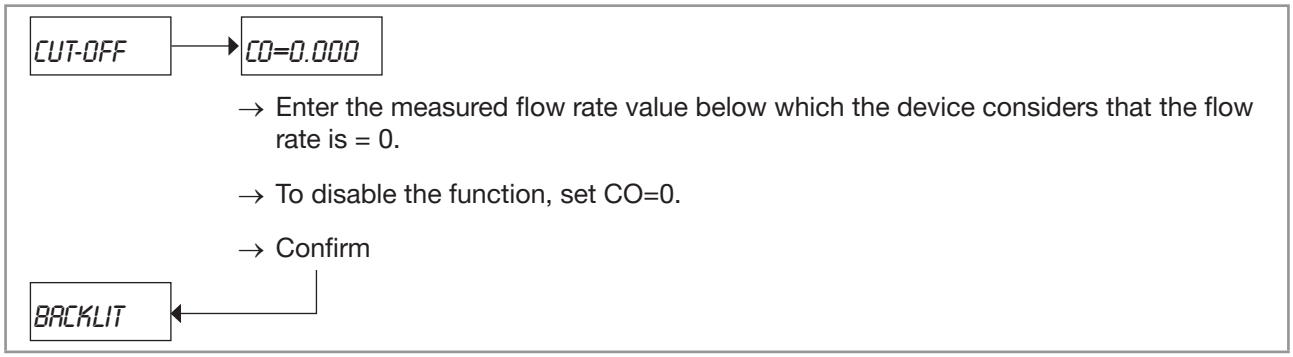


Fig. 49: Diagram of the "CUT-OFF" parameter of the Parameters menu

→ If you do not want to adjust another parameter, go to the "END" parameter of the Parameters menu and press ENTER to save the settings or not and go back to the Process level.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.6.17 Setting the brightness of the display and how long it stays ON, or deactivating the backlight

This parameter makes it possible:

- to adjust the brightness of the display and how long the display is backlit after a key press.
- to deactivate the backlight.

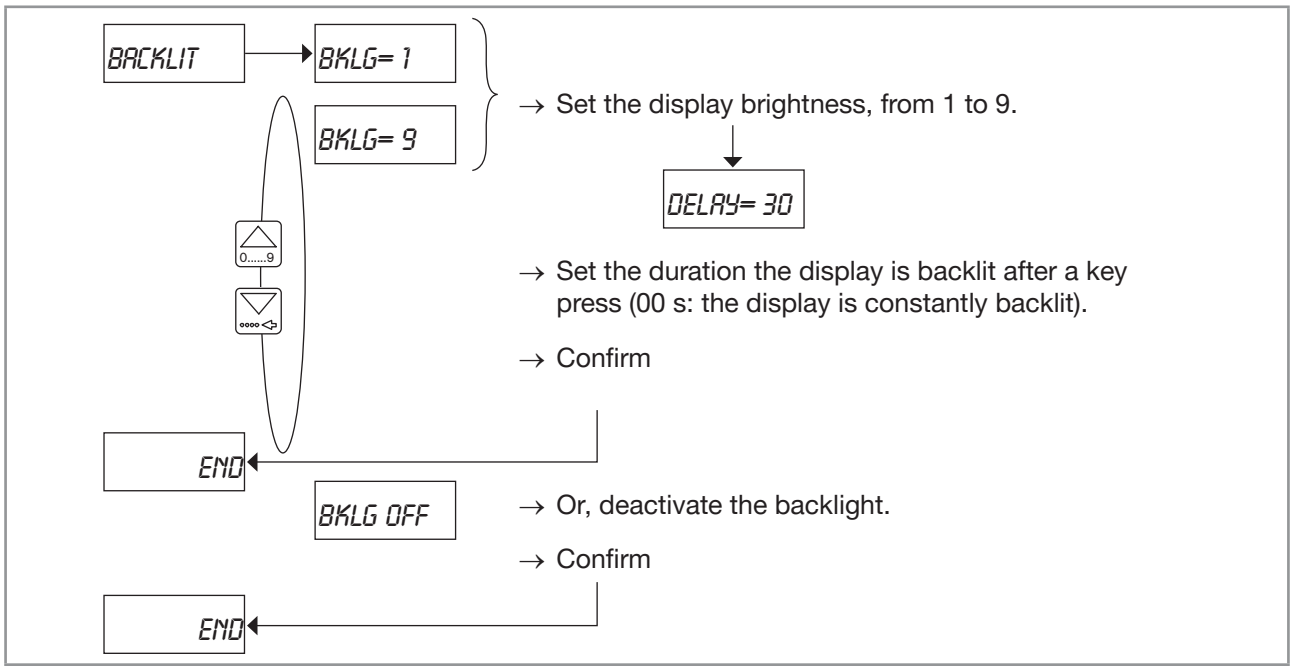


Fig. 50: Diagram of the "BACKLIT" parameter of the Parameters menu

→ If you do not want to adjust another parameter, confirm the "END" parameter to save the settings or not and go back to the Process level.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.7 Details of the Test menu

To access the Test menu, simultaneously press keys  for at least 5 s.

This menu comprises the following configurable parameters:

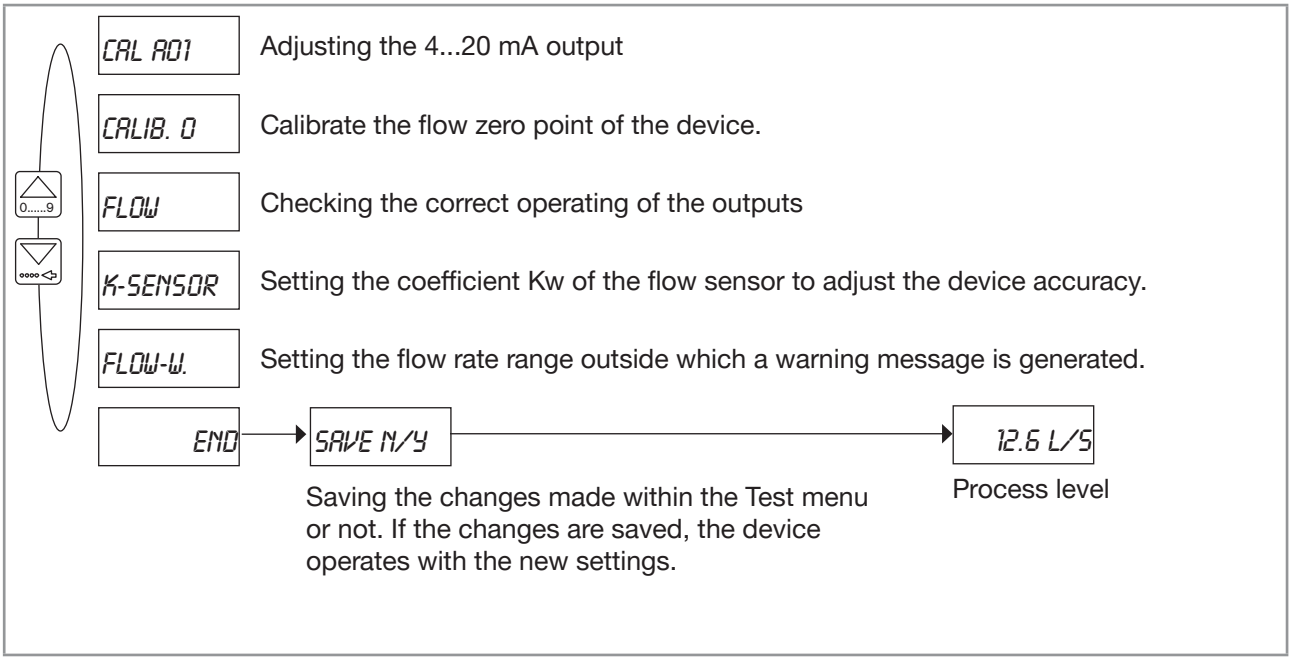


Fig. 51: Diagram of the Test menu

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.7.1 Adjusting the current output

This parameter makes it possible to adjust the value of the current transmitted on the analogue output.

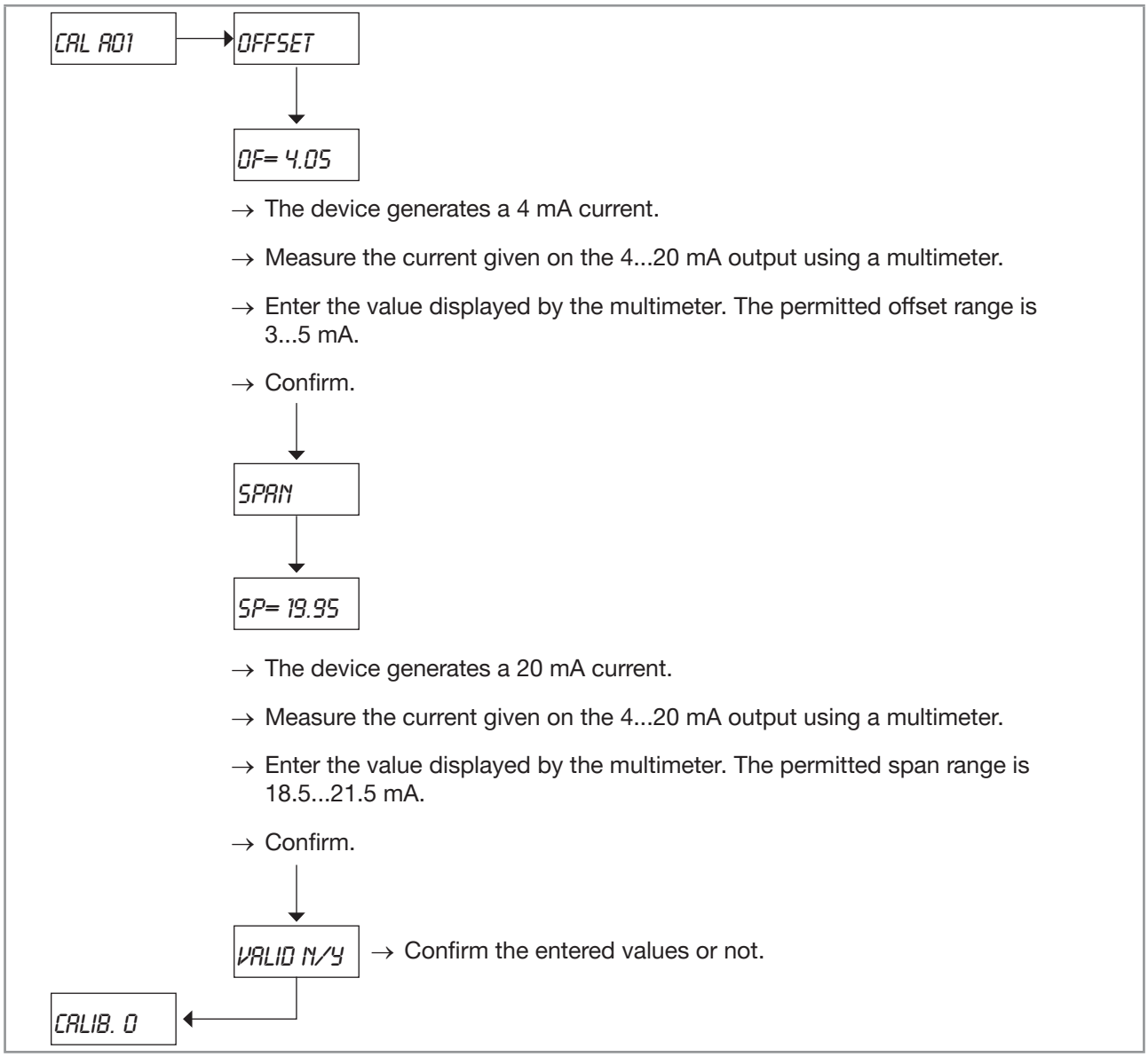


Fig. 52: Diagram of the "CAL AO1" of the Test menu

→ If you do not want to adjust another parameter, go to the "END" parameter of the Test menu and press ENTER to save the settings or not and go back to the Process level.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.7.2 Calibrating the flow zero point

Adjust this parameter:

- before carrying out a Teach-In procedure of the K-factor.
- after maintenance work.
- if the measured flow rate is not zero whereas the fluid circulation has been stopped.

Make sure there are no bubbles in the pipe.

Before calibrating the flow zero point:

- at first commissioning the device, immerse the sensor in fluid for 24 hours before calibration.
- after maintenance work, immerse the sensor in the fluid for 1 hour before calibration.

During the calibration:

- the device status LED flashes.
- the outputs are frozen to the last measured flow rate value.
- the device cannot be configured.

The flow zero point calibration can be:

- either remotely triggered via the digital input. See chapter 8.6.12 and Fig. 53.
- either carried out using this parameter in the Test menu; See Fig. 54.

→ Charge the pipe.

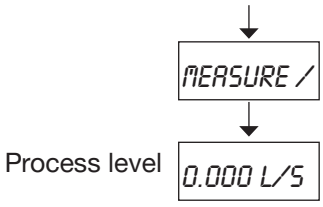
→ Stop the fluid circulation.

→ Make sure the fluid is still.

→ Make sure the device status LED is green.

→ Make sure the device is in the Process level and not in the Configuration level.

→ Activate the digital input configured to trigger the flow zeo point calibration.



The device calibrates the flow zero point during approximately 30 seconds.

- if the device status LED remains green, the calibration of the flow zero point has succeeded.
- if the device status LED is orange, the calibration of the flow zero point failed: the message "CAL. FAIL" is displayed in the warning message list. Restart the calibration.

Fig. 53: Flow zero point calibration via digital input

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

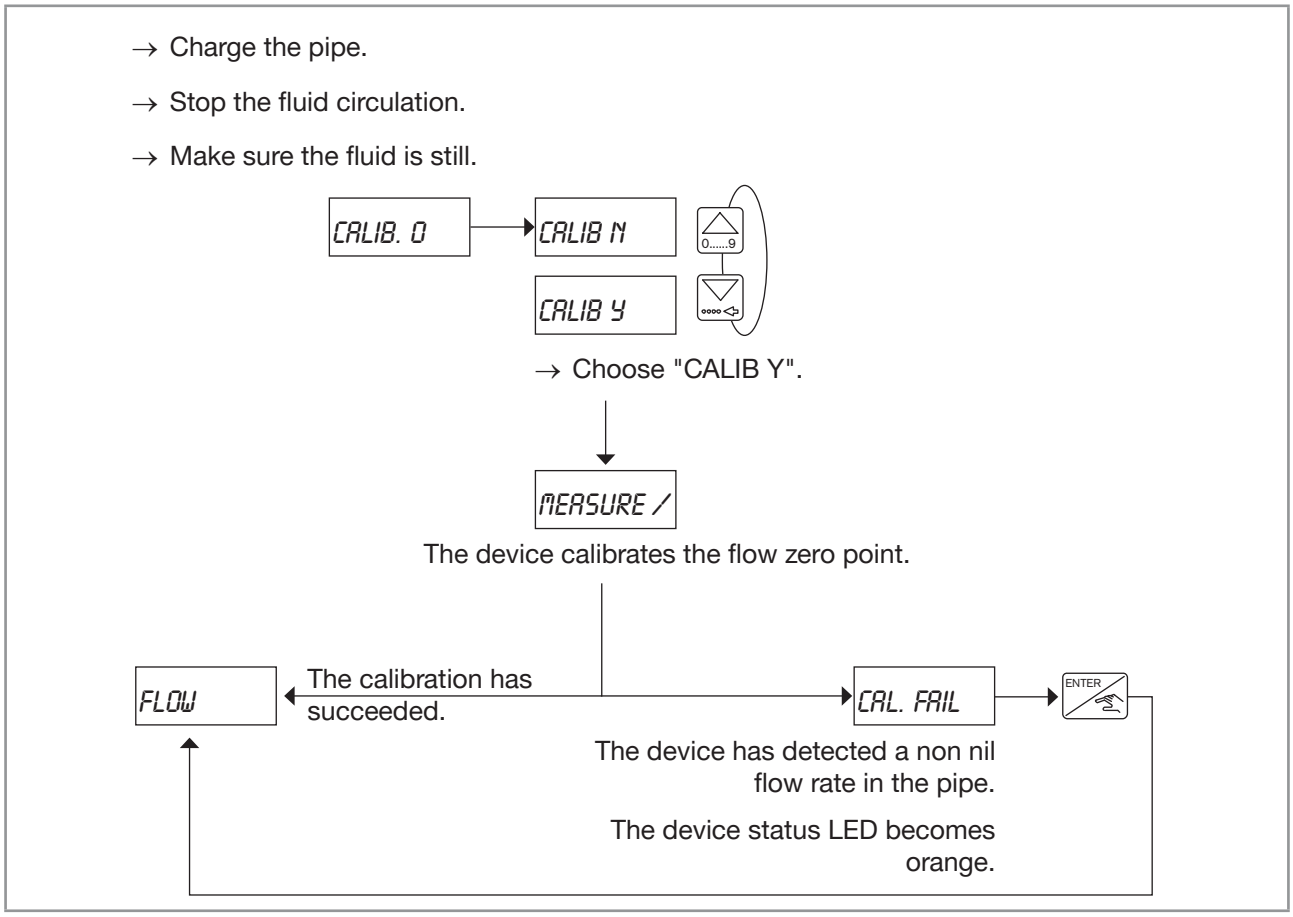


Fig. 54: Flow zero point calibration using the "CALIB 0" parameter of the Test menu

→ If you do not want to adjust another parameter, go to the "END" parameter of the Test menu and press ENTER to save the settings or not and go back to the Process level.

8.7.3 Checking the outputs behaviour

This parameter makes it possible to check that the outputs are behaving as expected by the configuration made.

- The totalizers are incremented depending on the measured value of the flow rate and not the simulated value.
- The device status LED flashes during the running check of the output behaviour.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

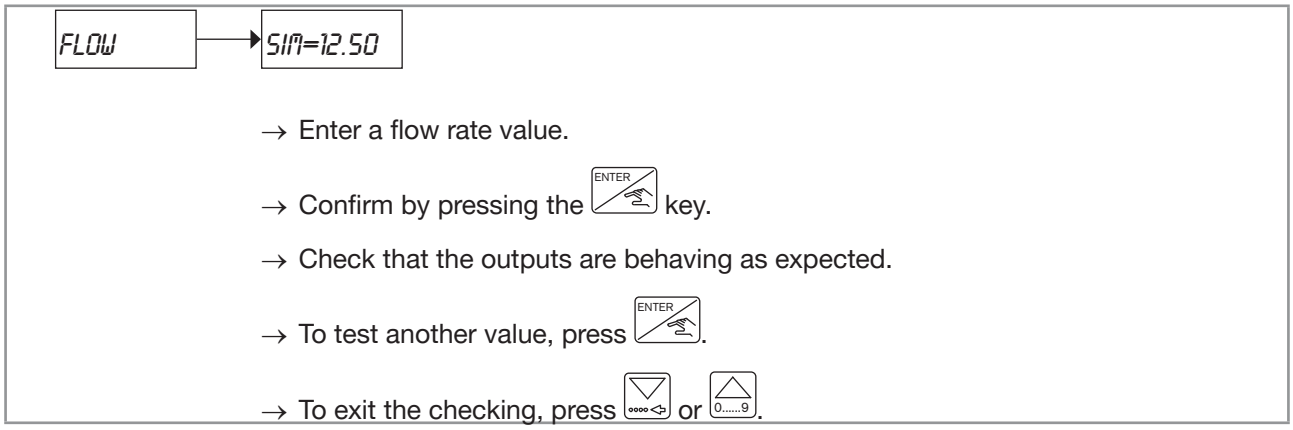


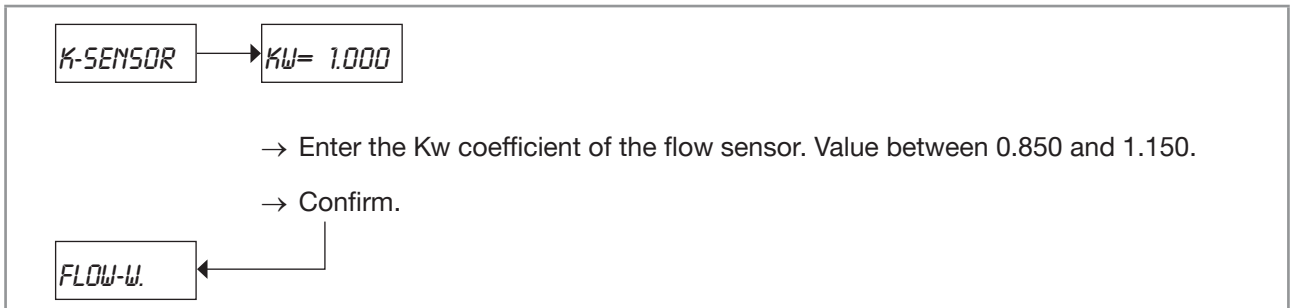
Fig. 55: Diagram of the "FLOW" parameter of the Test menu

→ If you do not want to adjust another parameter, go to the "END" parameter of the Test menu and press ENTER to save the settings or not and go back to the Process level.

8.7.4 Setting the Kw coefficient of the flow sensor

This parameter makes it possible to adjust the accuracy of the device.

Modifying the Kw coefficient has consequences for determining the fitting K-factor using a Teach-In procedure. See chapter 8.6.4.



Setting example: to increase the measured flow rate value by 1.5 %, enter KW= 1.015.

Fig. 56: Diagram of the "K-SENSOR" parameter of the Test menu

→ If you do not want to adjust another parameter, go to the "END" parameter of the Test menu and press ENTER to save the settings or not and go back to the Process level.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.7.5 Monitoring the flow rate in the pipe

A malfunction in your process or the flow sensor may be indicated either by too low or too high a flow rate.

This parameter makes it possible to monitor the flow rate and configure the behaviour of the device if the parametered range is exceeded.

- To disable the flow rate monitoring, set W– = W+ = 0.
- To disable one of the limits, set it to 0.

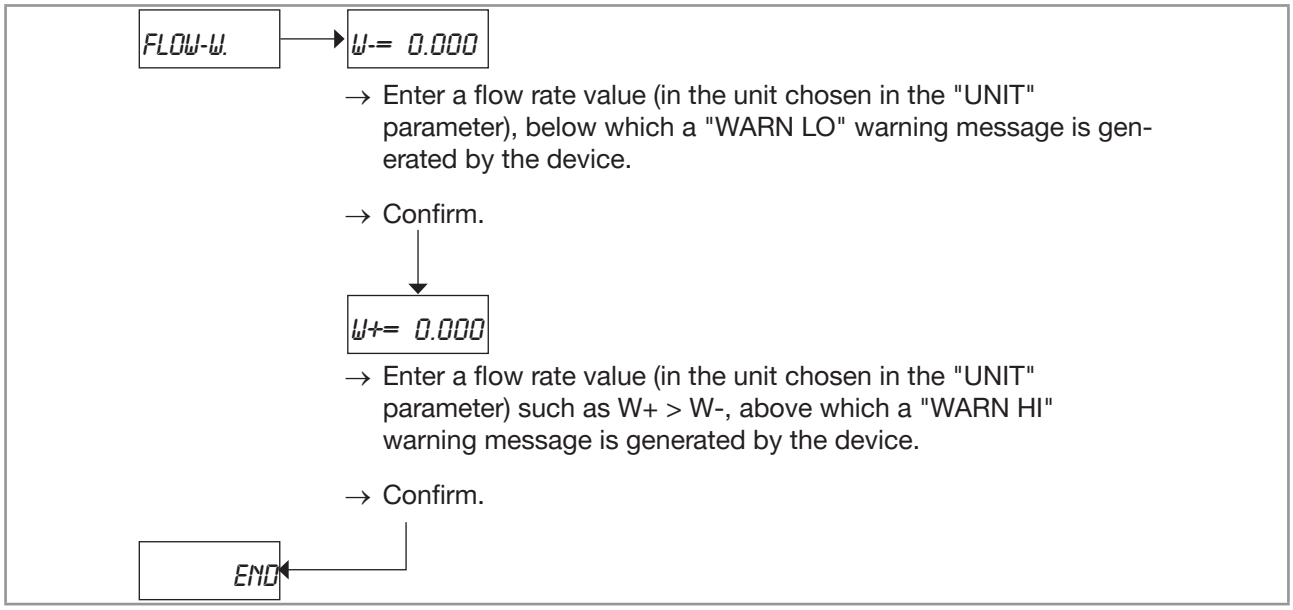


Fig. 57: Diagram of the "FLOW-W." parameter of the Test menu

To be warned when the flow rate is too low or too high, parameter the flow rate range (in the units that have been chosen in the "UNIT" parameter of the Parameters menu), outside which the device generates a warning message, "WARN LO" or "WARN HI", and turns the device status LED to orange.

When a warning message, "WARN LO" or "WARN HI", is generated by the device:

→ check the process.

→ if the process is not faulty, check the flow sensor condition and clean it if necessary.

→ if the flow rate measurement is still faulty, contact the Bürkert retailer.

- The transistor output or either relay output can be configured to switch when a warning message is generated by the device. See chapter 8.6.5.
- See also "If you encounter problems" in chapter 9.5.

→ If you do not want to adjust another parameter, confirm the "END" parameter to save the settings or not and go back to the Process level.

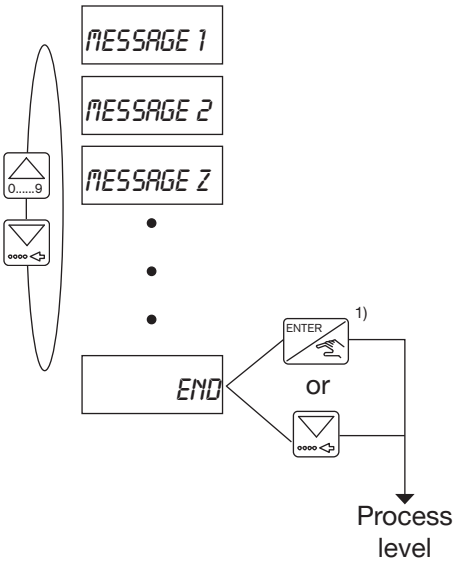
MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

8.8 Details of the Information menu

- This menu is available when the device status LED is orange or red.
- For the meaning of a message, go to chapter 9.5.4 and 9.5.5.

To access the Information menu, press the key for at least 2 s, in the Process level.

In this menu read the fault and warning messages generated by the device.



[1] If the ENTER key is unlocked.

Fig. 58: Diagram of the Information menu

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

9 MAINTENANCE AND TROUBLESHOOTING

9.1 Safety instructions

DANGER

Risk of injury due to high pressure in the installation.

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Danger due to electrical voltage.

- Disconnect the electrical power for all the conductors and isolate it before carrying out work on the system.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to high fluid temperatures.

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.

Risk of injury due to the nature of the fluid.

- Respect the prevailing regulations on accident prevention and safety relating to the use of aggressive fluids.

WARNING

Risk of injury due to non-conforming maintenance.

- Maintenance must only be carried out by qualified and skilled staff with the appropriate tools.
- Ensure that the restart of the installation is controlled after any interventions.

9.2 Cleaning the device

The device can be cleaned with a cloth dampened with water or a detergent compatible with the materials the device is made of.

Please feel free to contact your Bürkert supplier for any additional information.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

9.3 Cleaning the flow sensor

NOTICE

- Use a cleaning product that is compatible with the materials the flow sensor is made of.
- Do not use any abrasive acting materials.

NOTICE

After cleaning of the flow sensor:

- Rince the flow sensor.
- Check the seals and replace them if necessary.
- Before commissioning calibrate the flow zero point.

To prevent any measurement error due to deposits on the electrodes, clean the wetted parts regularly (cleaning frequency depends on the process).

9.4 Replacing the seal on a 8045 with G2" nut

NOTICE

Do not scratch the seal groove.

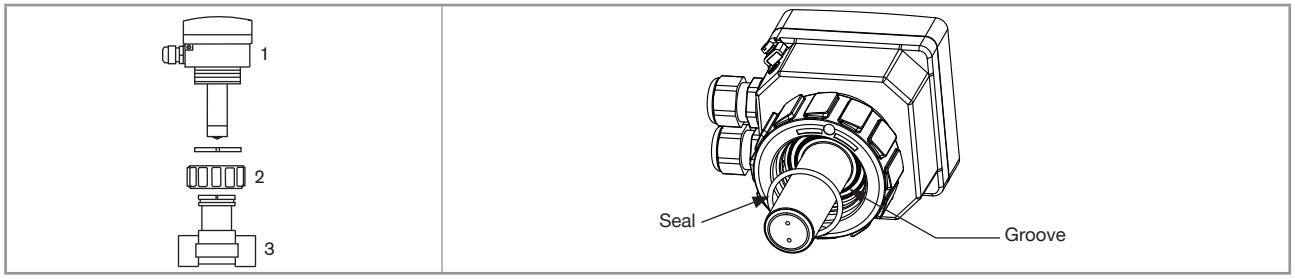


Fig. 59: Dismounting of the flowmeter and location of the seal

→ Loosen the nut of the flowmeter (mark 2).

→ Remove the flowmeter (mark 1) from the fitting.

→ Remove the seal from the groove.

→ Clean the seal groove.

→ Insert the new O-ring seal in the groove (see chapter 10).

→ Insert the flowmeter into the fitting.

→ Tighten the nut (mark 2) by hand on the flowmeter.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

9.5 If you encounter problems

9.5.1 Resolution of problems when the device status LED is OFF

Device status LED	Current output AO1	Output DO1 and/or DO2 and/or DO3	Message displayed	Possible cause	Recommended action
OFF	0 mA	low level	"PWRFAIL"	The supply voltage is too low. The device does not function.	→ Check that the supply voltage is between 18 and 36 V DC. → If the problem occurs again, take contact with Bürkert.
OFF	0 mA	not switched	-	The device is not energized.	→ Check the wiring. → Check the fuse of the installation and replace it if necessary. → Check that the installation is not shut-down. → Check that the power source is working properly.

9.5.2 Resolution of problems without message generation but device status LED ON

Device status LED	Current output AO1	Output DO1 and/or DO2 and/or DO3	Problem	Recommended action
any colour	4...20 mA	depending on the thresholds or switched [1)]	Access to the Parameters and Test menus is impossible.	→ Check the position of the "ENTER key lock/unlock" switch. See chapter 7.3.3.
any colour	0 mA	depending on the thresholds or switched [1)]	The current output transmits 0 mA.	→ Check the wiring of the current output. → Check the fuse of the installation and replace it if necessary. → Check the position of the sink/source switch. See chapter 7.3.4. → If the problem occurs again, take contact with Bürkert.
			The current output transmits a value between 0 and 4 mA.	→ Switch the device power supply off then on. → If the problem occurs again, take contact with Bürkert.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

Device status LED	Current output AO1	Output DO1 and/or DO2 and/or DO3	Problem	Recommended action
any colour	4 mA	depending on the thresholds or switched [1]	The current output transmits 4 mA whatever the displayed flow rate value.	→ Check the configuration of the current output. See chapter 8.6.6.
any colour	20 mA	depending on the thresholds or switched [1]	The current output transmits 20 mA whatever the displayed flow rate value.	→ Check the configuration of the current output. See chapter 8.6.6.
any colour	22...30 mA	depending on the thresholds or switched [1]	The current output transmits a value between 22 and 30 mA.	→ Switch the device power supply off then on. → If the problem occurs again, take contact with Bürkert.
any colour	30 mA	depending on the thresholds or switched [1]	The current output transmits a value > 30 mA.	→ Check the wiring of the current output. → If the problem occurs again, take contact with Bürkert.
any colour	4...20 mA	depending on the thresholds or switched [1]	The current value transmitted on the AO1 current output does not correspond to the displayed flow rate.	→ Check the configuration of the current output. See chapter 8.6.6. → Check the OFFSET and SPAN parameters of the current output. See chapter 8.7.1.
any colour	4...20 mA	The DO2 and DO3 outputs do not switch whatever the displayed flow rate value.		→ Check the parameters of the DO2 and DO3 relay outputs. See chapter 8.6.11. → Check the flow rate unit. → Check the behaviour of the outputs. See chapter 8.7.3.

[1] If the output is configured to switch when a warning message is generated. See chapter 8.6.5.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

9.5.3 Resolution of problems without message generation and device status LED green

Device status LED	Current output AO1	Output DO1 and/or DO2 and/or DO3	Possible cause	Recommended action
green	4...20 mA	depending on the thresholds or switched [1]	The device does not properly measure the flow rate.	→ Check that the K-factor corresponds to the fitting used. → Check that the Kw coefficient has not been disturbed. → Carry out a Teach-In procedure to determine the K-factor of the fitting used.
green	4...20 mA	depending on the thresholds or switched [1]	The displayed flow rate is not nil but the flow rate in the pipe is.	→ Check that the flow rate in the pipe is nil. → Check that there are no bubbles in the pipe. → Check the filter chosen. → Calibrate the flow zero point.
green	4...20 mA	depending on the thresholds or switched [1]	The displayed flow rate is always nil.	→ Check that the flow rate in the pipe is not nil. → Check that the K-factor or the Kw coefficient are not too low. → Check that the electrodes are perpendicular to the flow direction. → Choose a smaller flow rate unit or increase the number of displayed decimals..
green	4...20 mA	depending on the thresholds or switched [1]	The displayed flow rate is not stable.	→ Check that there is fluid in the pipe. → Choose a higher filter.
green	4...20 mA	depending on the thresholds or switched [1]	The displayed flow rate changes very slowly.	→ Check that there is fluid in the pipe. → Choose a lower filter.

[1] If the output is configured to switch when a warning message is generated. See chapter 8.6.5.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

9.5.4 Resolution of problems without message generation and device status LED red

Device status LED	Current output AO1	Output DO1 and/or DO2 and/or DO3	Message displayed	Possible cause	Recommended action
red	22 mA	depending on thresholds	"ERROR3"	The user parameters and the factory calibration are lost. The device measures wrong values.	→ Start the device again. → If the problem occurs again, take contact with Bürkert. → If the "LIN.LOST" message is also generated, take contact with Bürkert.
red	22 mA	depending on thresholds	"ERROR4"	The totalizer values are lost. The values saved upon the next to last power down are retrieved.	→ Start the device again. → If the problem occurs again, take contact with Bürkert.
red	22 mA	depending on thresholds	"ERROR5"	Both "ERROR3" and "ERROR4".	→ Take contact with Bürkert.
red	22 mA	depending on thresholds	"ERROR6"	Totalizers definitely lost. Both totalizers are reset.	→ Start the device again. → If the problem occurs again, take contact with Bürkert.
red	22 mA	depending on thresholds	"ERROR7"	Both "ERROR3" and "ERROR6".	→ Take contact with Bürkert.
red	22 mA	depending on thresholds	"MEAS. OVF"	The flow rate in the pipe is > 12 m/s.	→ Check the flow rate in the pipe. → If necessary, adjust the flow rate. → If the problem occurs again, take contact with Bürkert.
red	22 mA	depending on thresholds	"BAD MEAS."	The measuring signal is disturbed. The device does not measure the flow rate correctly.	→ Check if there is liquid in the pipe. → Check the liquid does not contain any air bubble. → Check the equipotentiality of the installation. → If the problem occurs again, take contact with Bürkert.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

9.5.5 Resolution of problems without message generation and device status LED orange

Device status LED	Current output AO1	Output DO1 and/or DO2 and/or DO3	Message displayed	Possible cause	Recommended action
orange	4...20 mA	Switched [1]	"PULS. OVF"	The value parametered for the pulse output is wrong (generated frequency is > 250 Hz).	→ Increase the value of the PU parameter (see chapter 8.6.7).
orange	4...20 mA	Switched [1]	"NEG. FLOW"	The measured flow rate is negative (although the display shows a positive flow rate).	→ Check that the reverse fluid circulation has no consequences on the process. → Else, mount the device on the pipe such as the arrow on the housing indicates the flow direction.
orange	4...20 mA	Switched [1]	"WARN. LOW"	The measured flow rate is below the authorized low limit. This message appears when the flow rate is monitored (see chapter 8.7.5).	→ Check the flow rate in the pipe and its consequences on the process. → If necessary, clean the flow sensor then calibrate the flow zero point.
orange	4...20 mA	Switched [1]	"WARN. HIG"	The measured flow rate is above the authorized high limit. This message appears when the flow rate is monitored (see chapter 8.7.5).	→ Check the flow rate in the pipe and its consequences on the process. → If necessary, clean the flow sensor then calibrate the flow zero point.
orange	4...20 mA	Switched [1]	"DISP. OVF"	The real flow rate cannot be displayed (display is saturated). Except the display, the device operates depending on the earl flow rate.	→ Adjust the unit or the number of decimals in the UNIT parameter of the Parameters menu so that the display can show higher values.
orange	4...20 mA	Switched [1]	"LIN. LOST"	The factory calibration is lost. The device measures wrong values.	→ Take contact with Bürkert.
orange	4...20 mA	Switched [1]	"CAL. FAIL"	The flow zero point calibration failed.	→ Follow the calibration conditions described in chapter 8.7.2.

[1] If the output is configured to switch when a warning message is generated. See chapter 8.6.5.

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

10 SPARE PARTS AND ACCESSORIES

CAUTION

Risk of injury and/or damage caused by the use of unsuitable parts.

Incorrect accessories and unsuitable replacement parts may cause injuries and damage the device and the surrounding area.

▸ Use only original accessories and original replacement parts from Bürkert.

Spare part	Article number
Cover in PC, with lid, incl. window, screws and sticked foil	553 189
Cover in PPA, with lid, incl. window, screws and sticked foil	553 190
Set including: • 2 M20x1.5 cable glands • 2 CR flat seals for cable glands or screw plugs • 2 M20x1.5 screw plugs • 2 multiway seals 2x6 mm	449 755
Set including: • 2 M20x1.5 / NPT 1/2" reductions (mounted o-ring) • 2 CR flat seals for the screw plugs • 2 M20x1.5 screw plugs	551 782
Set including: • 1 blanking plug for an M20x1.5 cable gland • 1 multiway seal, 2x6 mm, for cable gland • 1 green FKM seal • 1 mounting instruction sheet	558 102
Snap ring	619 205
PC nut for PC housing	619 204
PPA nut for PPA housing	440 229
Set including: • 1 green FKM seal • 1 black EPDM seal	552 111
EPDM seal (for a 8045 with a clamp connection)	730 837
FEP seal (for a 8045 with a clamp connection)	730 839
Clamp collar	731 164
Set of: • 1 blanking plug for an M20x1.5 cable gland • 1 multi-way seal, 2x6 mm, for a cable gland	565 384

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

11 PACKAGING, TRANSPORT

NOTICE

Damage due to transport

Transport may damage an insufficiently protected device.

- ▸ Transport the device in shock-resistant packaging and away from humidity and dirt.
- ▸ Do not expose the device to temperatures that may exceed the admissible storage temperature range.
- ▸ Protect the electrical interfaces using protective plugs.

12 STORAGE

NOTICE

Poor storage can damage the device.

- ▸ Store the device in a dry place away from dust.
- ▸ Storage temperature of the device: –20...+60 °C.

13 DISPOSAL OF THE DEVICE

Environmentally friendly disposal

- ▸ Follow national regulations regarding disposal and the environment.
- ▸ Collect electrical and electronic devices separately and dispose of them as special waste.

Further information: country.burkert.com

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

bürkert
FLUID CONTROL SYSTEMS

MAN 1000180103 EN Version: H Status: RL (released | freigegeben) printed: 06.12.2023

www.burkert.com