bürkert
FLUID CONTROL SYSTEMS

Type 8619

8619 multiCELL WM AC
8619 multiCELL WM DC
8619 multiCELL

Modular transmitter/controller

Operating Instructions

(from software version B.02.00)

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Technische Änderungen vorbehalten.
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Operating Instructions 2309/03_EU-ML 00569042 / Original_EN

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1 ABOUT THE OPERATING INSTRUCTIONS

The Operating Instructions describe the entire life cycle of the device. Please keep this operating instructions in a safe place, accessible to all users and any new owners.

This operating instructions contains important safety information.

Failure to comply with these instructions can lead to hazardous situations.

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

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.

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 in the Operating Instructions refers to the controller/transmitter:

- Type 8619 multiCELL, i.e. the panel-mounted versions,
- Type 8619 multiCELL WM AC, i.e. the wall-mounted versions with an AC operating voltage,
- Type 8619 multiCELL WM DC, i.e. the wall-mounted versions with a DC operating voltage,

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1.3 Definition of the word "Industrial Ethernet"

The term “Industrial Ethernet” as used in the Operating Instructions, refers to the devices that communicate with the industrial network protocols Modbus TCP, PROFINET or EtherNet/IP.

1.4 Validity of the Operating Instructions

The Operating Instructions are valid for the devices from software version B.02.00.

→ On the device, check the software version in the menu "Information -> Versions -> M0: Main -> Firmware" (see chapter 13, page 176).

2 INTENDED USE

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

The device is intended, depending on the modules fitted and the measurement sensors connected, for the acquisition, processing, transmission and regulation of physical parameters such as pH/ORP, conductivity, temperature, flow rate... .

- Use the device only in combination foreign devices or foreign components recommended or approved by Bürkert.
- Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of climatic conditions.
- Use the device in compliance with the characteristics and commissioning and use conditions specified in the contractual documents and in the Operating Instructions.
- Never use the device for security applications.
- Store, transport, install and operate the device properly.
- Only operate a device in perfect working order.
- Only use the device as intended.

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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 device.

The operating company is responsible for the respect of the local safety regulations including for the staff safety.

Risk of injury due to electrical voltage.

- If a 12...36 V DC wall-mounted version is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Before carrying out work on the system, disconnect the electrical power for all the conductors and isolate it.
- All equipment connected to the device must be double insulated in relation to the mains according to the standards UL/EN 61010-1.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Various dangerous situations.

To avoid injury:

- Do not use the device in explosive atmospheres.
- Do not use the device in an environment incompatible with the materials it is made of.
- Do not subject the device to mechanical loads.
- Do not make any modifications to the device.
- Prevent any unintentional power supply switch-on.
- Only qualified and skilled staff can carry out the installation and maintenance work.
- Guarantee a defined or controlled restarting of the process, after a power supply interruption.
- Observe the general technical rules.

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 standard EN 61340-5-1.
- Also ensure that you do not touch any of the live electrical components.

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4 GENERAL INFORMATION

4.1 Manufacturer's address and international contacts

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

Burkert SAS

Rue du Giessen

BP 21

F-67220 TRIEMBACH-AU-VAL

You may also contact your local Burkert 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 the Operating Instructions.

4.3 Information on the internet

You can find the Operating Instructions and technical data sheets for Type 8619 at: country.burkert.com

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5 DESCRIPTION

5.1 Area of application

The device is a multifunction product intended to display, record, transmit, exchange and regulate various physical parameters.

5.2 Construction of a 8619 multiCELL

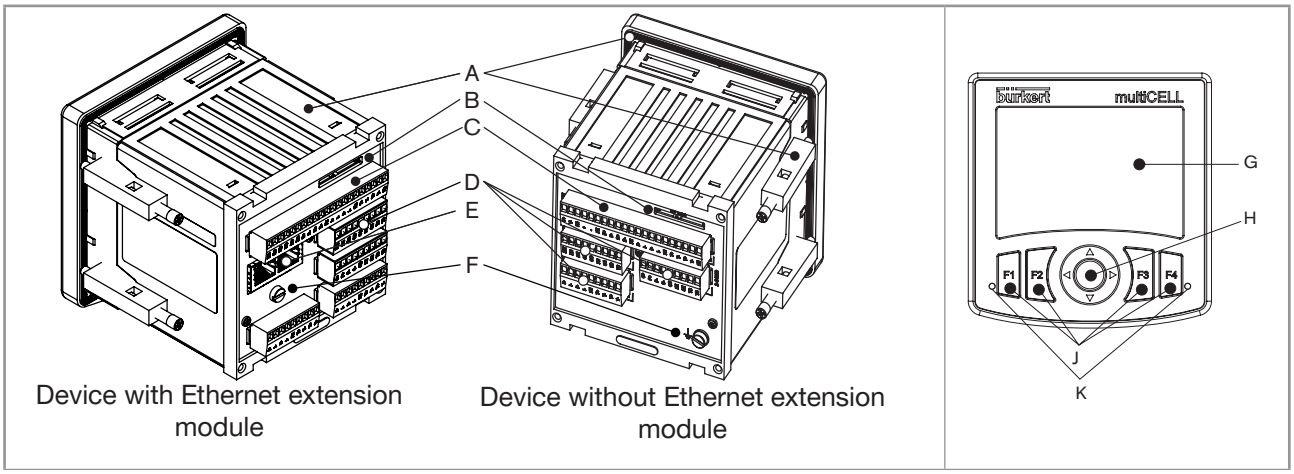

Fig. 1: Construction of a 8619 multiCELL

A: Standardised 1/4 DIN housing (92x92 mm) with seal, to be mounted in the door of the electrical enclosure or cabinet and attached using 4 fasteners

B: Memory card slot

C: Main board (identified by "M0" on the rear plate):

- To connect the electrical power source of the device
- To power another device, e.g. a flow-rate sensor
- Offering 2 digital inputs (identified by "DI", digital input), two 4...20 mA current outputs (identified by "AO", analogue output) and 2 digital outputs (identified by "DO", digital output)

D: 1 to 6 slots (4 slots for an Ethernet version) for the extension modules

Possible extension modules:

- Module with light grey connector for connection of a pH sensor or oxidation reduction potential sensor and/or a temperature sensor
- Module with green connector for connection of a conductivity sensor and/or a temperature sensor
- Module with black connector with two 4...20 mA current outputs and two digital outputs
- Module with orange connector with two analogue inputs and two digital inputs

If a slot is unused, a cap blanks off the opening.

E: Ethernet extension module (if present on the device, always located on slot "M1") with ports for 2 RJ45 connectors (Ethernet version only)

F: Functional earth screw (connected internally to all "FE" terminals on the main board and additional modules)

G: Display with backlight

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H: Navigation button (4 directions)

J: 4 dynamic keys

K: 2 LEDs

5.3 Construction of a 8619 multiCELL WM DC

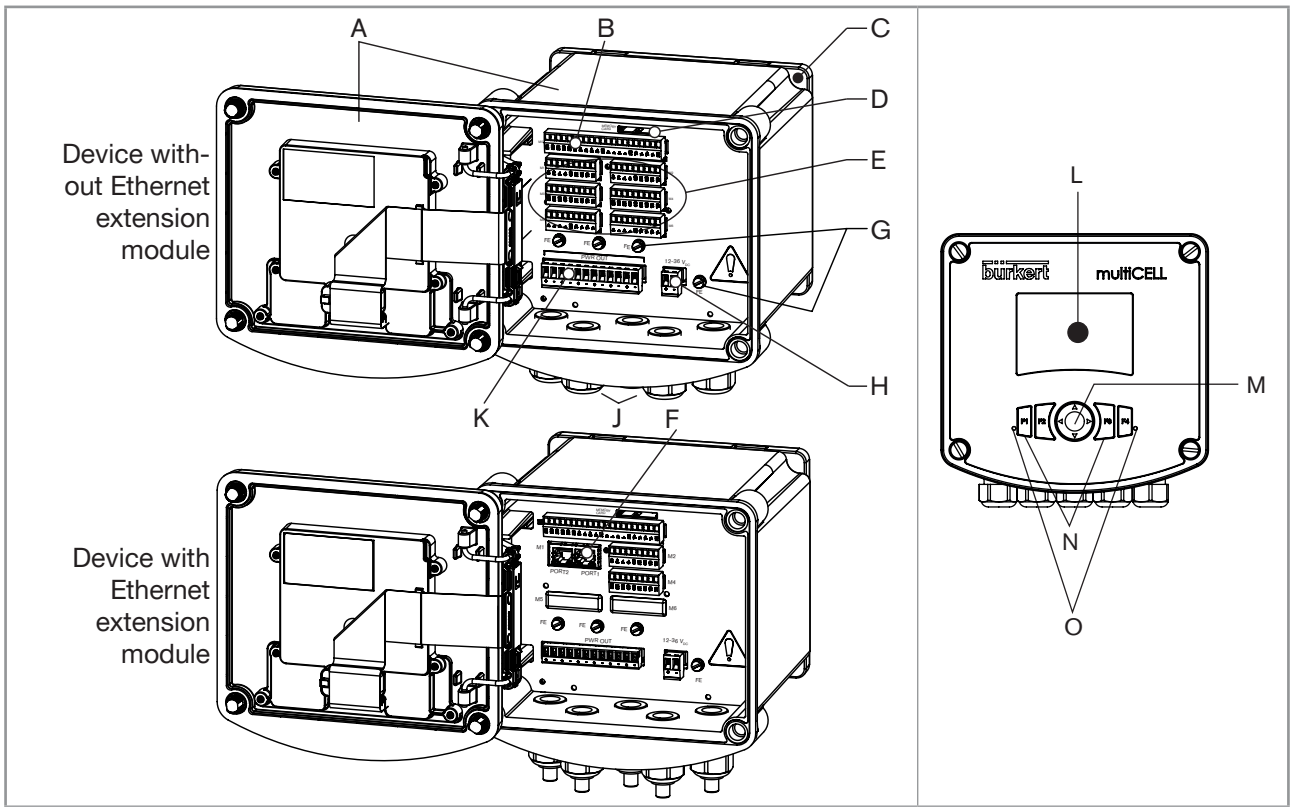

Fig. 2: Construction of a 8619 multiCELL WM DC

A: Wall-mounting housing; Cover with seal, closed by 4 screws; Display with navigation button, dynamic keys and LEDs

B: Main board (identified by "M0" on the plate) with two digital inputs (identified by "DI", digital input), two 4...20 mA current outputs (identified by "AO", analogue output) and two digital outputs (identified by "DO", digital output)

C: Wall-mounting plate, removable

D: Memory card slot

E: 1 to 6 slots (4 slots for an Ethernet version) for the extension modules

Possible extension modules:

- Module with light grey connector for connection of a pH sensor or oxidation reduction potential sensor and/or a temperature sensor
- Module with green connector for connection of a conductivity sensor and/or a temperature sensor
- Module with black connector with two 4...20 mA current outputs and two digital outputs
- Module with orange connector with two analogue inputs and two digital inputs

If a slot is unused, a cap blanks off the opening.

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F: Ethernet extension module (if present on the device, always located on slot M1) with ports for 2 RJ45 connectors (Ethernet version only)

G: Functional earth screw (connected internally to all "FE" terminals on the main board and additional modules)

H: Connection terminal board for the 12...36 V DC power supply

J: 5 M20 x 1.5 cable glands

K: Supply and distribution board

L: Display with backlight

M: Navigation button (4 directions)

N: 4 dynamic keys

O: 2 LEDs

5.4 Construction of a 8619 multiCELL WM AC

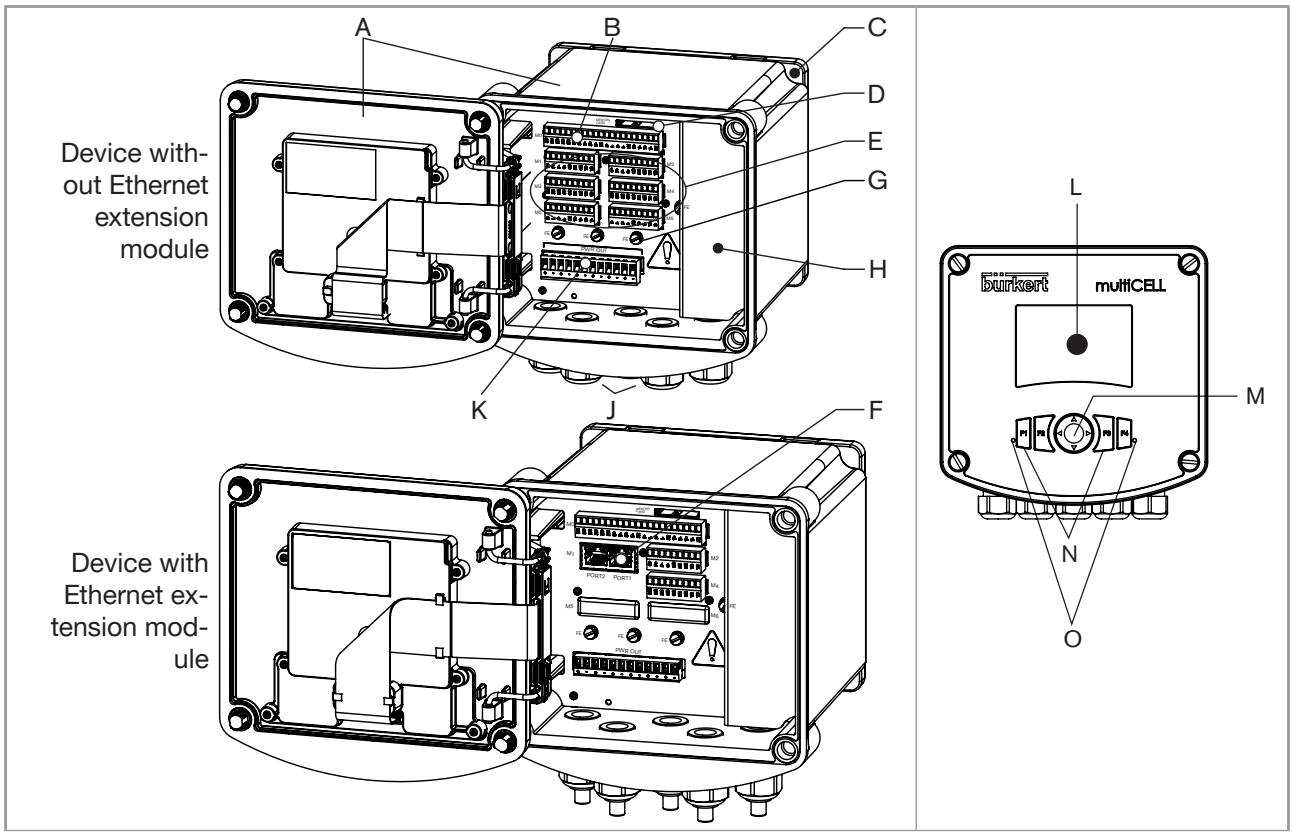

Fig. 3: Construction of a 8619 multiCELL WM AC

A: Wall-mounting housing; Cover with seal, closed by 4 screws; Display with navigation button, dynamic keys and LEDs

B: Main board (identified by "M0" on the plate) with two digital inputs (identified by "DI", digital input), two 4...20 mA current outputs (identified by "AO", analogue output) and two digital outputs (identified by "DO", digital output)

C: Wall-mounting fastening plate, removable

D: Memory card slot

E: 1 to 6 slots (4 slots for an Ethernet version) for the extension modules

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Possible extension modules:

- Module with light grey connector for connection of a pH sensor or oxidation reduction potential sensor and/or a temperature sensor
- Module with green connector for connection of a conductivity sensor and/or a temperature sensor
- Module with black connector with two 4...20 mA current outputs and two digital outputs
- Module with orange connector with two analogue inputs and two digital inputs

If a slot is unused, a cap blanks off the opening.

F: Ethernet extension module (if present on the device, always located on slot M1) with ports for 2 RJ45 connectors (Ethernet version only)

G: Functional earth screw (connected internally to all "FE" terminals on the main board and additional modules)

H: Protective cap for the terminal block of the 110...240 V AC power supply

J: 5 M20 x 1.5 cable glands

K: Supply and distribution board

L: Display with backlight

M: Navigation button (4 directions)

N: 4 dynamic keys

O: 2 LEDs

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5.5 Description of the LEDs for the connection to the network (Industrial Ethernet only)

An Industrial Ethernet device has 2 LEDs on each RJ45 connector to show the status of the connection to the network.

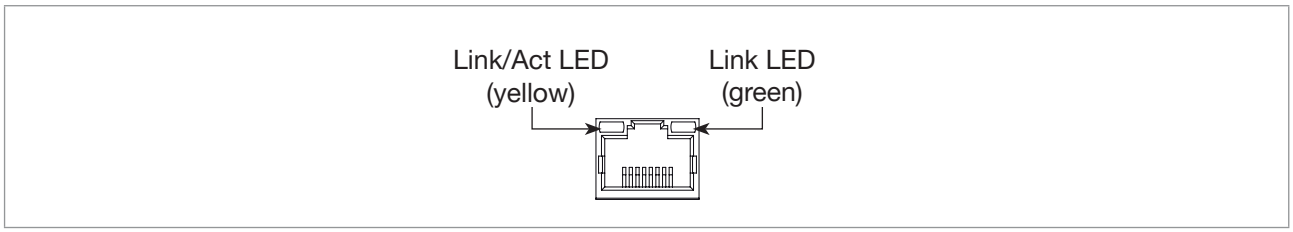

Fig. 4: Location of the LEDs of an RJ45 connector

LEDs	Behaviour	Meaning
Link/Act LED (yellow)	ON, fast blinking	Connection to the parent protocol layer is established. Data is being exchanged.
	ON, slow blinking	No connection to the protocol layer.
	OFF	No connection to the network.
Link LED (green)	ON	Connection to the network is established.
	OFF	No connection to the network.

Table 1: Description of the LEDs of an RJ45 connector

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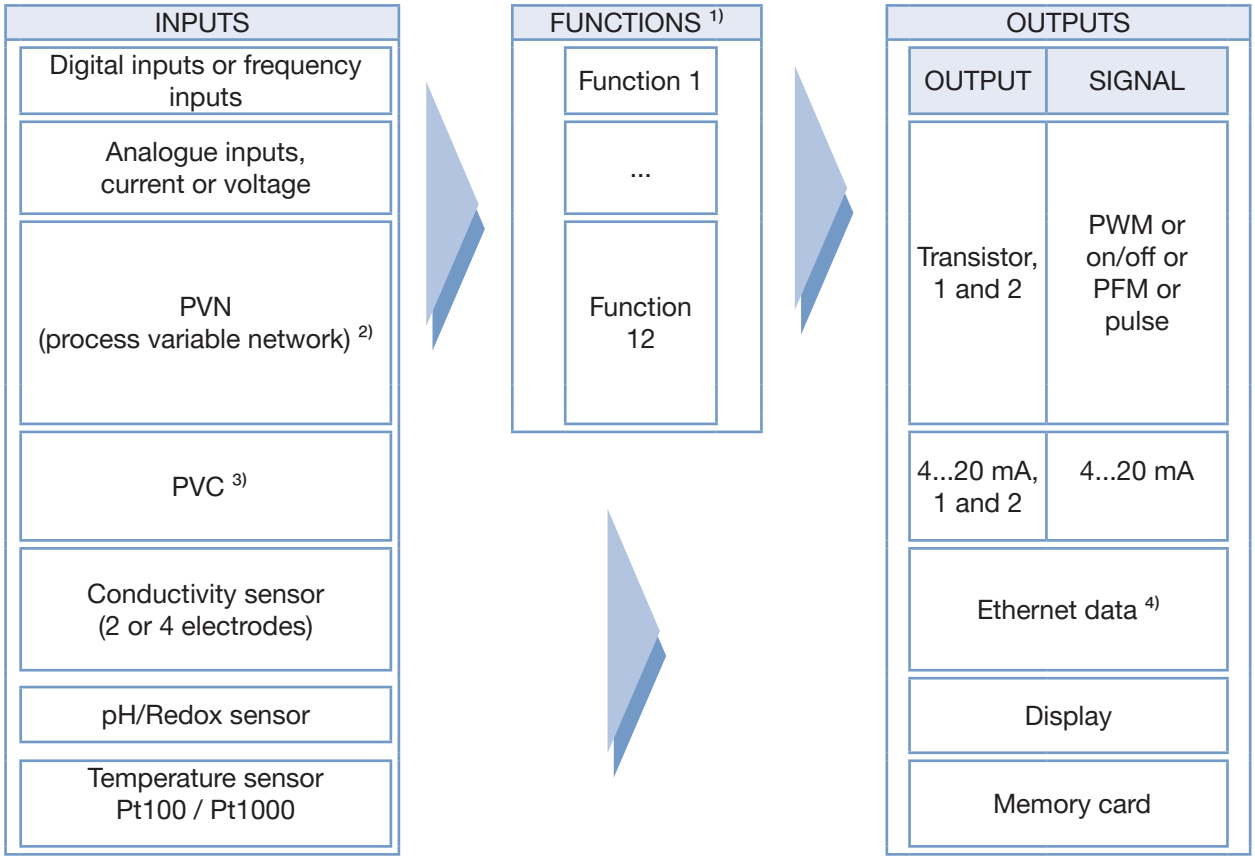
5.6 Functional diagram



1) *Simultaneously active*
2) *PVN: Process variable network. Process variables (PV) coming from a network controller (for example a PLC) via the Ethernet network (see chapter 9.27)*
3) *PVC: process variables (PV) whose value can be defined by the user in the Process level (see chapter 9.13)*
4) *Ethernet data: values coming from the 8619 MultiCELL via the Ethernet network to a network controller (for example a PLC).*

Refer to the supplement related to the digital communication for the Type 8619, available on: country.burkert.com

5.6.1 Arithmetic functions

Availability	Standard on all models
Formula	• A + B • A – B • A / B • A * B
Use	Operation between two process variables. → To set the parameters of the function, refer to section 9.14.

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5.6.2 Function PASS

Availability	Standard on all models
Formula	A/B * 100 %
Use	Calculation of the passage rate between two process variables. → To set the parameters of the function, refer to section 9.14.

5.6.3 Function REJECT

Availability	Standard on all models
Formula	(1 – A/B) * 100 %
Use	Calculation of the rejection rate between two process variables. → To set the parameters of the function, refer to section 9.14.

5.6.4 Function DEVIAT

Availability	Standard on all models
Formula	(A/B – 1) * 100 %
Use	Calculation of the deviation rate between two process variables. → To set the parameters of the function, refer to section 9.14.

5.6.5 Function MATH

Availability	Optional (see section 9.5)
Formula	The function "MATH" permits to enter an equation which respects the following rules: - up to 125 characters; - up to 5 process variables A, B, C, D, E. A, B, C, D, E can be constants, measured physical parameters, results of other active configured functions, the previous result of the same function, values entered by the user (PVC), values coming from a PLC (PVN), ... (see section 15); - with the operators and priority rules given in Table 2.

Table 2: Operators, priority and calculation sequence of the MATH equation

Possible operators	Priority	Sequence of calculation
( )	1	–
! ±	2	from the right to the left
^	3	from the left to the right
× ÷ %	4	
+ -	5	
< > ≤ ≥	6	

→ You can enter multiplications without the operator, e.g.
10A/5(B3) = 10xA/5x(Bx3) = 6xAxB

→ See also section 8.5 Entering a mathematical equation.

Use	→ To set the parameters of the function and have some examples of use, refer to section 9.14.

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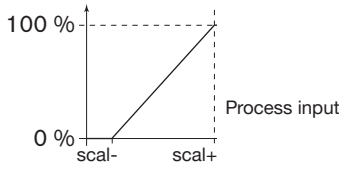
5.6.6 Function PROP (proportional)

Availability	Standard on all models
Formula	
Use	Calculation of an output proportional to a bounded input. → To set the parameters of the function, refer to section 9.16.

5.6.7 Function ON/OFF

Availability	Standard on all models
Formula	ON/OFF control
Use	For all input types. → To set the parameters of the function, refer to section 9.17.

5.6.8 Function "Flow rate measurement"

Availability	• Standard on models 560205, 560213, 565984 to 565987 569259 to 569261, 569268 to 569270, 569277 to 569279 • Optional (see section 9.5) on all other models
Use	Each digital input can be used to measure the flow rate.

5.6.9 Function PID

Availability	Optional (see section 9.5)
Formula	Continuous regulation
Use	For all input types; with internal or external setpoint. → To set the parameters of the function, refer to section 9.18. Only up to 6 PID functions can be active simultaneously.

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5.6.10 Function "Time dosing"

Availability	Optional (see section 9.5)
Use	In a cooling tower, for example; used to dose 2 products at fixed intervals or for twice daily dosing scheduled over one week. The time dosing function can be combined with an ON/OFF function on a conductivity measurement only, in order to ensure pre-purging of the system. The "ON/OFF" function must be configured and activated before the time dosing function. → To set the parameters of the function, refer to section 9.19.

5.6.11 Function "Volume dosing"

Availability	Optional (see section 9.5)
Use	Dedicated to the cooling towers. Metering of a specific volume of water and activation of an actuator during a specific period in order to add a product and, finally, reset of the water volume to zero. → To set the parameters of the function, refer to section 9.20.

5.6.12 Function "Concentration"

Availability	Optional (see section 9.5)
Use	The concentration graphs for certain compounds such as NaCl and H2SO4 are memorised for use over the entire concentration range (see section. 9.29). Refer to the technical data sheet of the device, available at: country.burkert.com

5.6.13 Function "Datalogger on memory card"

Availability	Optional (see section 9.5)
Use	Option to memorise the variations in 1 to 16 values in a given time interval.

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5.7 Description of the Type label

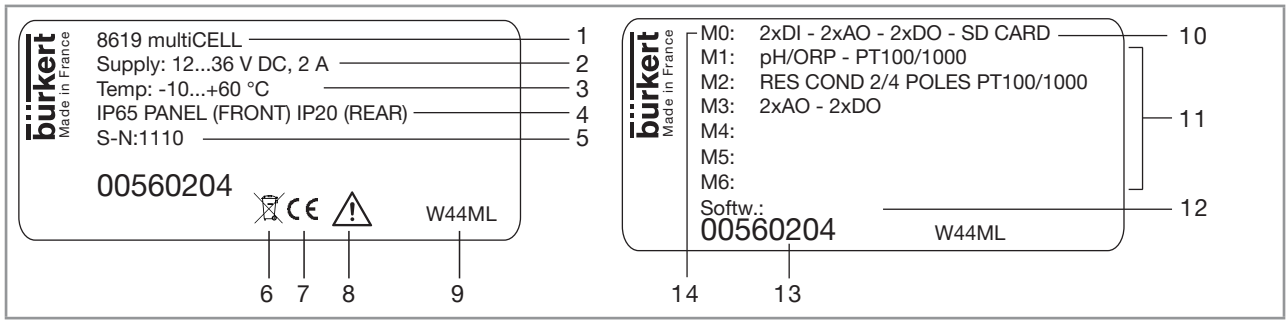

Fig. 5: Description of a Type label (example)

1. Type of the device
2. Electrical power supply
3. Ambient temperature range
4. Protection rating
5. Serial number
6. Disposal information
7. Conformity marking
8. Warning: Before using the device, take into account the technical specifications given in the Operating Instructions.
9. Manufacturing code
10. Device fitted with a memory card reader
11. Characteristics of the extension modules
12. Software options
13. Article number
14. Properties of the main board “M0”

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5.8 Additional markings (only for an Ethernet version)

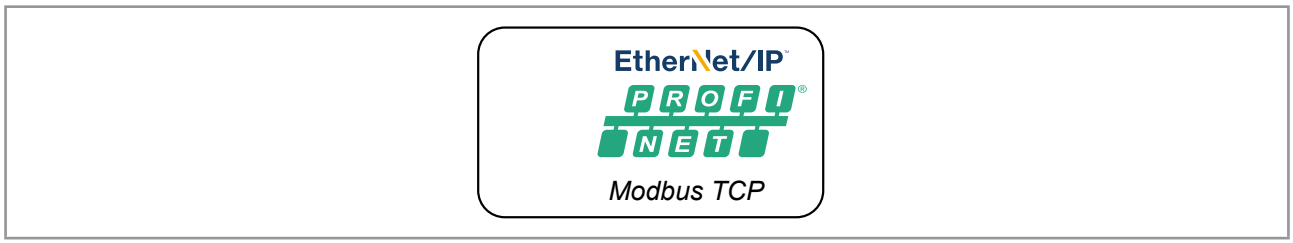

Fig. 6: Marking with the protocols (example)

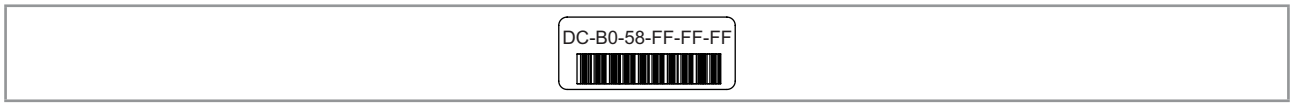

Fig. 7: Marking with the MAC address of the device (example)

5.9 Symbols on the device

Symbol	Description
⎓	Direct current
~	Alternating current
⏚	Earth terminal
⏚	Protective conductor terminal

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6 TECHNICAL DATA

6.1 Conditions of use of the 8619 multiCELL

Ambient temperature • without extension modules • with extension modules	 • –10...+70 °C[1)] • –10...+60 °C[1)] [1)] *If a memory card is used, observe the operating temperatures given by the manufacturer of the memory card*
Air humidity	< 85 %, not condensing
Use	Indoor and outdoor ▸ Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, against the effects of climatic conditions
IP-Code	• IP65[2)] according to IEC / EN 60529, NEMA4X on front, if the device is mounted in an electrical enclosure and if the electrical enclosure is tightly closed • IP20[2)] according to IEC / EN 60529 for the parts inside the electrical enclosure [2)] *not evaluated by UL*
Operating condition	Continuous operation
Mobility of the device	Fixed device
Degree of pollution	Degree 2 according to UL/EN 61010-1
Installation category	Category I according to UL/EN 61010-1
Maximum height above sea level	2000 m

6.2 Conditions of use of the 8619 multiCELL WM DC

Ambient temperature • without extension modules • with extension modules	 • –10...+75 °C[3)] • –10...+60 °C[3)] [3)] *If a memory card is used, observe the operating temperatures given by the manufacturer of the memory card.*
Air humidity	< 85 %, not condensing
Use	Indoor and outdoor ▸ Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, against the effects of climatic conditions

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IP-Code	IP65[4] and IP67[4], according to IEC / EN 60529, if the following conditions are met: • Body of each cable gland tightened to a torque of 5.5 Nm ± 20 % (4.06 lbf·ft ± 20 %) at the factory. • Cable glands blanked off or wired. • Nut of each cable gland tightened to a torque of 4.5 Nm ± 20 % (3.32 lbf·ft ± 20 %). • Housing tightly closed. • The 4 screws for the cover are tightened crosswise to a torque of 1.4 Nm ± 20 % (1.03 lbf·ft ± 20 %). *[4] not evaluated by UL*
Operating condition	Continuous operation
Mobility of the device	Fixed device
Degree of pollution	Degree 2 according to UL/EN 61010-1
Installation category	Category I according to UL/EN 61010-1
Maximum height above sea level	2000 m

6.3 Conditions of use of the 8619 multiCELL WM AC

Observe the maximum permissible load as a function of the ambient temperature.
See the derating curves Fig. 10 chapter 6.9.

Ambient temperature	–10...+70 °C[5]. Refer to the derating curves Fig. 10 chapter 6.9. *[5] If a memory card is used, observe the operating temperatures given by the manufacturer of the memory card.*
Air humidity	< 85 %, not condensing
Use	Indoor and outdoor ▸ Protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, against the effects of climatic conditions
IP-Code	IP65[6] and IP67[6] according to IEC / EN 60529, if the following conditions are met: • Body of each cable gland tightened to a torque of 5.5 Nm ± 20 % (4.06 lbf·ft ± 20 %) at the factory. • Cable glands blanked off or wired. • Nut of each cable gland tightened to a torque of 4.5 Nm ± 20 % (3.32 lbf·ft ± 20 %). • Housing tightly closed. • The 4 screws for the cover are tightened crosswise to a torque of 1.4 Nm ± 20 % (1.03 lbf·ft ± 20 %). *[6] not evaluated by UL*
Operating condition	Continuous
Mobility of the device	Device fixed

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Degree of pollution	Degree 3 according to UL/EN 61010-1 if the following conditions are met: • Housing tightly closed. • The 4 screws of the cover are tightened crosswise to a torque of 1.4 Nm ± 20 % (1.03 lbf·ft ± 20 %).
Installation category	Category II according to UL/EN 61010-1
Maximum height above sea level	2000 m

6.4 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.

UL certification

Finished 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

Identification on the device	Certification	Variable key
c UL us LISTED Measuring Equipment E237737	UL-listed	PU02
c UL us	UL-recognized	PU01

For Ethernet versions, the device is certified by the following certification bodies:

- ODVA for EtherNet/IP protocol,
- PI for PROFINET protocol.

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6.5 Material data

Table 3: Materials in contact with the ambient air

Component	Material	
	8619 multiCELL	8619 multiCELL WM AC or 8619 multiCELL WM DC
Panel-mounting housing and fastener	PPO	-
Wall-mounting housing, wall-mounting fastening plate, cable glands, protective cap (for LCD display), hinge stiffener.	-	PA66
Protective blank (for a slot without connection terminal)	PA66	
Seal	Silicone	
Front panel and keys	PC/silicone	
Terminal support plate	Stainless steel 304	
Terminal blocks	PBT, contacts in gold-plated copper alloy	
Port for an RJ45 connector	Housing: copper alloy and thermoplastic Contacts: gold-plated	
Ground screw + spring washer	Stainless steel 316 (A4)	
Protective cap for the 110...240 V AC power supply terminal board	-	Stainless steel 304
4 cover screws	-	PVC

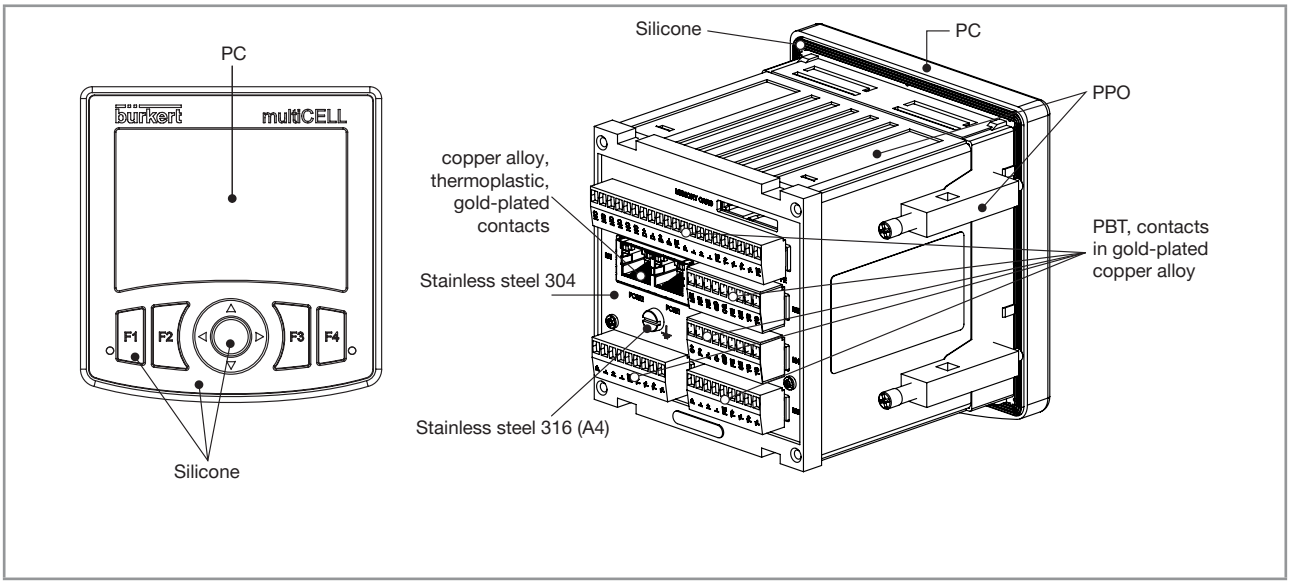

Fig. 8: Component materials of the 8619 multiCELL

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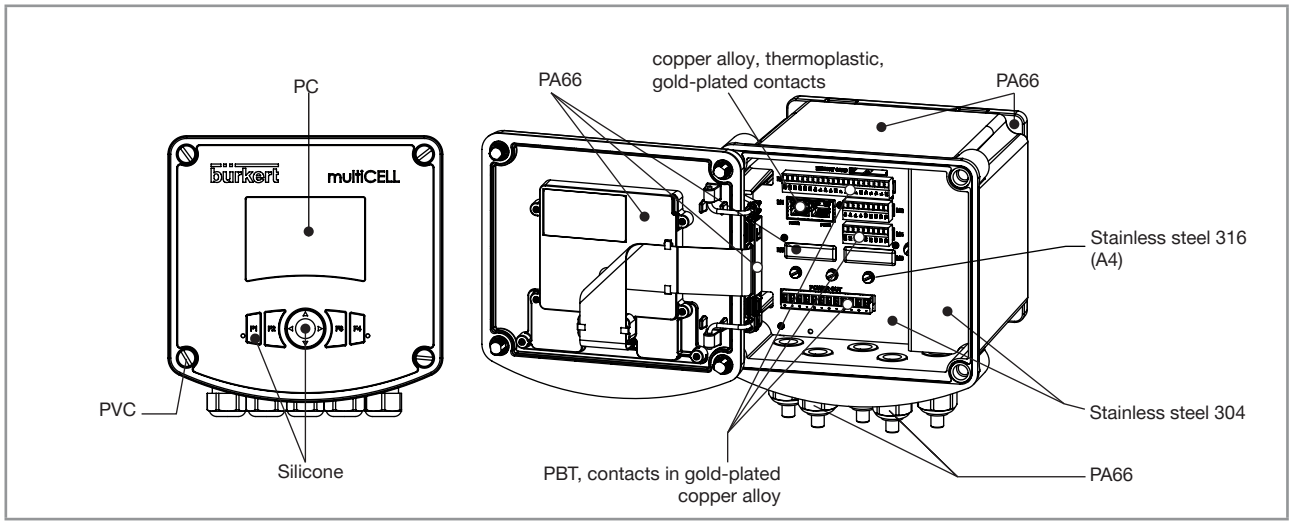

Fig. 9: Component materials of the 8619 multiCELL WM

6.6 Dimensions

Please refer to the technical data sheets of the device, available at: country.burkert.com

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6.7 Electrical specifications of the 8619 multiCELL

Operating voltage	• 12...36 V DC • Filtered and regulated • Tolerance: ±10 % • Maximal consumption: 2 A • 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
Own consumption (without extension modules, outputs not connected)	1.5 VA
Power distribution ("PWR OUT")	• 12...36 V DC, 1.8 A max. • Protected against polarity reversal
All digital inputs ("DI")	• Switching threshold V_{on}: 5...36 V DC • Switching threshold V_{off}: < 2 V DC • Input impedance: 3 kΩ • Galvanically isolated • Protected against polarity reversal and voltage spikes • Frequency: 0.5...2500 Hz
All analogue outputs ("AO")	• 4...20 mA current • Uncertainty: ±0.5 % of the measured value • Any connection mode, in sink or source mode • Galvanically isolated • Protected against polarity reversal • Max. loop impedance 860 Ω at 30 V DC, 610 Ω at 24 V DC, 100 Ω at 12 V DC
All digital outputs ("DO")	• Transistor • Any connection mode, in NPN or PNP mode • Galvanically isolated • Protected against short circuits • Max. voltage: 36 V DC • Max. frequency 2000 Hz • Maximum current consumption allowed: - Max. 700 mA if 1 DO per module is activated - Max. 1 A if the 2 DOs per module are activated - Max. 4 A for an Ethernet version if the device has 4 output modules

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6.8 Electrical specifications of the 8619 multiCELL WM DC

Operating voltage	• 12...36 V DC • Filtered and regulated • Tolerance: ±10 % • Maximal consumption: 2 A • 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
Own consumption (without extension module, outputs not connected)	2 VA
Power distribution (POWER OUT module)	• Protected against polarity reversal • 12...36 V DC, 1.8 A max.
All digital inputs ("DI")	• Switching threshold V_{on}: 5...36 V DC • Switching threshold V_{off}: < 2 V DC • Input impedance: 3 kΩ • Galvanically isolated • Protected against polarity reversal and voltage spikes • Frequency: 0.5...2500 Hz
All analogue outputs ("AO")	• 4...20 mA current • Uncertainty: ±0.5 % of the measured value • Any connection mode, in sink or source mode • Galvanically isolated • Protected against polarity reversal • Max. loop impedance 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 100 Ω at 12 V DC
All digital outputs ("DO")	• Transistor • Any connection mode, in NPN or PNP mode • Galvanically isolated • Protected against short circuits • Max. voltage: 36 V DC • Max. frequency 2000 Hz • Maximum current consumption allowed: - Max. 700 mA if 1 DO per module is activated - Max. 1 A if the 2 DOs per module are activated - Max. 4 A for an Ethernet version if the device has 4 output modules

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6.9 Electrical specifications of the 8619 multiCELL WM AC

Electrical supply 110...240 V AC • Tolerance • Frequency • Max. current • Integrated protection	 • –10...+10 % • 50...60 Hz • 550 mA • delayed 3.15 A fuse, 250 V AC, (breaking capacity = 1500 A at 250 V AC, 10 kA at 125 V AC), certified IEC 60127, UL-listed and UL-recognized
Power distribution (POWER OUT module)	• Protected against polarity reversal • 24 V DC, filtered and regulated, device permanently connected to a Safety Extra-Low Voltage circuit (SELV circuit), at a non-hazardous energy level, • 1.3 A max.: observe the maximum permissible load as a function of the ambient temperature. See the derating curves Fig. 10.

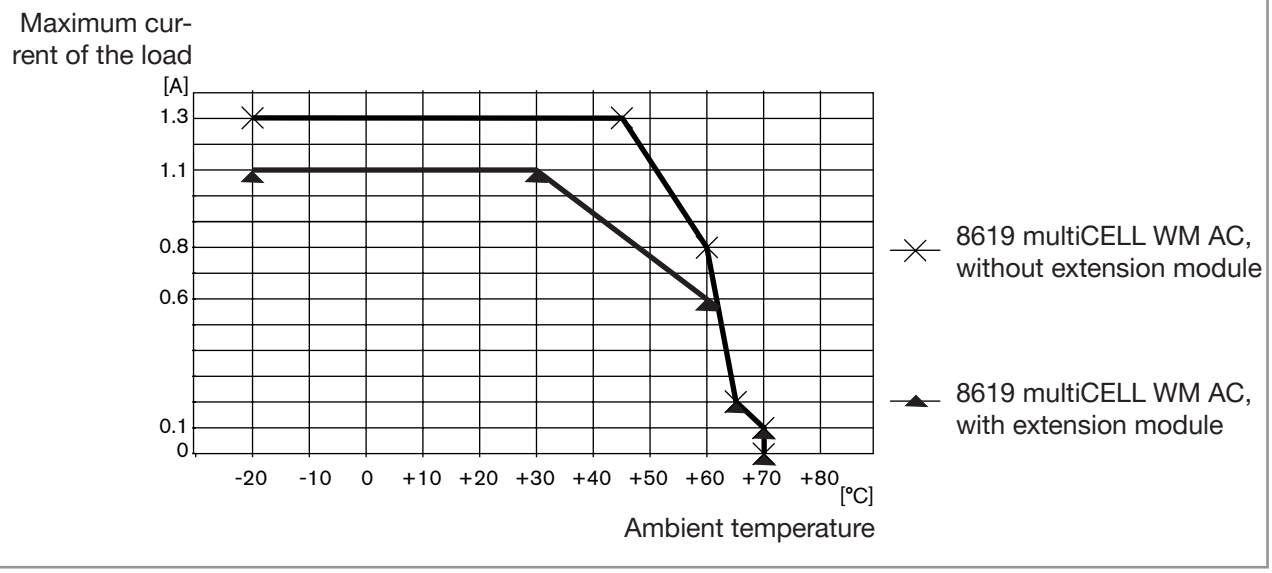

Fig. 10: Derating curves of the maximum permissible current, depending on the ambient temperature

All digital inputs ("DI")	• Switching threshold V_{on}: 5...36 V DC • Switching threshold V_{off}: < 2 V DC • Input impedance: 3 kΩ • Galvanically isolated • Protected against polarity reversal and voltage spikes • Frequency: 0.5...2500 Hz

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All analogue outputs ("AO")	• 4...20 mA current • Uncertainty: ±0.5 % of the measured value • Any connection mode, in sink or source mode • Galvanically isolated • Protected against polarity reversal • Max. loop impedance 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 100 Ω at 12 V DC
All digital outputs ("DO")	• Transistor • Any connection mode, in NPN or PNP mode • Galvanically isolated • Protected against short circuits • Max. voltage: 36 V DC • Max. frequency 2000 Hz • Maximum current consumption allowed: - Max. 700 mA if 1 DO per module is activated - Max. 1 A if the 2 DOs per module are activated - Max. 4 A for an Ethernet version if the device has 4 output modules

6.10 Specifications common to all the versions

6.10.1 Specifications of the memory card

We recommend to use the 8 GB memory card available at Bürkert with article number 564072, because it has been tested with and validated to operate with the device.

A memory card with a different capacity or from another manufacturer can lead to the malfunction of the device.

• Memory card type	• MMC (Multimedia Memory Card) and compatible
• Capacity	• 8 GB max.
• File system	• FAT32
• Operating temperature	• –25...+85 °C

6.10.2 Flow rate measurement

Refer to the Operating Instructions of the flow sensor connected to the device.

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6.10.3 Specifications of the "Input" module

Power consumption	0.1 VA
Digital inputs ("DI")	• Switching threshold V_{on}: 5...36 V DC • Switching threshold V_{off}: < 2 V DC • Input impedance: 3 kΩ • Galvanically isolated • Protected against polarity reversal and voltage spikes • Frequency: 0.5...2500 Hz
Analogue inputs ("AI")	• Any connection mode, in sink or source mode • Galvanically isolated • Precision ±0.25 % • Current: 0...22 mA or 3.5...22 mA. Max. voltage: 36 V DC. Impedance: 50 Ω. Resolution: 1.5 µA • Voltage: 0...5 V DC or 0...10 V DC. Max. voltage: 36 V DC. Impedance: 110 kΩ. Resolution: 1 mV

6.10.4 Specifications of the output module "OUT"

Power consumption	0.1 VA
All digital outputs ("DOx")	• Transistor • Any connection mode, in NPN or PNP mode • Galvanically isolated • Protected against short circuits • Max. voltage: 36 V DC • Max. frequency 2000 Hz • Maximum current consumption allowed: see section 6.7, 6.8 or 6.9
All analogue outputs ("AOx")	• 4...20 mA current • Uncertainty: ±0.5 % of the measured value • Any connection mode, in sink or source mode • Galvanically isolated • Protected against polarity reversal • Max. loop impedance 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 100 Ω at 12 V DC

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6.10.5 Specifications of the "pH/ORP" module

pH measurement	
• pH measurement range	• –2.00...+16.00 pH
• Resolution of pH measurement	• 0.01 pH
• Systematic variation in the pH measurement	• ±0.02 pH + pH probe error
• Potential difference measurement range	• –600...+600 mV
• Resolution of the potential difference measurement	• 0.1 mV
• Systematic variation in the potential difference measurement	• ±1 mV + pH probe error
• pH probe type	• Electrochemical
Power consumption	0.1 VA
Measurement of the oxidation reduction potential	
• Oxidation reduction potential measurement range	• –2000...+2000 mV
• Resolution of the potential difference measurement	• 0.1 mV
• Systematic variation in the potential difference measurement	• ±1 mV + ORP probe error
• Oxidation reduction potential probe type	• Electrochemical
Temperature measurement	
• Measurement range	• –25...+130 °C
• Measurement resolution	• 0.1 °C
• Systematic variation in the measurement	• ±1 °C + temperature probe error
• Temperature sensor type	• Pt100 or Pt1000, with 2 or 3 wires

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6.10.6 Specifications of the conductivity module "COND"

Resistance measurement (without conductivity sensor connected)	5 Ω...1 MΩ
Power consumption	0.25 VA
Type of conductivity probe	With 2 or 4 electrodes; the specifications of Bürkert cells are described in the related operating instructions.
Conductivity measurement (with connected conductivity sensor)	
• Measurement range	• 0.000 µS/cm...2 S/cm (depends on the conductivity sensor)
• Measurement resolution	• 10^{-9} S/cm
• Systematic variation in the measurement	• ±0.5 % of the measured value + conductivity sensor error
Resistivity measurement (with connected conductivity sensor)	
• Measurement range	• 0.500 Ω.cm...100 MΩ.cm (depends on the conductivity sensor)
• Measurement resolution	• 10^{-1} Ω.cm
• Systematic variation in the measurement (without sensor)	• ±0.5 % of the measured value + conductivity sensor error
Temperature measurement	
• Measurement range	• –40 °C...+200 °C
• Measurement resolution	• ±0.1 °C
• Systematic variation in the measurement	• ±1 °C + temperature probe error
• Temperature sensor type	• Pt100 or Pt1000, with 2 or 3 wires

6.10.7 Specifications of the Ethernet module M1

Power consumption	2.2 VA
Supported network protocols	• Modbus TCP • PROFINET • EtherNet/IP
LEDs	• 2 Link/Act LED (yellow) • 2 Link LEDs (green)
Electrical connection	• 2 ports for an RJ45 connector

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6.11 Specifications of the Industrial Ethernet protocols

6.11.1 Modbus TCP protocol

TCP port	502
Protocol	Internet protocol, version 4 (IPv4)
Network topology	• Tree • Star • Line (open daisy chain)
IP configuration	• Fixed IP • BOOTP (Bootstrap Protocol) • DHCP (Dynamic Host Configuration Protocol)
Transmission speed	10 and 100 MBit/s
Data transport layer	EtherNet II, IEEE 802.3
Modbus function codes	3, 4, 16, 23
Read/write register	Max. 125 read registers and 123 write registers per telegram
Message mode	Server
Input (Target to Originator)	• All diagnostics and errors informations are with the highest priority and can be read by a PLC (refer to the supplement related to the digital communication for the Type 8619). • AI / DI / AO / DO: value, status, unit • Device and modules: status • Functions: value, status, unit • PVC: value, status, unit
Output (Originator to Target)	20 Process Variables Network (PVN)

AI = Analogue Input, AO = Analogue Output, DI = Digital Input, DO = Digital Output, Target = Server, Originator = Client.

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6.11.2 PROFINET protocol

Product type	Compact field IO device
PROFINET IO specification	V2.3
Network topology	• Tree • Star • Ring (closed daisy chain) • Line (open daisy chain)
Network management	• LLDP (Link Layer Discovery Protocol) • SNMP V1 (Simple Network Management Protocol) • MIB (Management Information Base)
Additional supported features	• DCP (Discovery and Configuration Protocol) • VLAN- and priority tagging • Shared device • RTC (Real Time Cyclic) protocol: Class 1
Transmission speed	100 MBit/s full duplex
Data transport layer	EtherNet II, IEEE 802.3
Maximum supported conformance class	CC-B
Media Redundancy (for ring topology)	MRP client is supported
Minimum cycle time	64 ms
Input cyclic data (device to IO-controller or device to IO-supervisor)	• All diagnostics and errors informations are with the highest priority and can be read by a PLC (refer to the supplement related to the digital communication for the Type 8619). • AI / DI / AO / DO: value, status, unit • Device and modules: status • Functions: value, status, unit • PVC: value, status, unit
Output cyclic data (IO-controller to device or IO-supervisor to device)	20 Process Variables Network (PVN)
Multiple Application Relations (AR)	Stack can simultaneously process up to 2 IO-ARs, 1 Supervisor-DA AR
GSDml file	Available at / Download from: country.burkert.com

AI = Analogue Input, AO = Analogue Output, DI = Digital Input, DO = Digital Output.

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6.11.3 EtherNet/IP protocol

Protocol	Internet protocol, version 4 (IPv4)
Network topology	• Tree • Star • DLR (Device Level Ring) for closed daisy chain • Linear for open daisy chain
IP configuration	• Fixed IP • BOOTP (Bootstrap Protocol) • DHCP (Dynamic Host Configuration Protocol)
CIP reset services (Common Industrial Protocol)	Reset service (type 0 or type 1) of the Identity object
Transmission speed	10 and 100 MBit/s
Duplex modes	Half duplex, full duplex, auto-negotiation
Data transport layer	EtherNet II, IEEE 802.3
MDI modes (Medium Dependant Interface)	auto-MDIX
Predefined standard objects	• Identity (0x01) • Message Router (0x02) • Assembly (0x04) • Connection Manager (0x06) • DLR (0x47) • QoS (0x48) • I/O main board M0 (0x64) • Functions (0x65) • Extension modules (0x66) • Ethernet module (0x67) • TCP/IP Interface (0xF5) • EtherNet Link (0xF6)
RPI (Requested Packet Interval)	• minimum: 100 ms • maximum: 9999 ms
Input (Consumer to Producer or Adapter to Scanner)	• All diagnostics and errors informations are with the highest priority and can be read by a PLC (refer to the supplement related to the digital communication for the Type 8619). • AI / DI / AO / DO: value, status, unit • Device and modules: status • Functions: value, status, unit • PVC: value, status, unit
Output (Producer to Consumer or Scanner to Adapter)	20 Process Variables Network (PVN)
EDS file	Available at / Download from: country.burkert.com

AI = Analogue Input, AO = Analogue Output, DI = Digital Input, DO = Digital Output, Consumer = Server, Producer = Client, Adapter = Server, Scanner = Client.

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7 INSTALLATION AND WIRING

7.1 Safety instructions

DANGER

Risk of injury due to electrical voltage.

- If a 12..36 V DC wall-mounted version is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Before carrying out work on the system, disconnect the electrical power for all the conductors and isolate it.
- All equipment connected to the device must be double insulated in relation to the mains according to the standards UL/EN 61010-1.
- Observe all applicable accident protection and safety regulations for electrical equipment.

WARNING

Risk of injury due to non-conforming installation.

- Electrical installation can only be carried out by qualified and skilled staff with the appropriate tools.
- Fit a circuit breaker or a switch to the electrical installation in which the device is installed.
- Install the circuit breaker or the switch in a place which is easy to reach.
- Identify the circuit breaker or the switch as the electrical power cut-off system for the device.
- Install appropriate overload safety devices. For a version powered by 110...240 V AC, insert overcurrent protective devices in the live conductor and in the neutral conductor.
- Do not power a device, version 12...36 V DC, with an alternating voltage or with a direct voltage higher than 36 V DC +10 %.
- Do not power a device, version 110...240 V AC, with a direct voltage or with an alternating voltage higher than 240 V AC.
- Observe the standard NF C 15-100 / IEC 60634.
- Use preferably probes or sensors sold by Bürkert.
- Read and follow the Operating Instructions manuals of all the instruments connected to the device.
- On a 8619 multiCELL WM, only authorized personnel may insert in or remove the memory card from the reader/recorder.

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.

For the Ethernet installation, observe the standard ISO / IEC 61918.

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

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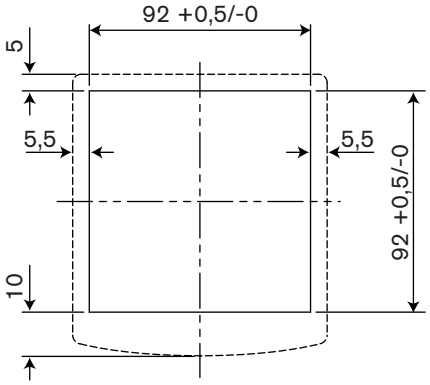
7.2 Installation procedure

1. To carry out mechanical installation: Depending on the version, follow the instructions in section 7.2.1 or 7.2.2.
2. To wire the device: Depending on the version, follow the instructions in section 7.3.

7.2.1 Installing a 8619 multiCELL on an enclosure or electrical cabinet

→ Follow the instructions below to mount the device, delivered fully assembled, onto an enclosure or cabinet.



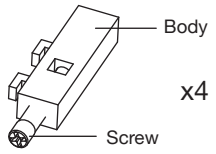
This diagram is not to scale.
The dimensions are given in mm.

Step 1:

→ Check that the thickness of the door of the enclosure or cabinet is less than 4 mm.

→ Ensure there will be sufficient space around the cut out hole and on the inside of the cabinet to easily accommodate the 4 fasteners.

→ Cut a hole in the door of the enclosure or electrical cabinet according to standard CEI 61554:1999 (DIN 43700).

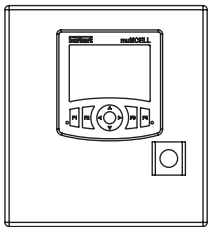


Step 2:

Prepare the 4 fasteners:

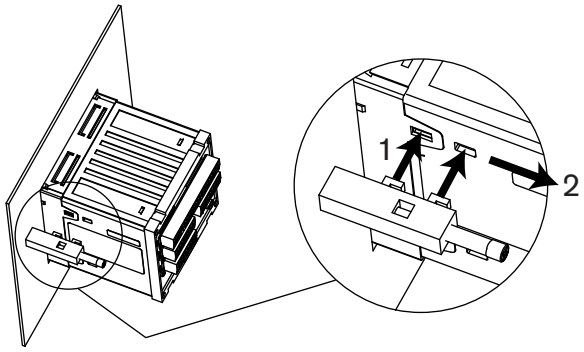
→ Insert a screw into each device.

→ Tighten the screw until the end of the shaft of the screw is flush with the device.



Step 3:

→ Slide the housing into the cut-out with the connectors to the back, until it can go no further.



Step 4:

→ Insert (1) the hooks on the first fastener into the slots on the housing.

→ Pull the fastener (2).

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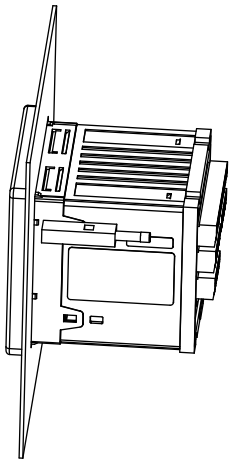
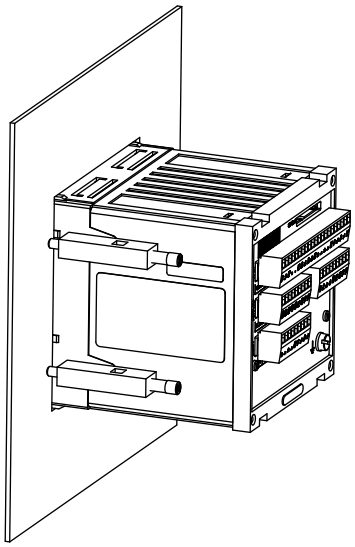
	Step 5: → Place the fastener flush against the device by hand, so that the hooks remain in place. Step 6: → Fully tighten the screws using an appropriate screwdriver.
	→ Repeat steps 4 to 6 to fit the remaining 3 fasteners.

Fig. 11: Panel mounting of the device on an enclosure or cabinet

7.2.2 Installing a 8619 multiCELL WM on a support

NOTICE

Risk of material damage the cable glands are loosened. The body of the cable glands are screwed into the housing at the factory with a torque of 5.5 Nm (4.06 lbf·ft)

▸ Before installing the wall-mounting housing on its support, check that the bodies of the cable glands are tightened. If the bodies of the cable glands are loose, tighten them with a torque of 5.5 Nm ± 20 % (4.06 lbf·ft ± 20 %).

The 8619 multiCELL WM is installed on a support using the wall-mounting fastening plate.

→ Choose a location such that:

- The surface is plane.
- The surface temperature of the support remains below 100 °C.
- The display is at eye level.
- There is sufficient space to open the housing by 180°.

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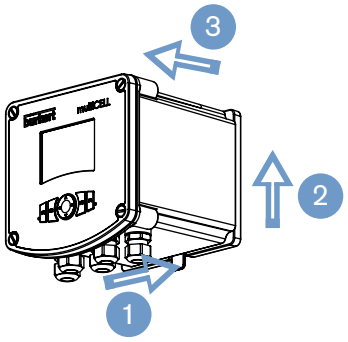
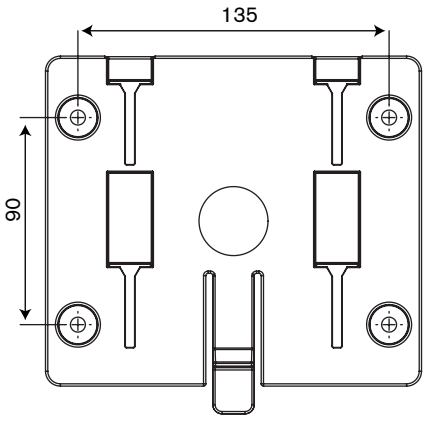


Step 1: Removing the wall-mounting fastening plate from the device.

1. Press the tab to unlock the device.
2. Lift the device.
3. Separate the device from the wall-mounting fastening plate.



This diagram is not to scale.
The dimensions are given in mm.

Step 2: Installing the wall-mounting fastening plate on the support.

The screws and washers are not provided.

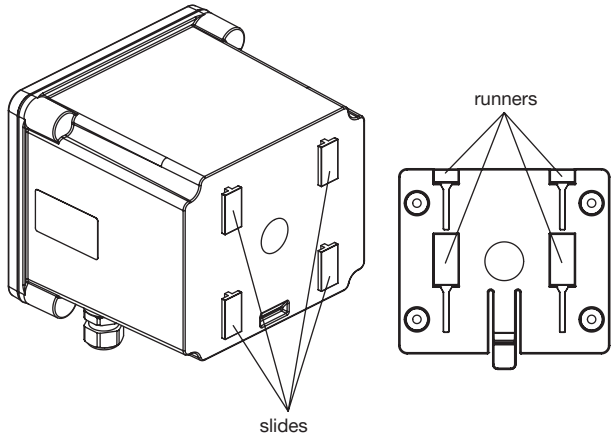
→ Drill holes in the support according to the dimensions indicated on the diagram to the left.

→ Use 4 screws of 6 mm diameter, which will support the weight of the device and are suitable for the support.

→ Insert a washer for each screw.

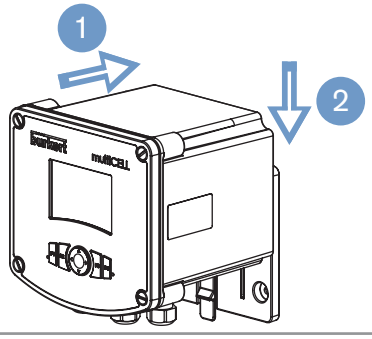
→ Insert the 4 screws in the wall-mounting fastening plate and in the holes drilled in the support.

→ Tighten the 4 screws in a crosswise manner, with a maximum torque of 5.3 Nm (3.91 lbf·ft).



Step 3: Installing the device on the fastening plate.

→ Align the base of the slides with the height of the runners.



→ Insert the 4 slides into the 4 runners until you hear a click.

Fig. 12: Installation of a 8619 multiCELL WM on a support

7.3 Electrical wiring

DANGER

Risk of injury due to electrical voltage.

- If a 12...36 V DC wall-mounted version is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Before carrying out work on the system, disconnect the electrical power for all the conductors and isolate it.
- All equipment connected to the device must be double insulated in relation to the mains according to the standards UL/EN 61010-1.
- Observe all applicable accident protection and safety regulations for electrical equipment.

On the rear plate of the device, depending of the version of the device that you order, caps blank off the free slots.

- Do not remove the caps of the rear plate.

For the Ethernet installation, observe the standard ISO / IEC 61918.

7.3.1 Recommendations for wiring a 8619 multiCELL WM

NOTICE

On a 8619 multiCELL WM, the ribbon cable which connects the display to the electronic board can be damaged.

- Open and close the cover of the housing with care.
- Do not pinch the ribbon cable.
- Do not pull the ribbon cable.
- Manipulate the ribbon cable with care.
- If the ribbon cable is disconnected, reconnect it with care.

NOTICE

A 8619 multiCELL WM may be damaged if the device is not tight.

- Make sure the nuts of the unused cable glands are tightened (at the factory, a stopper gasket has been inserted in each cable gland).
- When the mechanical installation and wiring are completed, tighten the cable gland screws with a torque of 4.5 Nm ± 20 % (3.32 lbf·ft ± 20 %).
- When the mechanical installation and wiring are completed, tighten the 4 screws of the cover in a crosswise manner with a torque of 1.4 Nm ± 20 % (1.03 lbf·ft ± 20 %).

→ Before wiring the device, install it according to the instructions in section 7.2.1 or section 7.2.2.

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7.3.2 Specifications of the cables and conductors

→ Use shielded cables (not provided) with a maximum operating temperature greater than 90 °C.

→ Use cables and electric wires with dimensions that respect the specifications described in Table 4.

→ For an Ethernet version, use RJ45 cables that respect the specifications described in Table 5.

The electrical connections are carried out via terminal blocks and, on an Ethernet version, via RJ45 ports:

- Directly, on a 8619 multiCELL.
- Via the cable glands, on a 8619 multiCELL WM.

Table 4: Specifications of the cables and conductors for the terminal blocks

External diameter of the cable (8619 multiCELL WM)	6...12 mm (4 mm if using a multiple entry seal)
Cross-section of the local earth connection conductor (12...36 V DC versions)	0.75...1.5 mm^2
Cross-section of the protective earth connection conductor (110...240 V AC versions)	min. 1.5 mm^2
Rigid conductor cross-section H05(07) V-U	0.2...1.5 mm^2, stripped over 7 mm
Flexible conductor cross-section H05(07) V-K	0.2...1.5 mm^2, stripped over 7 mm
Cross-section of a conductor with a non-insulated lug	0.2...1.5 mm^2, stripped over 7 mm
Cross-section of a conductor with an insulated lug	0.2...0.75 mm^2, stripped over 7 mm

Table 5: Specifications of the RJ45 cable

To make sure the door of a wall-mounted Ethernet version can be fully closed, use RJ45 male connectors with maximum dimensions of 45 mm, including the bend radius of the Ethernet cable.

Shielded cable	minimum required: FTP
Minimum category	5e / CAT-5
Length	max. 100 m

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7.3.3 Wiring the 12...36 V DC electrical supply for a 8619 multiCELL

→ Use a filtered and regulated 12...36 V DC electrical power supply.

→ Wire the 12...36 V DC power supply on the main board "M0" of a 8619 multiCELL.

→ Connect the functional earth of the installation to the earth screw of the device (see section 5, Fig. 1) using a lug with an eyelet, suitable for the M4 earth screw and earth conductor. Tighten to the torque of 1 Nm ± 20 % (0.74 lbf·ft ± 20 %).

→ Connect the shielding on each wire to an "FE" (functional earth) terminal to guarantee the equipotentiality of the installation.

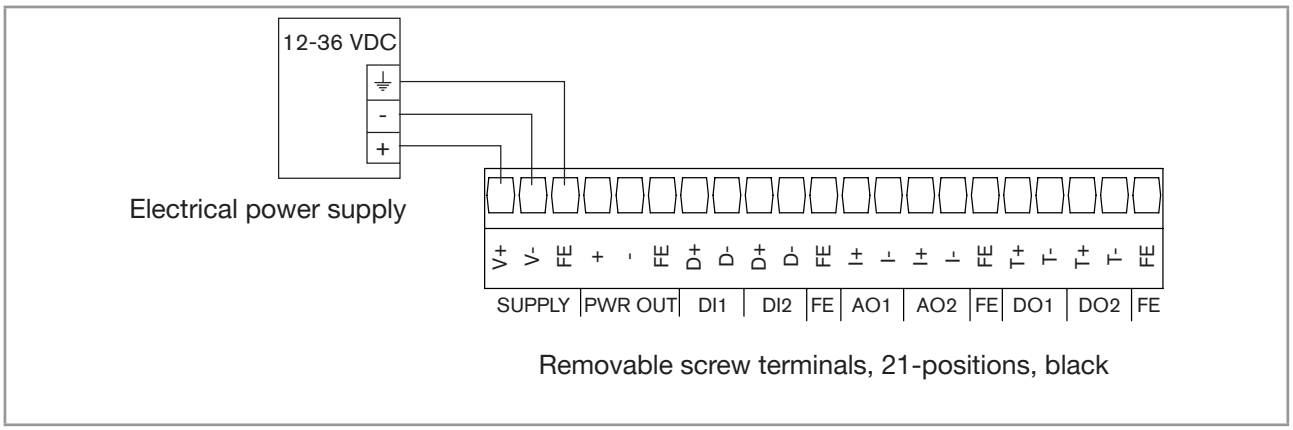

Fig. 13: Wiring the 12...36 V DC electrical supply for a 8619 multiCELL

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7.3.4 Wiring the 12...36 V DC electrical supply for a 8619 multiCELL WM DC

→ Use a filtered and regulated 12...36 V DC electrical power supply.

→ Use the rightmost cable gland for the electrical power supply cable.

→ Wire the 12...36 V DC power supply for a 8619 multiCELL WM on a terminal block marked 12...36 V DC.

→ Connect the functional earth of the installation to the earth screw of the device (see section 5, Fig. 2) using a lug with an eyelet, suitable for the M4 earth screw and earth conductor. Tighten with a torque of 1 Nm ± 20 % (0.74 lbf·ft ± 20 %).

→ Connect the shielding on each wire to an "FE" (functional earth) terminal to guarantee the equipotentiality of the installation.

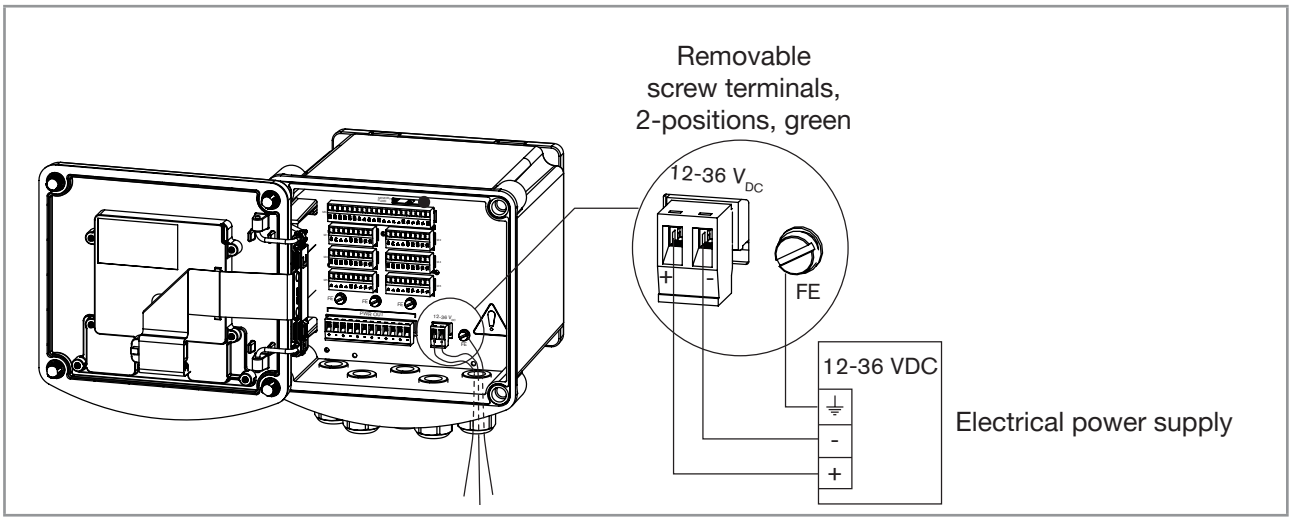

Fig. 14: Wiring the 12...36 V DC electrical supply for a 8619 multiCELL WM

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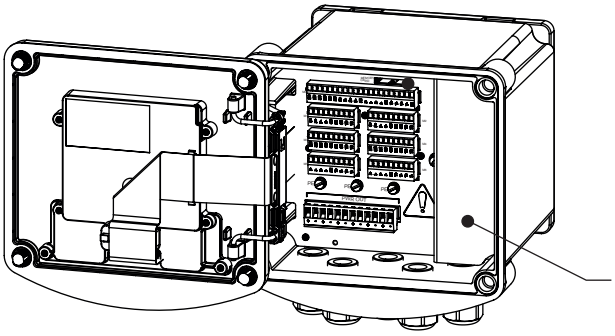
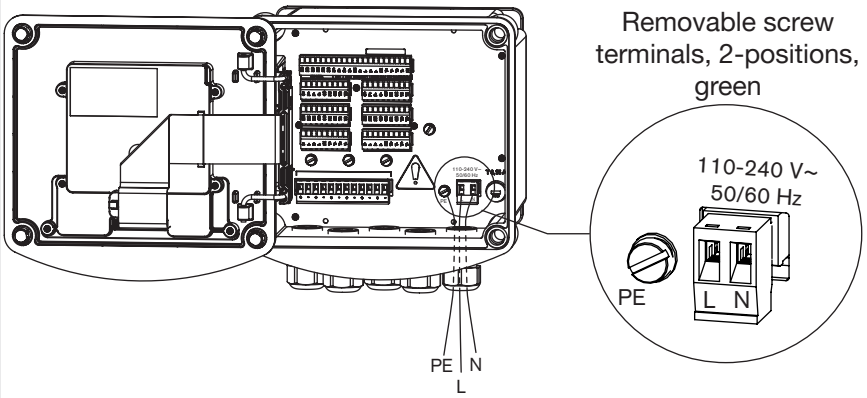
7.3.5 Wiring the 110...240 V AC electrical supply for a 8619 multiCELL WM AC



→ Unscrew and remove the protective cover of the power supply connection terminal block.



→ Use the rightmost cable gland for the electrical power supply cable.

→ Wire the 110...240 V AC power supply for a 8619 multiCELL WM AC on a terminal block marked 110...240 V AC.

→ Connect the protective earth of the installation to the earth screw of the device (see section 5, Fig. 3) using a lug with an eyelet, suitable for the M4 earth screw and earth conductor. Tighten with a torque of 1 Nm ±20 % (0.74 lbf·ft ±20 %).

L: Live conductor

N: Neutral conductor

→ Put in place and screw on the protective cover.

Fig. 15: Wiring the 110...240 V AC electrical supply for a 8619 multiCELL WM AC

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7.3.6 Supplying an external instrument via a 8619 multiCELL

The device in a panel-mounted version can be used to supply an external instrument, for example a flow sensor, with a voltage identical to the supply voltage of the device.

The power supply is available on the main board "M0" of a 8619 multiCELL.

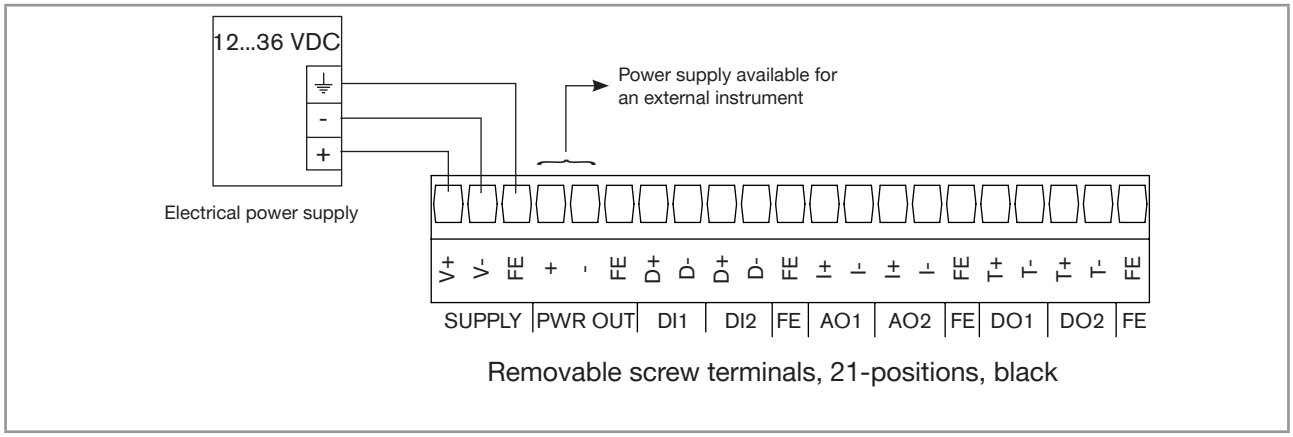

Fig. 16: Supplying an external instrument via a 8619 multiCELL

7.3.7 Supplying an external instrument via a 8619 multiCELL WM

The device can be used to supply power to several external instruments, such as flow sensors or conductivity sensors for example.

→ To supply power to an external instrument, connect it to a positive and negative screw terminal on the terminal block "POWER OUT".

The voltage available on the green terminal block "POWER OUT" of a 8619 multiCELL WM:

- is equal to the supply voltage of the 8619 multiCELL WM DC which is supplied with a voltage of 12...36 V DC.
- is equal to a voltage of 24 V DC on a 8619 multiCELL WM AC which is supplied with a voltage of 110...240 V AC.

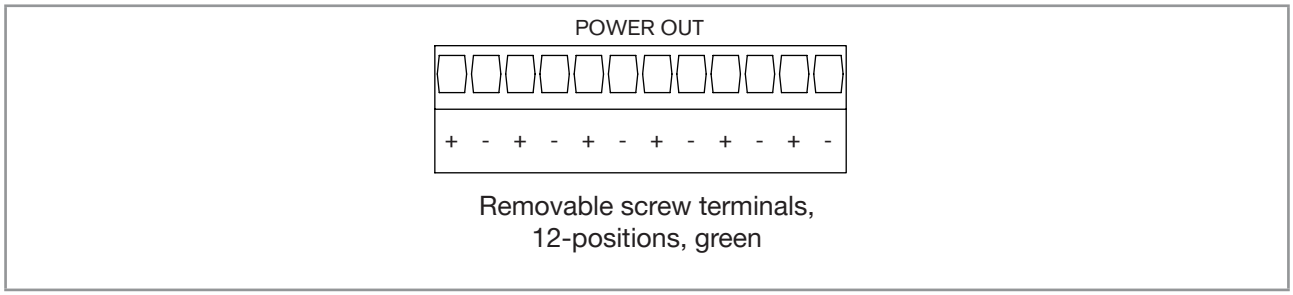

*Fig. 17: Supplying external instruments via a 8619 multiCELL WM **

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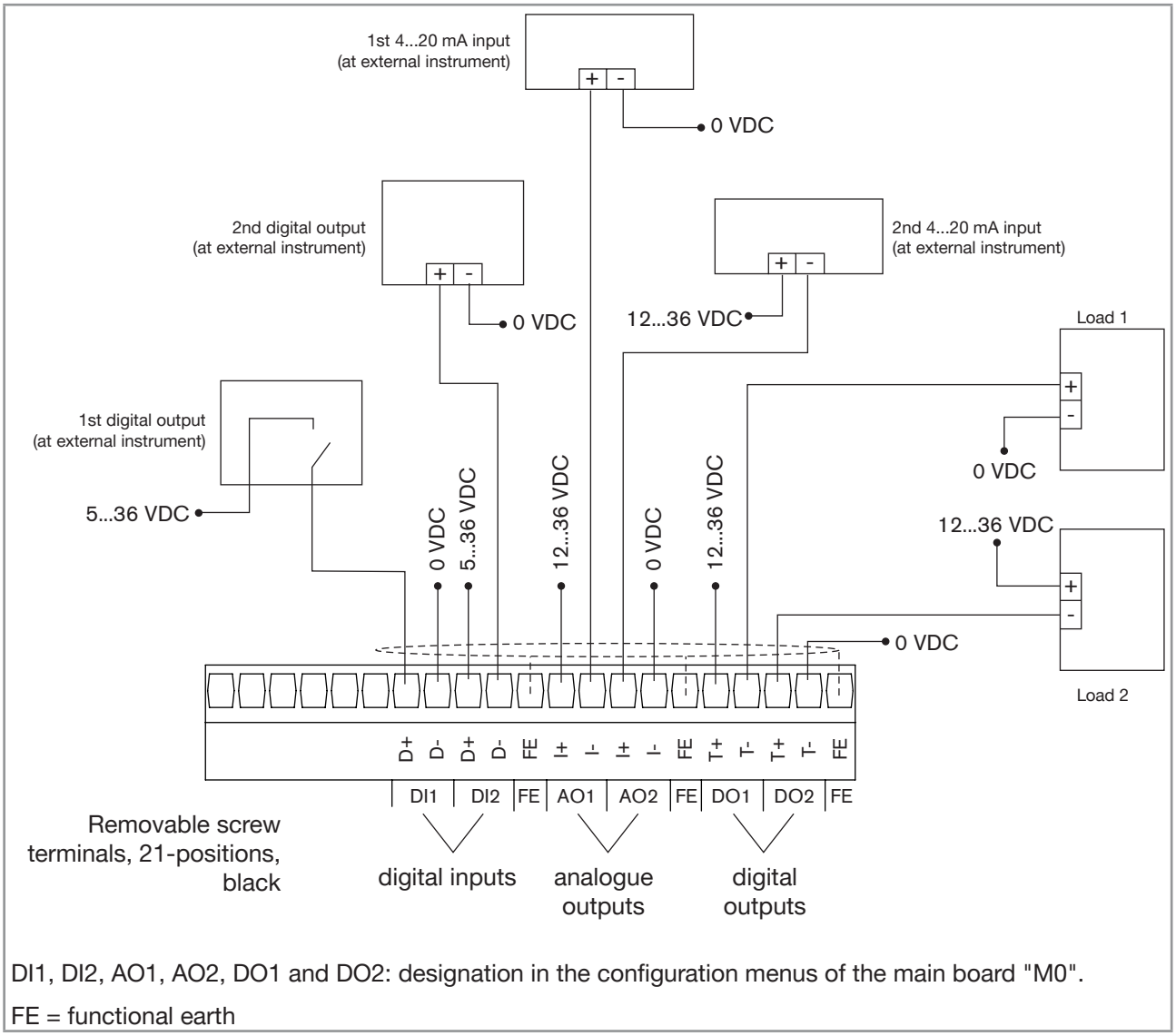
7.3.8 Wiring the inputs and outputs on the main board "M0"

The main board "M0" has:

- 2 digital inputs (marked DI1 and DI2), for connecting a flow sensor for example
- Two 4...20 mA analogue outputs (marked AO1 and AO2)
- 2 digital outputs (marked DO1 and DO2)

The inputs and outputs are galvanically insulated and therefore floating.



DI1, DI2, AO1, AO2, DO1 and DO2: designation in the configuration menus of the main board "M0".

FE = functional earth

Fig. 18: Wiring the inputs and outputs on the main board "M0"

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7.3.9 Examples of the connection of flowmeters to a 8619 multiCELL

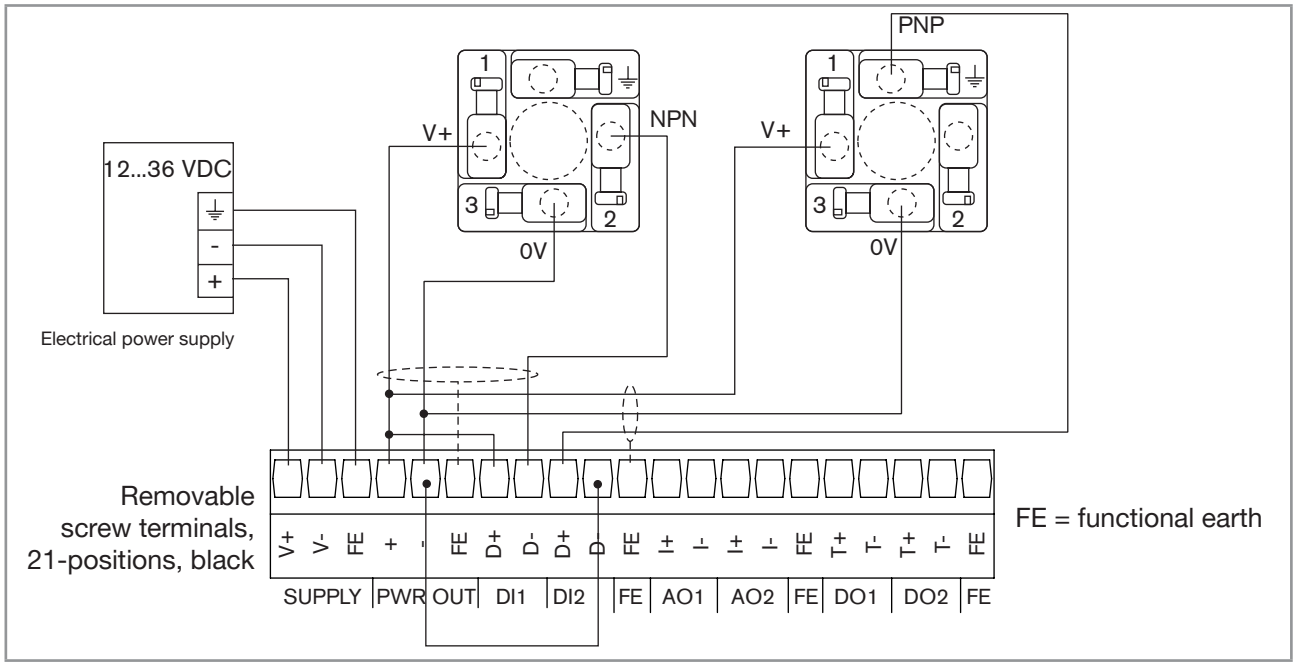

Fig. 19: Wiring 2 flow sensors Type 8030 via 2 connectors Type 2508 or Type 2518

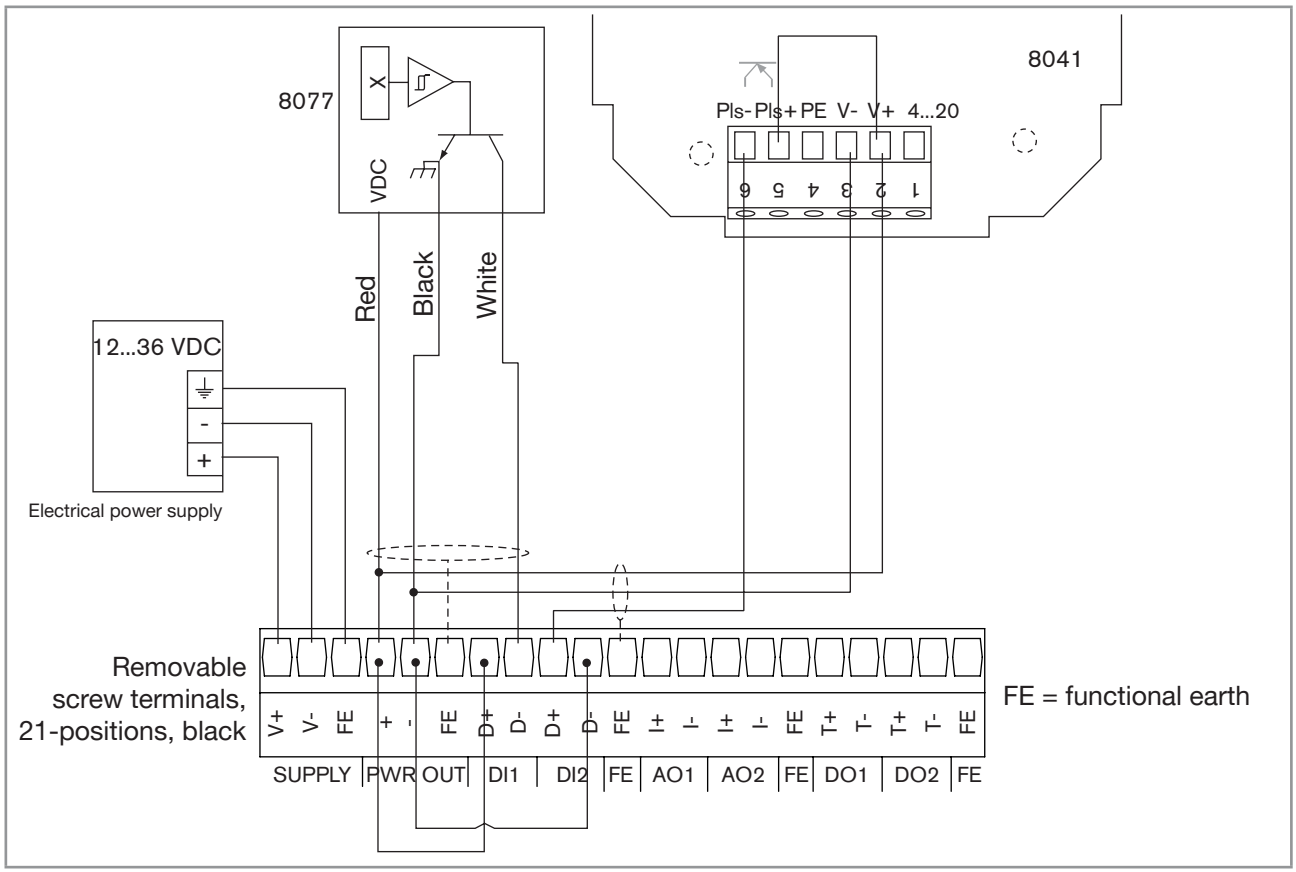

Fig. 20: Wiring a flow sensor Type 8077 and a flow sensor Type 8041

7.3.10 Examples of the connection of a solenoid valve to a 8619 multiCELL WM

The solenoid valve can be connected to the device via main board "M0" or via the output module "OUT".

If a solenoid valve is connected to the device, connect a flyback diode in parallel to the solenoid valve. If the solenoid valve is connected via a Type 2508 or via a Type 2518 connector, this connector is available with an integrated flyback diode.

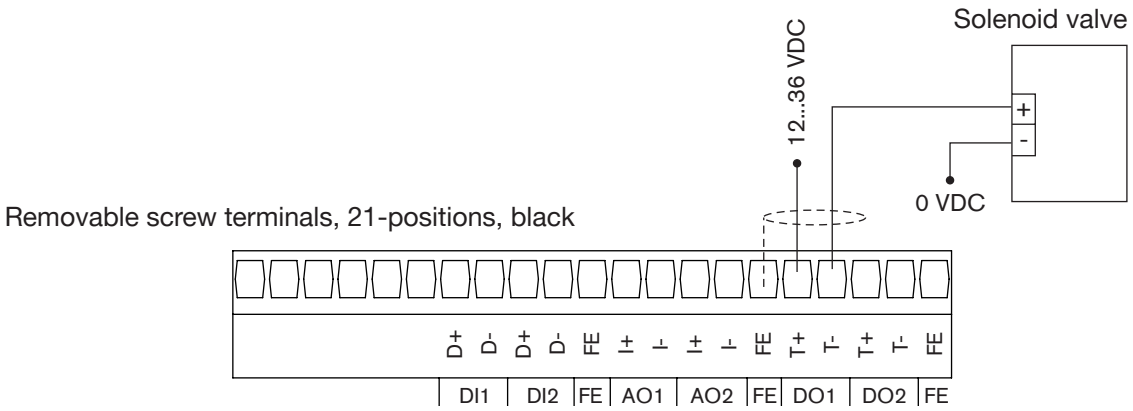

Fig. 21: Wiring a solenoid valve to the main board "M0" of the device

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7.3.11 Identifying the pins on the extension modules

If you use terminal blocks other than those supplied with the device, these terminal blocks will not be marked.

Fig. 22 enables labelling of the terminals.

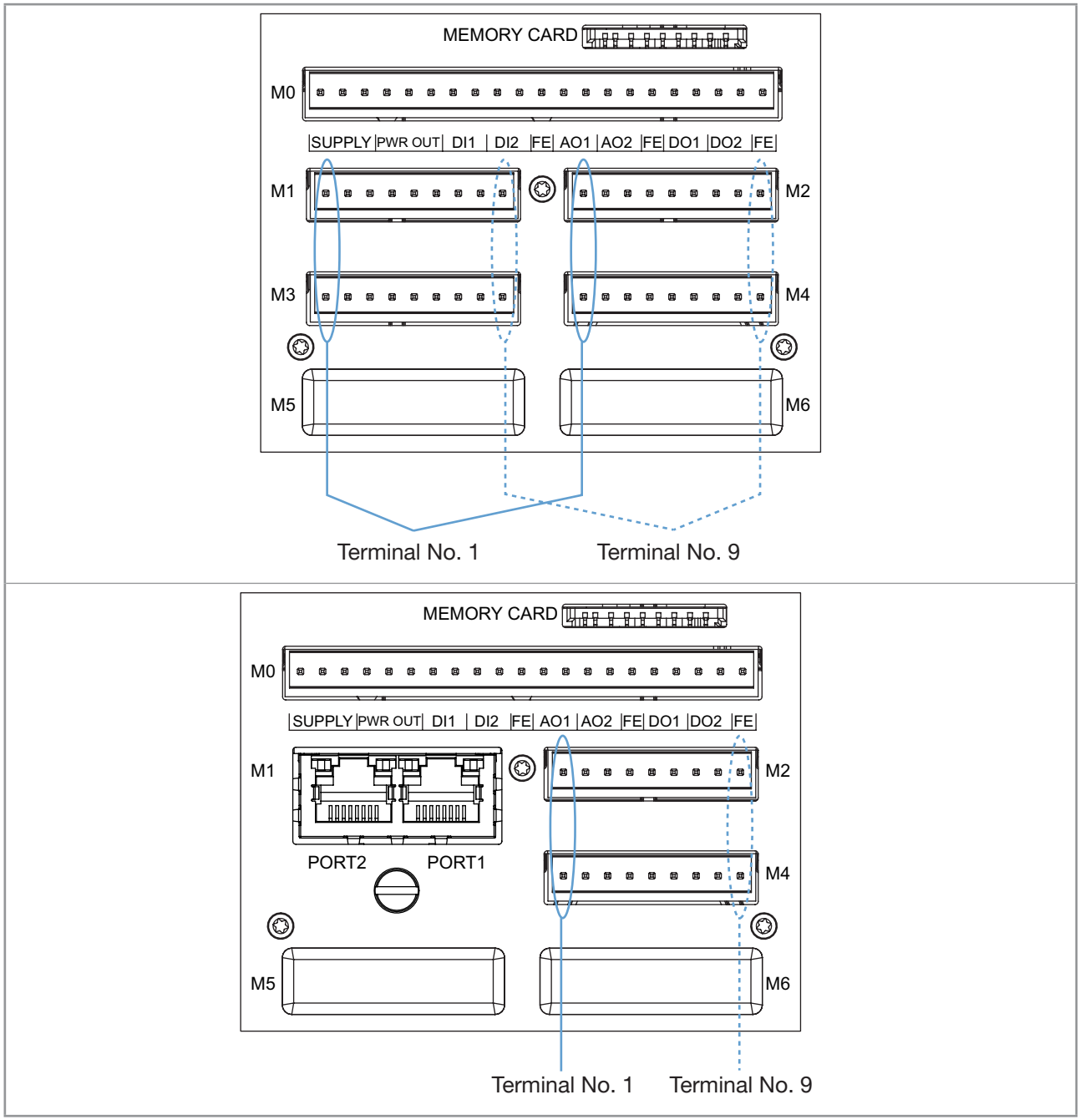

Fig. 22: Identifying the terminals on the extension modules

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7.3.12 Wiring the Industrial Ethernet

WARNING

Risk of injury due to non-conforming installation.

▸ Electrical installation can only be carried out by qualified and skilled staff with the appropriate tools.

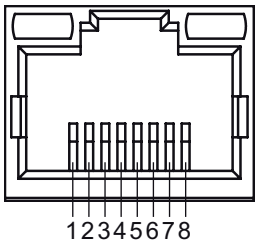
RJ45 port	Pin	Pin assignment
	1	TX+
	2	TX–
	3	RX+
	4	N. C.
	5	N. C.
	6	RX–
	7	N. C.
	8	N. C.
	Housing	FE

Fig. 23: Pin assignment of each RJ45 port

You can prepare a connection cable for wall-mounted version as described below, or you can use an adapter RJ45-M12. See chapter 17.

Preparing a connection cable for a wall-mounted version:

→ Choose an RJ45 male connector for industrial use

Shielded cable	minimum required: FTP
Minimum category	5e / CAT-5
Length	max. 100 m

→ To make sure the door of the device can be fully closed, use RJ45 male connectors with maximum dimensions of 45 mm including the bend radius of the Ethernet cable.

→ Insert the cable via the cable gland of the device.

→ Insert the wires as specified by the manufacturer of the RJ45 male connector and according to ISO / IEC 11801.

→ Crimp the RJ45 male connector.

→ Insert the RJ45 connector in the RJ45 port.

→ Do the settings of the Ethernet connection. Refer to the Supplement related to the digital communication for the Type 8619, available on: country.burkert.com.

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7.3.13 Connection example of the Ethernet module

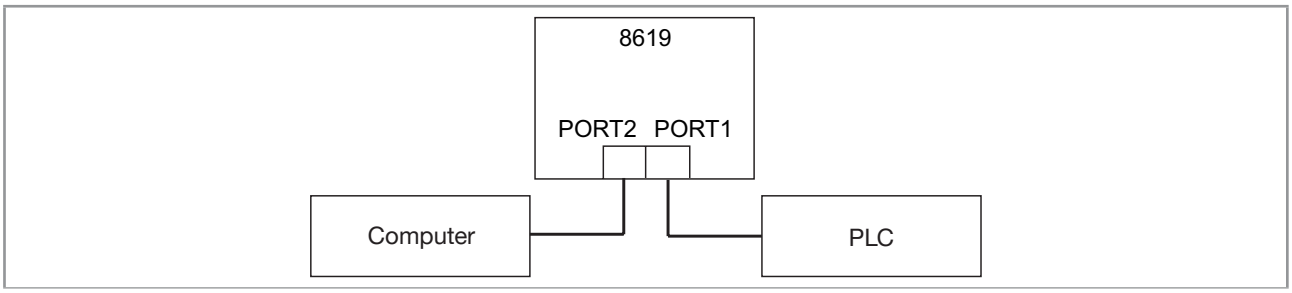

Fig. 24: Connection example of a computer and a PLC to the Ethernet module

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7.3.14 Wiring the module "INPUT"

The module "INPUT" has:

- Two analogue inputs;
- Two digital inputs.

The inputs are galvanically insulated, and therefore floating.

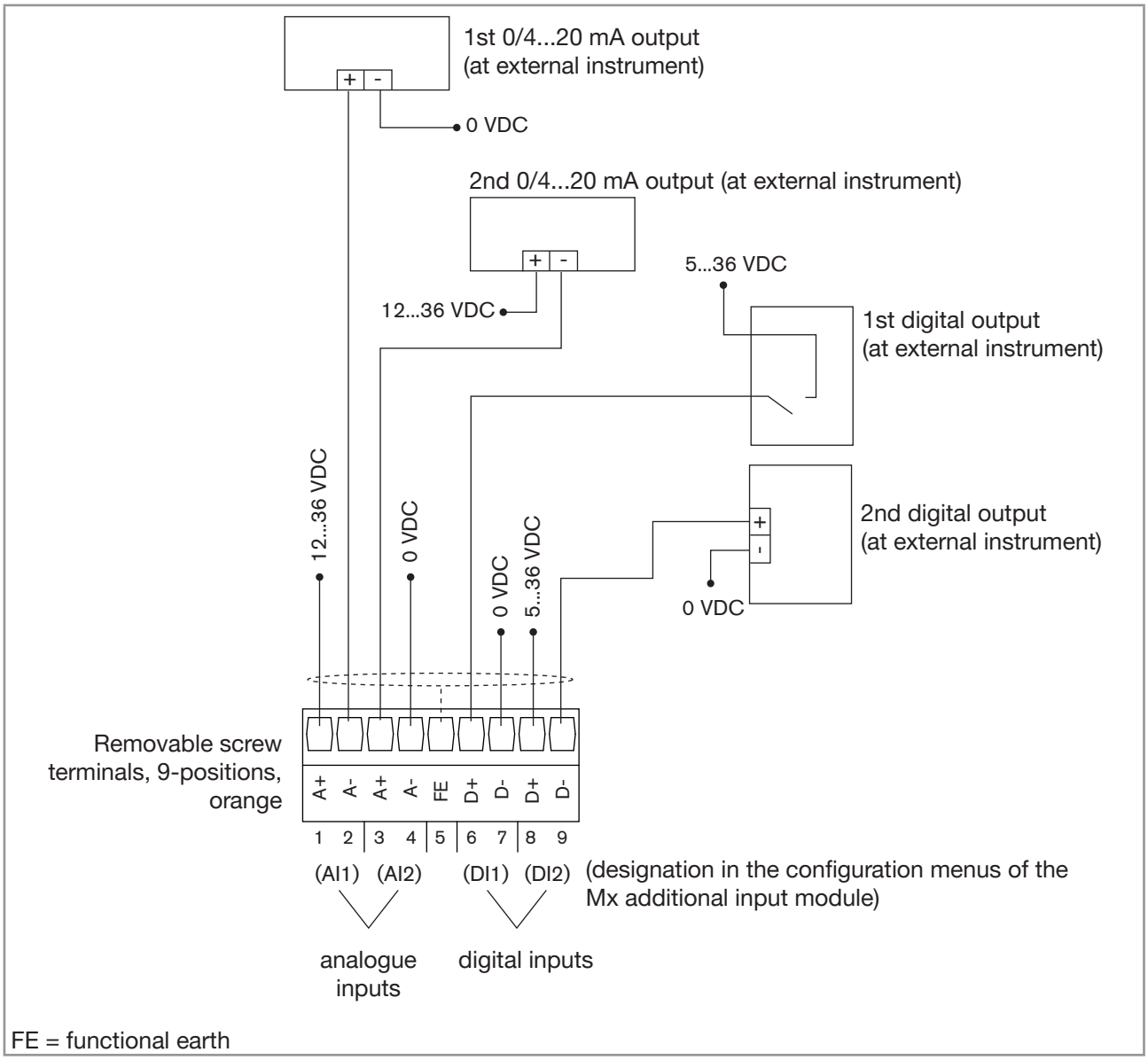

Fig. 25: Connecting the analogue inputs to a 2-wire current transmitter and connecting the digital inputs of the module "INPUT"

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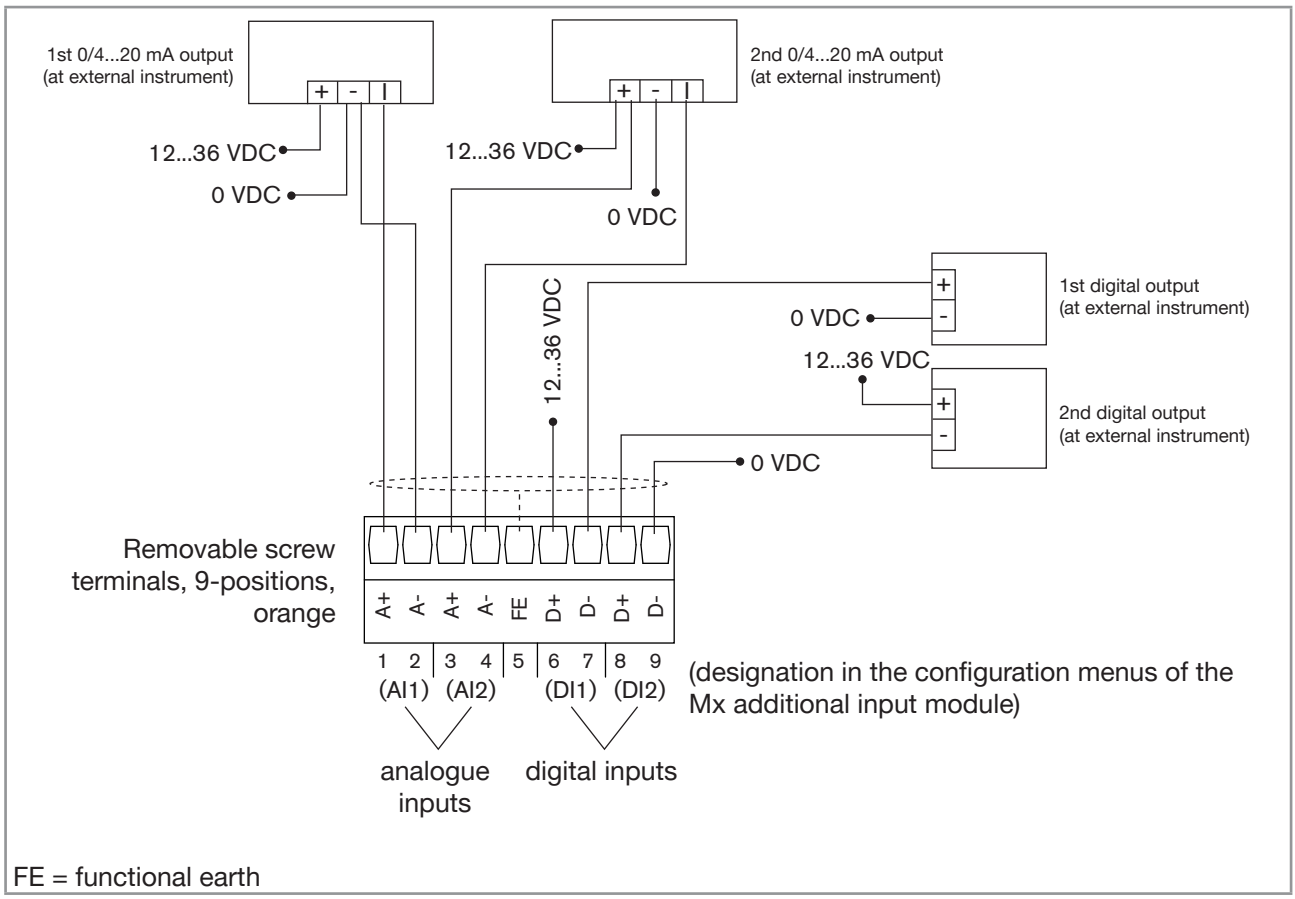

Fig. 26: Connecting the AI1 analogue input in source mode and the analogue input AI2 in sinking mode to a 3-wire current transmitter (for example Type 8025 with relay outputs) and connecting the digital inputs of the module "INPUT"

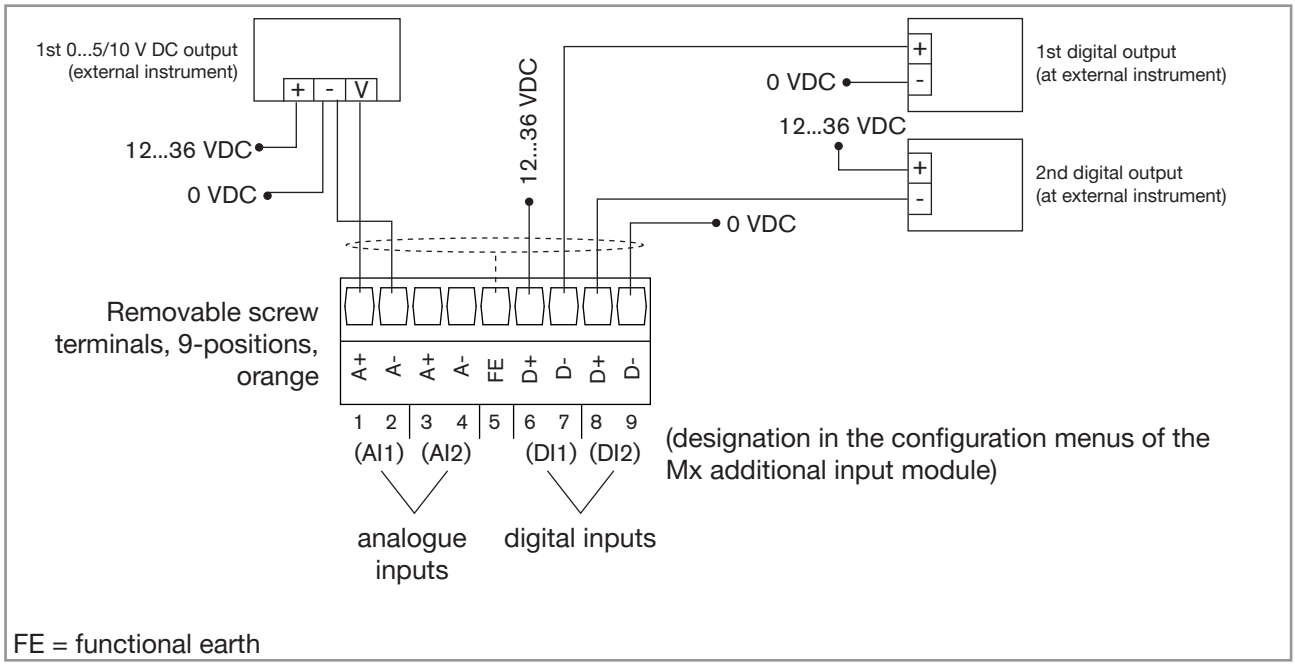

Fig. 27: Connecting the analogue inputs to a voltage transmitter and connecting the digital inputs of the module "INPUT"

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7.3.15 An example of the connection of a chlorine sensor Type 8232 (article number 568523 or 568524) to the module "INPUT"

NOTICE

The chlorine sensor Type 8232 may be damaged by the electrical power supply.

▸ Power the chlorine sensor with a voltage 12...30 V DC.

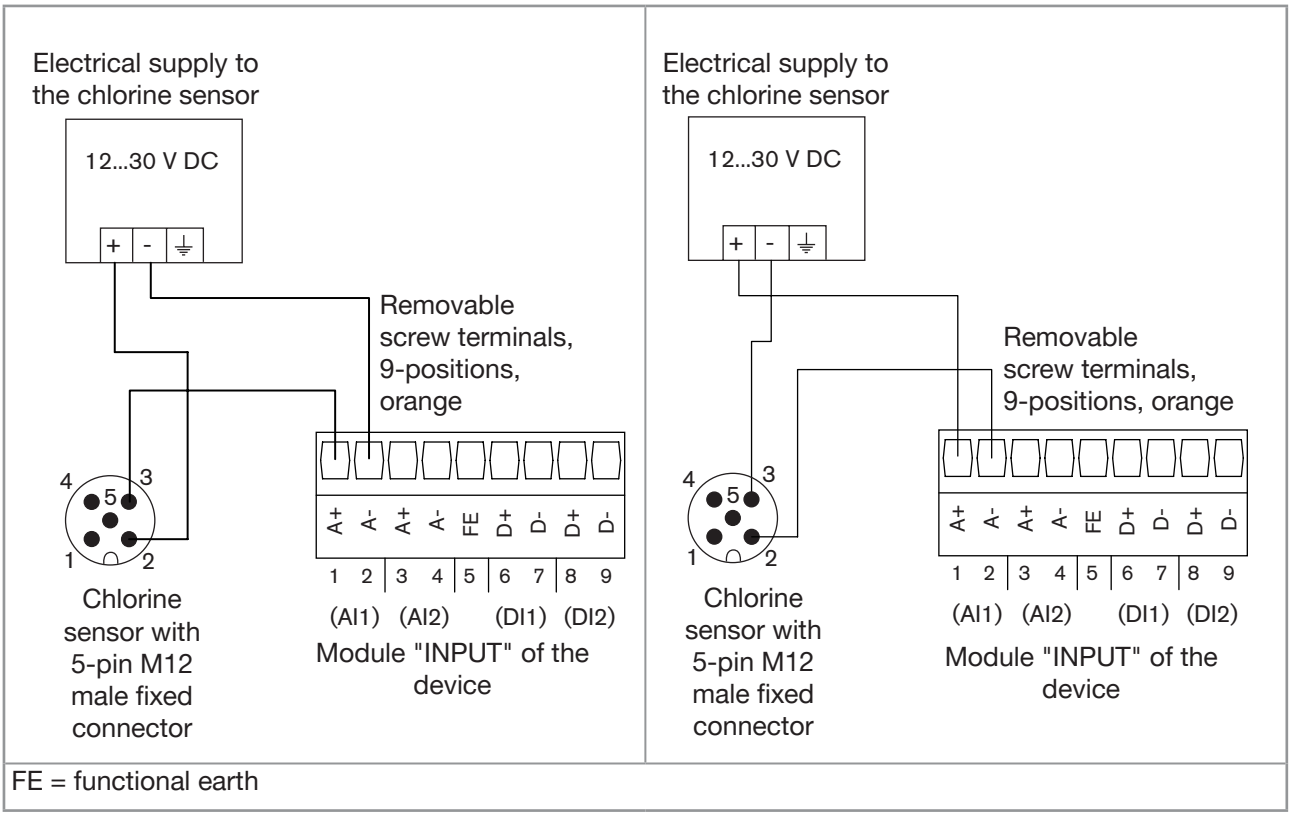
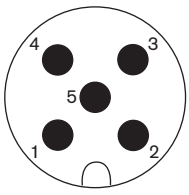


Fig. 28: Possible connections of a chlorine sensor Type 8232 (article number 568523 or 568524) powered by an external voltage source



1: Not connected
2: V+ (white, if cable with article number 438680, 560365 or 563108 is used)
3: 0 V DC (blue, if cable with article number 438680, 560365 or 563108 is used)
4: Not connected
5: Not connected

Fig. 29: Pin assignment of the 5-pin M12 male fixed connector of the sensor Type 8232

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7.3.16 Example of the connection of a chlorine sensor Type 8232 (article number 565164) to the module "INPUT"

NOTICE

The chlorine sensor Type 8232 may be damaged by the electrical power supply.

▸ Power the chlorine sensor with a voltage 9...30 V DC.

Colour of the conductor for chlorine sensor (article number 565164)	Signal
Green	Negative voltage signal
Yellow	Positive voltage signal
White	Positive supply
Brown	Negative supply

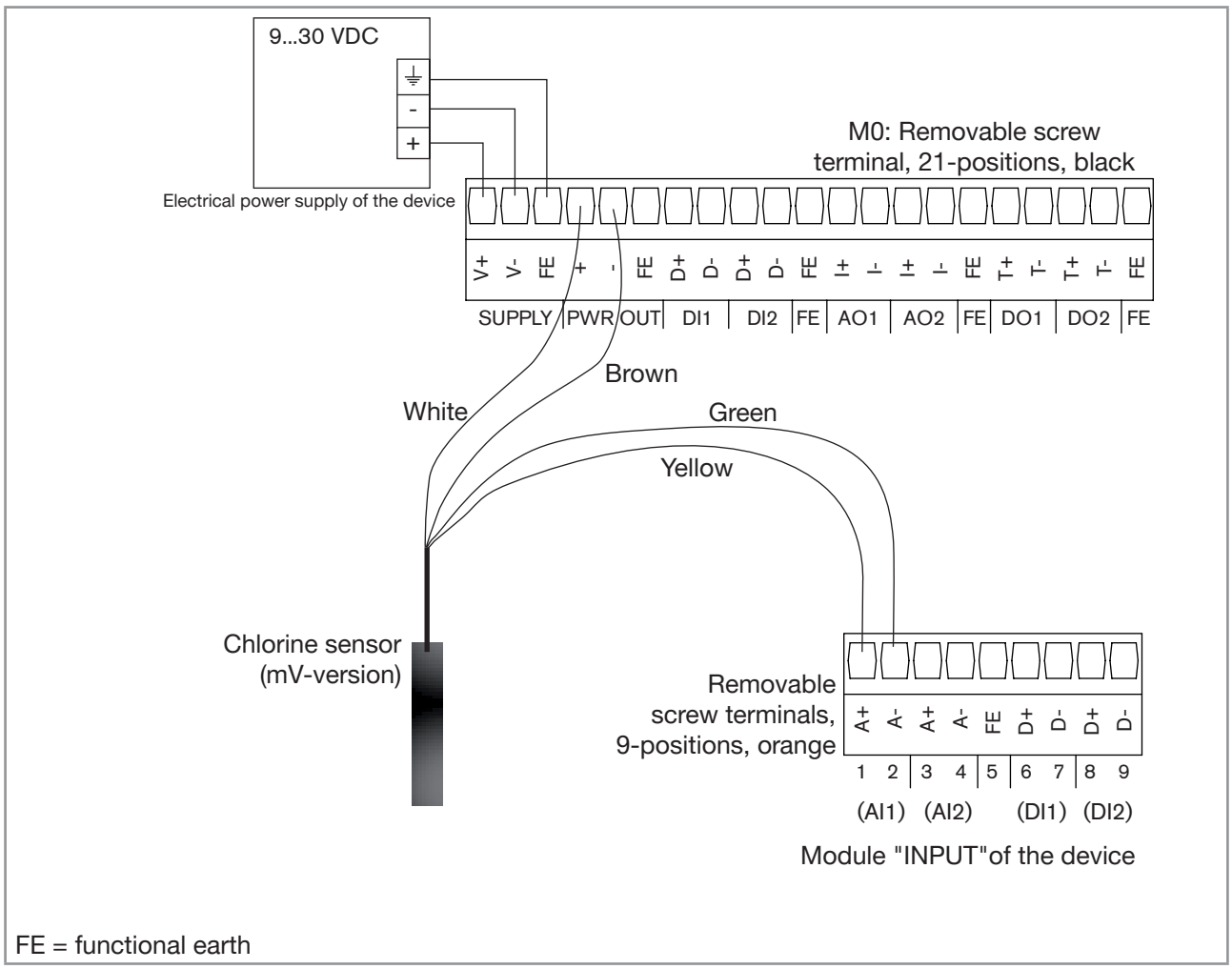

Fig. 30: Connection of the chlorine sensor Type 8232 (mV-version, with article number 565164), powered via the 8619 multiCELL

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7.3.17 Wiring the output module "OUT"

The module "OUT" has:

- Two 4...20 mA analogue outputs;
- Two digital outputs.

The outputs are galvanically insulated, and therefore floating.

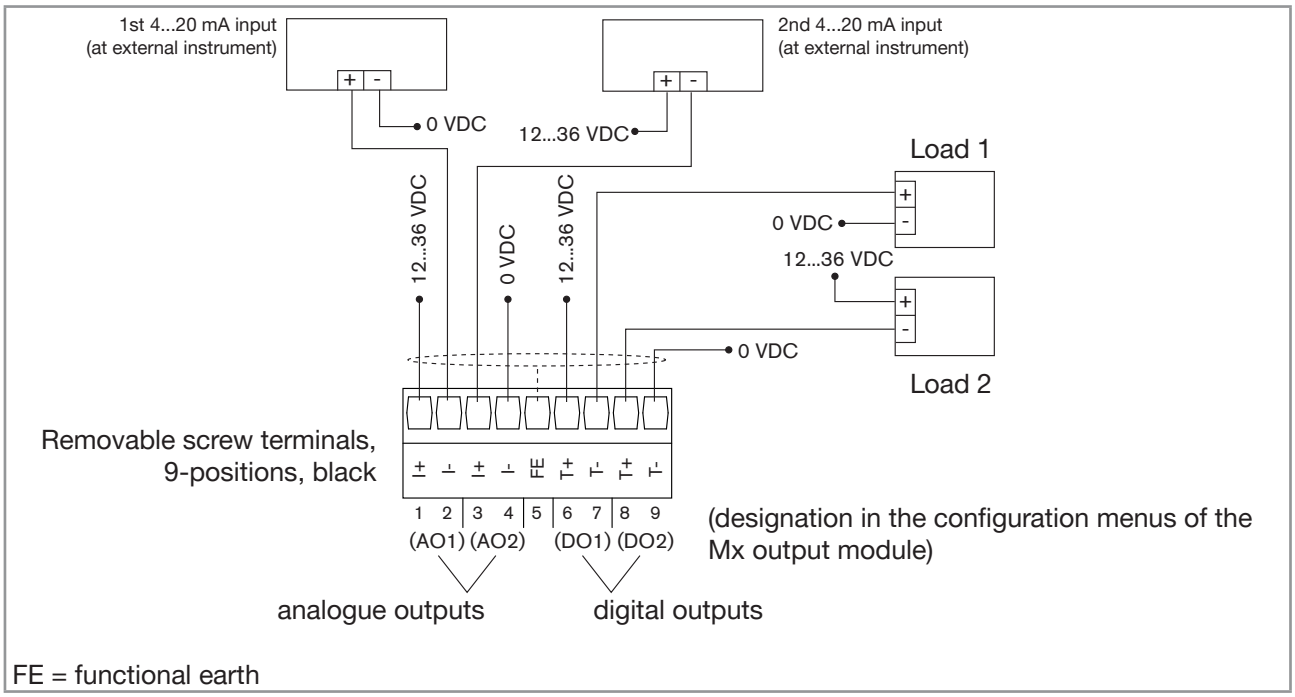

Fig. 31: Wiring the output module "OUT"

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7.3.18 Wiring the "pH/ORP" module

- To avoid the influence of disturbances, wire the pH sensor in symmetric mode. In this case, it is compulsory to wire the equipotential electrode.
- When the pH sensor is wired in asymmetrical mode, measurement of the pH may drift over time when the equipotential electrode is not wired.

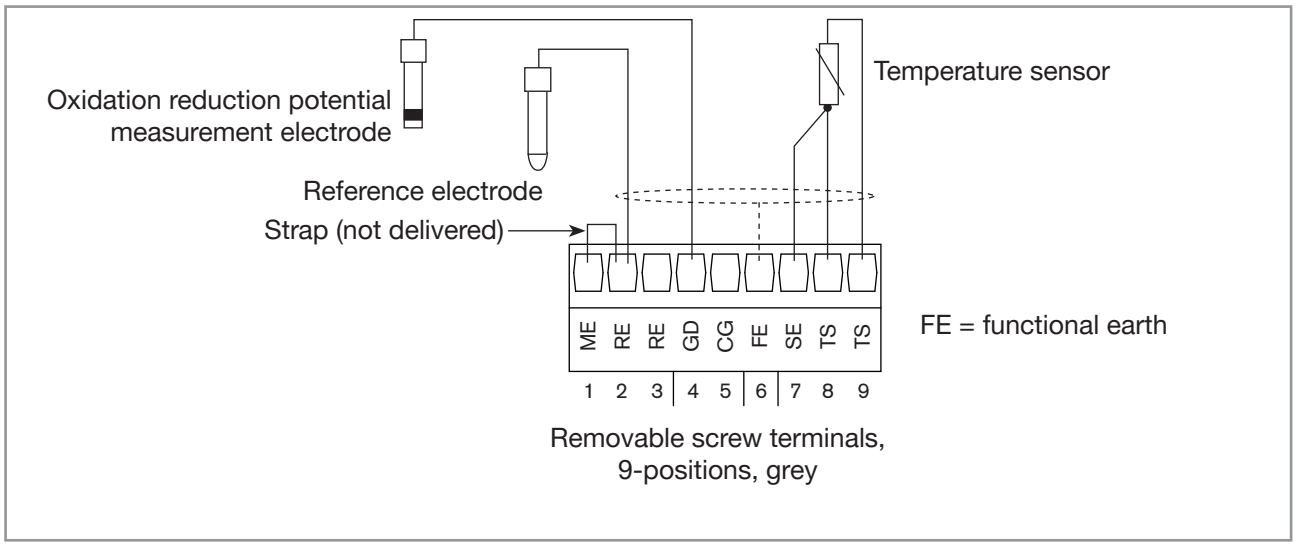

Fig. 32: Wiring a redox sensor and a Pt100 or Pt1000 temperature sensor to a "pH/ORP" module

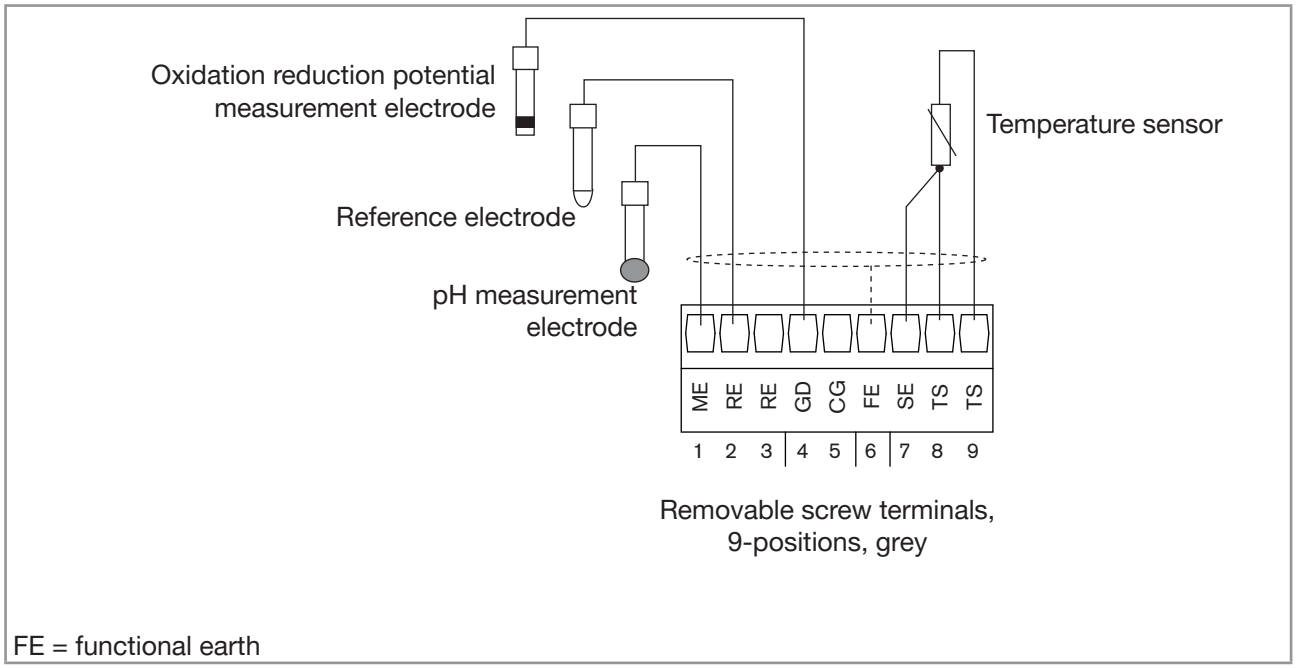

Fig. 33: Wiring a pH sensor, a redox sensor and a Pt100 or Pt1000 temperature sensor to a "pH/ORP" module

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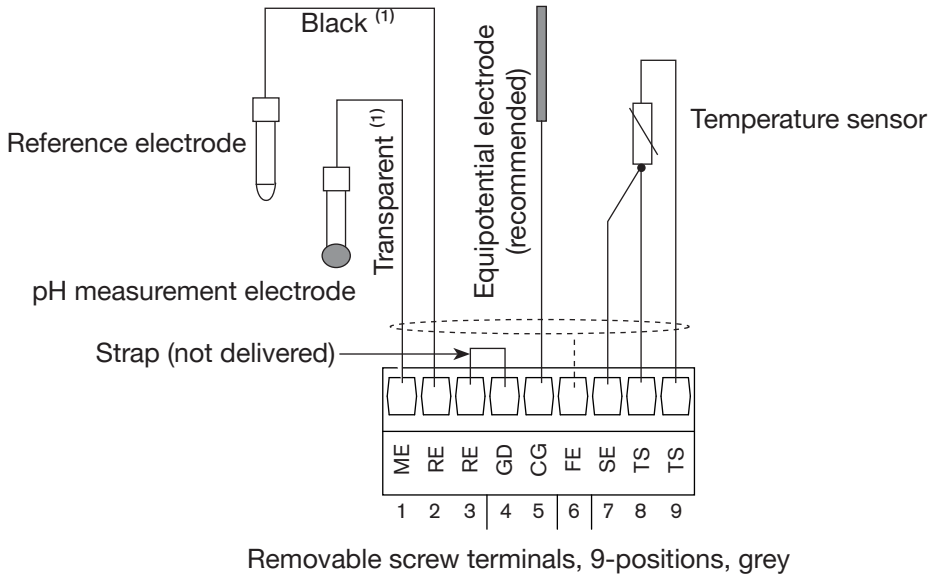
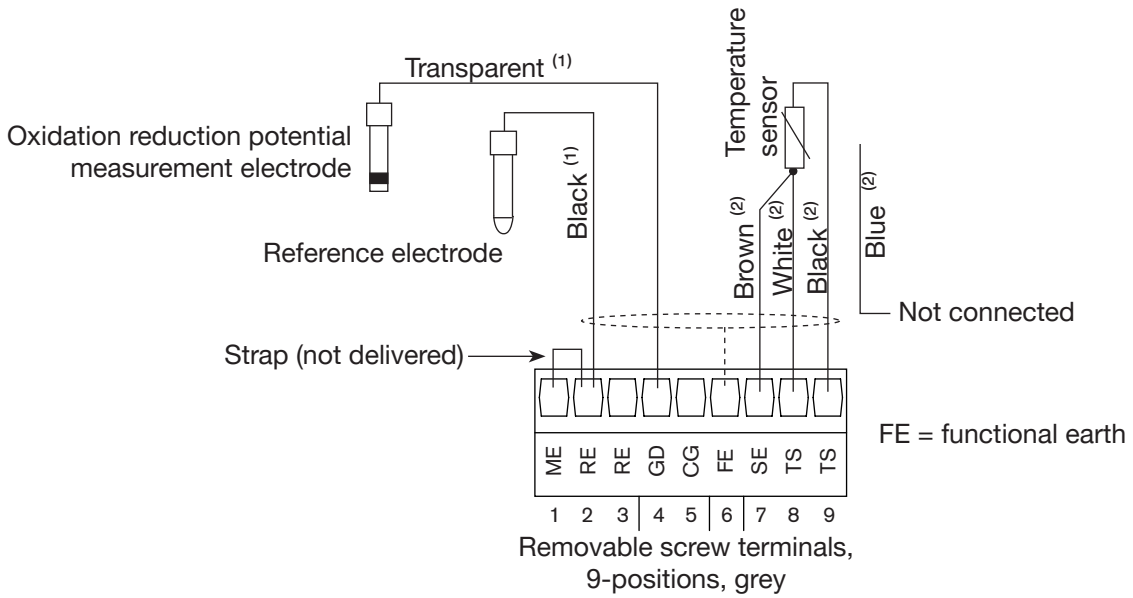


FE = functional earth

(1) Colour of the wires in Bürkert connection cables with article numbers 561904, 561905 or 561906.

Fig. 34: Wiring a pH sensor and a Pt100 or Pt1000 temperature sensor in asymmetrical mode to a "pH/ORP" module

7.3.19 Examples of connections to the "pH/ORP" module

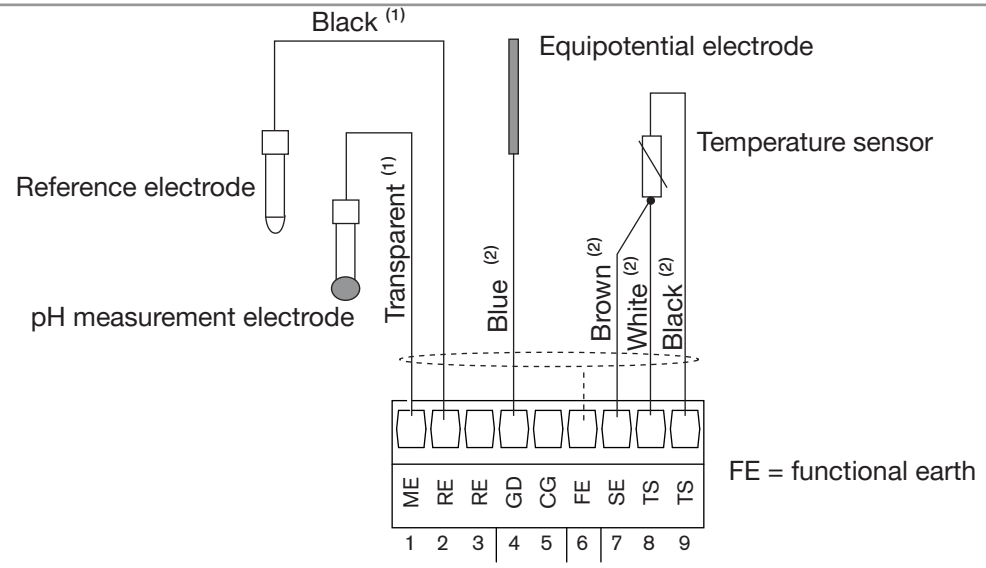


(1) Colours of the wires in Bürkert connection cables with article numbers 561904, 561905 or 561906.

(2) Colours of the wires of the Pt1000 sensor with article number 427023 and its Bürkert connection cable with article number 427113.

Fig. 35: Wiring a redox sensor Type 8203 and a Pt100 or Pt1000 temperature sensor to a "pH/ORP" module

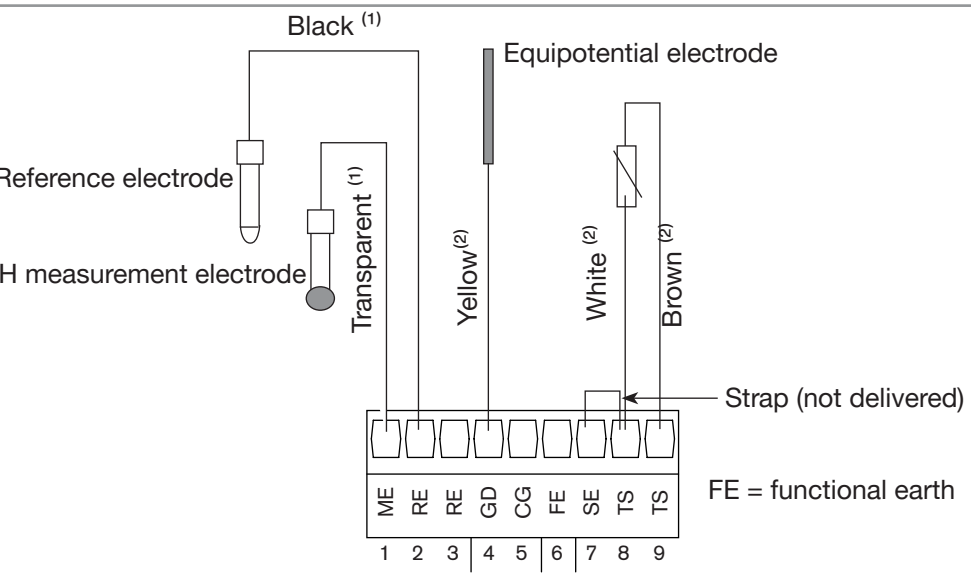
- To avoid the influence of disturbances, wire the pH sensor in symmetric mode. In this case, it is compulsory to wire the equipotential electrode.
- When the pH sensor is wired in asymmetrical mode, measurement of the pH may drift over time when the equipotential electrode is not wired.



(1) Colours of the wires in Bürkert connection cables with article numbers 561904, 561905 or 561906.

(2) Colours of the wires of the Pt1000 sensor with article number 427023 and its Bürkert connection cable with article number 427113.

Fig. 36: Wiring a pH sensor Type 8203 and a Pt1000 temperature sensor in symmetrical mode



(1) Colours of the wires in Bürkert connection cables with article numbers 561904, 561905 or 561906.

(2) Colours of the wires of the Pt1000 connection cable code 562628.

Fig. 37: Wiring a pH sensor mounted into the immersion fitting Type 8200 with Pt1000

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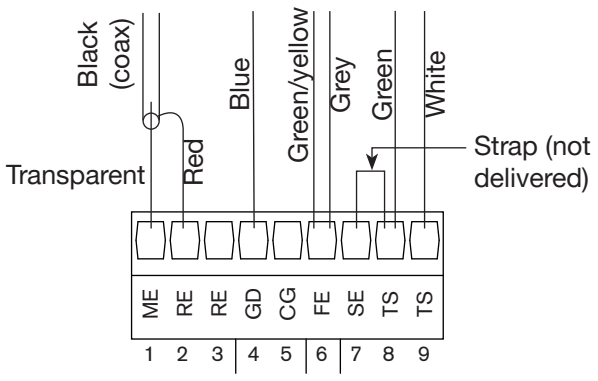
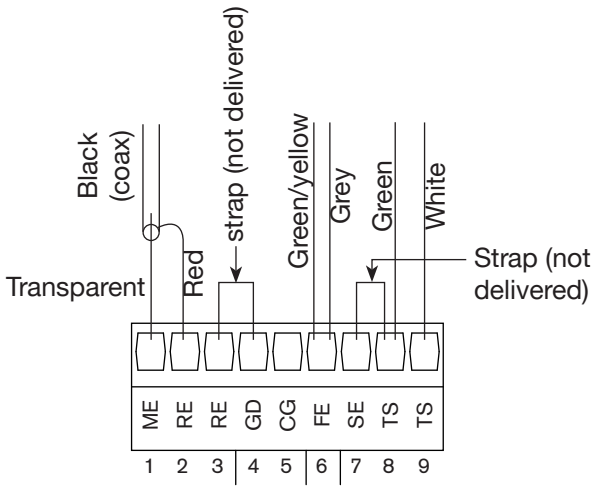
Wire colour	Signal
Transparent	pH sensor
Red (coax cable shielding)	Reference electrode
Blue	Rhodium electrode
Green/Yellow	Cable shielding
Grey	Sensor body
Green	Pt1000
White	Pt1000



FE = functional earth

Fig. 38: Wiring a Bürkert sensor Type 8201 in symmetrical mode using a Variopin connection cable with article number 554856 or 554857

Wire colour	Signal
Transparent	pH sensor
Red (coax cable shielding)	Reference electrode
Green/Yellow	Cable shielding
Grey	Sensor body
Green	Pt1000
White	Pt1000



FE = functional earth

Fig. 39: Wiring a Bürkert sensor Type 8203 with integrated Pt100 / Pt1000 temperature sensor, in asymmetrical mode using a Variopin connection cable with article number 554856 or 554857

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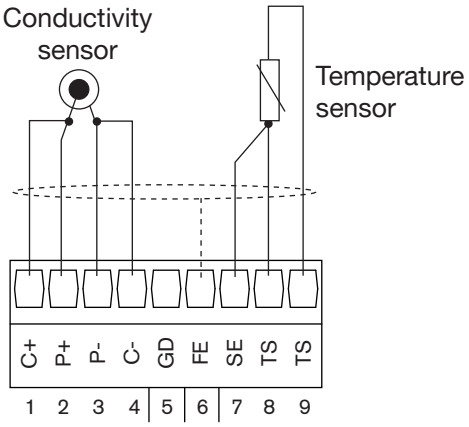
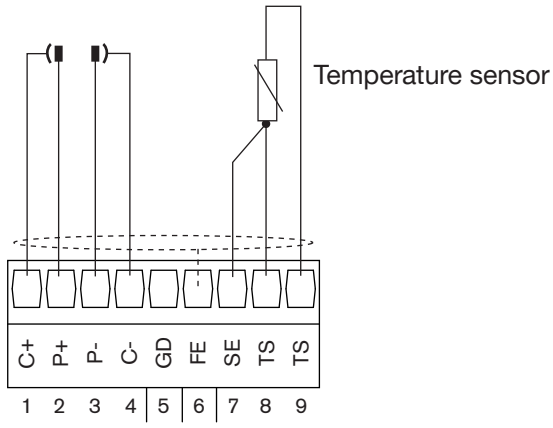
7.3.20 Wiring the conductivity module "COND"



Removable screw terminals, 9-positions, green

FE = functional earth

Fig. 40: Wiring a resistive conductivity sensor with 2 electrodes and a Pt100 or Pt1000 temperature sensor to a conductivity module "COND"



Removable screw terminals, 9-positions, green

FE = functional earth

Fig. 41: Wiring a resistive conductivity cell with 4 electrodes and a Pt100 or Pt1000 temperature sensor to a conductivity module "COND"

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7.3.21 Examples of connection to the conductivity module "COND"

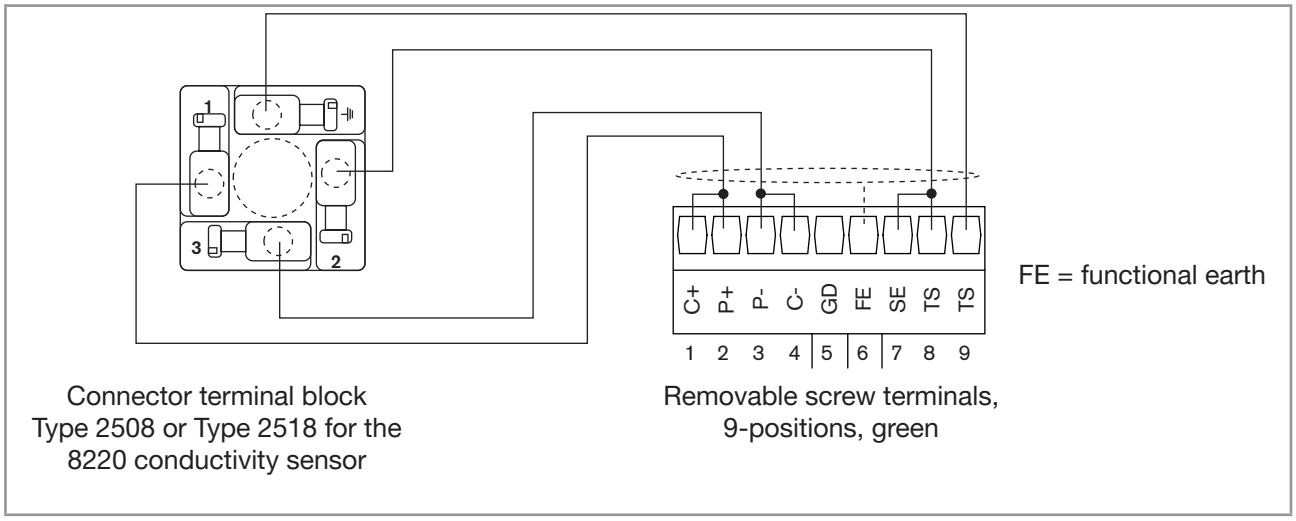

Fig. 42: Wiring a conductivity sensor Type 8220

Wire colour		Signal description
1 C+	Pink	Current electrode (high end)
2 P+	Green	Potential electrode (high end)
3 P–	Brown	Potential electrode (low end)
4 C–	Yellow	Current electrode (low end)
7 SE	Grey	Pt1000
8 TS	White	Pt1000
9 TS	Blue	Pt1000

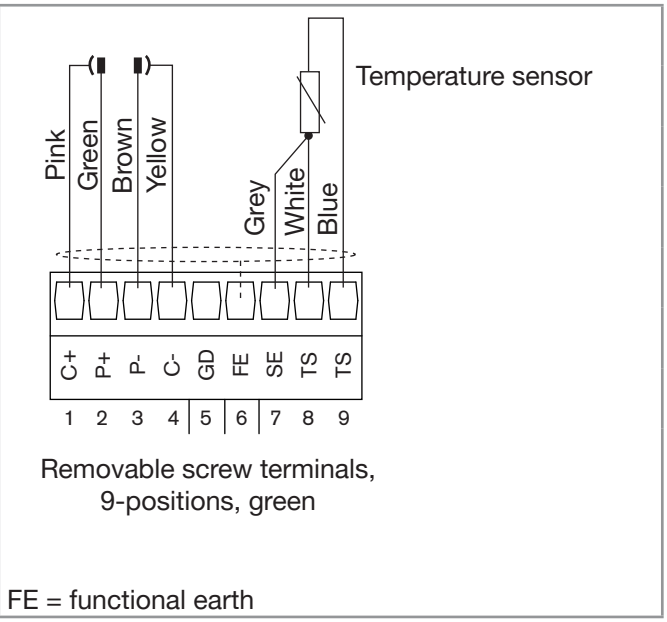

Fig. 43: Wiring a conductivity sensor Type 8221 with cable gland and connection cable

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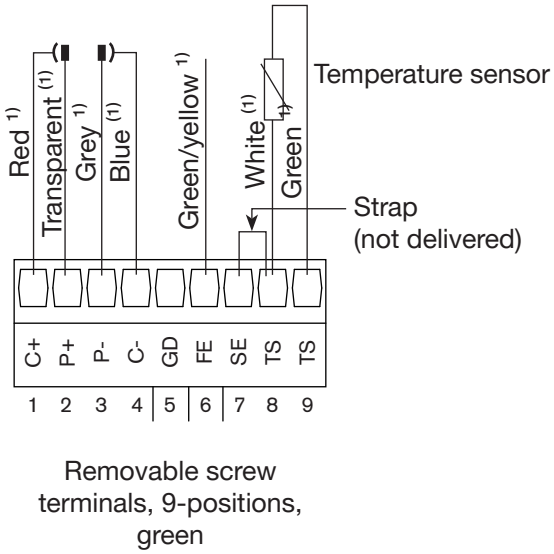
Wire colour		Signal description
1 C+	Red	Current electrode (high end)
2 P+	Transparent	Potential electrode (high end)
3 P–	Grey	Potential electrode (low end)
4 C–	Blue	Current electrode (low end)
6 FE	Green/yellow	Functional earth
8 TS	White	Pt1000
9 TS	Green	Pt1000



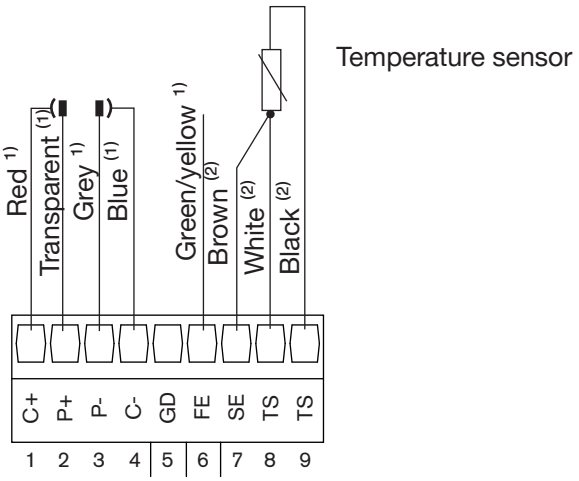
Removable screw terminals, 9-positions, green

FE = functional earth

(1) Colour of the wires of the connection cables with article numbers 554855, 554856 and 554857.

Fig. 44: Wiring a conductivity sensor Type 8221 with Variopin connector

Wire colour		Signal description
1 C+	Red	Current electrode (high end)
2 P+	Transparent	Potential electrode (high end)
3 P–	Grey	Potential electrode (low end)
4 C–	Blue	Current electrode (low end)
6 FE	Green/yellow	Functional earth
7 SE	Brown	Pt1000
8 TS	White	Pt1000
9 TS	Black	Pt1000



Removable screw terminals, 9-positions, green

FE = functional earth

(1) Colour of the wires of the connection cables with article numbers 554855, 554856 and 554857.

(2) Colours of the wires of the Pt1000 sensor with article number 427023 and its Bürkert connection cable with article number 427113.

Fig. 45: Wiring a conductivity sensor Type 8221 with Variopin connector and a separated Pt1000 temperature sensor

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Wire colour		Signal description
2 P+	Brown	Potential electrode (high end)
3 P–	White	Potential electrode (low end)
7 SE	Grey	Pt1000
8 TS	Black	Pt1000
9 TS	Blue	Pt1000

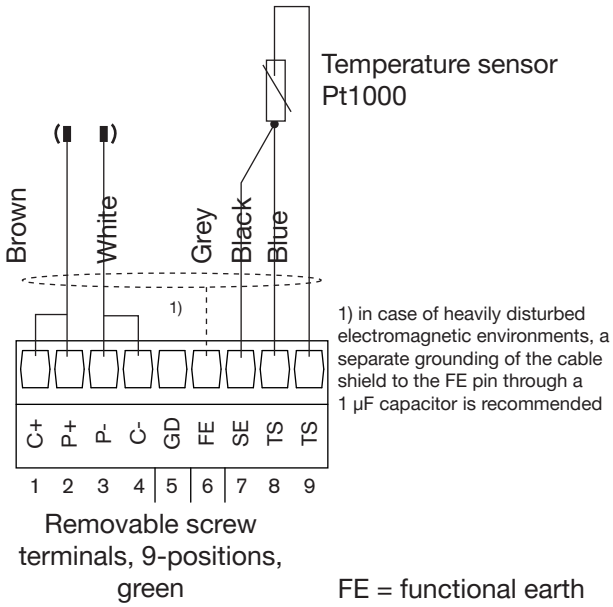

Fig. 46: Wiring a conductivity sensor Type 8221 with 5-Pin M12 connector and a separated Pt1000 temperature sensor

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Commissioning and display description

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8 COMMISSIONING, DISPLAY DESCRIPTION

8.1 Safety instructions

WARNING

Risk of injury due to non-conforming adjustment.

Non conforming adjustment could lead to injuries and damage the device and its environment.

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

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 operating instructions.
- In particular, observe the safety recommendations and intended use.
- The device/installation must only be commissioned by suitably trained staff.

Before commissioning, calibrate each measuring sensor connected to the device.

8.2 Switching on the device for the first time

When switching on the device for the first time, the display shows the first view in Process level:

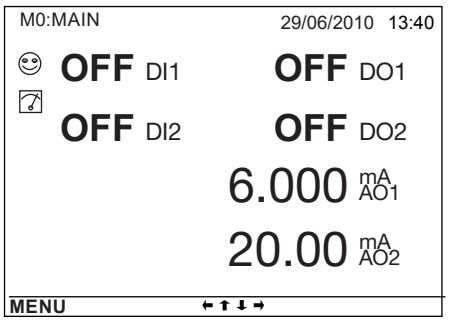

Fig. 47: Display when switching on for the first time

When switched on subsequently, the last active view in the Process level is displayed. See section 8.9 to browse in all views in Process level.

8.3 Using the navigation button and the dynamic keys

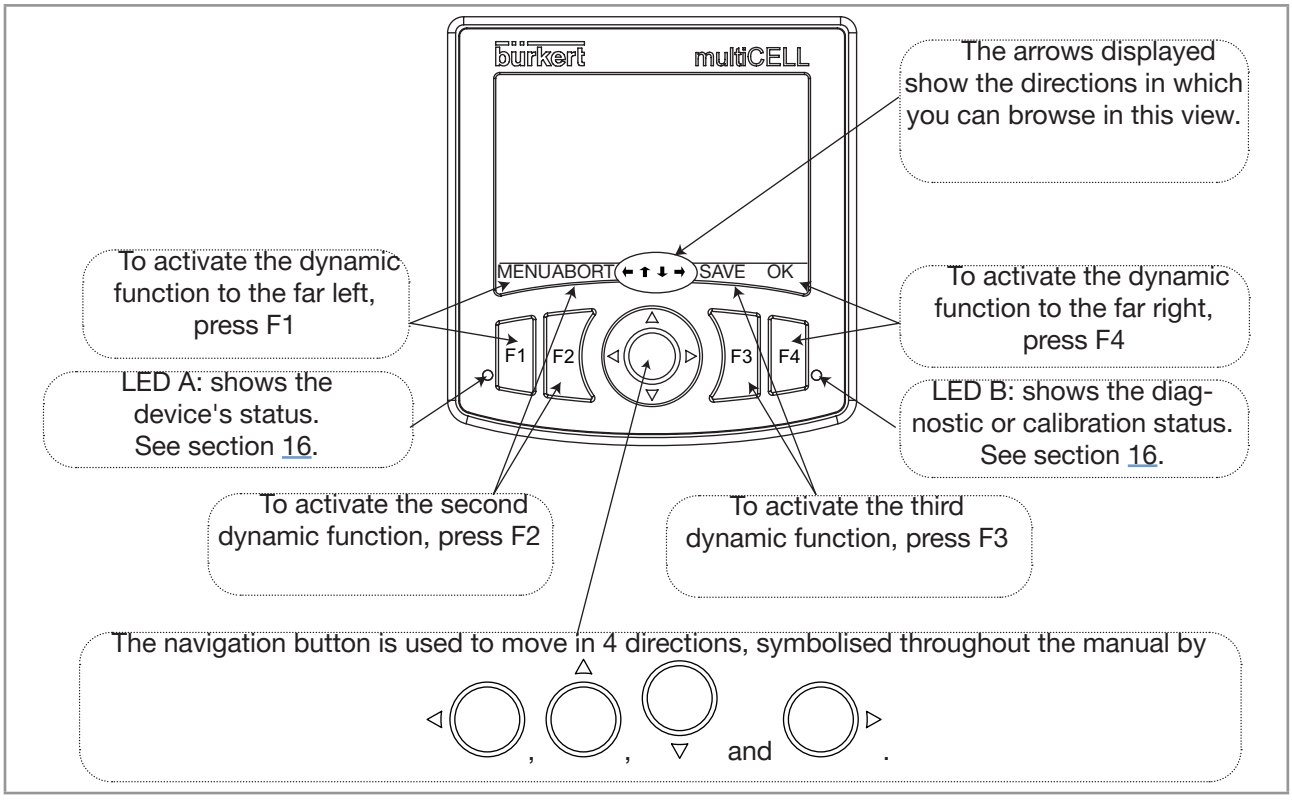

Fig. 48: Using the navigation button and the dynamic keys

You want to ...	Press ...
....access the Configuration level	Dynamic function, "MENU", from any view in Process level
...go back to Process level	Dynamic function, "MEAS"
...access the menu displayed	Dynamic function, "OK"
...access the highlighted function	Dynamic function, "OK"
...confirm the entry	Dynamic function, "OK"
...delete the entered text at once	Dynamic function "CLR"
...save modifications	Dynamic function "SAVE"
...go back to the parent menu	Dynamic function "BACK"
...cancel the current operation	Dynamic function "ABORT"
...set a setpoint value	Dynamic function "SETP"
...activate manual mode in a configured and activated function	Dynamic function "MANU"
...manually set the percentage of the function	Dynamic function "CMD"
...force the result of a function to 0 %	Dynamic function "0%"
...force the result of a function to 100 %	Dynamic function "100%"
...activate automatic mode in a configured and activated function	Dynamic function "AUTO"
...start teach-in	Dynamic function "START"
...end teach-in	Dynamic function "END"
...answer the question asked in the affirmative	Dynamic function "YES"
...answer the question asked in the negative	Dynamic function "NO"

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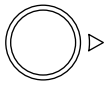
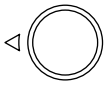
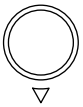
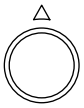
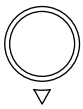
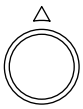
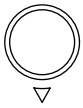
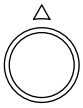
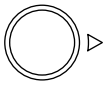
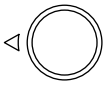
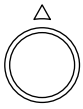
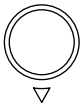
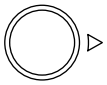
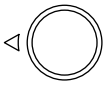
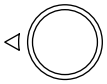
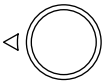
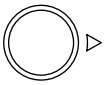
You want to ...	Press ...			
...select the highlighted character or mode	Dynamic function "SEL"			
...modify the PVC value	Dynamic function "VAL"			
...browse in Process level	 next view	 previous view	 next level	 previous level
...browse in the Configuration level menus	 display the next menu		 display the previous menu	
...browse in the menu functions	 highlight the next function		 highlight the previous function	
...set the contrast or brightness percentage for the display (after accessing the function in the "Parameters" menu)	 increase the percentage		 reduce the percentage	
...modify a numerical value or the units	 increment upwards the figure selected or modify the units		 increment downwards the figure selected or modify the units	
	 select the next figure		 select the previous figure	
...allocate the "+" or "-" sign to a numerical value	 to the extreme left of the numerical value then  until the desired sign is displayed			
...move the decimal point in a numerical value	to the extreme right of the numerical value then  until the decimal point is in the desired place			

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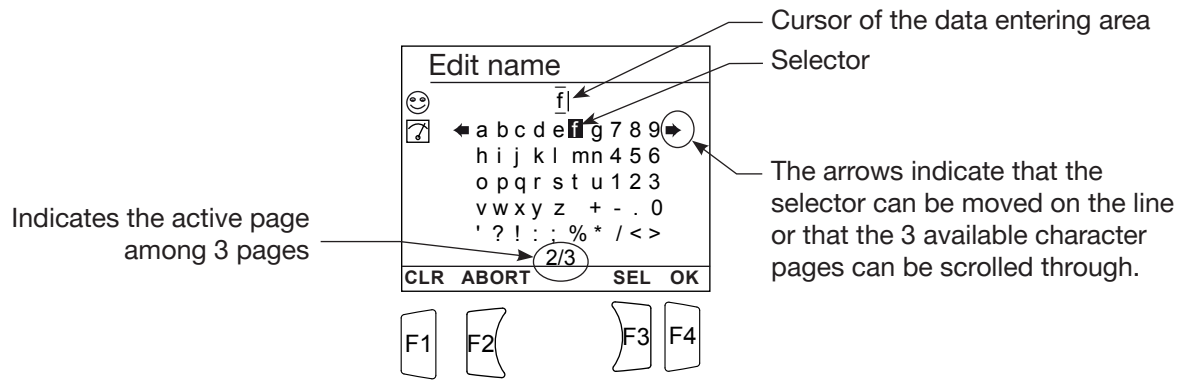
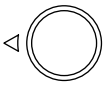
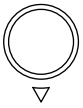
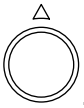
8.4 Entering text

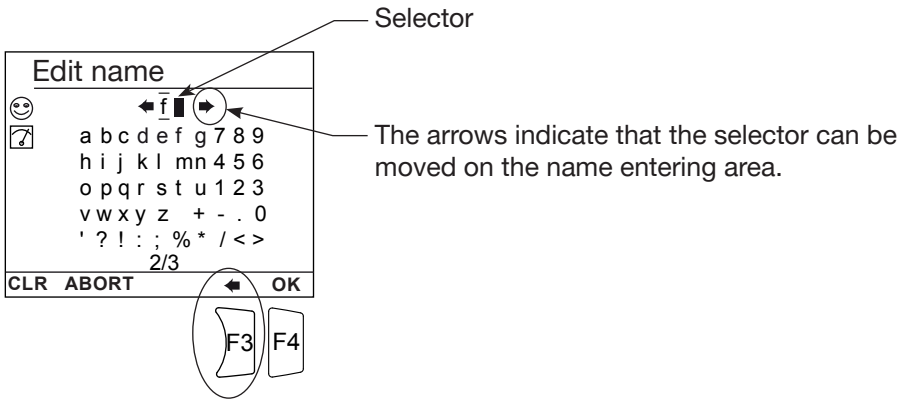
This section describes how to use the keyboard displayed to modify the name of a process variable (13 characters max.), a function (12 characters max.) or the title of a view (12 characters max.).



→ To move the cursor in the data entering area using keys and  first move the selector into the data entering area using the keys  and  .

→ To insert a character in place of the cursor, move the selector over this character and press key (function "selection").

→ To remove the character before the cursor, move the selector into the data entering area then press key (function "backspace"):



→ To erase all the characters at once, press key (function "clear").

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8.5 Entering a mathematical equation

This section describes how to use the keyboard displayed to enter a mathematical equation (max. 125 characters).

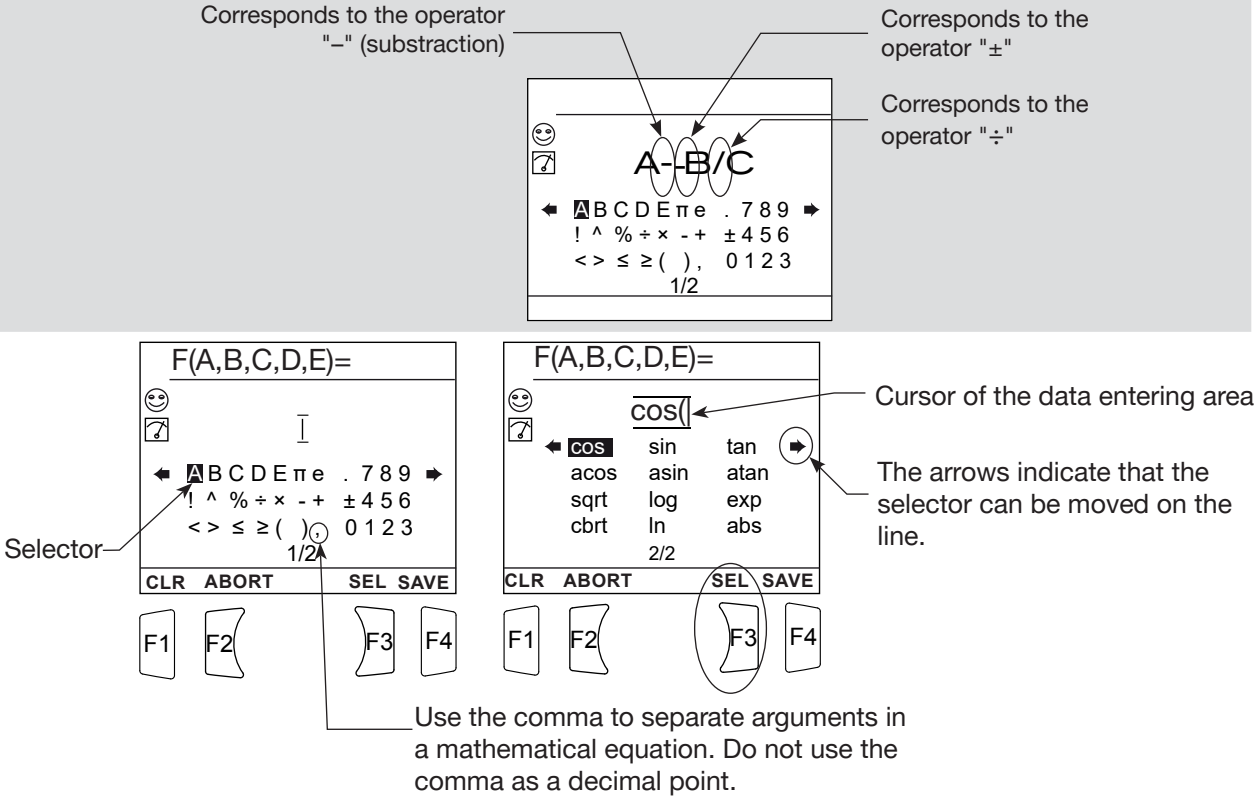
→ You can enter multiplications without the operator, e.g. 10A/5(B3) = 10xA/5x(Bx3) = 6xAxB.

Table 6 gives the possible operators, the priority of the operators and the calculation sequence of the equation items.

Table 6: Operators, priority and calculation sequence of the MATH equation

Possible operators	Priority	Sequence of calculation
( )	1	–
! ±	2	from the right to the left
^	3	from the left to the right
× ÷ %	4	
+ -	5	
< > ≤ ≥	6	

- The 2 operators "±" and "–" are displayed in the equation with the same sign "–", but they are placed on 2 different vertical levels.
- The operator "÷" is displayed in the equation with the sign "/".



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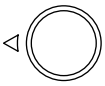
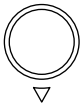
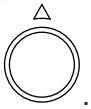
→ To move the cursor in the data entering area using keys and  first move the selector into the data entering area using the keys  and  .

→ To insert a character in place of the cursor, move the selector over this character and press key F3 (function "selection").

→ To remove the character before the cursor, move the selector into the data entering area then press key F3 (function "backspace").

→ To erase all the characters at once, press key F1 (function "clear").

Furthermore, you must know the result given by some operators: see Table 7.

Operator	Result	Example
±	Changes the sign of the operand that follows the operator	±6 = –6 ±–6 = +6
%	Remainder of the integer division between the left operand by the right operand	17,48%4 = 1,48
<	• 1,0 if the left operand is lower than the right operand.	5 < 8 = 1,0
	• 0,0 if the left operand is higher than or equal to the right operand.	8 < 5 = 0,0 5 < 5 = 0,0
≤	• 1,0 if the left operand is lower than or equal to the right operand.	5 ≤ 8 = 1,0 8 ≤ 8 = 1,0
	• 0,0 if the left operand is higher than the right operand.	8 ≤ 5 = 0,0
>	• 1,0 if the left operand is higher than the right operand.	8 > 5 = 1,0
	• 0,0 if the left operand is lower than or equal to the right operand.	5 > 8 = 0,0 5 > 5 = 0,0
≥	• 1,0 if the left operand is higher than or equal to the right operand.	8 ≥ 5 = 1,0 5 ≥ 5 = 1,0
	• 0,0 if the left operand is lower than the right operand.	5 ≥ 8 = 0,0
!	• 1,0 if the right operand is an element of]–0,50; +0,50[	!0,12 = 1,0
	• 0,0 if the right operand is an element of]–∞; –0,50] or [+0,50;+∞[	!–456 = 0,0

Table 7: Result of some operators

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8.6 Entering a numerical value

→ Accessing, for example, the manual calibration function for a conductivity sensor. Refer to section 8.10 to access the "Calibration" menu.

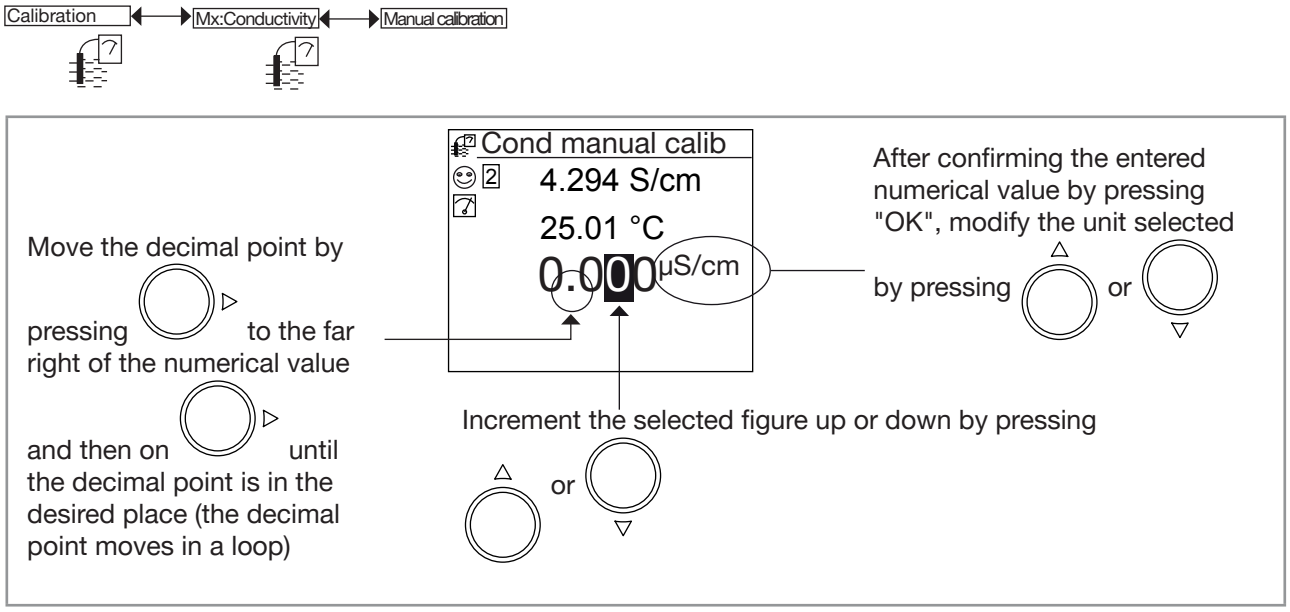

Fig. 49: Example of entering a numerical value

→ Accessing, for example, the function for simulation of a pH value. Refer to section 8.10 to access the "Tests" menu.

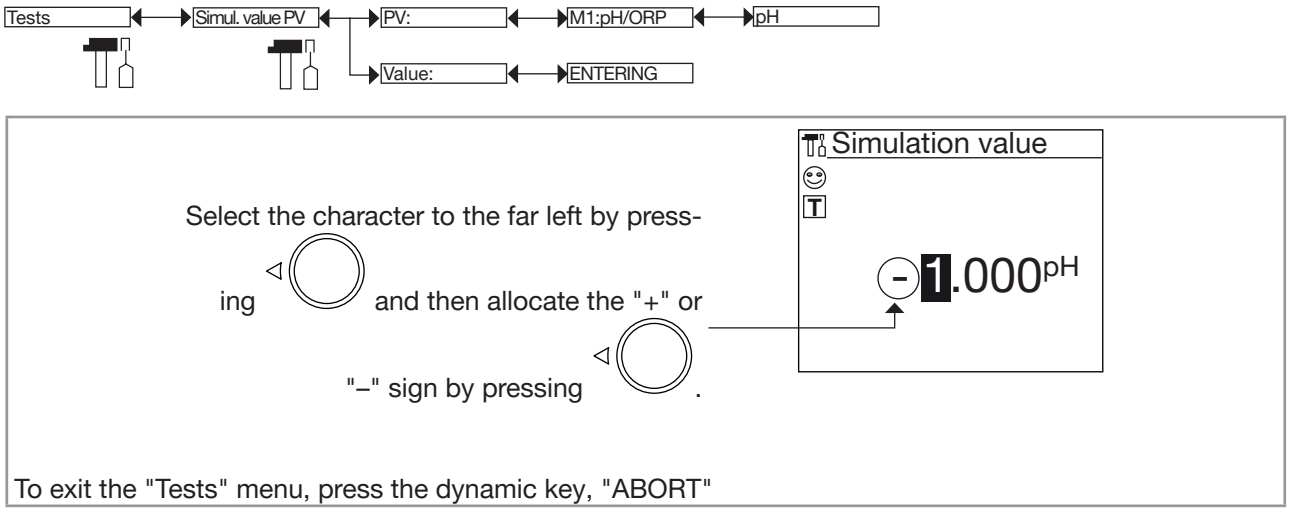

Fig. 50: Changing the sign of a numerical value

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8.7 Description of the icons

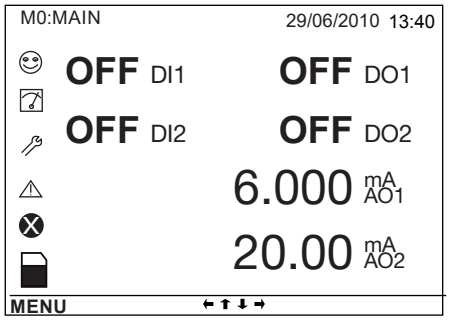

Fig. 51: Position of the icons

Icon	Meaning and alternatives
☺	Default icon when process monitoring is not activated via the "Diagnostics" menu; if monitoring is activated, this icon indicates that the parameters monitored are not out of range. If at least one monitoring is activated, the alternative icons in this position are: • ☺, combined with ⚠: see sections 11.3 to 11.7 • ☹, combined with ⊗ : see sections 11.3 to 11.7 The "smiley" symbols do not relate to correct functioning of the device.
	Device currently measuring. The alternative icons in this position are: • H flashing: HOLD mode activated (see section 10.2) • T flashing: running check that an output is working and behaving correctly (see section 12.2 and 12.3)
	"Maintenance" event; see section 10.19 and 10.20.
⚠	"Warning" event; See sections 10.19, 10.20 and 11.3 to 11.7
⊗	"Error" event; See sections 10.19, 10.20 and 11.3 to 11.7
	Memory card inserted and datalogger activated. The alternative icon to this position is X , indicating an error. Access menu "Information -> Log", to read the associated error message and see section 16.3.9 for the meaning of the message.

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8.8 Operating levels

The device has 2 operating levels:

Process level

See section 8.9 for the description of the Process level.

Configuration level

This level comprises 5 menus:

Menu title	Relevant icon
"Parameters": see section 9	
"Calibration": see section 10	
"Diagnostics": see section 11	
"Tests": see section 12	
"Information": see section 13.	

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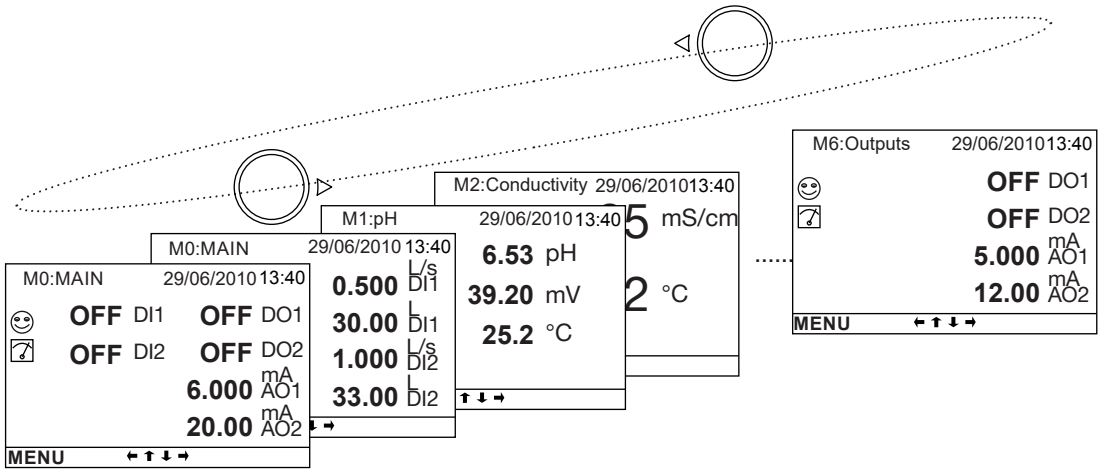
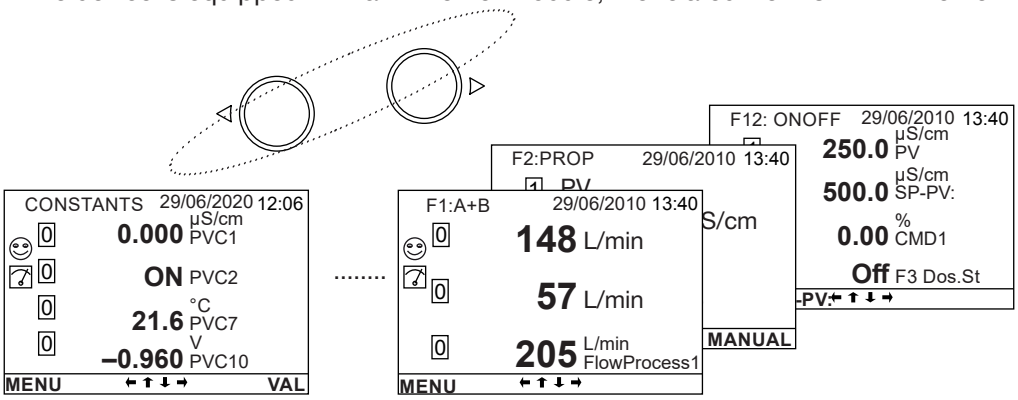
8.9 Process level



Views of the modules connected to the device (cannot be modified):

- "M0:MAIN" view: displays the values of inputs and outputs on the main board; the second "M0:" view is available if the software option, "FLOW", is activated (see section 9.5).
- "M1:" to "M6:" views display the data for modules 1 to 6.
  If the device is equipped with an Ethernet module, the related view is "M1: Ethernet".

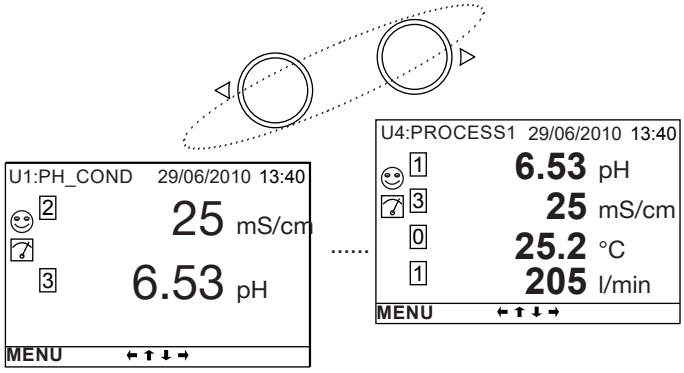


Views of the constants. Only activated constants are displayed.

To configure and activate the constants to be displayed see section 9.13.

Views of active functions which cannot be modified (F1: to F12:) are used to display one function each. Only views of functions declared "active" are displayed.

To configure and activate a function, see sections 9.14 to 9.20.



User defined views (U1 to U4) are each used to display 1, 2 or 4 data or a graph. Only the effectively defined views are shown.

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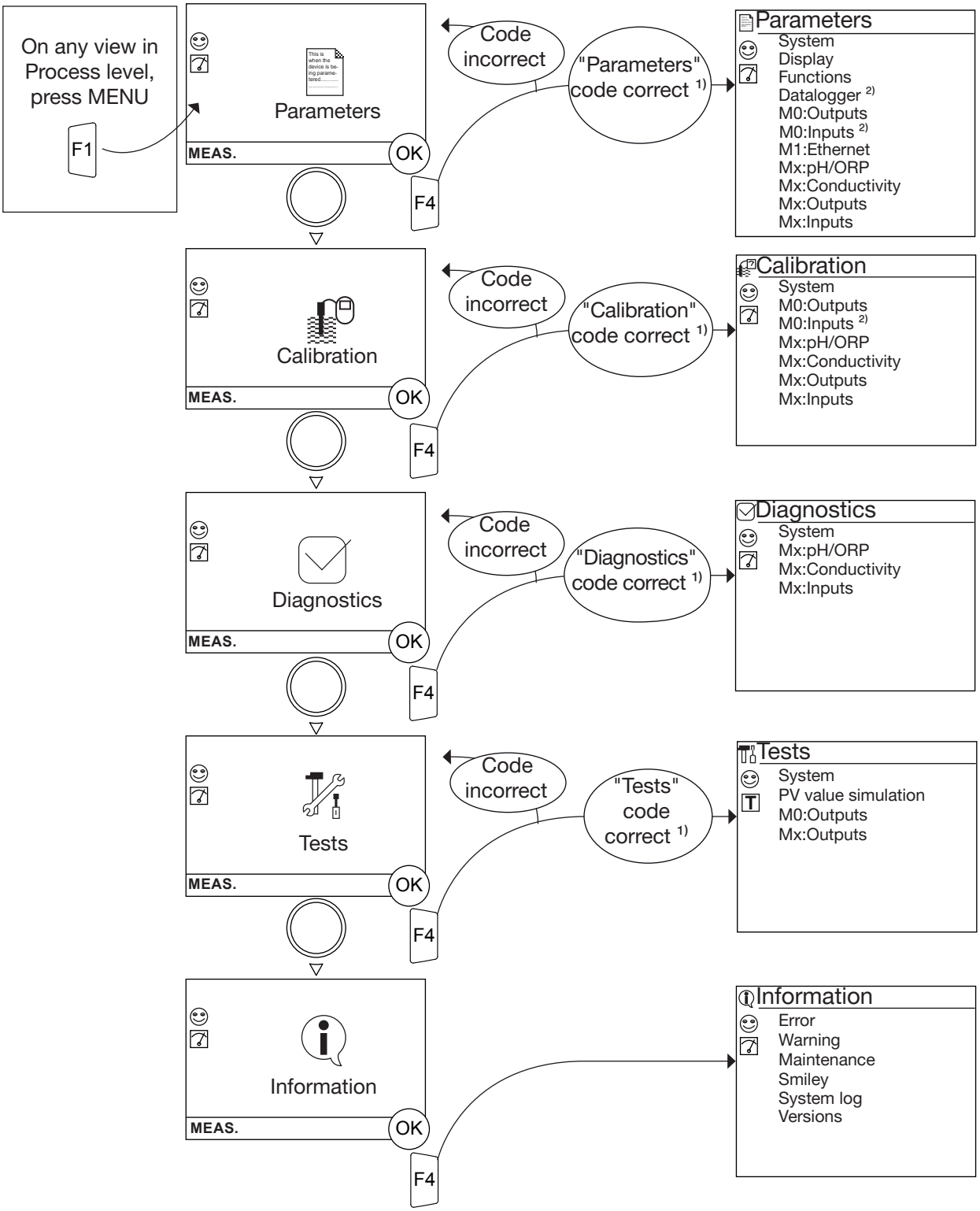
8.10 Configuration level access



1) The code is not requested if the default code "0000" is used.

2) This menu is available as an option (see section 9.5).

→ See section 14 for details of the functions by menu.

Menu Parameters

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9 PARAMETERS MENU

9.1 Safety instructions

WARNING

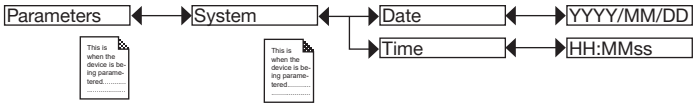
Risk of injury due to non-conforming adjustment.

Non conforming adjustment could lead to injuries and damage the device and its environment.

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

9.2 Setting the device date and time

Refer to section 8.10 to access the "Parameters" menu.

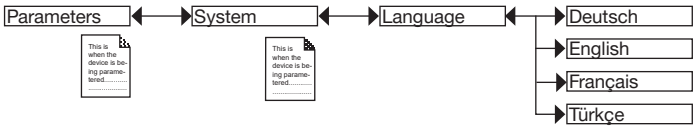


DATE: Set the date

TIME: Set the time

9.3 Selecting the display language

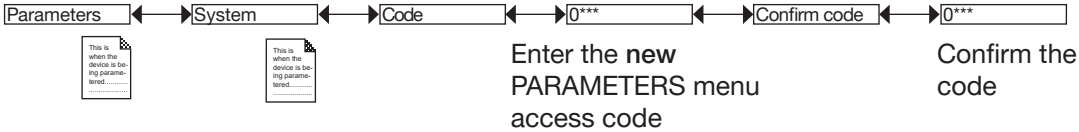
Refer to section 8.10 to access the "Parameters" menu.



The messages are displayed in the new language as soon as the choice has been saved.

9.4 Modifying the PARAMETERS menu access code

Refer to section 8.10 to access the "Parameters" menu.



If the default access code "0000" is kept, the device does not request it to access the "Parameters" menu.

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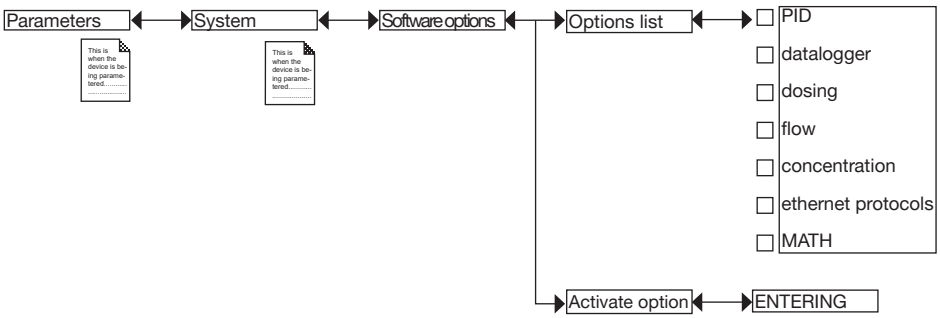
9.5 Consulting and/or activating the available software options

This menu is used:

- To consult the list of software options available
- To activate the options by entering the code.
  The activation code is obtained on requests from your Bürkert dealer. Provide him with the article number of the desired option and the article number and serial number of your device which you will find in the menu "Information" -> "Versions" -> "M0:MAIN" -> "Product" (article number) and "S/N" (serial number).

The "Dosing" option also activates the "Flow" option if it does not exist by default in the device.

Refer to section 8.10 to access the "Parameters" menu.



When an option is ticked, it is activated in the device.

OPTIONS LIST: read the options available, whether or not activated on the device:

- *PID:* enables configuring of a PID function on the device; See section 9.18.
- *DATALOGGER*: enables the recording of process data; See section 9.22.
- *DOSING*: enables configuring of the "Time dosing" and "Volume dosing" functions; See sections 9.19 and 9.20. This option automatically activates the "FLOW" option below.
- *FLOW*: the "Flow" and "Totaliser" process inputs are available in the "PV" list on the main board "M0:MAIN" and the input modules "Mx:Inputs"; See section 15.
- *CONCENTRATION*: the concentration tables for a number of solutions are available in the menu "Parameters" -> "Mx:Conductivity" -> "Concentration"; See section 9.29.
- *ETHERNET PROTOCOLS:* enables configuring of the ethernet protocols (Modbus TCP, PROFINET or EtherNet/IP) on a device with an Ethernet module. The default ethernet protocol activated is Modbus TCP; See section 9.27.
- *MATH:* enables configuring of a MATH function. See section 9.15.

ACTIVATE OPTION: enter the activation code for an option.

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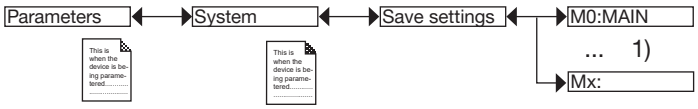
9.6 Saving the settings on the memory card

This function is used to save, on the memory card, the user settings of the main board M0 and of all the modules fitted ("Parameters" menu).

- Only authorized personnel may insert in or remove a memory card from the reader/recorder.
- To ensure the tightness of the device, tighten the 4 screws of the cover in a crosswise manner with a torque of 1.4 Nm ± 20 % (1.03 lbf·ft ± 20 %).
- Data can only be saved if the "datalogging" function is deactivated. See sections 9.5 and 9.22.
- The software options activated on the device (see section 9.5) cannot be transferred.

Refer to section 8.10 to access the "Parameters" menu.



1) *The choices offered depend on the modules fitted.*

If an error message is displayed, refer to section 16.3.7.

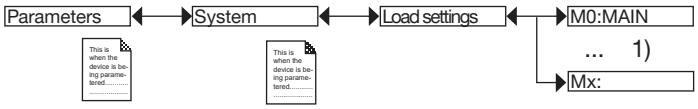
9.7 Loading settings from the memory card

This function is used to load settings from the memory card, initially saved on it.

The device receiving the settings must be identical to the one from which these data originate.

- Check that both devices have the same article number and the same activated software options.

Refer to section 8.10 to access the "Parameters" menu.



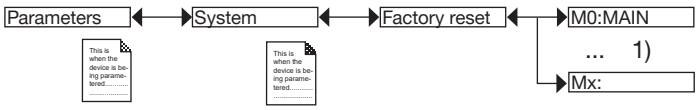
1) *The choices offered depend on the modules fitted.*

If an error message is displayed, refer to section 16.3.8.

9.8 Restoring the default parameters of the Process level and the outputs

This function is used to restore (dynamic key "Yes") the default parameters of the Process level and outputs or keep (dynamic key "No") the current parameters.

Refer to section 8.10 to access the "Parameters" menu.



1) *The choices offered depend on the modules fitted*

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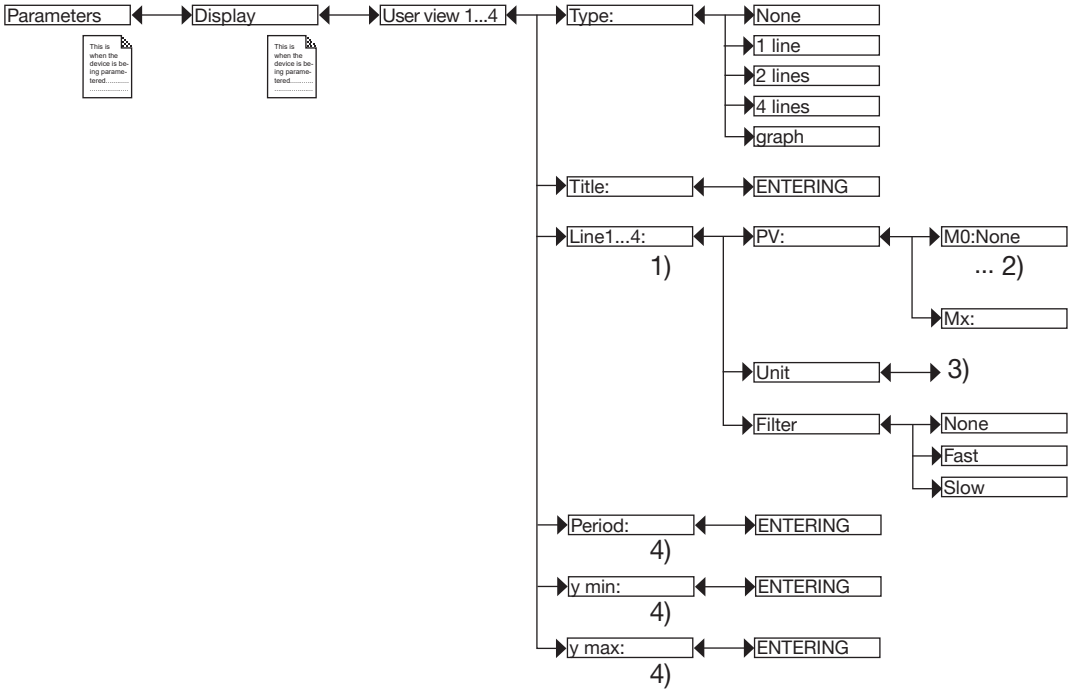
9.9 Customising user views 1 to 4

Refer to section 8.10 to access the "Parameters" menu.



1) *If "Type" = 1, 2 or 4 "lines"*
2) *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.*
3) *The choices offered depend on the choice made in "PV" above*
4) *If "Type" = "graph"*

TYPE: Choosing to display 1, 2 or 4 values (on 1, 2 or 4 lines) or a graph in the customised "Ux" view selected.

TITLE: Entering the name displayed in the corresponding "Ux" view. See section 8.4 Entering text.

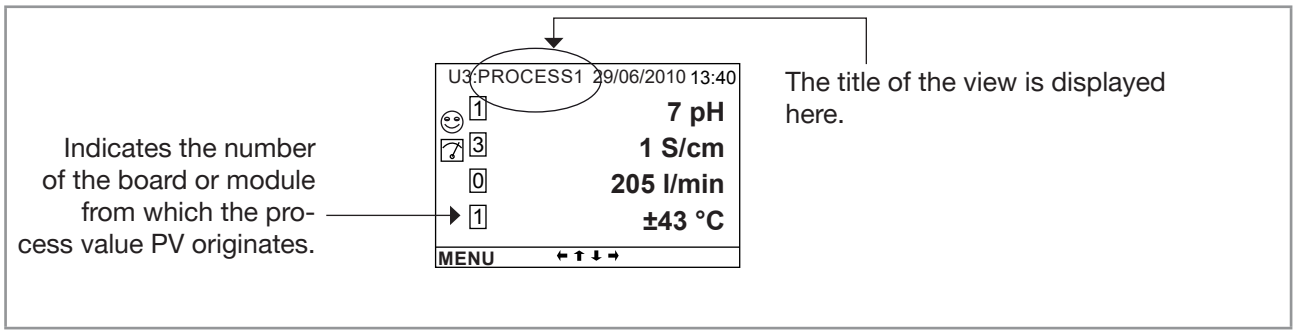


Fig. 52: Example of a title for a customised view

LINE1 TO LINE4: Setting the parameters for the values (1, 2 or 4) displayed in a customised "Ux" view:

- *PV*: Select the digital input, the analogue output, the physical parameter, the value entered by the user (PVC) or the value coming from a PLC (PVN) to be displayed on the line selected in this customised view. The options available depend on the modules fitted.

One of the "PVs" in the conductivity module, available for the customised "Ux" views, is "USP" (see section 9.29).

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- *UNIT*: Select the units in which the digital input, the analogue output, the physical parameter, a value entered by the user (PVC) or a value coming from a PLC (PVN), selected in the PV list above, is displayed.
- *FILTER*: Select the level of attenuation for the measurement signal on the digital input, the analogue output, the physical parameter, a value entered by the user (PVC) or a value coming from a PLC (PVN) displayed on the line selected. Three levels of attenuation are proposed: "slow" (slow filtering has a high attenuation effect), "fast" (fast filtering) or "none" (no filtering)

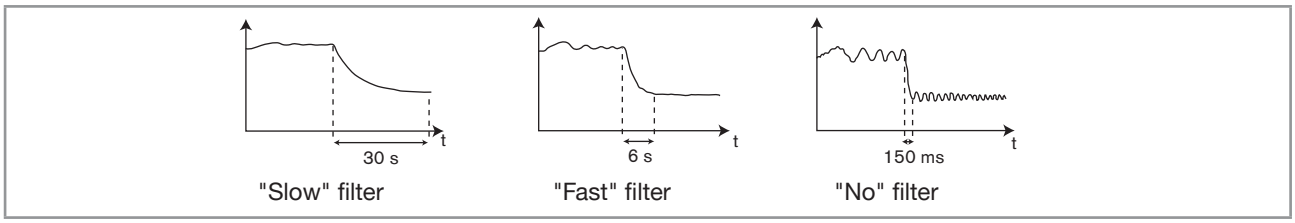

Fig. 53: Filtering curves

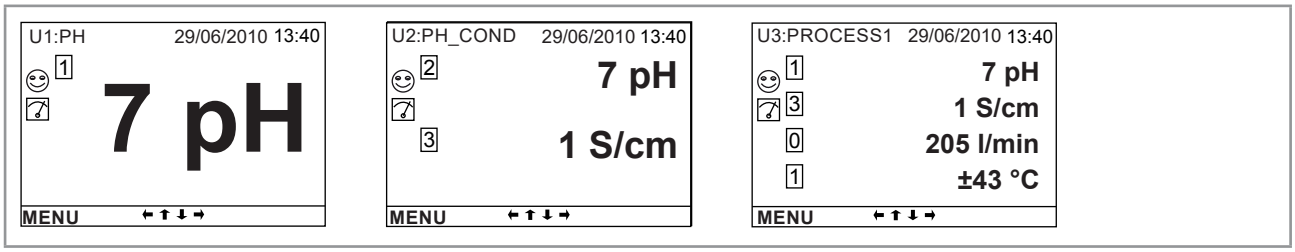

Fig. 54: Examples of customised views with 1, 2 and 4 lines

LINE: Set the parameters for the graph displayed in a customised "Ux" view:

- *PERIOD*: Enter the graph refresh period in seconds.
- *Y MIN*: Enter the minimum value on the vertical axis for the PV selected.
- Y MAX: Enter the maximum value on the vertical axis for the PV selected.

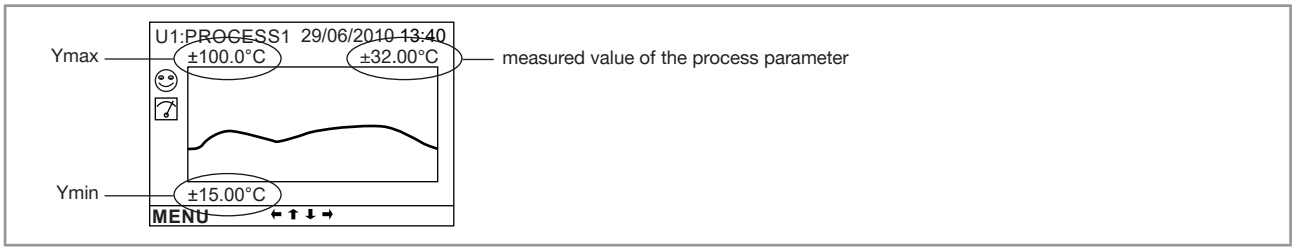

Fig. 55: Example of a customised view of a graph

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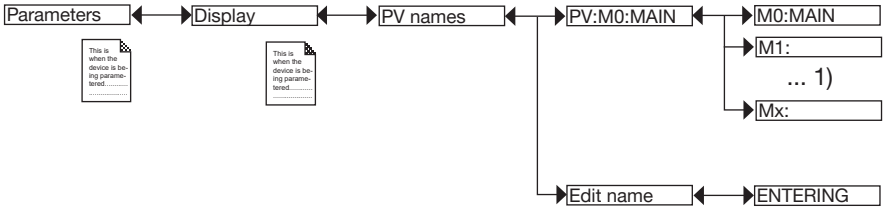
9.10 Renaming a process variable

To retrieve the original name of a variable, even after modification and saving:
→ Move the selector into the customised name entering area.
→ Delete all the characters and save.

Refer to section 8.10 to access the "Parameters" menu.



[1] *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*

The entered name appears in the view in Process level. See section 8.4 Entering text.

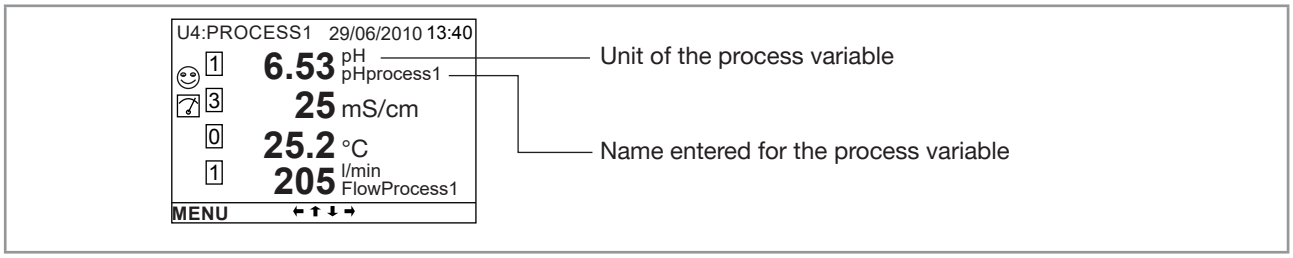
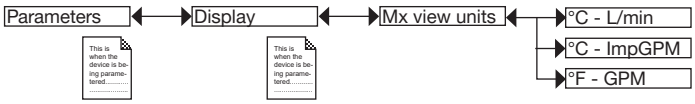


Fig. 56: Example of a renamed process variable

9.11 Customising the units

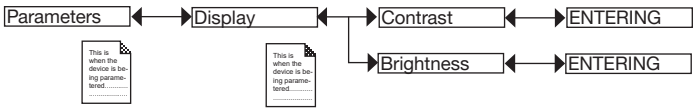
Refer to section 8.10 to access the "Parameters" menu.



MX VIEW UNITS: Choose the units in which the values are displayed.

9.12 Setting the display contrast and brightness

Refer to section 8.10 to access the "Parameters" menu.



→ Set each percentage using and

CONTRAST: choose the display contrast level (as a %).

BRIGHTNESS: choose the light intensity of the display (as a %).

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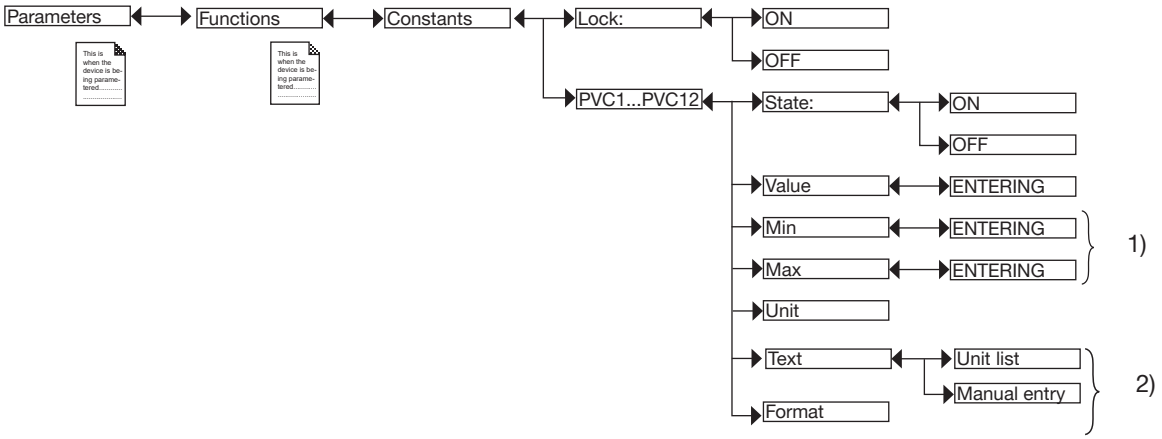
9.13 Configuring a PVC

A PVC is a process variable (PV) whose value is constant as long as you do not change it manually. You can change the value in the menu below or in the Process level.

Refer to section 8.10 to access the "Parameters" menu.



[1] *If "Unit" ≠ "ON/OFF"*
[2] *Only if "Unit" = "Custom"*

LOCK:

- ON: the values of the PVCs cannot be modified in the Process level without entering an access code. To modify the value of a PVC, first enter the access code of the "Parameters" menu. The default access code is "0000" (see section 9.4).
- OFF: the values of the PVCs can be modified in the Process level without entering an access code.

STATE: Used to activate (choose "ON") or deactivate (choose "OFF") the selected PVC. Only activated PVCs are displayed in the Process level and in the lists of available PVs. See section 15.

VALUE: If *UNIT* is set to ON/OFF, then choose whether *VALUE* is always ON or always OFF. If *UNIT* is different from ON/OFF, then enter the numeric value of the PVC.

MIN: If *UNIT* is different from ON/OFF, enter the lower limit of the PVC.

MAX: If *UNIT* is different from ON/OFF, enter the upper limit of the PVC.

UNIT: Choose a unit for the PVC. The following choices are possible:

- *ON/OFF:* Choose whether *VALUE* is always ON or always OFF. The following use cases are possible:
  - Control a digital output (DOx). Then, configure the DO output as an ON/OFF output (see section 9.26.1).
  - Reset a totaliser. Then, configure the totaliser (see section 9.23.2).
  - Freeze a totaliser. Then, configure the totaliser (see section 9.23.3).
  - Participate in a boolean equation. Then, configure the equation (see section 9.15.1).
  - Trigger the "System switch" event. Then, configure the "System switch" event in mode ON/OFF (see section 9.21).
- *CUSTOM:* To enter a customized text for the unit and choose the format of the PVC.
- *NO UNIT:* To enter a very high range of values.

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- Selection of units related to the PVC. The following use cases are possible:
  - Configure an arithmetic function that uses the PVC and a PV coming from a measurement sensor connected to the device. Then, assign the unit of the PV to the PVC. Refer to section 9.14.
  - Configure a PID function that uses the PVC and a PV coming from a measurement sensor connected to the device. Then, assign the unit of the PV to the PVC. Refer to section 9.18.

TEXT: If *UNIT* is set to *CUSTOM*, choose *MANUAL ENTRY* to enter a customized text for the unit or choose *UNIT LIST* to select a unit of the list.

FORMAT: If *UNIT* is set to *CUSTOM,* choose the format of the process variable with different accuracies (0 / 0.0 / 0.00 / 0.000).

9.14 Configuring an arithmetic function with 2 process variables

The following arithmetic functions are possible: addition, substraction, multiplication, division, passage, rejection, deviation.

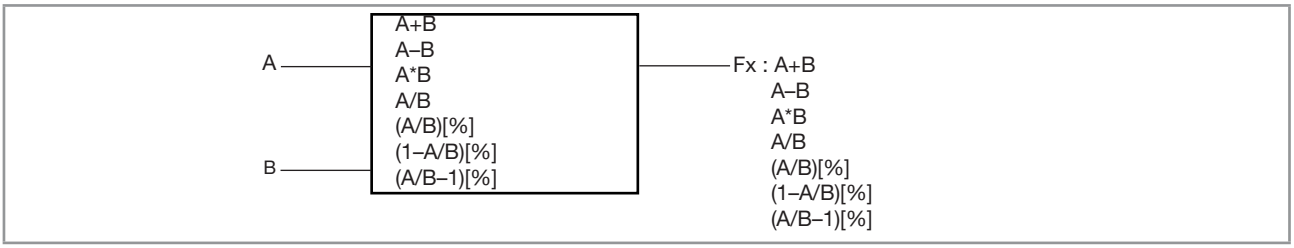

Fig. 57: Arithmetic functions

A and B are process variables. They can be constants, measured physical parameters, results of other active configured functions, values entered by the user (PVC), values coming from a PLC (PVN), ... (see section 15).

Function	Calculation made
A+B	Sum of 2 process variables, A and B. ▸ Make sure all the items have the same units. ▸ If A or B is a constant, first create the other process variable and choose the associated unit.
A–B	Subtraction between the 2 process variables, A and B. ▸ Make sure all the items have the same units. ▸ If A or B is a constant, first create the other process variable and choose the associated unit.
A*B	Multiplication between 2 process variables, A and B. The items can have different units but make sure the unit of the result is as expected.

Function	Calculation made
A/B	Ratio between the 2 process variables, A and B The items can have different units but make sure the unit of the result is as expected.
A/B[%]	Passage rate ▸ Make sure all the items have the same units. ▸ If A or B is a constant, first create the other process variable and choose the associated unit.
(1 – A/B)[%]	Rejection rate ▸ Make sure all the items have the same units. ▸ If A or B is a constant, first create the other process variable and choose the associated unit.
(A/B – 1)[%]	Deviation rate ▸ Make sure all the items have the same units. ▸ If A or B is a constant, first create the other process variable and choose the associated unit.

Once the function has been configured and activated, the result "Fx:" calculated is available in the list of process variables on the "M0:MAIN" board. This list appears in the output configuring, user view configuring and datalogging menus to:

- Assign the result "Fx:" calculated to a physical output (analogue, AO, or digital, DO). See sections 9.25 and 9.26).
- Display the result "Fx:" on one of the user defined "Ux" views. See section 9.9.
- Logging the values of "Fx:" using the datalogger. See section 9.22.

Refer to section 8.10 to access the "Parameters" menu.

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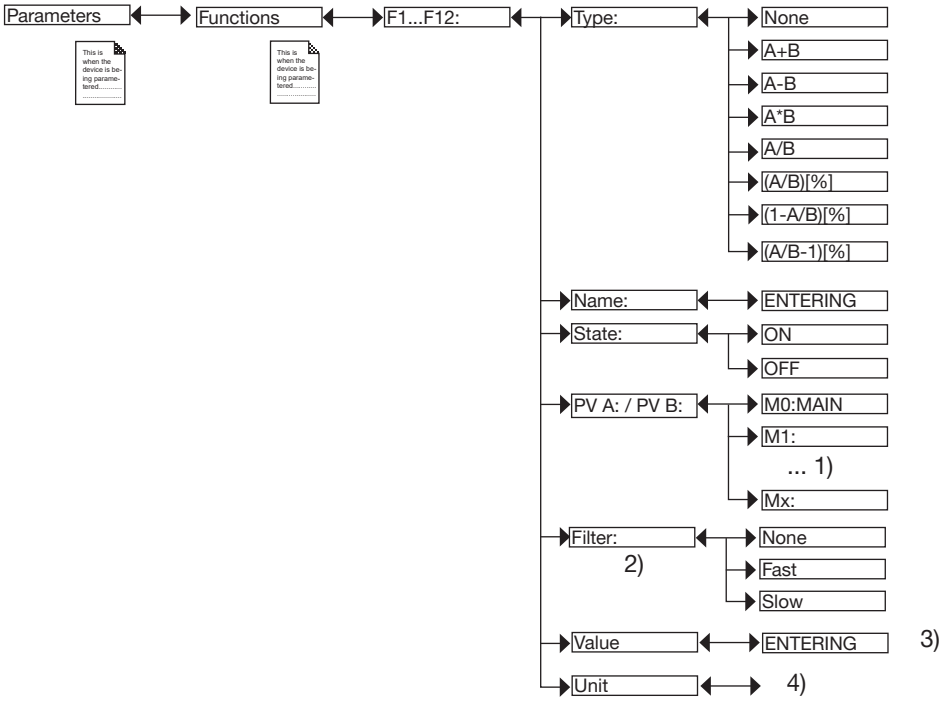

1) *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*
2) *If PV is not a constant.*
3) *If "PV A: / PV B:" is a constant.*
4) *The choices offered depend on the choice made in "PV A: / PV B:" above.*

TYPE: Choose the function.

NAME: Rename the function chosen. See section 8.4 Entering text. This name appears in the view associated with this function in Process level.

STATE: Used to activate (choose "ON") or deactivate (choose "OFF") the selected function.

At each start-up of the device, the functions are checked. If there is a problem with a function, the device automatically deactivates the function. For example, if a function F1 uses a function F2 and F2 has been deactivated, either manually or automatically, the function F1 will be deactivated.

PV A (OR PV B): A and B can be constants, measured physical parameters, results of other active configured functions, values entered by the user (PVC), values coming from a PLC (PVN), ... (see section 15).

FILTER: If required, choose the level of attenuation of the input variables. See Fig. 53: Filtering curves.

VALUE: If "PV A: / PV B:" is a constant, enter the value of the constant.

UNIT: Select the units in which the result is displayed on the associated user view.

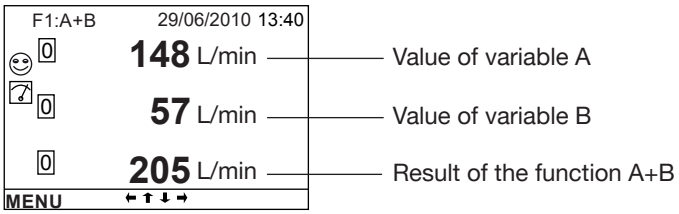

Fig. 58: Example of a view of an active arithmetic function in Process level

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9.15 Configuring a MATH function

The function is available as an option. See section 9.5.

The function "MATH" permits to enter an equation which respects the following rules:

- up to 125 characters;
- up to 5 process variables A, B, C, D, E.
  A, B, C, D, E can be constants, measured physical parameters, results of other active configured functions, the previous result of the same function, values entered by the user (PVC), values coming from a PLC (PVN),...(see section 15);
- with the operators and priority rules given in Table 8.

Table 8: Operators, priority and calculation sequence of the MATH equation

Possible operators	Priority	Sequence of calculation
( )	1	–
! ±	2	from the right to the left
^	3	from the left to the right
× ÷ %	4	
+ −	5	
< > ≤ ≥	6	

→ You can enter multiplications without the operator, e.g.
10A/5(B3) = 10xA/5x(Bx3) = 6xAxB.

→ To enter the equation, respect the rules given in section 9.15.1.

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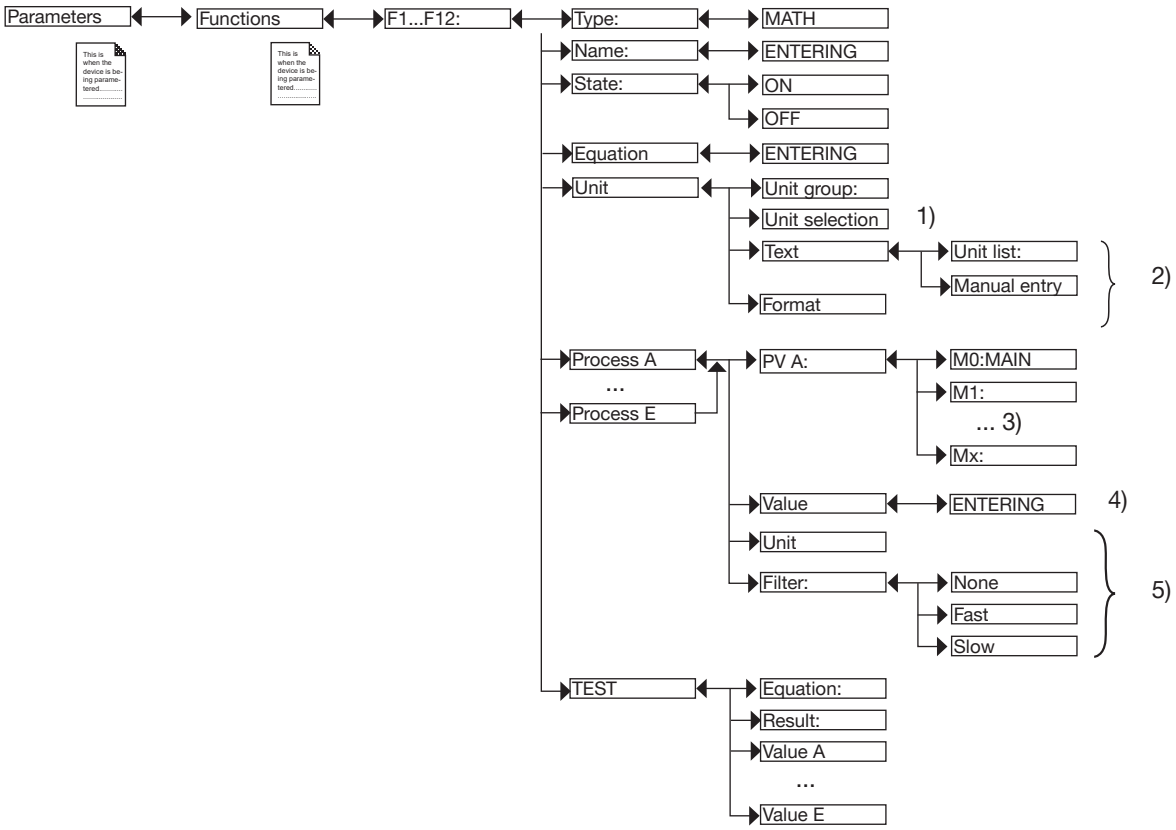
Refer to section 8.10 to access the "Parameters" menu.



1) *If "Unit group" ≠ "ON/OFF" and ≠ "Custom"*
2) *If "Unit group" = "Custom"*
3) *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*
4) *If "PV A:...PV E:" = "Constant"*
5) *If "PV A:...PV E:" ≠ "Constant"*

Once the function has been configured and activated, the result "Fx:" calculated is available in the list of process variables on the "M0:MAIN" board. This list appears in the output configuring, user view configuring and datalogging menus to:

- Assign the result "Fx:" calculated to a physical output (analogue, AO, or digital, DO) (see sections 9.25 and 9.26).
- Display the result "Fx:" on one of the user defined "Ux" views: see section 9.9.
- Logging the values of "Fx:" using the datalogger: see section 9.22.

TYPE: Choose the function MATH.

NAME: Rename the function chosen. See section 8.4 Entering text. This name appears in the view associated with this function in Process level.

STATE: Used to activate (choose "ON") or deactivate (choose "OFF") the selected function.

At each start-up of the device, the functions are checked. If there is a problem with a function, the device automatically deactivates the function. For example, if a function F1 uses a function F2 and F2 has been deactivated, either manually or automatically, the function F1 will be deactivated.

EQUATION: Enter the equation, using the process variables A, B, C, D, E. Respect the rules given in section 9.15.1 Entering a mathematical equation.

UNIT:

- *UNIT GROUP*: Choose the units for the equation result. The following choices are possible:
  - *ON/OFF:* Choose whether the value of the PV is always ON or always OFF. If the equation result is 0, then the PV associated to the equation result is set to OFF. If the equation result is different from 0, then the PV associated to the equation result is set to ON. The following use cases are possible:
    - Allow the equation result to control a digital output (DOx) of the device. Then, configure the DO output as an ON/OFF output that uses the equation result (see section 9.26.1).
    - Allow the equation result to reset a totaliser. Then, configure the totaliser (see section 9.23.2).
    - Allow the equation result to freeze a totaliser. Then, configure the totaliser (see section 9.23.3).
    - Allow the equation result to participate in another boolean equation. Then, configure the equation (see section 9.15.1).
    - Allow the equation result to trigger the "System switch" event. Then, configure the "System switch" event in mode ON/OFF (see section 9.21).
  - *NO UNIT:* To allow a very high range of results.
  - *CUSTOM:* To enter a customized text for the unit and choose the displayed format of the equation result.
  - Selection of units related to the equation result. The following uses cases are possible:
    - the equation result participates in an arithmetic function that uses a PV coming from a measurement sensor connected to the device. Then, assign the unit of the PV to the equation result. To configure an arithmetic function, see section 9.14.
    - the equation result participates in a PID function that uses a PV. Then, assign the unit of the PV to the equation result. To configure a PID function, see section 9.18.
- *UNIT SELECTION*: If this menu point is proposed, choose the unit for the equation result.
- *TEXT:* If *UNIT GROUP* is set to *CUSTOM*, choose *MANUAL ENTRY* to enter a customized text or choose *UNIT LIST* to select a unit of the list.
- *FORMAT:* If *UNIT GROUP* is set to *CUSTOM*, choose the displayed format of the process variable with different accuracies (0 / 0.0 / 0.00 / 0.000).

PROCESS A (B, C, D, E):

- *PV A (B, C, D, E):* Define the process variables A, B, C, D or E used into the equation. The process variables can be constants, measured physical parameters, results of other active configured functions, the previous result of the same function, values entered by the user (PVC), values coming from a PLC (PVN),... See section 15.

→ Make sure the unit of the final result is as expected.

- *UNIT:* Select the unit in which the process variable must be scaled before it is used in the equation.
- *VALUE:* If "PV A:...PV E:" is a constant, enter the value of the constant.
- *FILTER*: Choose the level of attenuation of the process variable, before it is used in the equation. See Fig. 53: Filtering curves.

TEST: Simulate the process variables A, B, C, D, E to test the entered equation. During the simulation, the device is operating normally.

- *EQUATION*: the entered equation can be read.
- *RESULT:* the result of the equation with the entered values for A, B, C, D, E can be read.
- *VALUE A, B, C, D, E:* simulate the values of A, B, C, D, E to make sure the result is as expected.

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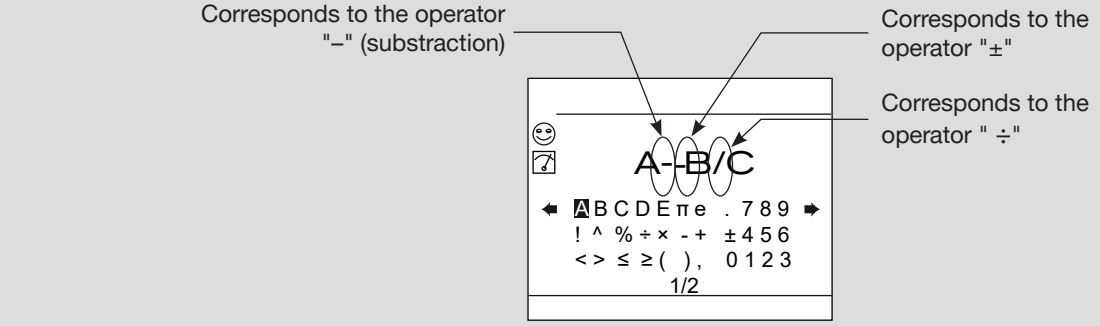
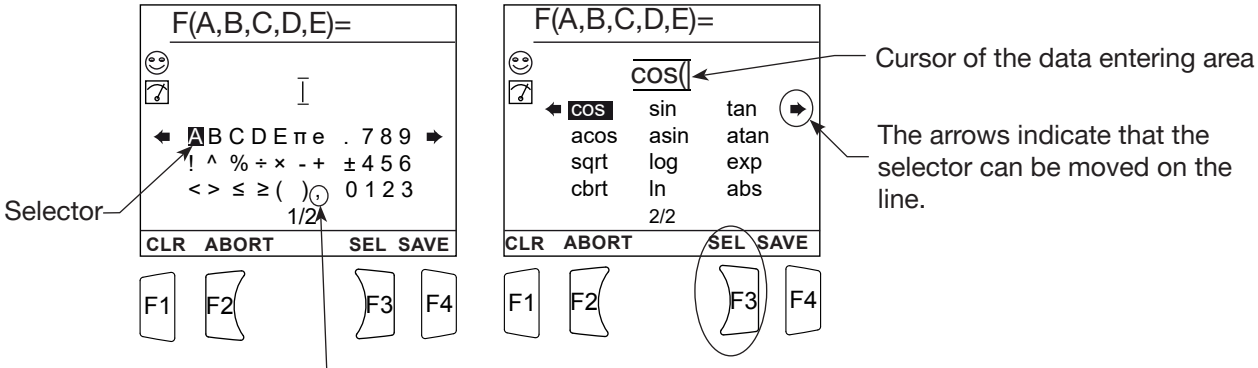
9.15.1 Entering a mathematical equation

This section describes how to use the keyboard displayed to enter a mathematical equation (max. 125 characters).

- The 2 operators "±" and "-" are displayed in the equation with the same sign "-", but they are placed on 2 different vertical levels.
- The operator "÷" is displayed in the equation with the sign "/".





→ To move the cursor in the data entering area using keys ◁ ▷ and ◁ ▷ first move the selector into the data entering area using the keys ▽ and △.

→ To insert a character in place of the cursor, move the selector over this character and press key F3 (function "selection").

→ To remove the character before the cursor, move the selector into the data entering area then press key F3 (function "backspace").

→ To erase all the characters at once, press key F1 (function "clear").

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Furthermore, you must know the result given by some operators: see Table 9.

Table 9: Result of some operators

Operator	Result	Example
±	Changes the sign of the operand that follows the operator	±6 = –6 ±–6 = +6
%	Remainder of the integer division between the left operand by the right operand	17,48%4 = 1,48
<	• 1,0 if the left operand is lower than the right operand.	5 < 8 = 1,0
	• 0,0 if the left operand is higher than or equal to the right operand.	8 < 5 = 0,0 5 < 5 = 0,0
≤	• 1,0 if the left operand is lower than or equal to the right operand.	5 ≤ 8 = 1,0 8 ≤ 8 = 1,0
	• 0,0 if the left operand is higher than the right operand.	8 ≤ 5 = 0,0
>	• 1,0 if the left operand is higher than the right operand.	8 > 5 = 1,0
	• 0,0 if the left operand is lower than or equal to the right operand.	5 > 8 = 0,0 5 > 5 = 0,0
≥	• 1,0 if the left operand is higher than or equal to the right operand.	8 ≥ 5 = 1,0 5 ≥ 5 = 1,0
	• 0,0 if the left operand is lower than the right operand.	5 ≥ 8 = 0,0
!	• 1,0 if the right operand is an element of]–0,50; +0,50[	!0,12 = 1,0
	• 0,0 if the right operand is an element of]–∞; –0,50] or [+0,50;+∞[	!–456 = 0,0

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9.15.2 Examples of MATH functions

Function	Equation	A, B, C, D, E
"NO"	!A	A is a binary PV, such as a DI • result is 1.0 if A is an element of]–0,5; +0,5[• result is 0.0 if A is an element of]–∞; –0,5] or [+0,5; +∞[
"AND"	AB	A and B are binary PVs, such as DIs
"Triple AND"	ABC	A, B and C are binary PVs, such as DIs
"OR"	!!(A+B)	A and B are binary PVs, such as DIs
"Triple OR"	!!(A+B+C)	A, B and C are binary PVs, such as DIs
"XOR" (eXclusive OR)	A!B+!AB	A and B are binary PVs, such as DIs
"Triple XOR"	A!B!C+!AB!C+!A!BC	A, B and C are binary PVs, such as DIs
Return the highest value from 2 PVs	(A<B)B+(A≥B)A	A and B are PVs
Return the lowest value from 2 PVs	(A>B)B+(A≤B)A	A and B are PVs

9.15.3 Use case of the MATH function: pulse timer

The result of F2:MATH generates a pulse with a predefined time on a digital output DOx. Refer to Fig. 59.

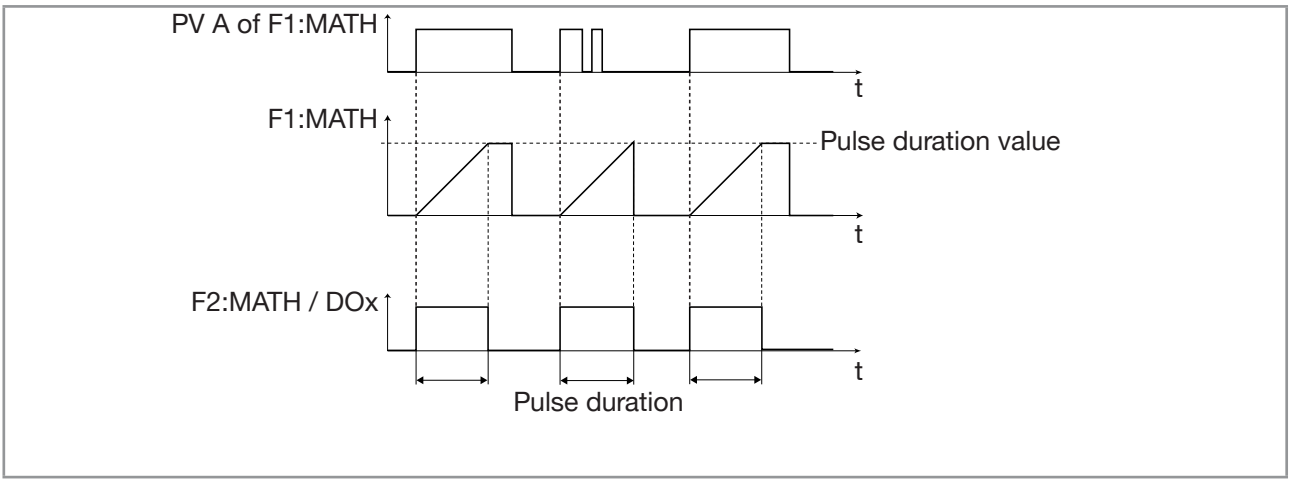

Fig. 59: Timing diagrams for a pulse timer

To create the pulse timer, do the following steps:

1. Do the settings for function F1:

   - *TYPE*: Choose MATH
   - *EQUATION*: Enter !!(A+C)(B+0.1)
   - *UNIT*

     UNIT GROUP: Choose *CUSTOM*

     TEXT then *UNIT LIST* and choose the unit "s" or *TEXT* then *MANUAL ENTRY* and enter s (for second).

     FORMAT: Choose *0.0*

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- *PROCESS A*

  PV A: Choose the event that will trigger a pulse; either a digital input (DIx in *M0:MAIN* or in *Mx:Inputs*), the event *WARNING* (in *M0:MAIN*) or the event *SYSSWITCH* (in *M0:MAIN*).
  If you want to trigger a pulse when a process variable exceeds a given threshold value, replace A in the equation by (A>"threshold value") and assign the process variable to *PV A*.

- *PROCESS B*

  PV B: Choose *M0:MAIN* and *F1:MATH*. If *F1:MATH* is not displayed in the list of process variables for *M0:MAIN*, press *BACK* then *SAVE*. Go again to *PV B* and choose *M0:MAIN* and *F1:MATH*

- *STATE:* Make sure the state is set to *ON*.
- Press SAVE.

At each start-up of the device, the functions are checked. As function F1 uses the result of function F2, F1 is automatically deactivated because F2 cannot be calculated. After each start up of the device, you must manually activate the function F1.

2. Do the settings for function F2:

- *TYPE*: Choose MATH
- *EQUATION*: Enter (0<A)(A<"value of the pulse duration in seconds"); the value of the pulse duration must have a maximum resolution of 0.1 s.
- *UNIT*

  UNIT GROUP: Choose *ON/OFF*

- *PROCESS A*

  PV A: Choose *M0:MAIN* and *F1:MATH*

- *STATE:* Make sure the state is set to *ON*.
- Press SAVE.

3. Do the settings for the digital output (DOx) (also refer to section 9.26.1):

- *MODE*: Choose *ON/OFF.*
- *PV:* Choose *M0:MAIN* and *F2:MATH*
- Press SAVE.

4. Go back to the function F1 and complete the settings for function F1:

- *PROCESS C*

  PV C: Choose *Mx:DOy*

- Press SAVE.

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9.15.4 Use case of the MATH function: ON-delay timer

The result of F2:MATH sets the digital output DOx to ON after a predefined time delay. Refer to Fig. 60.

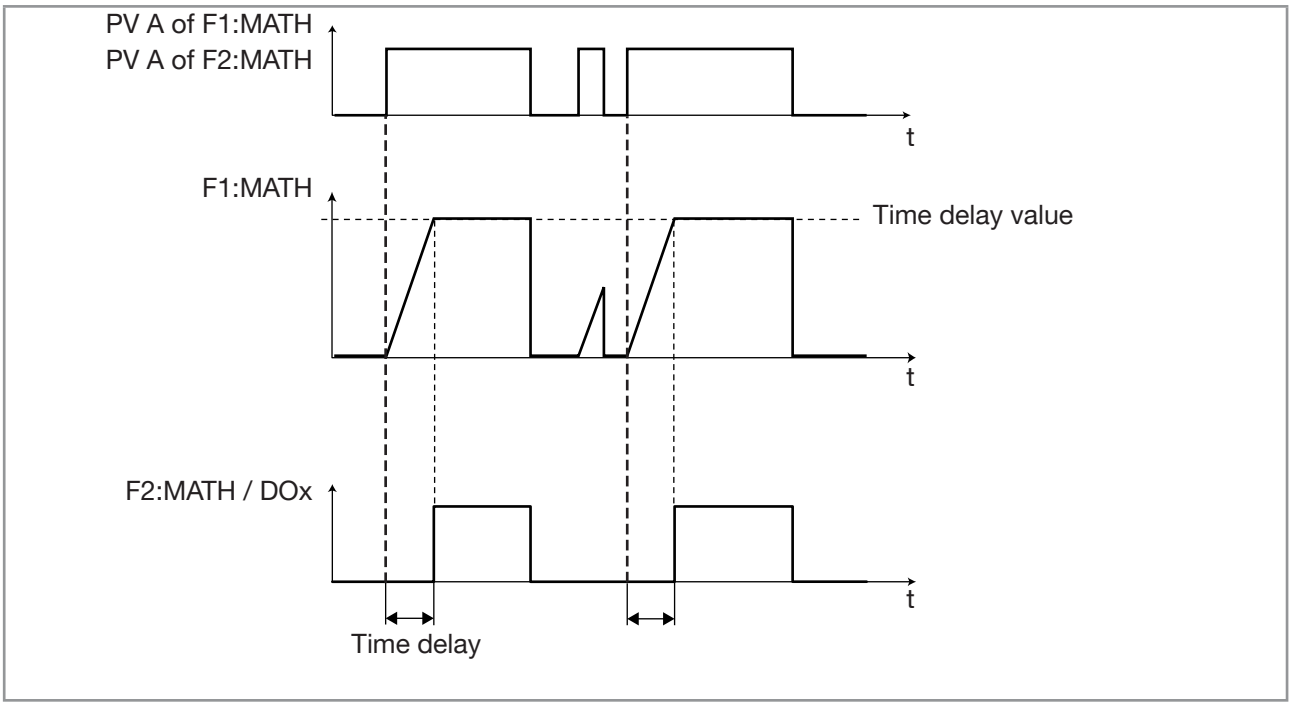

Fig. 60: Timing diagrams for an ON-delay timer

To create the ON-delay timer, do the following steps:

1. Do the settings for function F1:

- *TYPE*: Choose MATH
- *EQUATION*: Enter A(B+0.1)
- *UNIT*

  UNIT GROUP: Choose *CUSTOM*

  TEXT then *UNIT LIST* and choose the unit "s" or *TEXT* then *MANUAL ENTRY* and enter s (for second).

  FORMAT: Choose *0.0*

- *PROCESS A*

  PV A: Choose the event that will trigger a pulse; either a digital input (DIx in *M0:MAIN* or in *Mx:Inputs*), the event *WARNING* (in *M0:MAIN*) or the event *SYSSWITCH* (in *M0:MAIN*).
  If you want to trigger a digital output with a given delay when a process variable exceeds a given threshold value, replace A in the equation by (A>"threshold value") and assign the process variable to *PV A*.

- *PROCESS B*

  PV B: Choose *M0:MAIN* and *F1:MATH*. If *F1:MATH* is not displayed in the list of process variables for *M0:MAIN*, press *BACK* then *SAVE*. Go again to *PV B* and choose *M0:MAIN* and *F1:MATH*

- *STATE:* Make sure the state is set to *ON*.
- Press SAVE.

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2. Do the settings for function F2:

- *TYPE*: Choose MATH
- *EQUATION*: Enter A(B>"value of the delay in seconds"); the value of the time delay must have a maximum resolution of 0.1 s.
- *UNIT*

  UNIT GROUP: Choose *ON/OFF*
- *PROCESS A*

  PV A: Choose the same event as the one set in *PV A* of *F1:MATH*
- *PROCESS B*

  PV B: Choose *M0:MAIN* and *F1:MATH*
- *STATE:* Make sure the state is set to *ON*.
- Press SAVE.

3. Do the settings for the digital output (DOx) (also refer to section 9.26.1):

- *MODE*: Choose *ON/OFF.*
- *PV:* Choose *M0:MAIN* and *F2:MATH*
- Press SAVE.

9.15.5 Use case of the MATH function: OFF-delay timer

The result of F2:MATH sets the digital output DOx to OFF after a predefined time delay. Refer to Fig. 61.

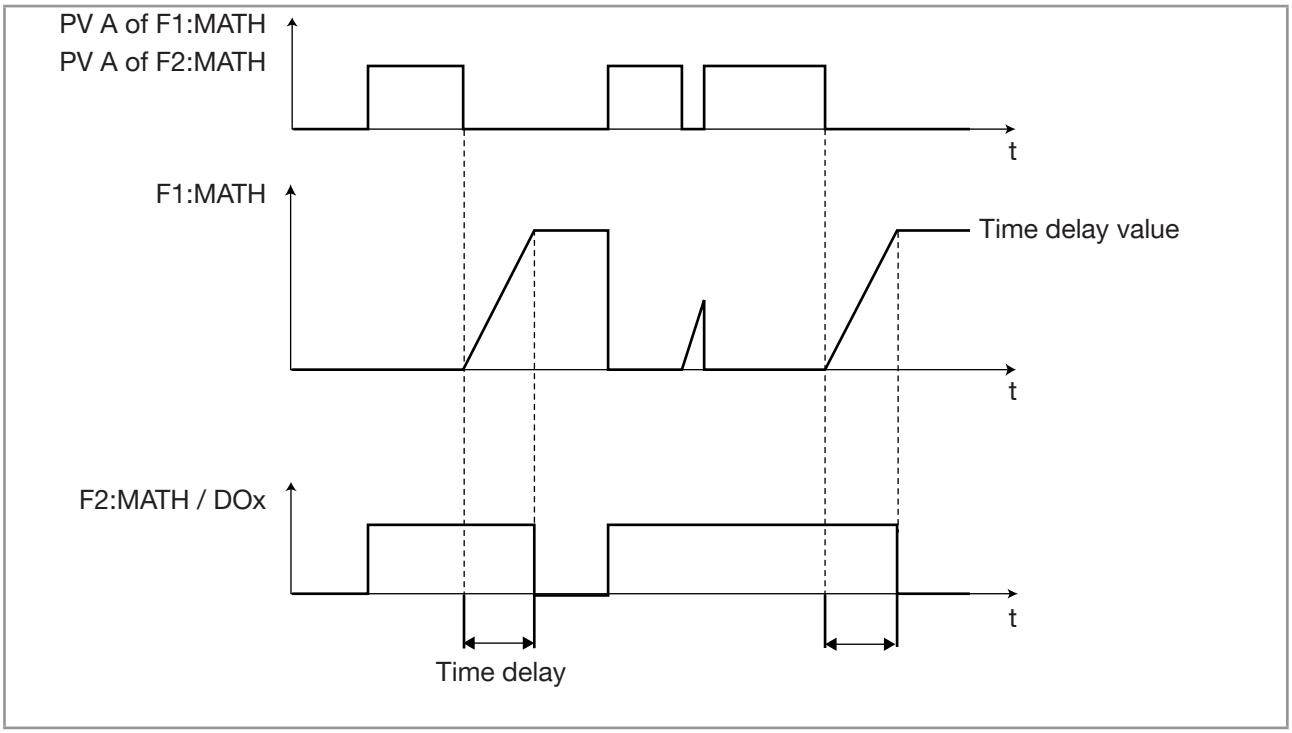

Fig. 61: Timing diagrams for an OFF-delay timer

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To create the OFF-delay timer, do the following steps:

1. Do the settings for function F1:

   - *TYPE*: Choose MATH
   - *EQUATION*: Enter !A(B+0.1)
   - *UNIT*

     UNIT GROUP: Choose *CUSTOM*

     TEXT then *UNIT LIST* and choose the unit "s" or *TEXT* then *MANUAL ENTRY* and enter s (for second).

     FORMAT: Choose *0.0*
   - *PROCESS A*

     PV A: Choose the event that will trigger a pulse; either a digital input (DIx in *M0:MAIN* or in *Mx:Inputs*), the event *WARNING* (in *M0:MAIN*) or the event *SYSSWITCH* (in *M0:MAIN*).
     If you want to trigger a digital output with a given delay when a process variable exceeds a given threshold value, replace A in the equation by (A>"threshold value") and assign the process variable to *PV A*.
   - *PROCESS B*

     PV B: Choose *M0:MAIN* and *F1:MATH*. If *F1:MATH* is not displayed in the list of process variables for *M0:MAIN*, press *BACK* then *SAVE*. Go again to *PV B* and choose *M0:MAIN* and *F1:MATH*
   - *STATE:* Make sure the state is set to *ON*.
   - Press SAVE.

2. Do the settings for function F2:

   - *TYPE*: Choose MATH
   - *EQUATION*: Enter A+(B<"value of the delay in seconds"); the value of the time delay must have a maximum resolution of 0.1 s.
   - *UNIT*

     UNIT GROUP: Choose *ON/OFF*
   - *PROCESS A*

     PV A: Choose the same event as the one set in *PV A* of *F1:MATH*
   - *PROCESS B*

     PV B: Choose *M0:MAIN* and *F1:MATH*
   - *STATE:* Make sure the state is set to *ON*.
   - Press SAVE.

3. Do the settings for the digital output (DOx) (also refer to section 9.26.1):

   - *MODE*: Choose *ON/OFF.*
   - *PV:* Choose *M0:MAIN* and *F2:MATH*
   - Press SAVE.

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9.15.6 Use case of the MATH function: totalising timer

The result of F2:MATH sets a digital output DOx to ON, when the totalising timer has reached a given value, and sets the digital output DOx to OFF when the event, defined as reset event, occurs.

The process variable PV C is used to reset the totalising timer and to deactivate the digital output DOx. Refer to Fig. 62.

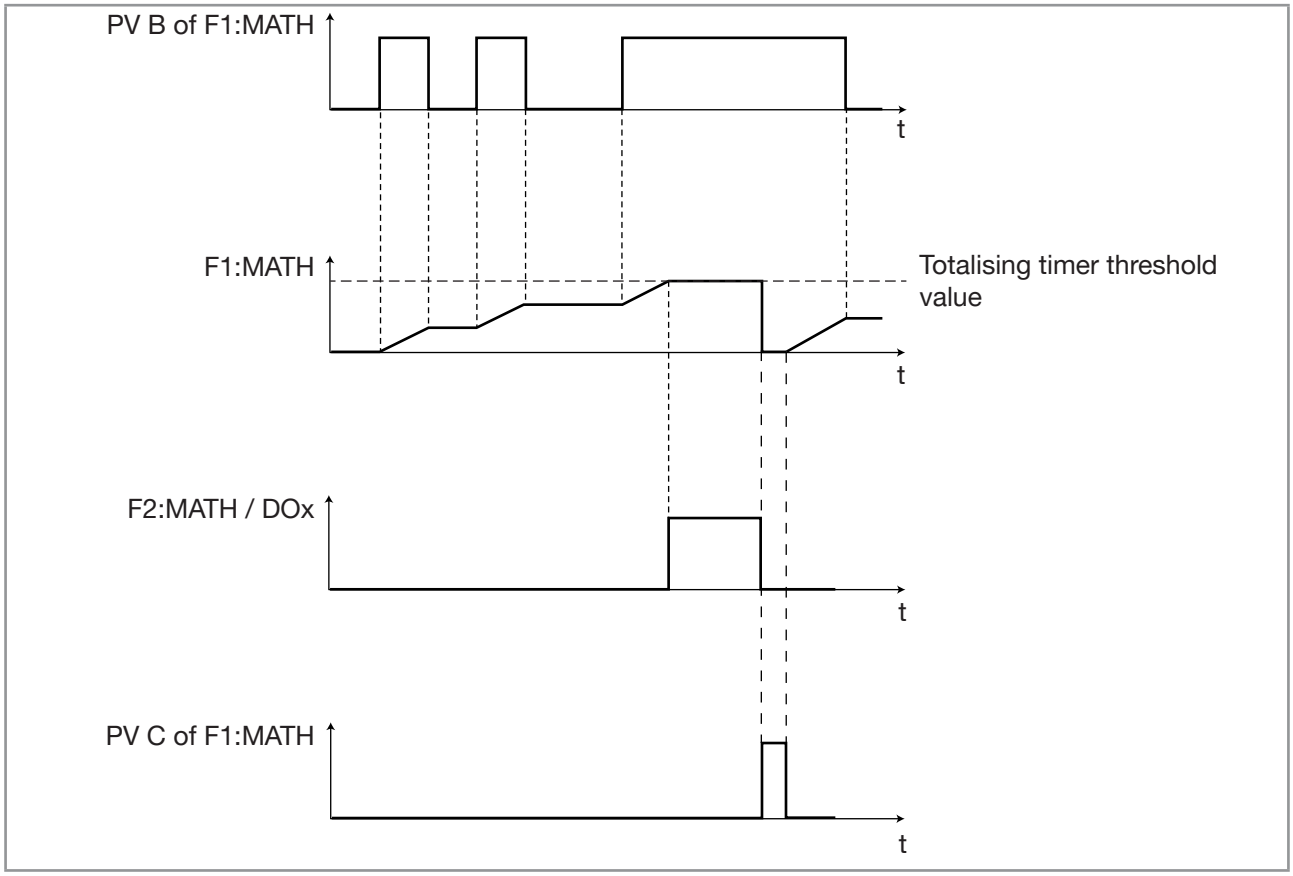

Fig. 62: Timing diagrams for a totalising timer

To create the totalising timer, do the following steps:

1. Do the settings for function F1:

- *TYPE*: Choose MATH
- *EQUATION*: Enter (A+B0.1)!C
- *UNIT*

  UNIT GROUP: Choose *CUSTOM*

  TEXT then *UNIT LIST* and choose the unit "s" or *TEXT* then *MANUAL ENTRY* and enter s (for second).

  FORMAT: Choose *0.0*

- *PROCESS A*

  PV A: Choose *M0:MAIN* and *F1:MATH*. If *F1:MATH* is not displayed in the list of process variables for *M0:MAIN*, press *BACK* then *SAVE*. Go again to *PV A* and choose *M0:MAIN* and *F1:MATH*

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- *PROCESS B*

  PV B: Choose the event whose active times must be totalised; either a digital input (DIx in *M0:MAIN* or in *Mx:Inputs*), the event *WARNING* (in *M0:MAIN*) or the event *SYSSWITCH* (in *M0:MAIN*).
  If you want to totalise the times a process variable exceeds a given threshold value, replace A in the equation by (A>"threshold value") and assign the process variable to *PV B*.

- *PROCESS C*

  PV C: Choose the event that will reset the totalising timer, for example a digital input (DIx in *M0:MAIN* or in *Mx:Inputs*).

- *STATE:* Make sure the state is set to *ON*.
- Press SAVE.

2. Do the settings for function F2:

- *TYPE*: Choose MATH
- *EQUATION*: Enter A>"value of the totalising timer threshold in seconds"); the value of the threshold must have a maximum resolution of 0.1 s.
- *UNIT*

  UNIT GROUP: Choose *ON/OFF*

- *PROCESS A*

  PV A: Choose *M0:MAIN* and *F1:MATH*. If *F1:MATH* is not displayed in the list of process variables for *M0:MAIN*, press *BACK* then *SAVE*. Go again to *PV A* and choose *M0:MAIN* and *F1:MATH*

- *STATE:* Make sure the state is set to *ON*.
- Press SAVE.

3. Do the settings for the digital output (DOx) (also refer to section 9.26.1):

- *MODE*: Choose *ON/OFF.*
- *PV:* Choose *M0:MAIN* and *F2:MATH*
- Press SAVE.

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9.16 Configuring a "PROP" proportional function

This function is used to scale a process input (PV):

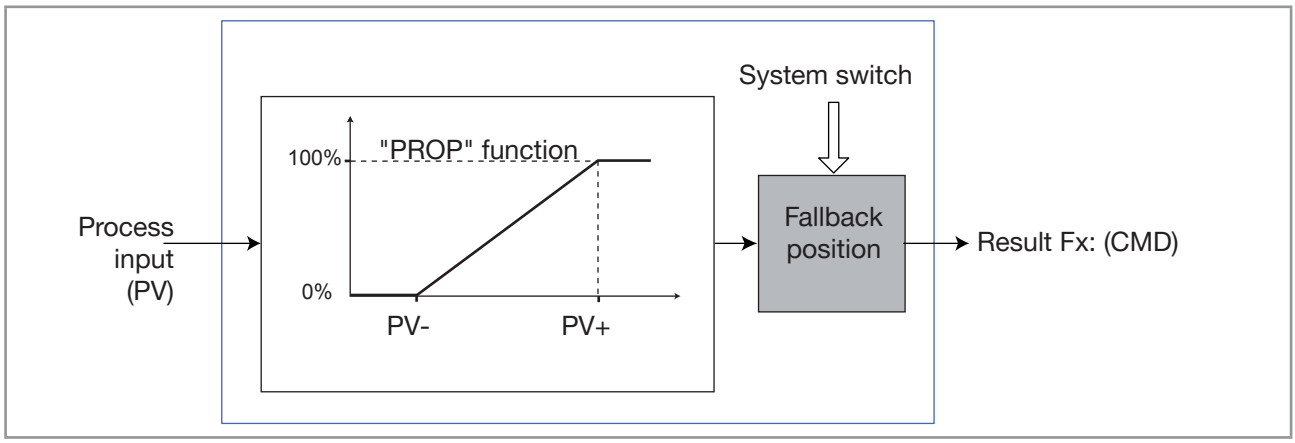
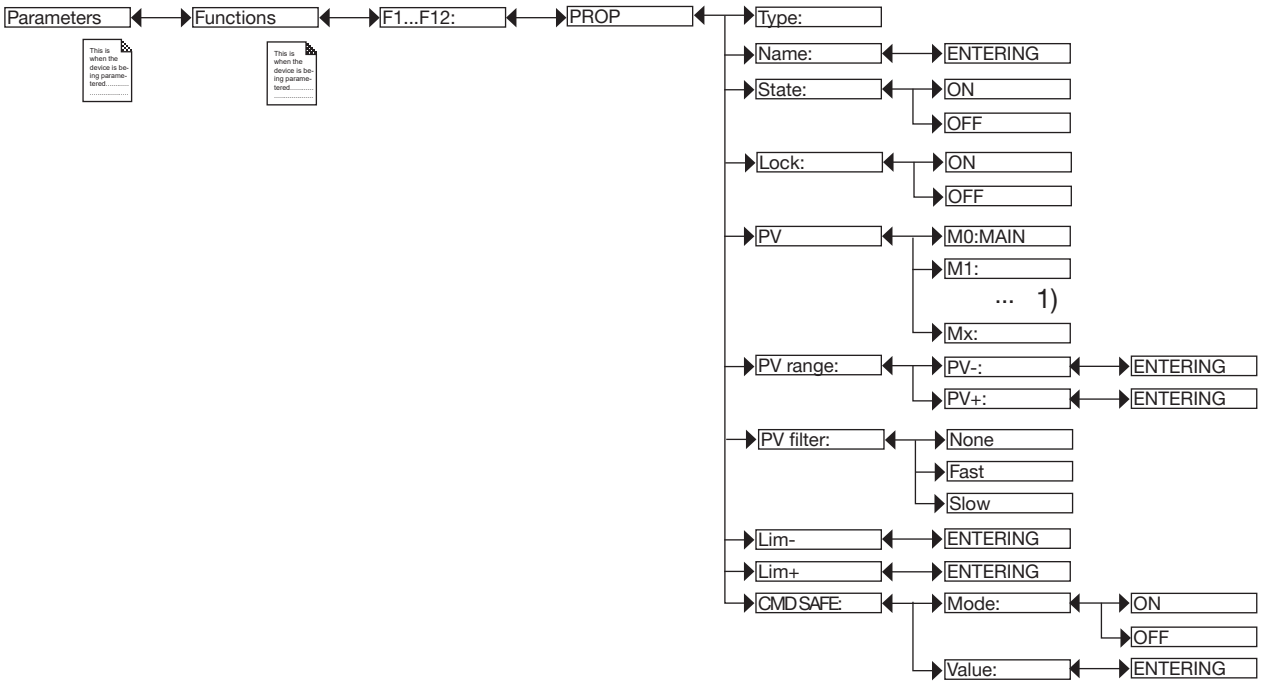


Fig. 63: "PROP" proportional function

Refer to section 8.10 to access the "Parameters" menu.

Once the function has been configured and activated, the result "Fx:" calculated is available in the list of process variables on the "M0:MAIN" board. This list appears in the output configuring, user view configuring and datalogging menus to:

- Assign the result "Fx:" calculated to a physical output (analogue, AO, or digital, DO) (see sections 9.25 and 9.26).
- Display the result "Fx:" on one of the user defined "Ux" views: see section 9.9.
- Logging the values of "Fx:" using the datalogger: see section 9.22.



[1] *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*

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TYPE: Choose the type of the function (here, "PROP").

NAME: Rename the function chosen. See section 8.4 Entering text. This name appears on the view associated with this function in Process level.

STATE: Used to activate (choose "ON") or deactivate (choose "OFF") the selected function.

At each start-up of the device, the functions are checked. If there is a problem with a function, the device automatically deactivates the function.

LOCK:

- ON: the mode cannot be modified in the Process level without entering an access code. Refer to Fig. 65. To switch the mode between the manual mode and the automatic mode, first enter the access code of the "Parameters" menu. The default access code is "0000" (see section 9.4).
- OFF: the mode in the Process level can be switched without entering an access code.

PV: Choose the process input for the function. See section 15.

PV RANGE: Enter the minimum ("PVScale-") and maximum ("PVScale+") values of the process input.

PV FILTER: Choose the level of attenuation of the chosen process variable. See Fig. 53: Filtering curves.

LIM-: Enter the lower limit on the output.

LIM+: Enter the upper limit on the output.

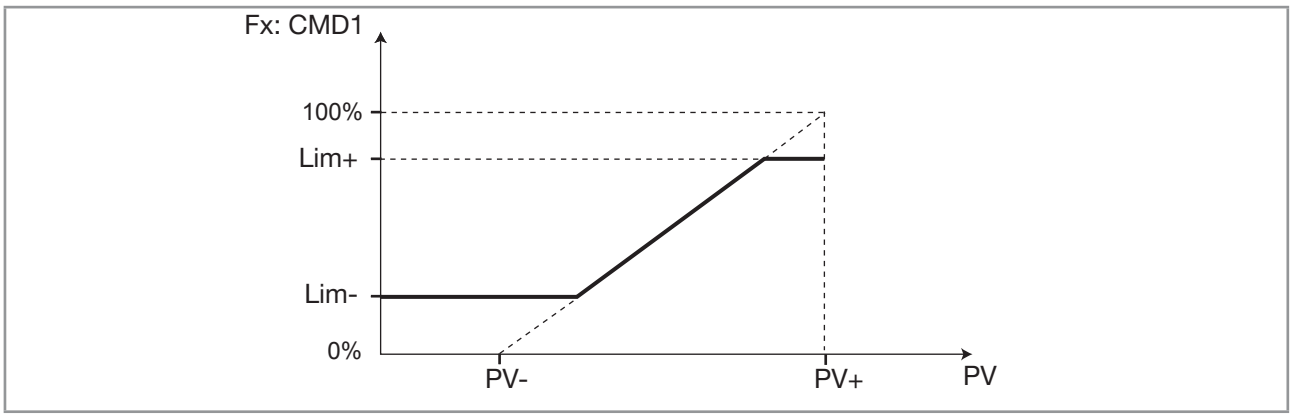

Fig. 64: Using the "LIM-" and "LIM+" parameters on a "PROP" function

CMD SAFE: Confirm (select "Mode: ON") or do not confirm (select "Mode: OFF") the use of a fallback position on the output when the "System switch" event (see section 9.21) has the state "ON". When use of the fallback position is confirmed, enter a fallback position value of 0...100 % for each output.

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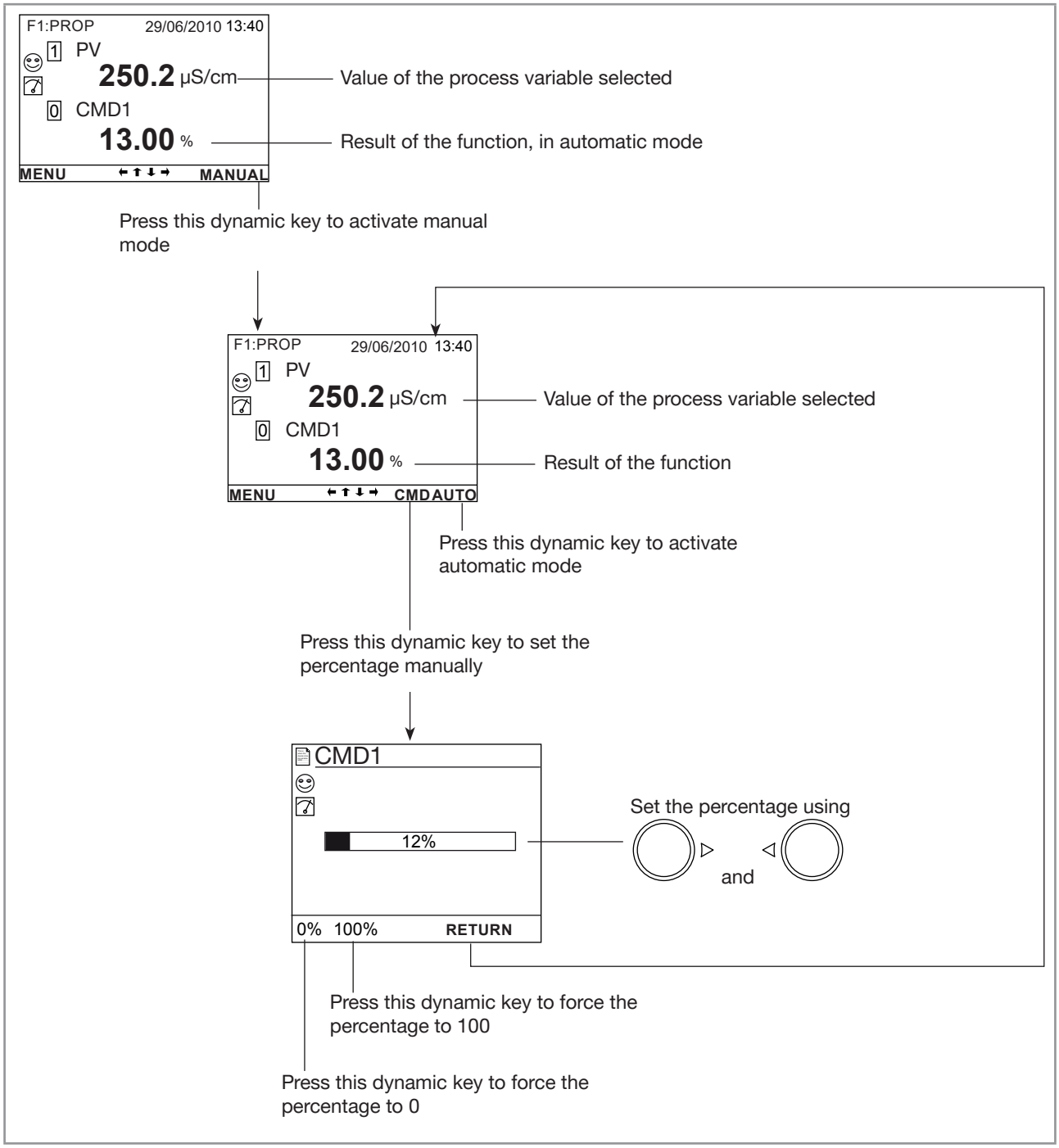

Fig. 65: Examples of a view of a "PROP" function in Process level and switch to manual or automatic mode

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9.17 Configuring an "ONOFF" control function

This function is used to set the on/off control.

A conductivity control system can be combined with the "time dosing" function (see section 9.19) to carry out a purging step (prebleed) before dosing.

Once the function has been configured and activated, the result "Fx:" calculated is available in the list of process variables on the "M0:MAIN" board. This list appears in the output configuring, user view configuring and datalogging menus to:

- Assign the result "Fx:" calculated to a physical output (analogue, AO, or digital, DO) (see sections 9.25 and 9.26).
- Display the result "Fx:" on one of the user defined "Ux" views: see section 9.9.
- Logging the values of "Fx:" using the datalogger: see section 9.22.

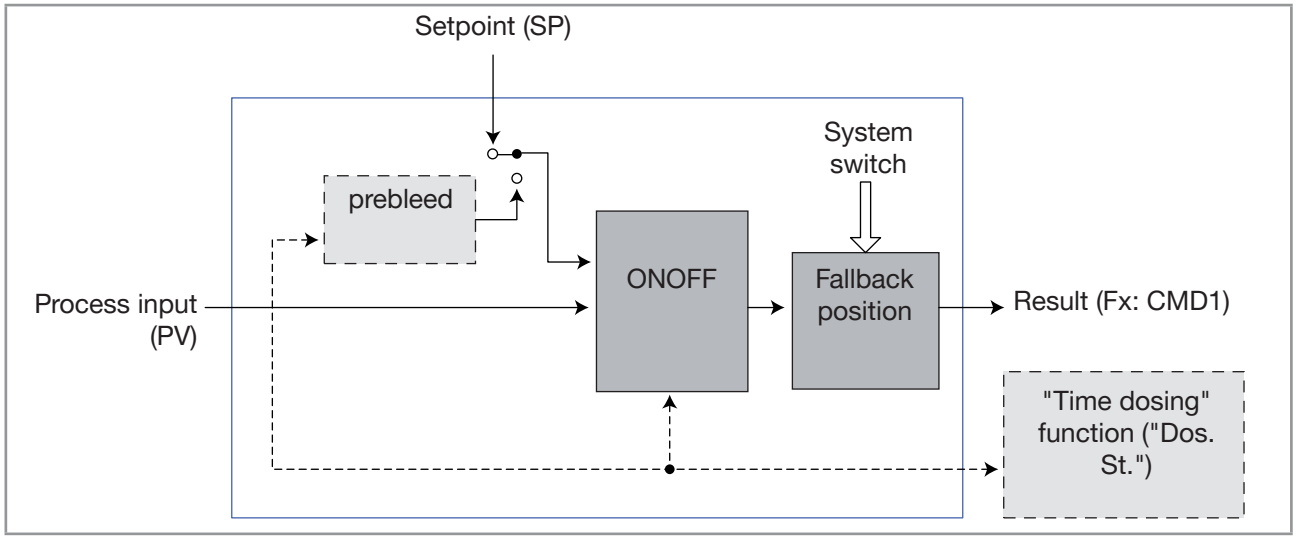

Fig. 66: "ONOFF" function

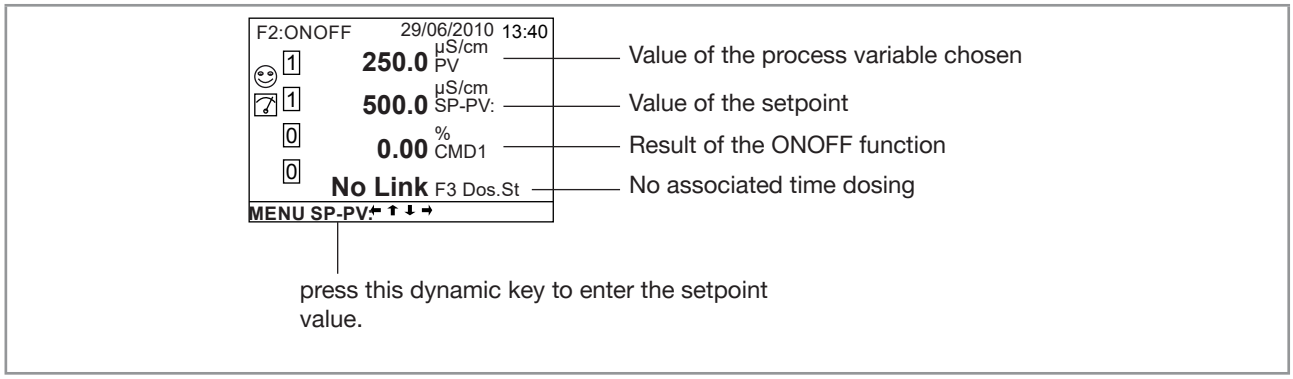

Fig. 67: Example of a view of an "ONOFF" function in Process level with no associated time dosing

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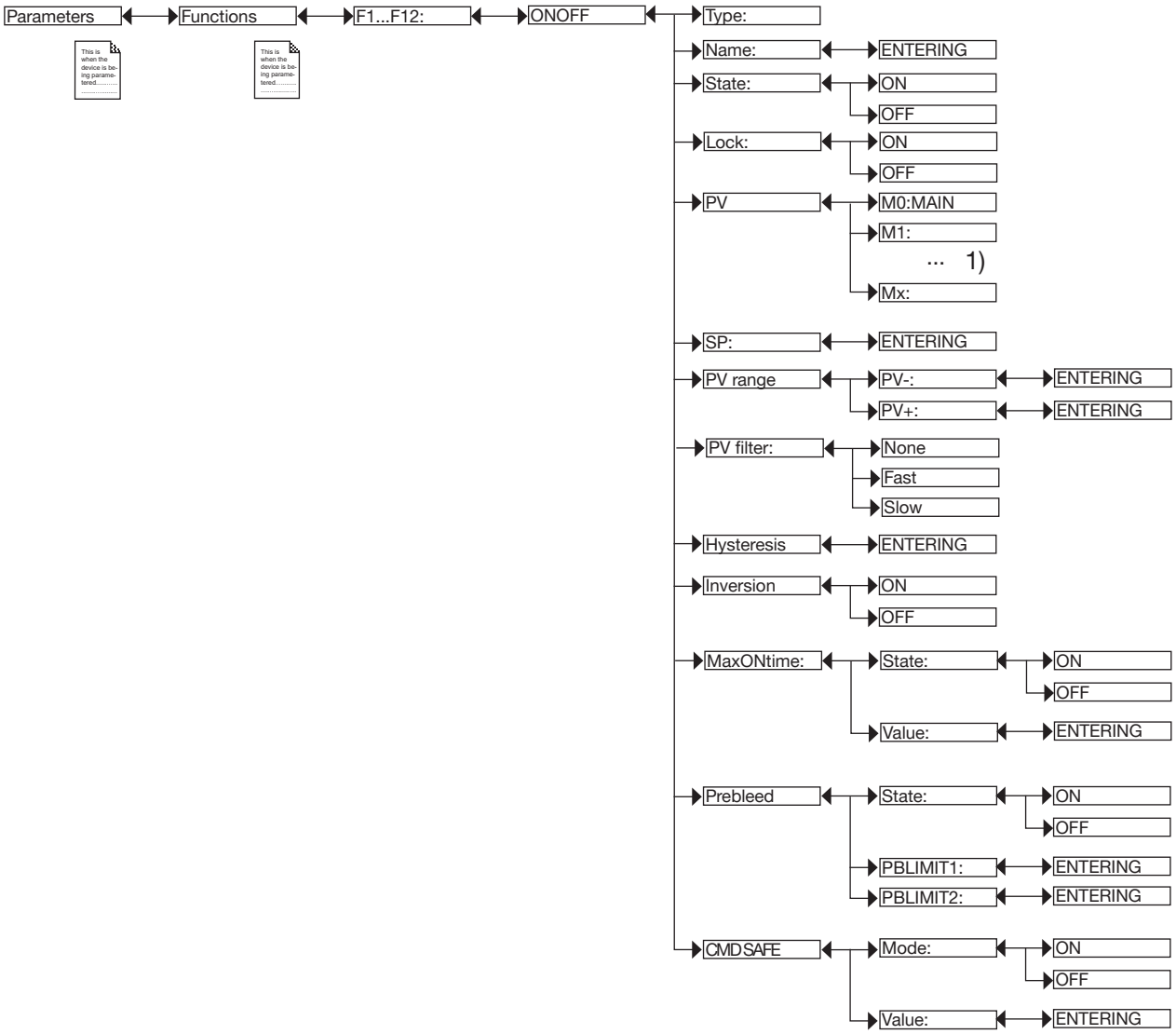
Refer to section 8.10 to access the "Parameters" menu.



[1] *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*

TYPE: Choose the type of the function (here, "ONOFF")

NAME: Rename the function chosen. See section 8.4 Entering text. This name appears in the view associated with this function in Process level.

STATE : Used to activate (choose "ON") or deactivate (choose "OFF") the selected function.

At each start-up of the device, the functions are checked. If there is a problem with a function, the device automatically deactivates the function.

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LOCK:

- ON: the mode and the value of the setpoint cannot be modified in the Process level without entering an access code. Refer to Fig. 70. To switch the mode between the manual mode and the automatic mode or to change the value of the setpoint, first enter the access code of the "Parameters" menu. The default access code is "0000" (see section 9.4).
- OFF: the mode in the Process level can be switched and the value of the setpoint can be set without entering an access code.

PV: Choose the process input for the function from the list suggested by the device. This process input may be a measured physical parameter, the result of another active configured function, a value entered by the user (PVC) or a value coming from a PLC (PVN). See section 15.

SP: Enter the setpoint value.

PV RANGE: Enter the minimum ("PVScale-") and maximum ("PVScale+") values of the process input.

PV FILTER: Choose the level of attenuation of the chosen process variable. See Fig. 53: Filtering curves.

HYSTERESIS: Enter the hysteresis value as a percentage of the PV range (and not as a percentage of the SP value), for the switching point.

INVERSION: Used to invert (choose "ON") or not (choose "OFF") the operating direction of switching. See Fig. 68: Non-inverted and inverted hysteresis mode.

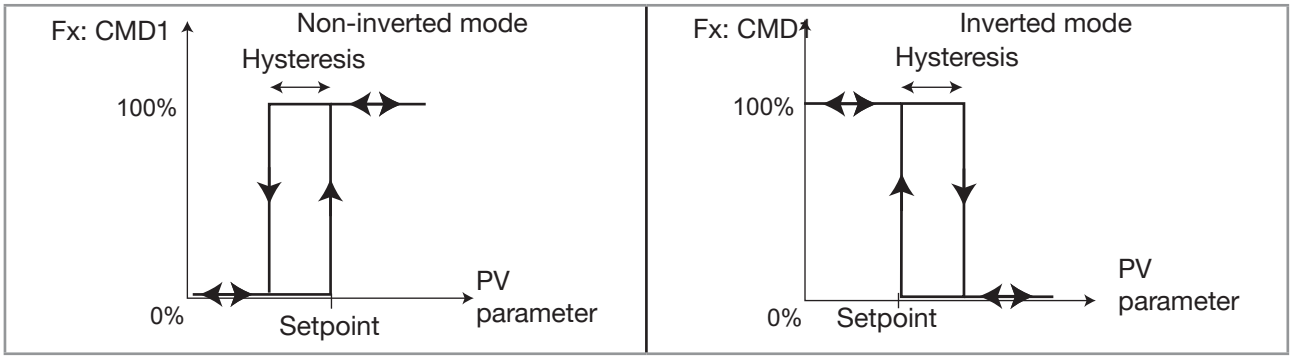

Fig. 68: Non-inverted and inverted hysteresis mode

MAXONTIME: Enter the max. authorised duration of output control: after this period, the output is deactivated.

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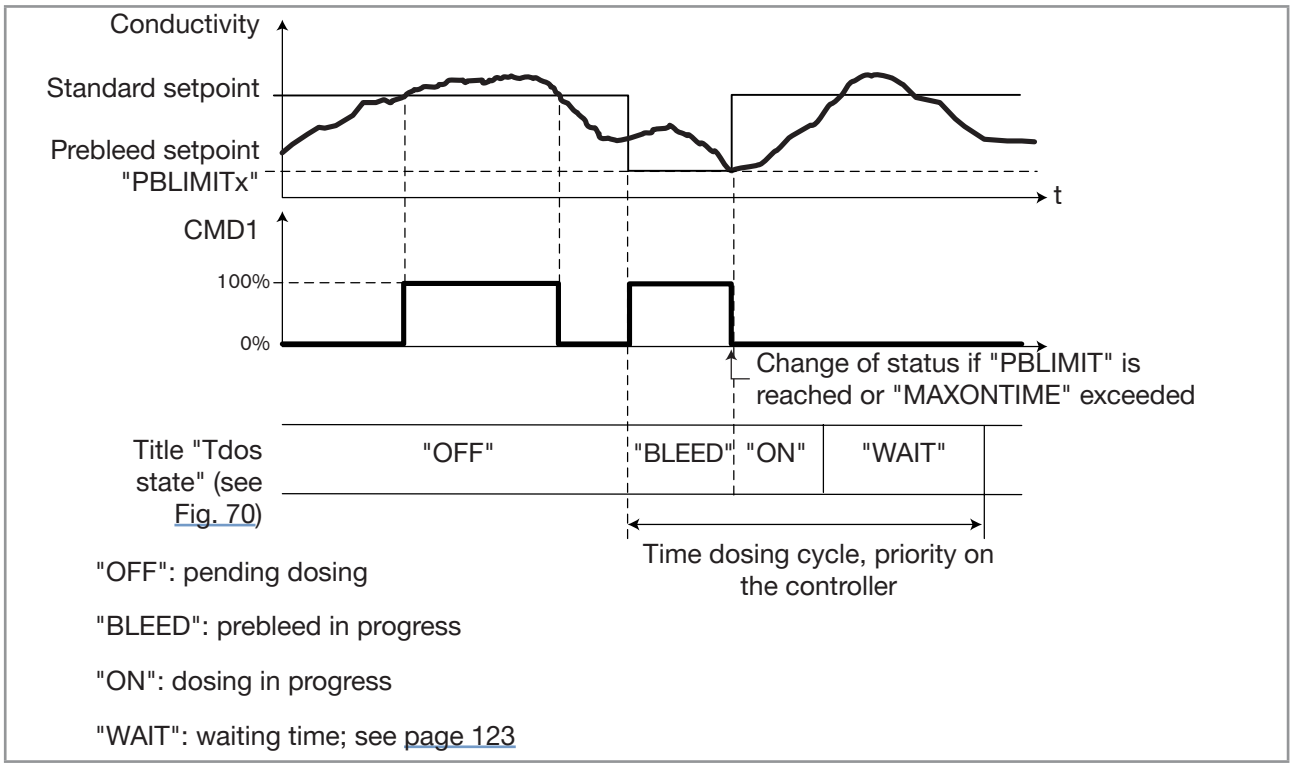

Fig. 69: Combination of "ONOFF" and "TIME DOSING" functions on a conductivity measurement

PREBLEED: Define (choose "ON") or not (choose "OFF") the ONOFF function for controlling a conductivity function as a prebleed function associated with a time dosing function ("Time Dosing": see section 9.19). When prebleed is activated, enter the prebleed setpoint value:

- *LIM CA1*:Enter the prebleed setpoint for channel 1 on the associated "Time Dosing" function.
- *LIM CA2*:Enter the prebleed setpoint for channel 2 on the associated "Time Dosing" function.

The prebleed lowers the fluid conductivity to a value less than the standard setpoint value of the ON/OFF regulator. The prebleed setpoint "LIM CAx", when enabled, takes priority over the standard setpoint of the regulator

CMD SAFE: Confirm (select "Mode: ON") or do not confirm (select "Mode:OFF") the use of a fallback position on the output when the "System switch" event (see section 9.8) has the state "ON". When use of the fallback position is confirmed, enter a fallback position value of 0...100 % for each output.

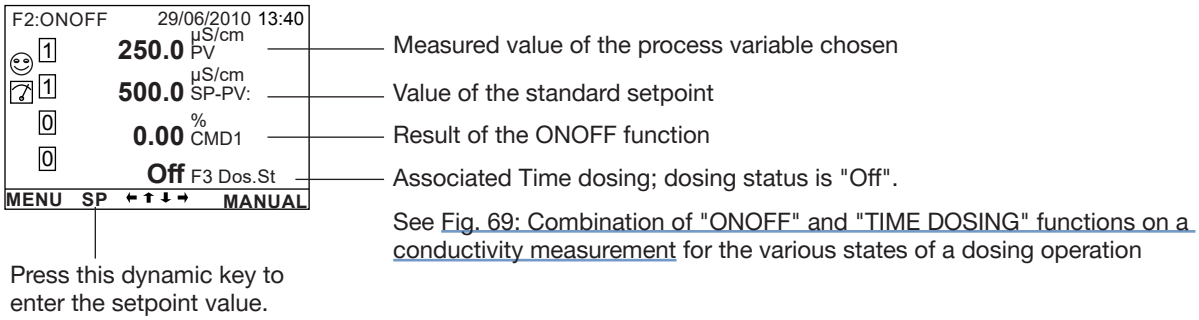

Fig. 70: Example of a view, in Process level, of the ONOFF function associated with a time dosing function

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9.18 Configuring a PID (proportional integral derivative) control function

This function is available as an option. See section 9.5.

Only up to 6 PID functions can be active simultaneously (see section 5.6.9).

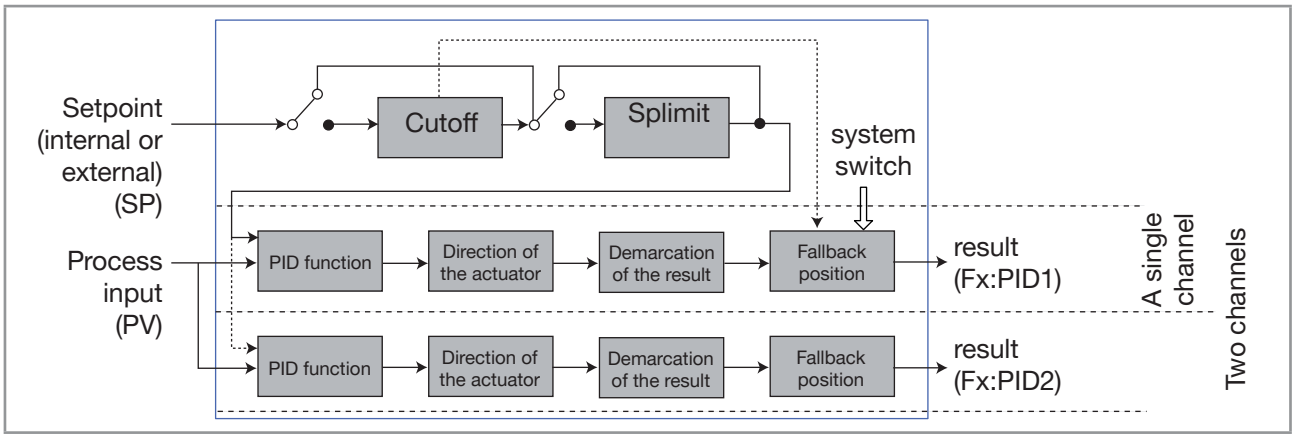

Fig. 71: PID function

Once the function has been configured and activated, the result "Fx:" calculated is available in the list of process variables on the "M0:MAIN" board. This list appears in the output configuring, user view configuring and datalogging menus to:

- Assign the result "Fx:" calculated to a physical output (analogue, AO, or digital, DO) (see sections 9.25 and 9.26).
- Display the result "Fx:" on one of the user defined "Ux" views: see section 9.9.
- Logging the values of "Fx:" using the datalogger: see section 9.22.

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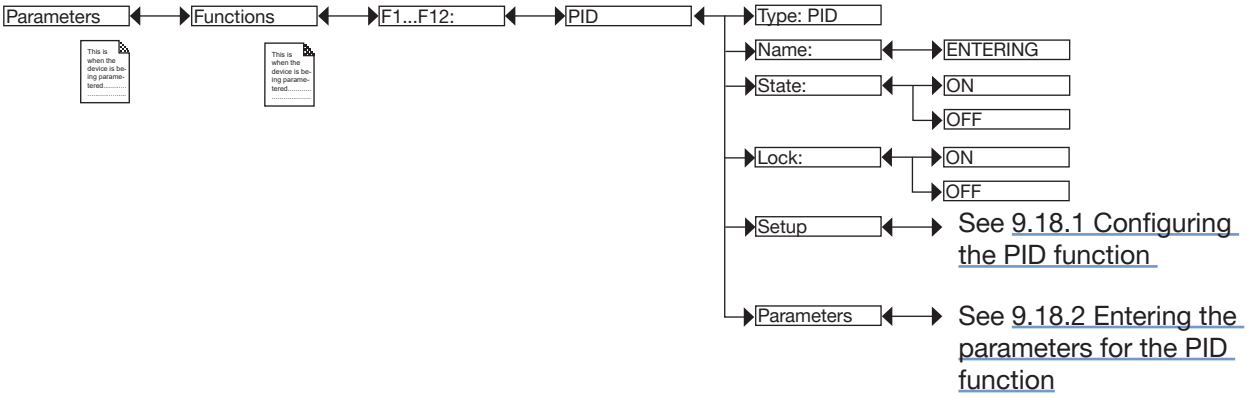
Refer to section 8.10 to access the "Parameters" menu.



TYPE: Choose the type of the function (here, "PID").

NAME: Rename the function chosen. See section 8.4 Entering text. This name appears in the view associated with this function in Process level.

STATE: Used to activate (choose "ON") or deactivate (choose "OFF") the selected function.

At each start-up of the device, the functions are checked. If there is a problem with a function, the device automatically deactivates the function.

LOCK:

- ON: the mode and the setpoint value cannot be modified in the Process level without entering an access code. Refer to Fig. 72. To switch the mode between the manual mode and the automatic mode or to change the value of the setpoint, first enter the access code of the "Parameters" menu. The default access code is "0000" (see section 9.4).
- OFF: the mode in the Process level can be switched and the value of the setpoint can be set without entering an access code.

To configure the PID function in 2 steps: see 9.18.1 Configuring the PID function and 9.18.2 Entering the parameters for the PID function.

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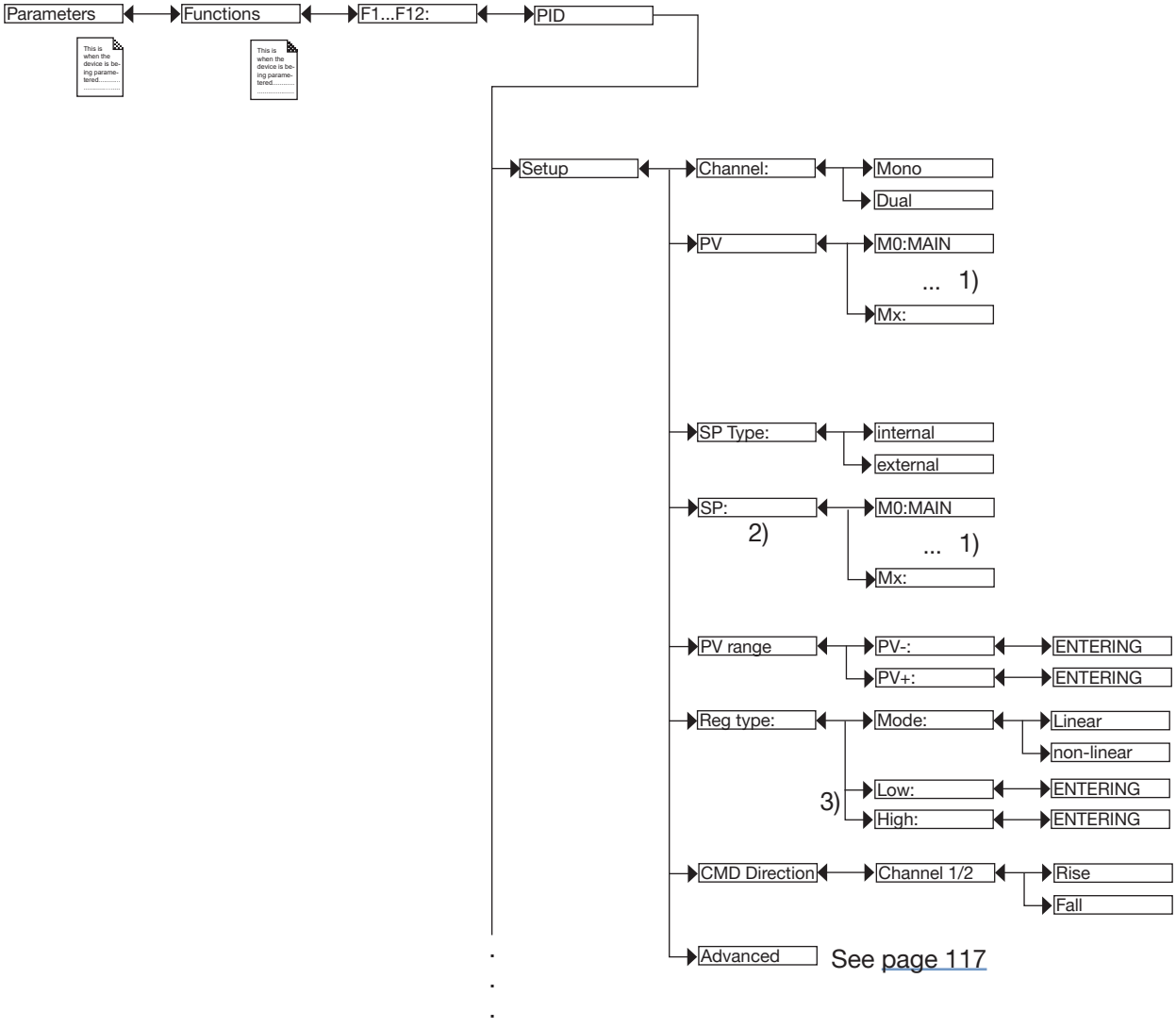
9.18.1 Configuring the PID function

Refer to section 8.10 to access the Parameters menu.



1) *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*
2) *This function is present if "SP Type" = "external"*
3) *These functions are present if "Reg. Type Mode" = "non-linear"*

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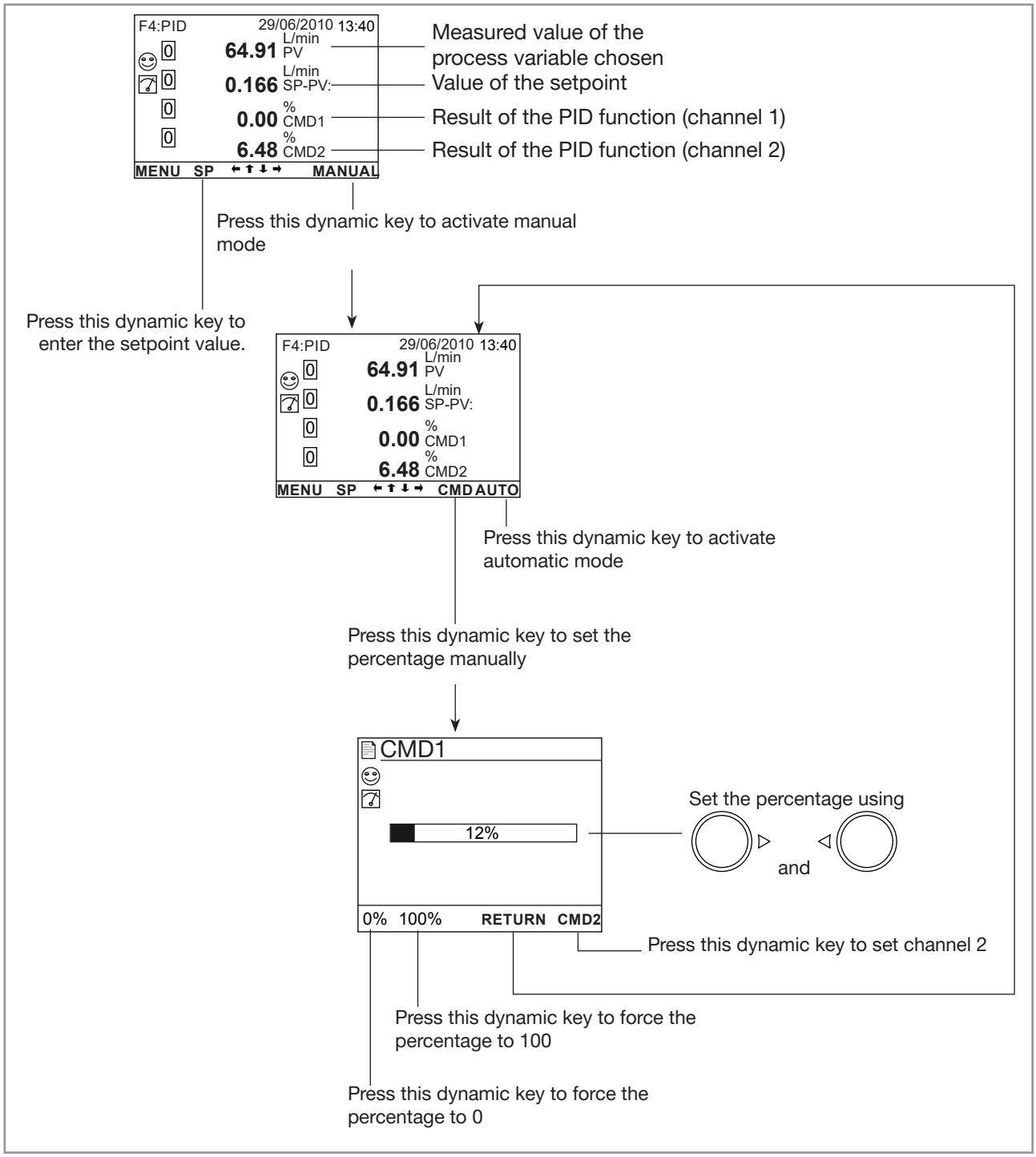

Fig. 72: Example of a view, in Process level, of the PID function, and switching to manual or automatic mode

CHANNEL: Choose to use a single control loop (choose "Single") or a control loop with 2 outputs, each with a set of parameters (choose "Dual").

"Dual" mode is used, for example, to control the pH with an acid output and a base output: when the "acid" output is controlled, the "base" output is at zero and vice versa.

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PV: Choose the process input from the list displayed by the device. This value may be a measurement input, the result of the function, the value entered by the user (PVC) or the value coming from a PLC (PVN). See section 15.

SP TYPE: Choose between an internal setpoint value (choose "internal") or an external setpoint value (choose "external"; then select the parameter used as the setpoint from the list in the "SP-PV" function below).

SP: Choose the parameter used as the external setpoint for the function.

▸ Make sure SP and PV have the same units.

PV RANGE: Enter the minimum ("PVRange-") and maximum ("PVRange+") measurement values of the process input.

REG TYPE: Choose a linear control mode (choose "linear") or non-linear control mode (choose "non-linear"; then enter under "Low" and "High" the 2 process input thresholds outside of which the "Drift" part is deactivated).

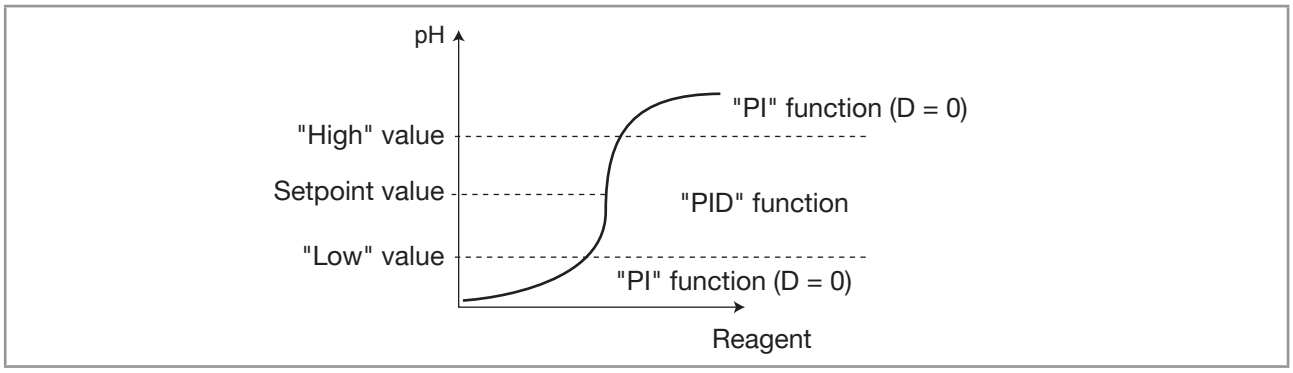


Fig. 73: Example of non-linear control of the pH

CMD DIRECTION: Choose the control direction for the function (CMD1 or CMD2 respectively): ascending (choose "Rise") or descending (choose "Fall").

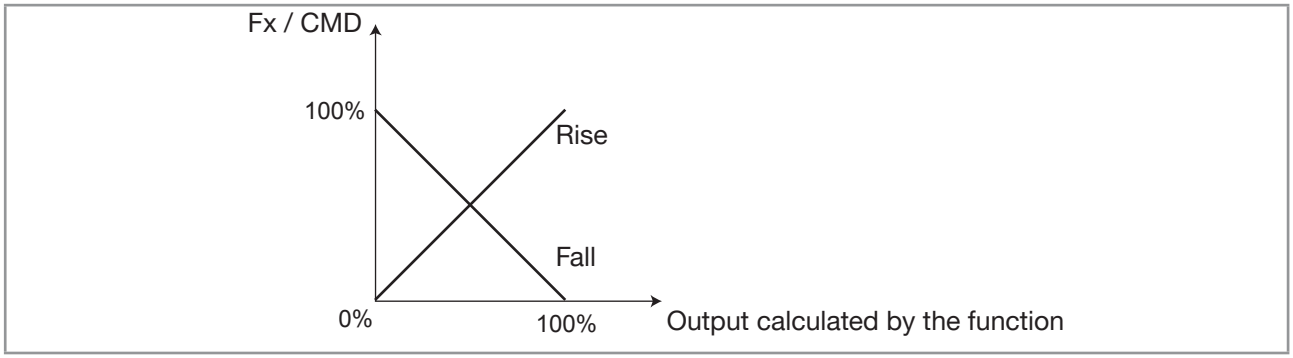
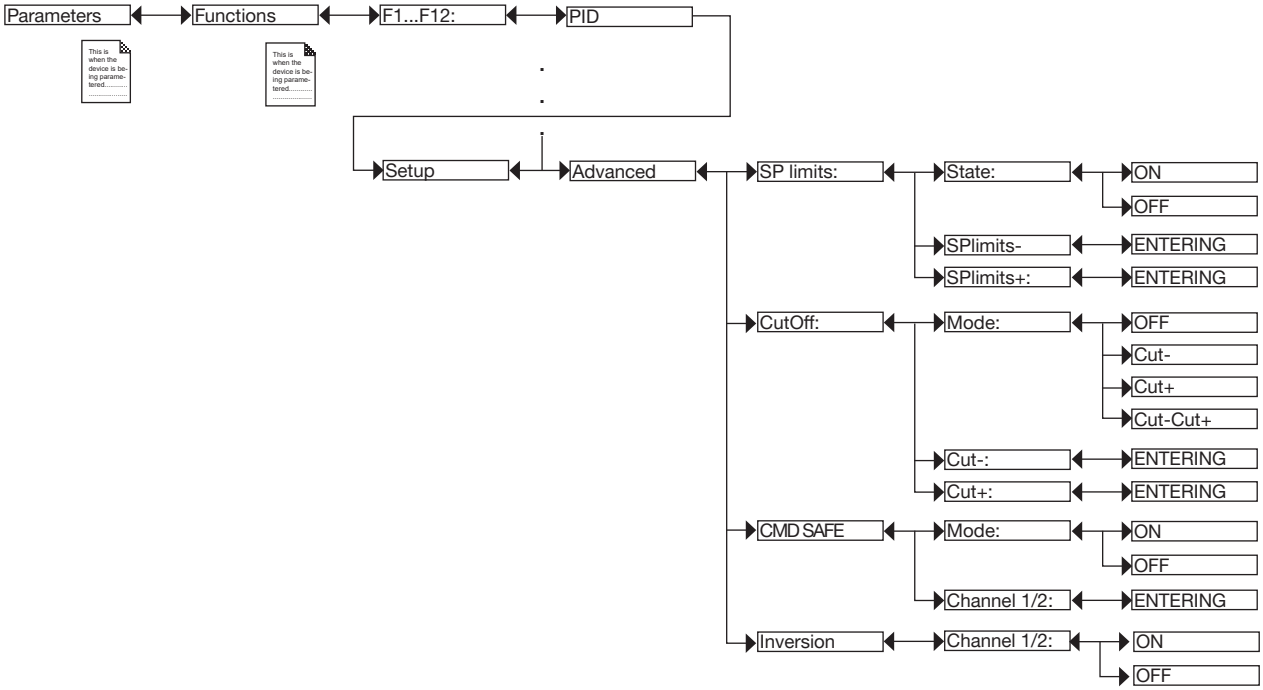


Fig. 74: CMD DIRECTION graphs



SP LIMITS: Set the low and high limits of the setpoint value in order to limit the working range of the setpoint.

CUTOFF: Force or do not force the module output to 0 % or 100 % if the setpoint value is outside a range defined by "Cut-" and "Cut+", or under the low range "Cut-", or above the high range "Cut+".

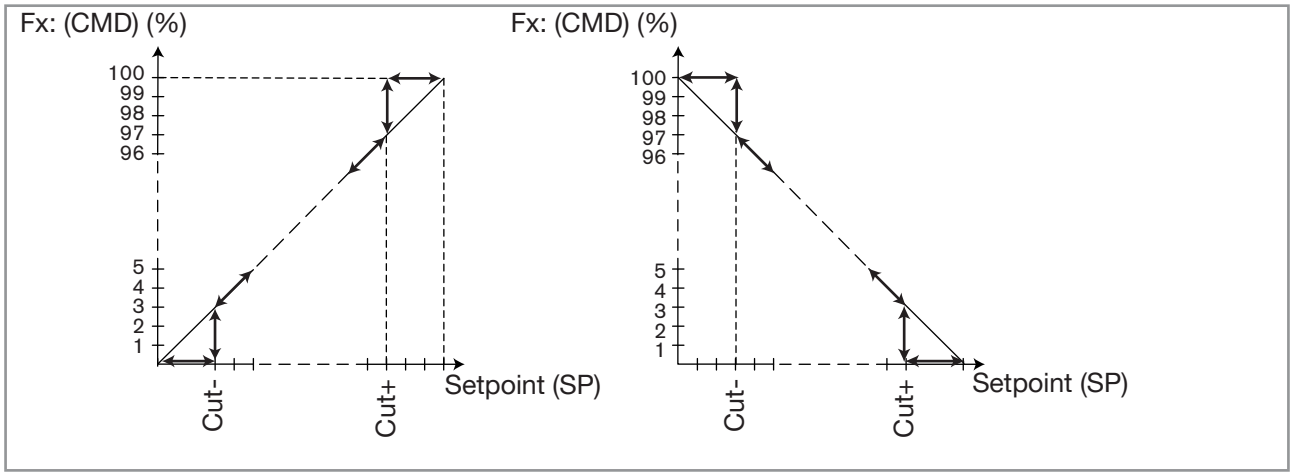


Fig. 75: "CUTOFF" graphs

CMD SAFE: Confirm (select "Mode: ON") or do not confirm (select "Mode: OFF") the use of a fallback position on the output when the "System switch" event (see section 9.21) has the state "ON". When use of the fallback position is confirmed, enter a fallback position value of 0...100 % for each output.

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INVERSION: Used to invert (choose "ON") or not (choose "OFF") the operating direction of the output depending on the indication of the difference between setpoint (SP) and measurement (PV). This function is used in particular in an acid-base regulation.

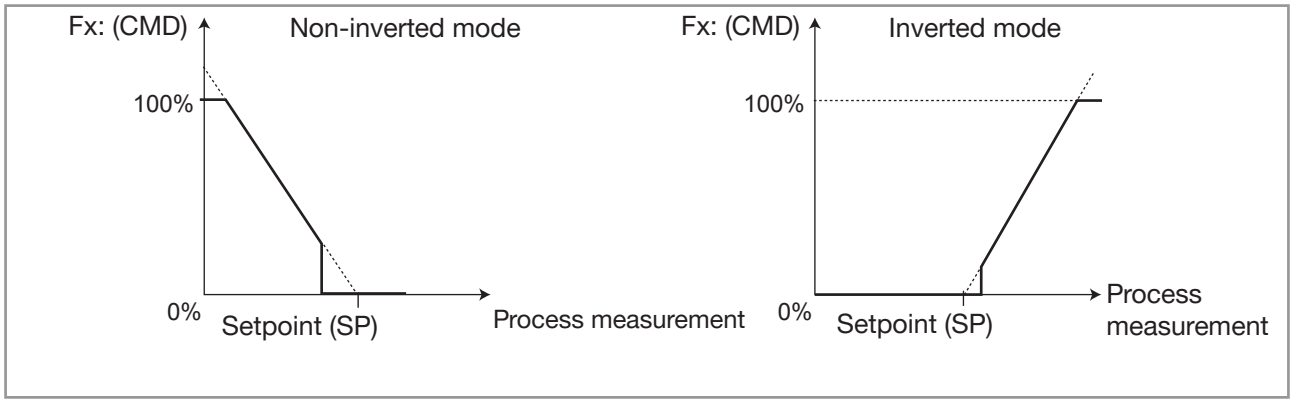
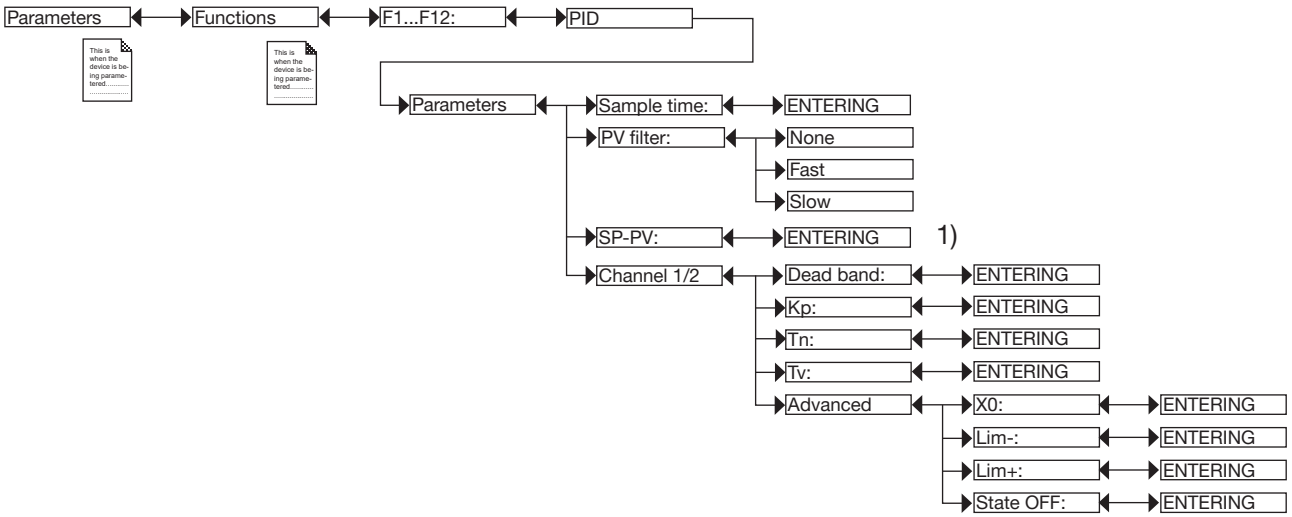


Fig. 76: Operating direction of the output, non-inverted or inverted

9.18.2 Entering the parameters for the PID function

Refer to section 8.10 to access the Parameters menu.



[1] *If "SP Type"= "Internal", see section 9.18, page 116.*

SAMPLE TIME: Define the sampling time (0.1...60 s).

SP: Enter the setpoint value.

PV FILTER: Choose the level of attenuation of the chosen process variable. See Fig. 53: Filtering curves.

DEADBAND: Define the percentage (0...100 %) of the deadband around the setpoint value.

KP: Define the proportional gain applied to the difference between the setpoint value and the measured value.

TN: This parameter represents the integral part of the PID module used to eliminate the static error between the measurement and the setpoint. Enter a value of 0.1...9999 seconds (default value: 9999 s).

TV: This parameter represents the drift part of the PID module used to react quickly to variations in measurement or setpoint and anticipate variations on the controller. Use this variable on slow processes. Enter a value of 0.0...9999 seconds (default value: 0.0 s).

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If the system becomes unstable, the "TV" value set is too high: reduce it as quickly as possible.

X0: Enter the working point of the output (0...100 %).

LIM– and *LIM+*: Some actuators (proportional solenoid valves) work over a reduced range (for example 40...80 %). The parameters "Lim–" and "Lim+" enable a correspondence between the working range of the actuator and that of the device: see Fig. 77.

STATE OFF: When scaling of the output is configured using the parameters "Lim–" and "Lim+", the parameter "STATE OFF" is used to guarantee the output setting to 0 % or 100 % to prevent a permanent command subsisting on the actuator terminals.

$$\Delta = \text{"state off"} \times (\text{"Lim+"} - \text{"Lim–"})$$

i.e. a proportional solenoid valve operating between a command of 40 % and 80 %.

Then set parameters "Lim–" = 40 % and "Lim+" = 80 %

If "state OFF" = 2 %, then $\Delta = 2\ \% \times (80 - 40) = 0.8\ \%$

Therefore, when the actual output is below 40 + 0.8 = 40.8 %, the command switches to 0 % and when the actual output is above 80 – 0.8 = 79.2 %, the command switches to 100 %.

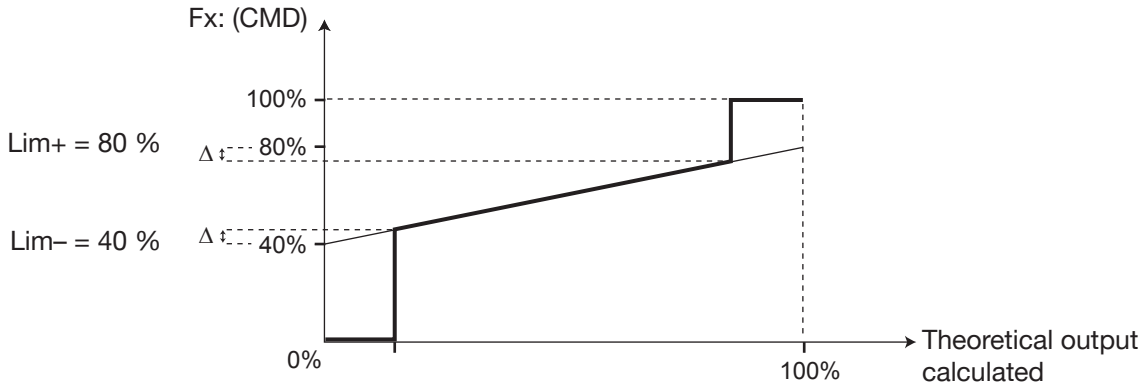

Fig. 77: Example of "Lim-", "Lim+" and "State OFF" parameter setting

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9.19 Configuring a time dosing cycle

This function is available as an option. See section 9.5.

It is used to add one or two products to the process, either at regular intervals ("DoMode" = "Period"), or according to the days of the week ("DoMode" = "Week"). The quantity added is proportional to the time open (programmable) of the command unit.

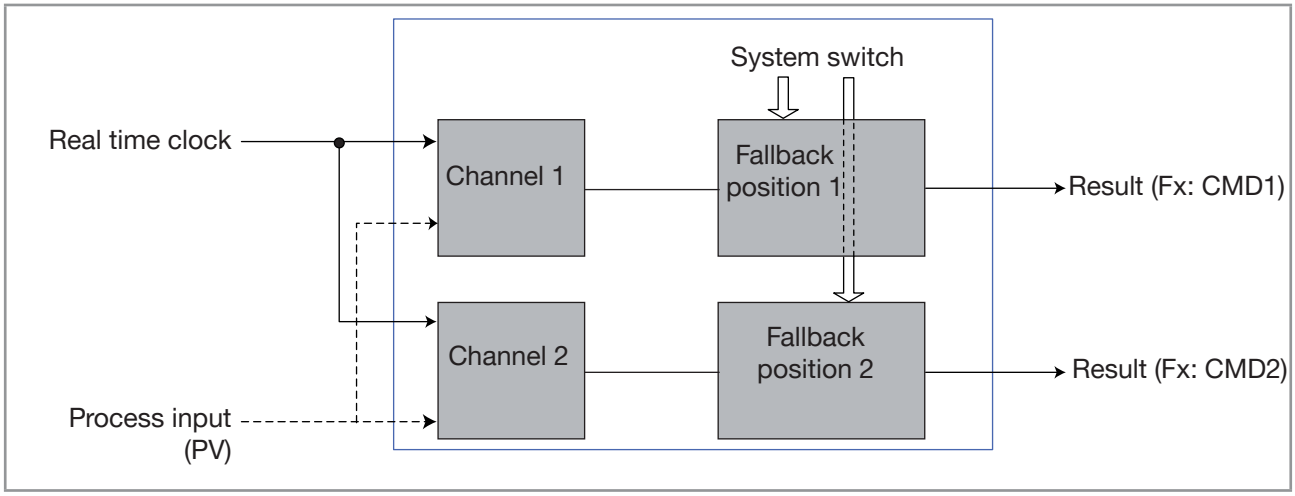

Fig. 78: "Time dosing" function

If the message "M0:W:Time lost" is generated, the dosing cycle cannot be carried out. See section 16.3.5.

Once the function has been configured and activated, the result "Fx:" calculated is available in the list of process variables on the "M0:MAIN" board. This list appears in the output configuring, user view configuring and datalogging menus to:

- Assign the result "Fx:" calculated to a physical output (analogue, AO, or digital, DO) (see sections 9.25 and 9.26).
- Display the result "Fx:" on one of the user defined "Ux" views: see section 9.9.
- Logging the values of "Fx:" using the datalogger: see section 9.22.

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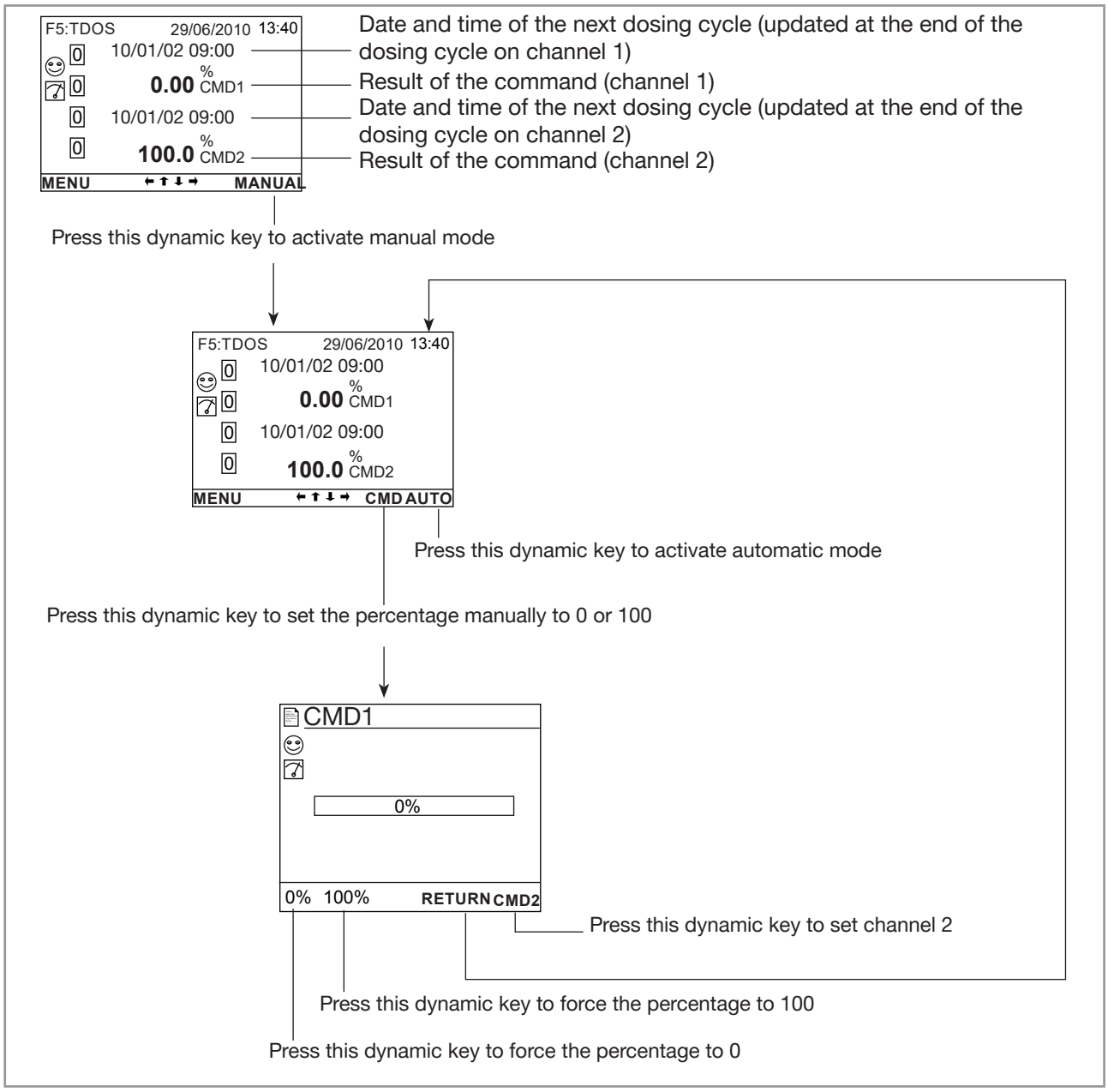

Fig. 79: Example of a view, in Process level, of the "time dosing" function

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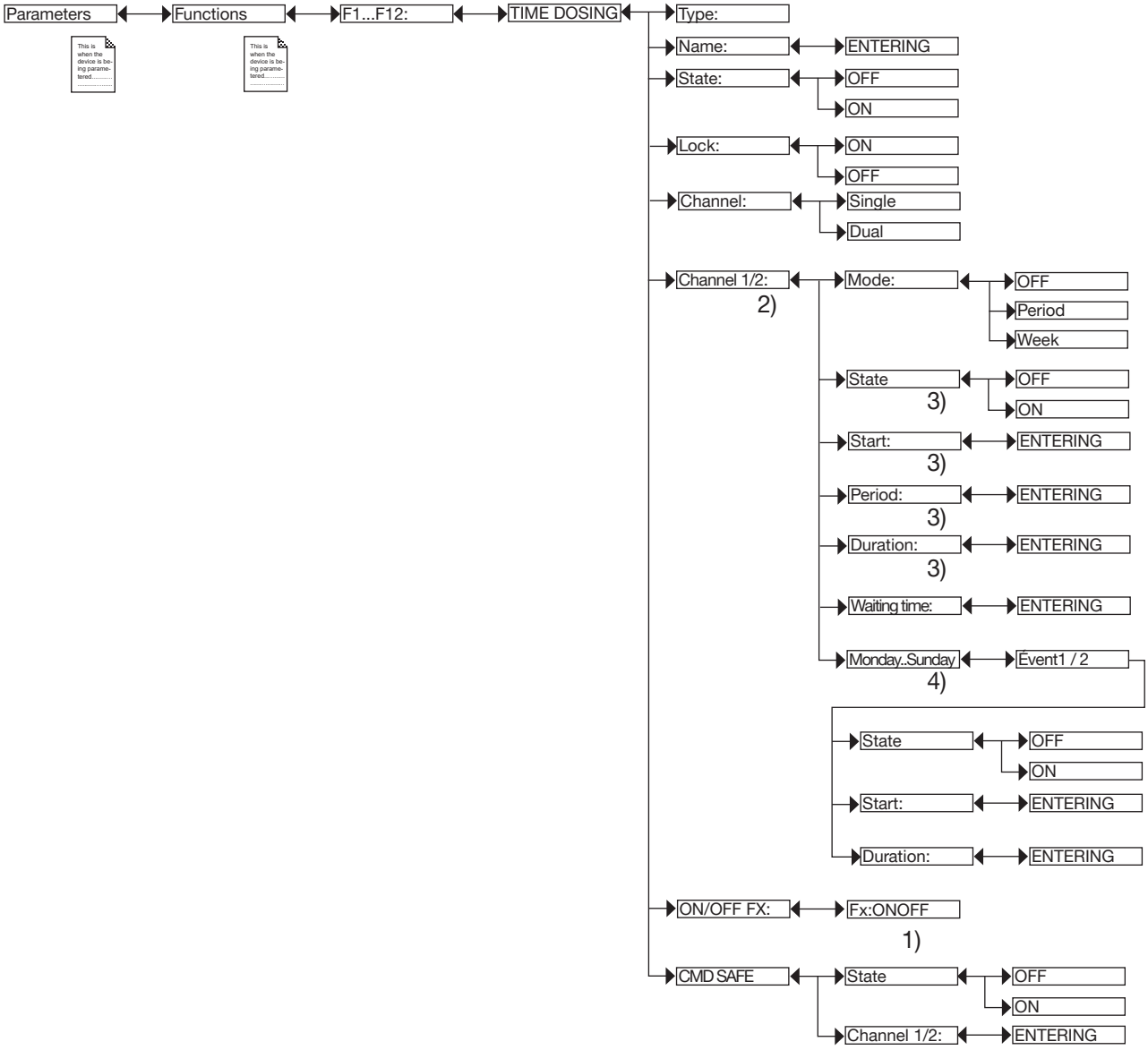
Refer to section 8.10 to access the "Parameters" menu.



1) *"Fx:" represents the ON/OFF function declared "active"*
2) *"Channel2" is present if "Channel" = "Dual"*
3) *These functions are present only if "Mode" = "Period"*
4) *These functions are present only if "Mode" = "Week"*

TYPE: Choose the type of the function (here, "TIME DOSING").

NAME: Rename the function chosen. See section 8.4 Entering text. This name appears in the view associated with this function in Process level.

STATE: Used to activate (choose "ON") or deactivate (choose "OFF") the selected function.

At each start-up of the device, the functions are checked. If there is a problem with a function, the device automatically deactivates the function.

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LOCK:

- ON: the mode cannot be modified in the Process level without entering an access code. Refer to Fig. 79. To switch the mode between the manual mode and the automatic mode in the Process level, first enter the access code of the "Parameters" menu. The default access code is "0000" (see section 9.4).
- OFF: the mode in the Process level can be switched without entering an access code.

CHANNEL: Choose to dose a chemical product (choose "Single") via 1 channel or two chemical products (choose "Dual") via 2 different channels.

CHANNEL 1/CHANNEL 2: Set the parameters for channel 1 and, if "CHANNEL" = "DUAL", channel 2.

- *MODE*: Choose to deactivate (choose "OFF") channel 1 or 2 or to configure the channel in dosing mode at regular intervals (choose "Period") or dosing according to the days of the week (choose "Week"). See details below for each mode.

9.19.1 Configuring "channel1" or "channel2" in "Period" mode, dosing at regular intervals

- *STATE*: Choose to activate (choose "ON") or deactivate (choose "OFF") the channel.
- *START*: Define the time of the first dosing of the day. The subsequent dosing cycles will be run at the intervals defined in "PERIOD" below.
- *PERIOD*: Define the interval between 2 dosing cycles.
- *DURATION*: Define the duration of the dosing cycle.
- *WAITING TIME*: Define the waiting time during which no new dosing cycles can be started, particularly when time dosing is associated with an ONOFF function (see section 9.17).

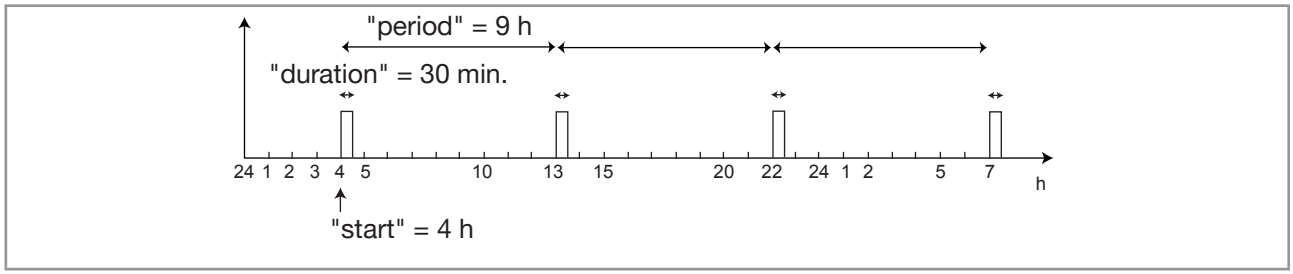

Fig. 80: Example of configuring in "Period" mode

9.19.2 Configuring "channel1" or "channel2" in "Week" mode, dosing according to the days of the week

In this mode, 1 or 2 dosing cycles (or "events") for the same product (in the same channel) can be configured for each day of the week ("Monday" to "Sunday").

- *STATE*: Choose to activate (choose "ON") or deactivate (choose "OFF") the channel.
- *WAITING TIME*: Define the waiting time during which no new dosing cycles can be started, particularly when time dosing is associated with an ONOFF function (see section 9.17).
- *START*: Define the start time of the dosing cycle for this day of the week.
- *DURATION*: Define the duration of the dosing cycle.

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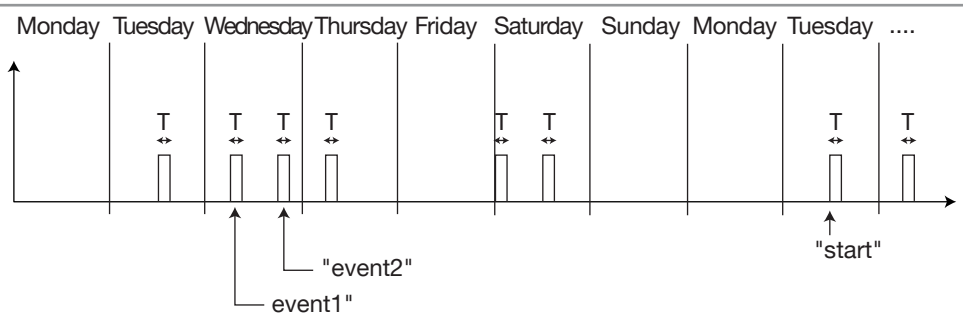

- T = "duration"
- "event 1" = 1st dosing cycle for this day of the week
- "event 2" = second dosing cycle for this day of the week

Fig. 81: Example of configuring in "Week" mode

ON/OFF FX: Combine the TIME DOSING function with an ONOFF function (see section 9.17) for a conductivity measurement only in order to ensure prebleed of the system. Configure and activate the "ONOFF" function before this "TIME DOSING" function so that it appears in this menu.

CMD SAFE: Confirm (select "Mode: ON") or do not confirm (select "Mode: OFF") the use of a fallback position on the output when the "System switch" event (see section 9.21) has the state "ON". When use of the fallback position is confirmed, enter a fallback position value of 0...100 % for each output.

- The time base is the one set in the "Date" and "Time" functions in the "Parameters" menu. See section 9.2.
- When the "time dosing" function is already operational, modifying one of its parameters resets the function.
- A new dosing cycle on the same channel cannot start until the previous dosing cycle has finished.
- Channels 1 and 2 operate independently of each other.
- When a dosing cycle is running on one of the channels, a new dosing cycle on the other channel is run according to the following rules:
  - when the current cycle is in prebleed phase, the lowest prebleed setpoint (or the highest for the inverted hysteresis mode) "PBLIMIT" of the 2 cycles is taken into account. Moreover, the longest prebleed duration of the 2 cycles is taken into account.
  - The prebleed phase on the new dosing cycle is not run if the current cycle is in dosing or waiting phase.
  - It is only when both cycles are finished that the conductivity controller takes over.

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9.20 Configuring a "Volume Dosing" function

This function is available as an option. See section 9.5

This function is used to add a solution to a process during a predefined period each time a predefined volume of fluid has been totalised.

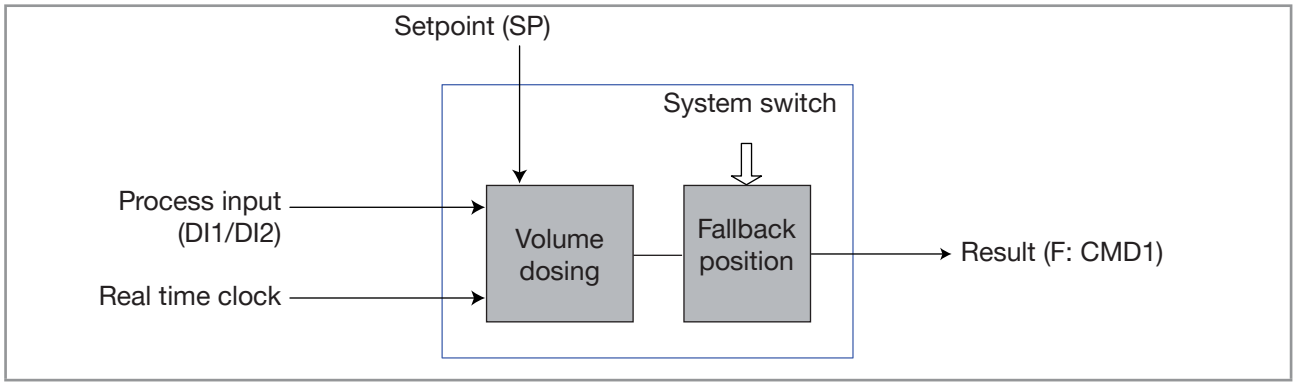

Fig. 82: "Volume dosing" function

Once the function has been configured and activated, the result "Fx:" calculated is available in the list of process variables on the "M0:MAIN" board. This list appears in the output configuring, user view configuring and datalogging menus to:

- Assign the result "Fx:" calculated to a physical output (analogue, AO, or digital, DO) (see sections 9.25 and 9.26).
- Display the result "Fx:" on one of the user defined "Ux" views: see section 9.9.
- Logging the values of "Fx:" using the datalogger: see section 9.22.

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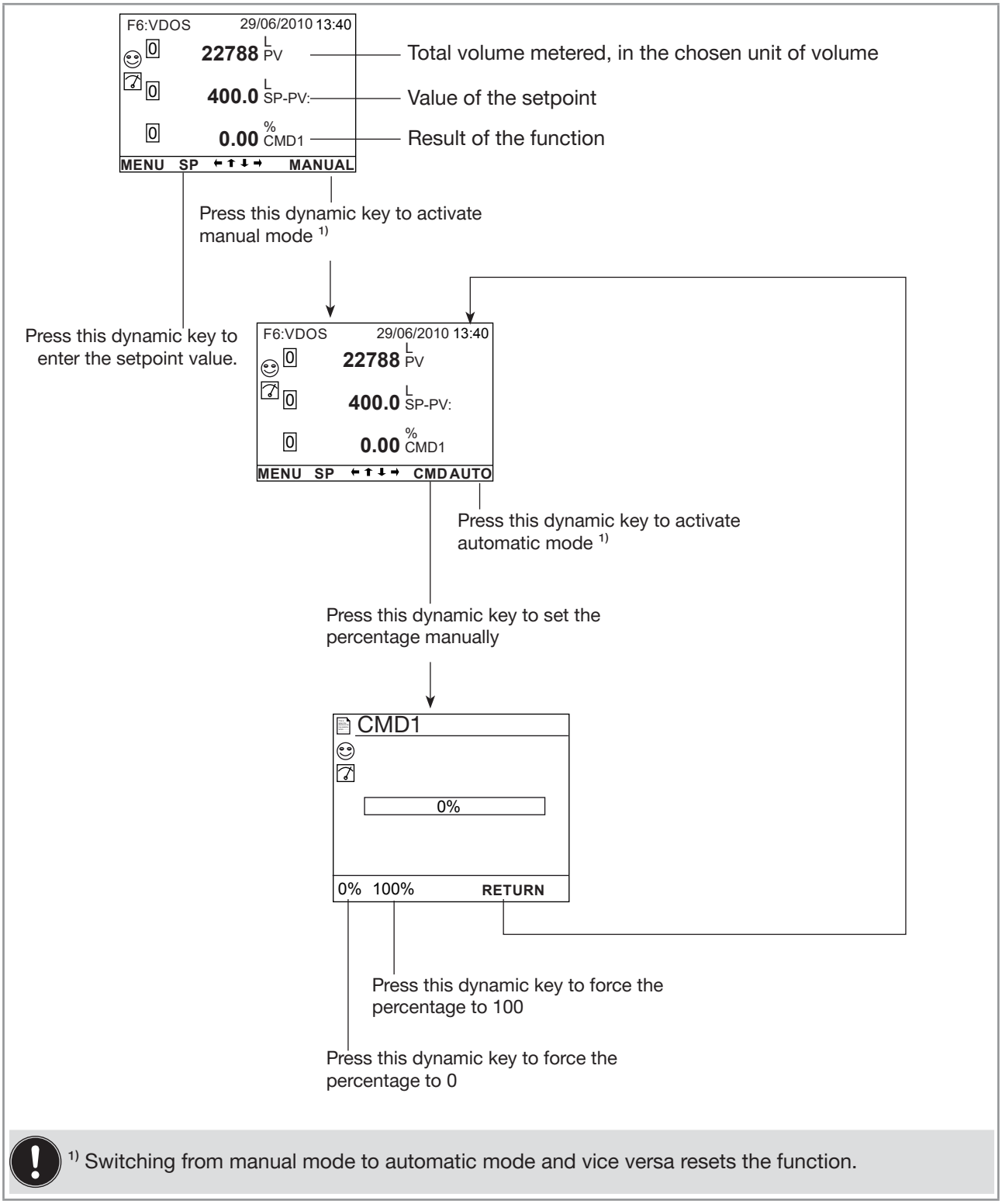

Fig. 83: Example of a view, in Process level, of the "volume dosing" function, and switching to manual or automatic mode

Refer to section 8.10 to access the "Parameters" menu.

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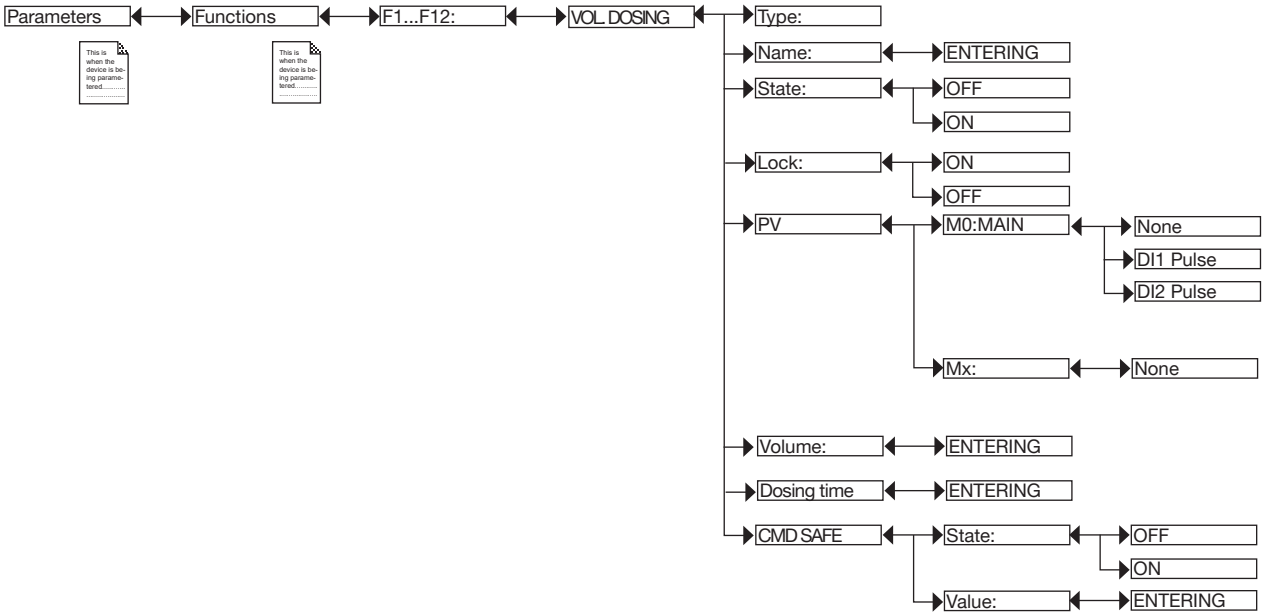

TYPE: Choose the type of the function (here, "VOLUME DOSING").

NAME: Rename the function chosen. See section 8.4 Entering text. This name appears in the view associated with this function in Process level.

STATE: Used to activate (choose "ON") or deactivate (choose "OFF") the selected function.

At each start-up of the device, the functions are checked. If there is a problem with a function, the device automatically deactivates the function.

LOCK:

- ON: the mode and the setpoint value cannot be modified in the Process level without entering an access code. Refer to Fig. 83. To switch the mode between the manual mode and the automatic mode or to change the value of the setpoint, first enter the access code of the "Parameters" menu. The default access code is "0000" (see section 9.4).
- OFF: the mode in the Process level can be switched and the value of the setpoint can be set without entering an access code.

PV: Define the digital input "DI1 Pulse" or "DI2 Pulse" of the main board "M0" as the volume metering base.

VOLUME: Enter the volume to be metered.

DOSING TIME: Enter the duration of dosing.

CMD SAFE: Confirm (select "Mode: ON") or do not confirm (select "Mode:OFF") the use of a fallback position on the output when the "System switch" event (see section 9.21) has the state "ON". When use of the fallback position is confirmed, enter a fallback position value of 0...100 % for each output.

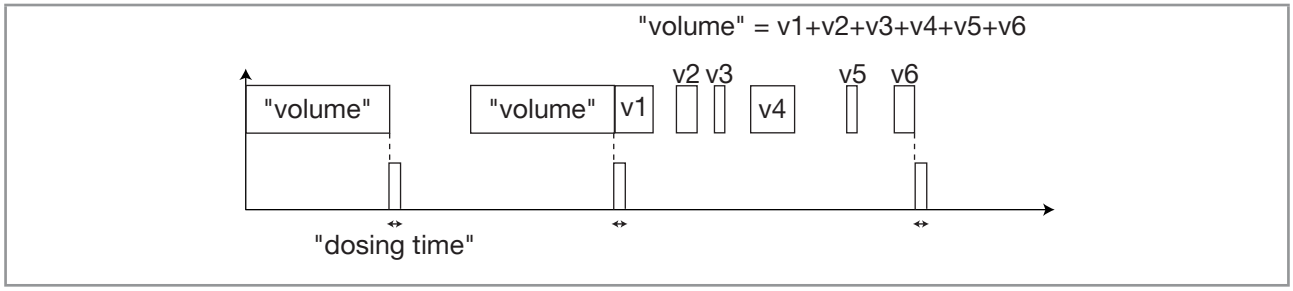

Fig. 84: Example of the "volume dosing" function

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9.21 Configuring the "System switch" event

The "System switch" event can be used to force the result of a function using the "CMD SAFE" menu for this function. The outputs of the function switch automatically to the values set in the "CMD safe" menu of each function, when the "System switch" event is at "ON".

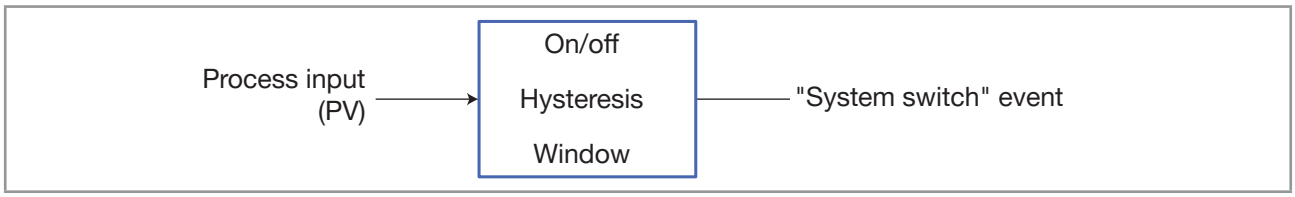
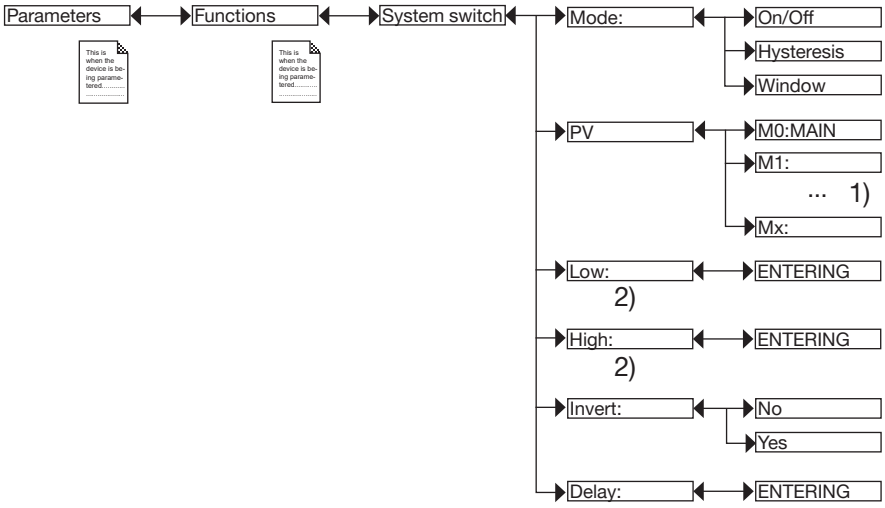


Fig. 85: "System switch" event

Once the "System switch" event has been configured and activated, it is available in the list of process variables on the "M0:MAIN" board. This list appears in the user view configuring and data-logging menus to:

- Display the "System switch" event on one of the user defined "Ux" views: see section 9.9.
- Logging the values of the "System switch" event using the datalogger: see section 9.22.

Refer to section 8.10 to access the "Parameters" menu.



1) *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*
2) *These functions are present if "Mode" ≠ "On/Off"*

MODE: Choose the switching mode: "On/Off", "hysteresis" or "window".

9.21.1 Configuring in "On/Off" mode

PV: Choose a process input with 2 states, ON or OFF, associated with the "System switch" event.

INVERT: Invert the event or not.

DELAY: Choose the value of the time-out before switching.

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9.21.2 Configuring in "Hysteresis" mode

The output status changes when a threshold is reached:

- by increasing process input value, the output status changes when the high threshold is reached.
- by decreasing process input value, the output status changes when the low threshold is reached.

Fig. 86: Hysteresis mode

PV: Choose the process input associated with the "System switch" event.

LOW: Choose the value of the low switching threshold.

HIGH: Choose the value of the high switching threshold.

INVERT: Invert the event or not.

DELAY: Choose the value of the time-out before switching. This is valid for both thresholds, "Low" and "High". Switching is only done if one of the thresholds, high or low, is exceeded for a duration longer than this time-out.

9.21.3 Configuring in "Window" mode

The output status changes as soon as any threshold (low or high) is reached.

Fig. 87: Window mode

PV: Choose the process input associated with the "System switch" event.

LOW: Choose the value of the low switching threshold.

HIGH: Choose the value of the high switching threshold.

INVERT: Invert the event or not.

DELAY: Choose the value of the time-out before switching. This is valid for both thresholds, "Low" and "High". Switching is only done if one of the thresholds, high or low, is exceeded for a duration longer than this time-out.

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9.22 Datalogging (datalogger)

This function is available as an option. See section 9.5

This function is used to log the measurement history of one to sixteen process inputs ("PV") on the memory card at regular intervals defined in the "Period" function.

Risk of data loss

- Set the "status" of the function to "OFF" before removing the memory card from the device.
- Do not remove the memory card from the device when a file is being written.
- Do not switch off the electrical power source when a file is being written.
- If the datalogging is unintentionally interrupted, check the memory card on a PC and format it if necessary before reuse in the device.
- In the event of problems during recording, the icon is displayed. For more information, access the "Information -> Log" menu and consult the error table in section 16.3.2.

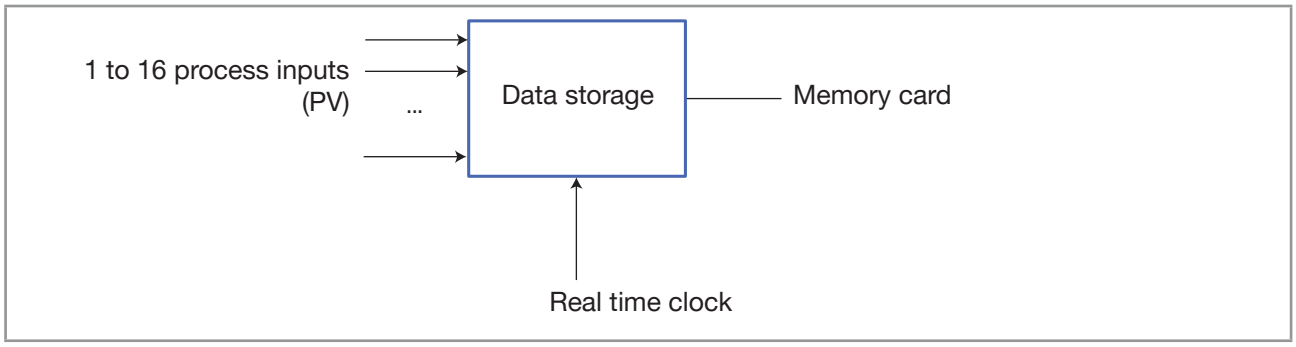
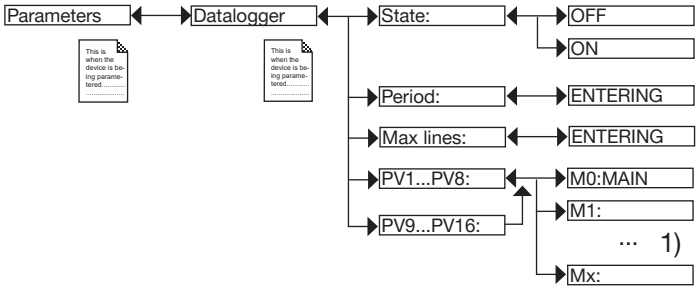


Fig. 88: Datalogger

Refer to section 8.10 to access the "Parameters" menu.



[1] *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*

STATE: Choose to activate (choose "ON") or deactivate (choose "OFF") the datalogger function.

PERIOD: Choose the data storage interval (in seconds), if datalogging is activated.

MAX LINES : Enter the maximum number of lines that a data file contains. The files are saved under "DL000000" to "DL999999".

PV1 TO PV8 OR PV9 TO PV16: Choose the process input ("PV") for which the values are logged.

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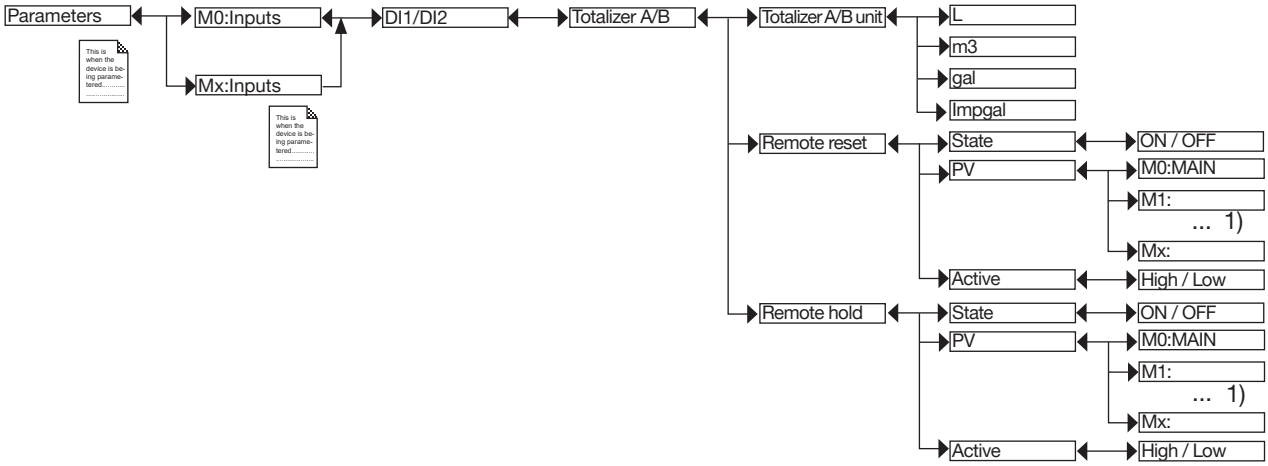
9.23 Setting the parameters of the digital inputs

This function is available if the software option "FLOW" is activated. See section 9.5.

Refer to section 8.10 to access the "Parameters" menu.



1) *The choices offered depend on the modules fitted. See section 15 Process variables.*

9.23.1 Choosing the units for the totalisers

TOTALIZER A/B UNIT: Select the units. The chosen unit is available in any place where the process value associated to the totaliser is selected.

9.23.2 Remotely reset the value of a totaliser

REMOTE RESET:

- *STATE:* choose *ON* to activate or *OFF* to deactivate the reset of the totaliser value over a PV.
- *PV:* if *STATE* is set to *ON*, choose the *PV* that resets the totaliser.
- *ACTIVE:* if *STATE* is set to *ON*, choose *HIGH* if you want that the high value of the *PV* ("ON") triggers the reset of the totaliser or choose *LOW* if you want that the low value of the selected *PV* ("OFF") triggers the reset of the totaliser.

9.23.3 Remotely freeze the last value of a totaliser

REMOTE HOLD:

- *STATE:* choose *ON* to activate or *OFF* to deactivate the freeze of the totaliser value over a PV.
- *PV:* if *STATE* is set to *ON*, choose the *PV* that freezes the last value of the totaliser.
- *ACTIVE:* if *STATE* is set to *ON*, choose *HIGH* if you want that the high value of the *PV* ("ON") triggers the freeze of the totaliser or choose *LOW* if you want that the low value of the selected *PV* ("OFF") triggers the freeze of the totaliser.

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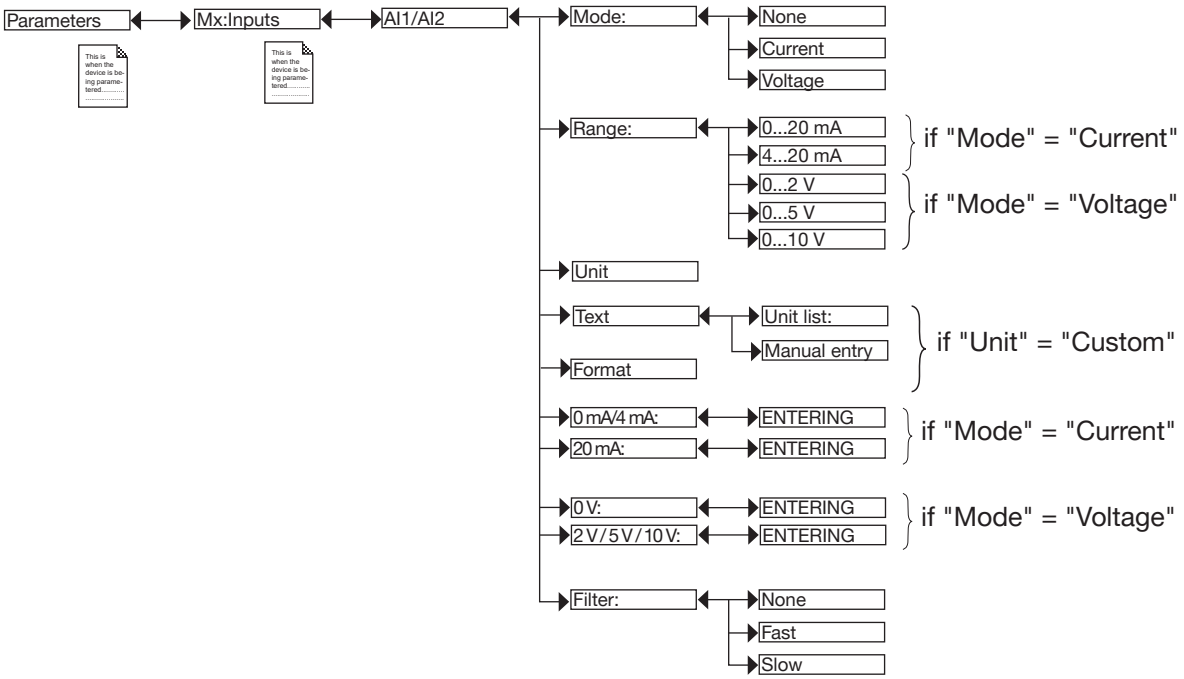
9.24 Setting the parameters of the analogue inputs

Refer to section 8.10 to access the "Parameters" menu.



MODE: Choose the input signal type, current or voltage.

RANGE: Choose the range of the input signal, depending on the choice made in "MODE".

UNIT: Choose the units associated to the input signal. The following choices are possible:

- *CUSTOM:* To enter a customized text for the unit and choose the displayed format of the process variable.
- *NO UNIT:* To allow a very high range of values.
- Selection of units related to the process variables. The following uses cases are possible:
  - Configure an arithmetic function that uses the input signal and a PV coming from a measurement sensor connected to the device. Then, assign the unit of the PV to the input signal. Refer to section 9.14.
  - Configure a PID function that uses the input signal and a PV coming from a measurement sensor connected to the device. Then, assign the unit of the PV to the input signal. Refer to section 9.18.

TEXT: If *UNIT* is set to *CUSTOM*, choose *MANUAL ENTRY* to enter a customized text or choose *UNIT LIST* to select a unit of the list.

FORMAT: If *UNIT* is set to *CUSTOM*, choose the displayed format of the process variable with different accuracies (0 / 0.0 / 0.00 / 0.000).

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0/4 MA: Enter the value of the previously selected physical parameter (AI1/AI2), which is associated to a 0/4 mA input current. Instead of being entered, the value can be automatically determined using the function "PV calibration" in the menu "Calibration -> Mx:Inputs -> AI1 or AI2". See section 10.9.

20 MA: Enter the value of the previously selected physical parameter (AI1/AI2), which is associated to a 20 mA input current. Instead of being entered, the value can be automatically determined using the function "PV calibration" in the menu "Calibration -> Mx:Inputs -> AI1 or AI2". See section 10.9.

0V: Enter the value of the previously selected physical parameter (AI1/AI2), which is associated to a 0 V input voltage. Instead of being entered, the value can be automatically determined using the function "PV calibration" in the menu "Calibration -> Mx:Inputs -> AI1 or AI2". See section 10.9.

2/5/10V: Enter the value of the previously selected physical parameter (AI1/AI2), which is associated to a 2/5/10 V input voltage. Instead of being entered, the value can be automatically determined using the function "PV calibration" in the menu "Calibration -> Mx:Inputs -> AI1 or AI2". See section 10.9.

P1 and P2 are the values of the process variables which are associated to the selected input range.

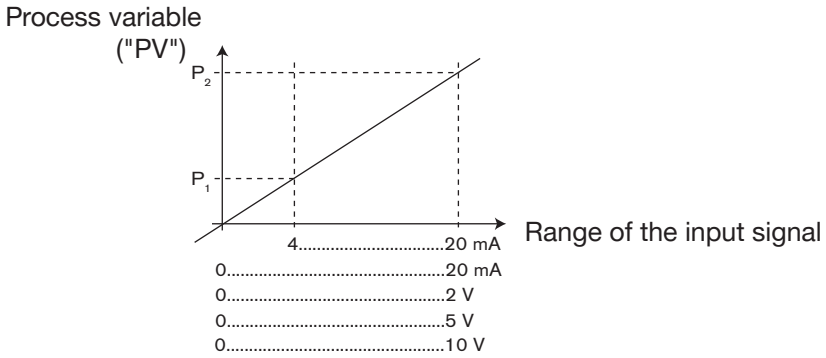

Fig. 89: Configuring an analogue input

FILTER: Choose the level of attenuation for the fluctuations of the current or voltage value. See Fig. 53: Filtering curves.

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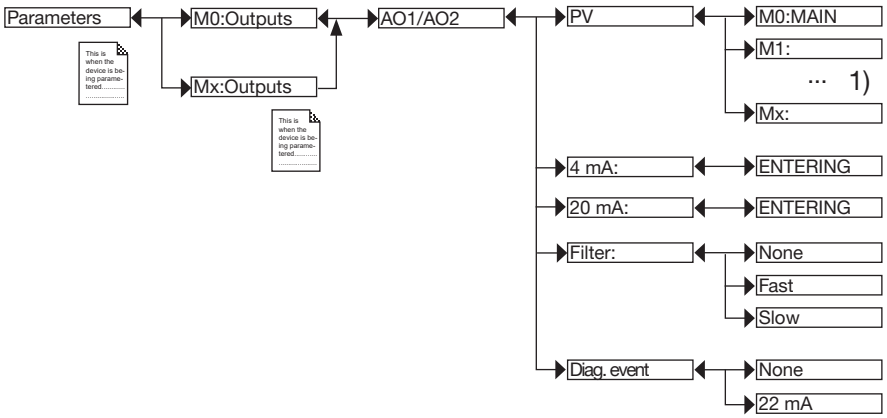
9.25 Setting the parameters of the current outputs

Refer to section 8.10 to access the "Parameters" menu.



[1] *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*

PV: Choose the process input associated with the current output.

4 MA: Choose the value of the process input previously selected, associated with a current of 4 mA, for each current output. See Fig. 90.

20 MA: Choose the value of the process input previously selected, associated with a current of 20 mA, for each current output. See Fig. 90.

P_1 and P_2 are the values associated with a current of 4 mA or 20 mA respectively.

If P_1 is higher than P_2, the signal is inverted and the range $P_1 - P_2$ corresponds to the range for the 20...4 mA current.

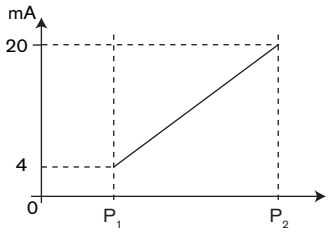


Fig. 90: 4...20 mA current depending on the PV selected

FILTER: Choose the level of attenuation for the fluctuations of the current value for each current output. See Fig. 53: Filtering curves.

DIAG. EVENT : Choose to emit a current of 22 mA on the current output selected when an "error" event related to diagnostics (see sections 11.3 to 11.7) is generated by the device or allow the current output to operate normally (choose "none").

See also "If you encounter problems" in section 16.3.

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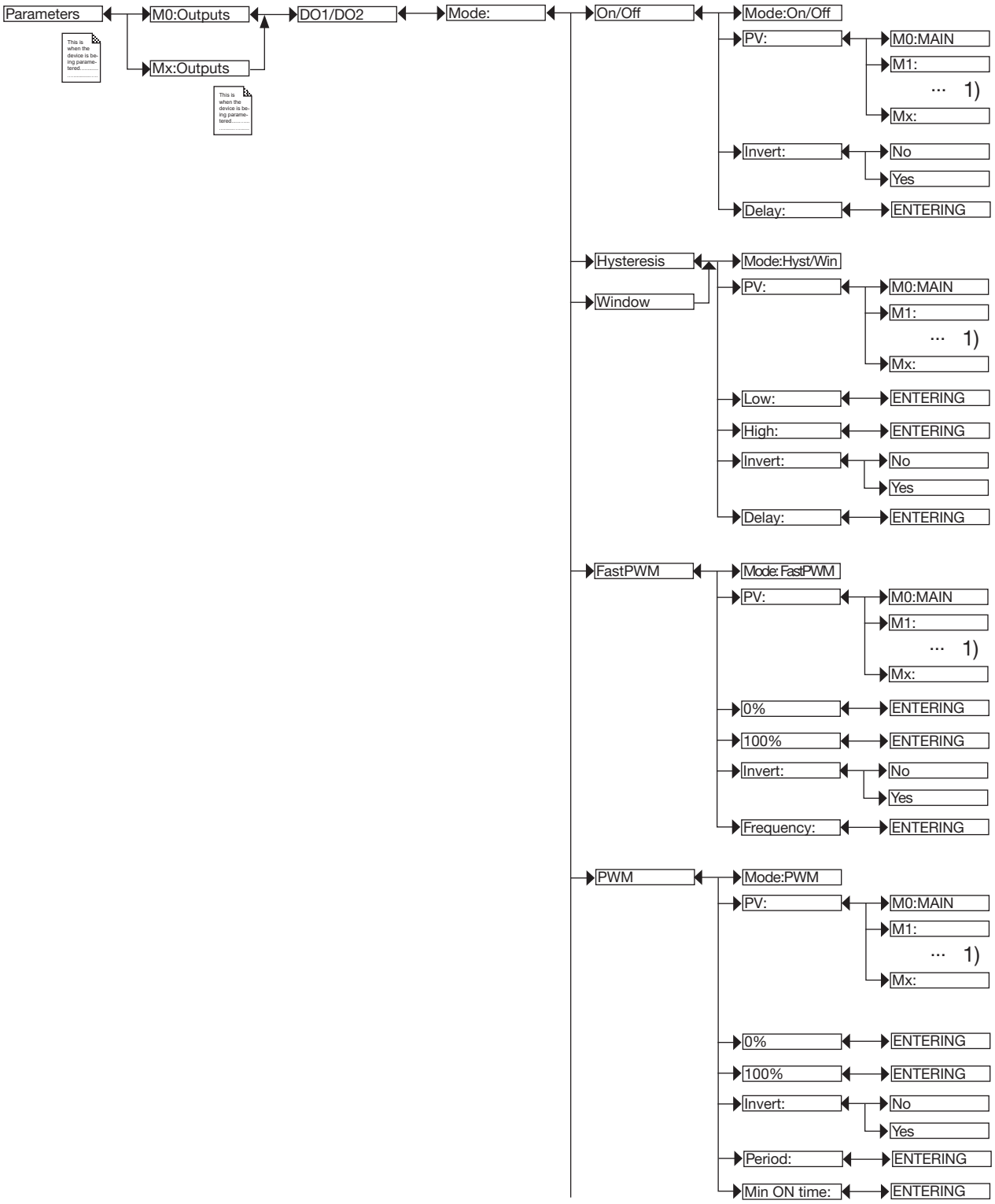
9.26 Setting the parameters of the digital outputs

Refer to section 8.10 to access the "Parameters" menu.



[1] *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*

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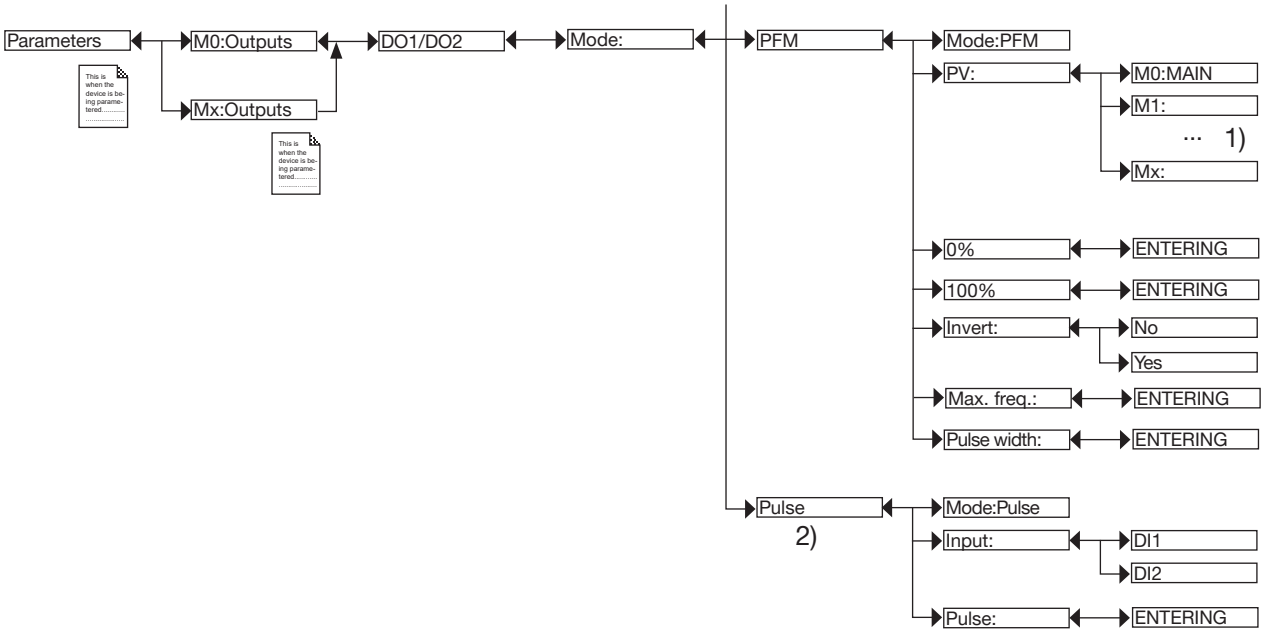

1) *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.*
2) *Function possible only for the DO1 and DO2 outputs on the MAIN board M0 and only if the software option "FLOW" is activated (see section 9.5).*

MODE: Choose the switching mode for the digital output selected.

9.26.1 Configuring in "On/Off" mode

PV: Choose a process input with 2 states, ON or OFF, associated with the output.

One of the "PVs" on the M0:MAIN board, available in "On/Off" mode, is the "warning" event. Such an event is generated when the calibration date expires and/or during the monitoring of certain process parameters (see section 10.19, 10.20, and 11.3 to 11.7). When the "warning" event is associated with a digital output, the output switches whenever such an event is generated by the device. See also section 16.3 If you encounter problems.

Furthermore, to allow the PLC to directly control the digital output of the device, refer to the parameter *UNIT GROUP* in section 9.27 Setting the parameters of an Ethernet module. Then, if the PLC sends 00000000h to the DO, the DO is set to OFF. And, if the PLC sends any other value to the DO, the DO is set to ON.

One of the "PVs" in the conductivity module, available in "ON/OFF" mode, is "USP" (see section 9.29).

INVERT: Invert the output or not.

DELAY: Choose the value of the time-out before the output is switched.

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9.26.2 Configuring in "Hysteresis" mode

The output status changes when a threshold is reached:

- When increasing the process input value, the output status changes when the high threshold is reached.
- When decreasing the process input value, the output status changes when the low threshold is reached.

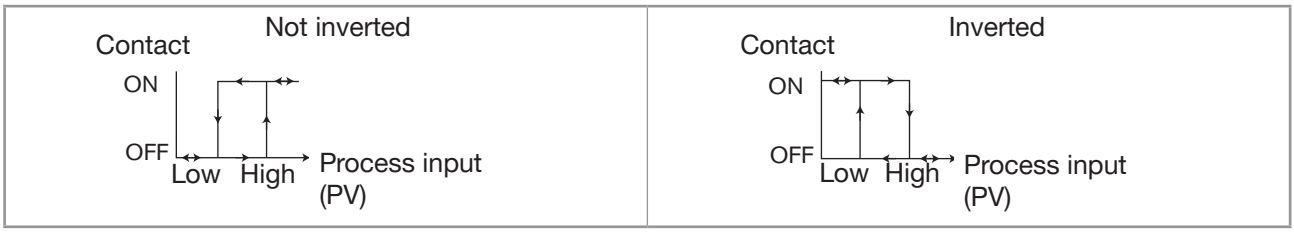

Fig. 91: Hysteresis mode

PV: Choose the process input associated with the output.

LOW: Choose the value of the low switching threshold of the output.

HIGH: Choose the value of the high switching threshold of the output.

INVERT: Invert the output or not.

DELAY: Choose the value of the delay time before switching for each digital output. This is valid for both output thresholds. Switching is only done if one of the thresholds, high or low (functions "High" or "Low"), is exceeded for a duration longer than this delay time.

9.26.3 Configuring in "Window" mode

The output status changes as soon as any threshold (low or high) is reached.

Fig. 92: Window mode

PV: Choose the process input associated with the selected output.

LOW: Choose the value of the process input for the low switching threshold of the output.

HIGH: Choose the value of the process input for the high switching threshold of the output.

INVERT: Invert the output or not.

DELAY: Choose the value of the delay time before switching for each output. This is valid for both output thresholds. Switching is only done if one of the thresholds, high or low (functions "High" or "Low"), is exceeded for a duration longer than this delay time.

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9.26.4 Configuring in "FastPWM" mode

This mode is used to control a proportional solenoid valve.

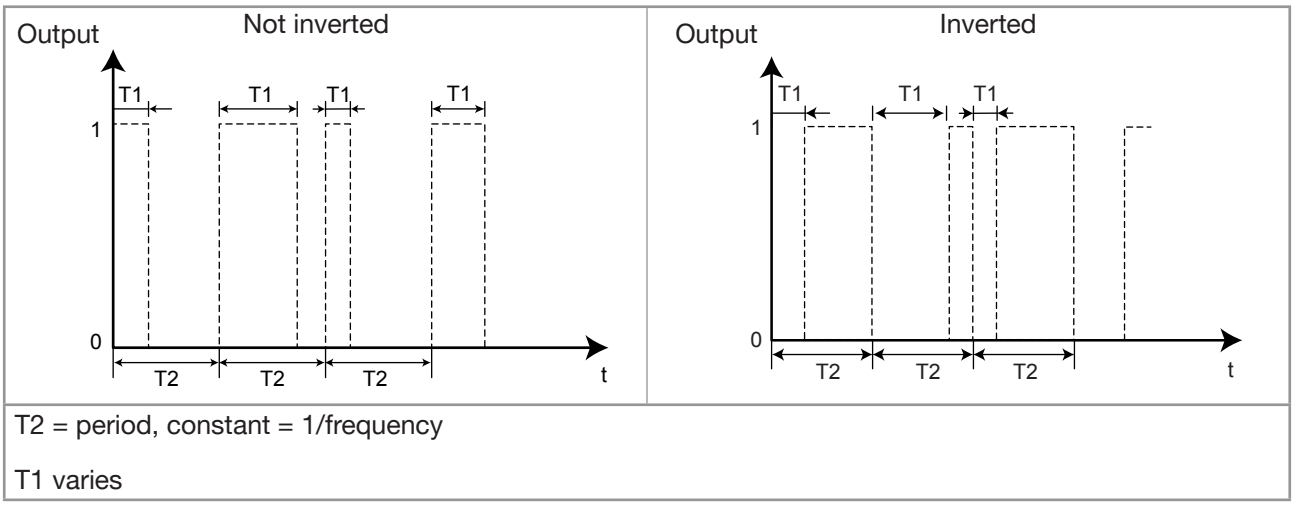

Fig. 93: "FastPWM" mode

PV: Choose the process input associated with the selected output.

0 %: Choose the value of the process input ("PV") corresponding to 0 % PWM.

100 %: Choose the value of the process input ("PV") corresponding to 100 % PWM.

INVERT: Invert the output or not.

FREQUENCY: Choose the value of the output frequency (= 1/T2), from 2 to 2000 Hz.

9.26.5 Configuring in "PWM" mode

This mode is used to control an "ON/OFF" actuator.

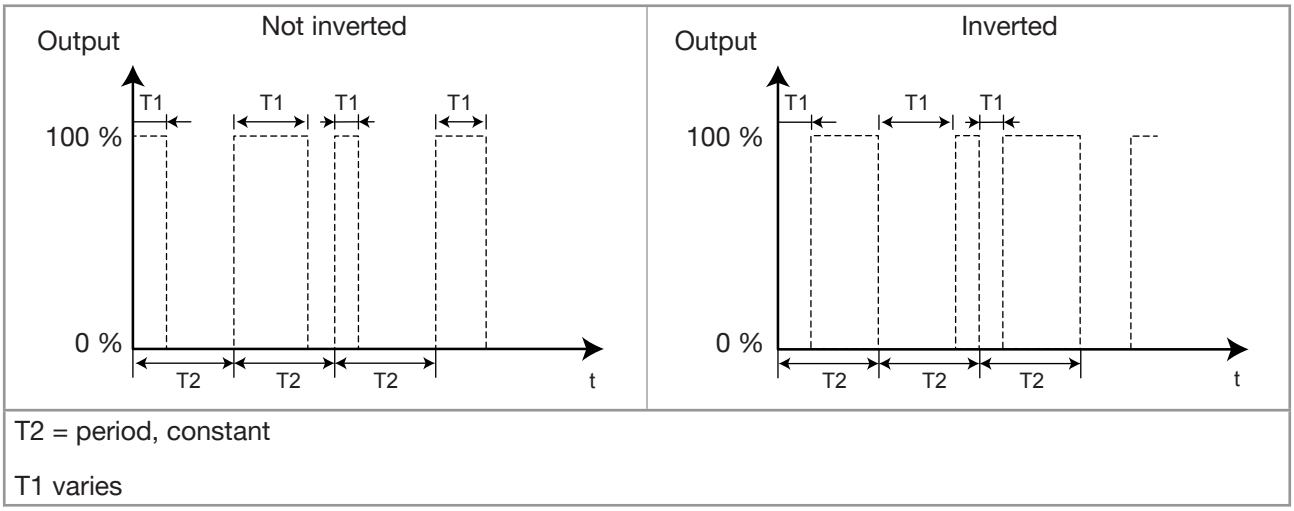

Fig. 94: "PWM" mode

PV: Choose the process input associated with the selected output.

0 %: Choose the value of the process input ("PV") corresponding to 0 % PWM.

100 %: Choose the value of the process input ("PV") corresponding to 100 % PWM.

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INVERT: Invert the output or not.

PERIOD: Choose the value of period T2 in seconds.

MIN ON TIME: Choose the minimum value of T1 in seconds.

9.26.6 Configuring in "PFM" mode

This mode is used to control a dosing pump, for example.

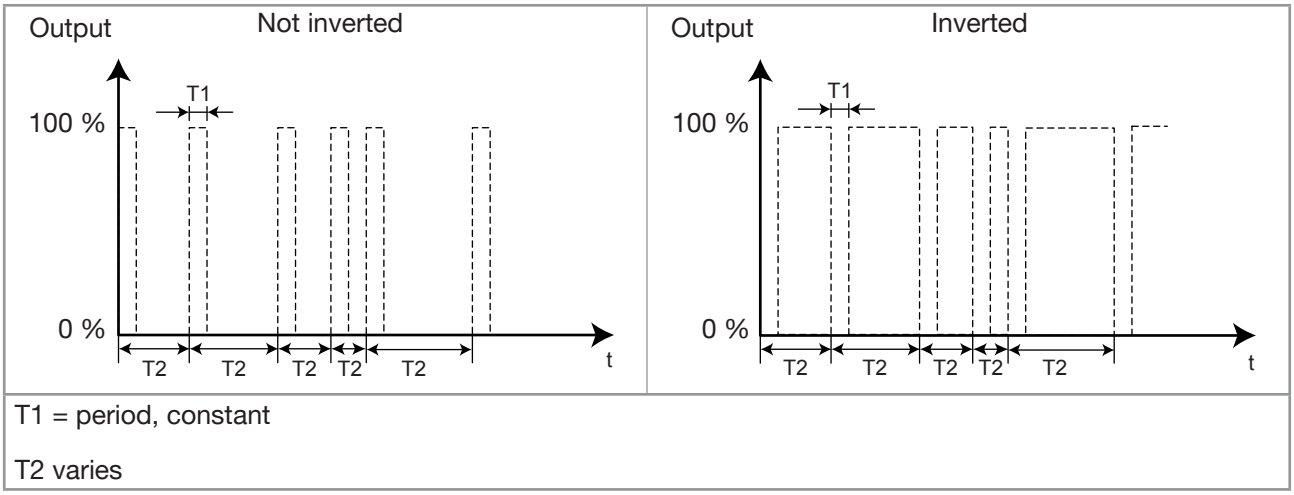


Fig. 95: "PFM" mode

PV: Choose the process input associated with the selected output.

0 %: Choose the value of the process input corresponding to the min. frequency.

100 %: Choose the value of the process input corresponding to the max. frequency defined in "MAX FREQ." below.

INVERT: Invert the output or not.

MAX. FREQ. : Choose the maximum value of the pulse frequency (1/T2) (180 pulses per minute maximum)

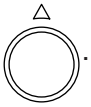
PULSE WIDTH : Choose the value of the pulse width (T1).

9.26.7 Configuring in "Pulse" mode

This function is available only if the "FLOW" option is activated on the device (see section 9.5). It is used to generate a pulse on the output each time a predetermined volume of fluid passes.

INPUT: Choose the digital input DI1 or DI2 associated with the output selected.

PULSE: Choose the volume of fluid for which a pulse must be transmitted on the selected output. First enter the digital value, then confirm by pressing the "OK" dynamic key in order to modify the volume units by pressing

successively on  .

- A "Warning" event is emitted and the message "M0:W:Pulse x lim." is displayed when the volume entered multiplied by the K factor of the device > 1,000,000.
- A "Warning" event is emitted and the message "M0:W:Pulse x 1:1" is displayed when the volume entered multiplied by the K factor of the device < 1. In this case, the pulse frequency is forced to the value of the input frequency.

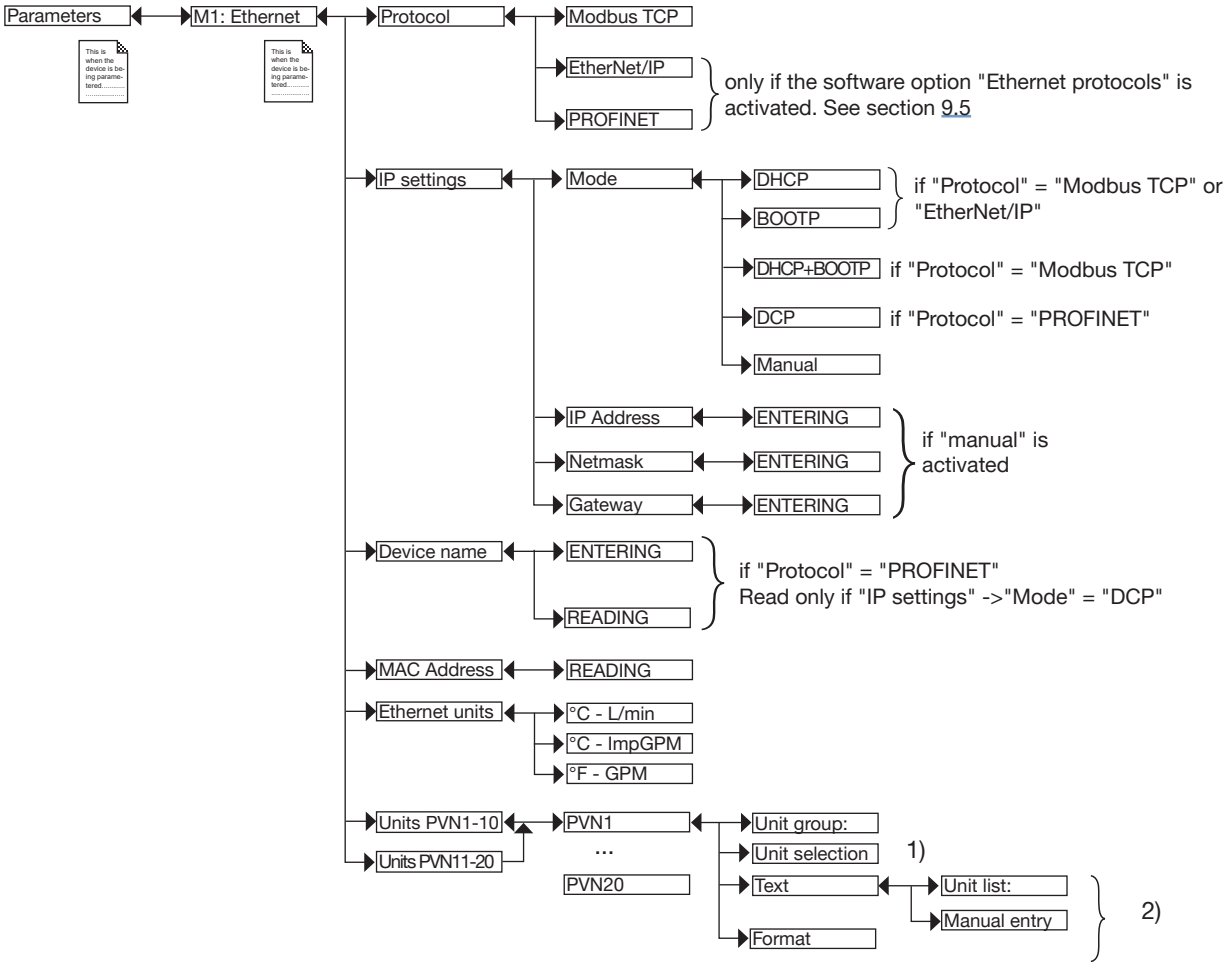
9.27 Setting the parameters of an Ethernet module

Checking the IP address of an Ethernet version

Before installing an Ethernet version to the network, make sure that the IP address of the device Type 8619 is not already used by another equipment.

→ If necessary, change the IP address of the device.

Refer to section 8.10 to access the "Parameters" menu.



1) *If "Unit group" ≠ "ON/OFF" and ≠ "Custom"*
2) *If "Unit group" = "Custom"*

PROTOCOL: Choose the type of protocol. Default protocol is Modbus TCP. Others protocols are available only if the software option "ethernet protocols" is activated. See section 9.5.

IP SETTINGS: Choose the IP settings of the device.

- *MODE:* Choose the configuration mode of the IP settings for the device.
  - *DHCP:* The IP address of the device is automatically affected by a DHCP server.
  - *BOOTP:* The IP address of the device is affected by a BOOTP server.
  - *DCP:* The IP address of the device is affected by the DCP protocol.
  - *DHCP+BOOTP:* The device is trying to obtain its IP address first by a DHCP server otherwise by a BOOTP server.
  - *MANUAL:* Enter manually the IP address of the device, the Gateway of the network and the Netmask of the network.

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Checking the IP address of an Ethernet version

Before installing an Ethernet version to the network, make sure the IP address of the device Type 8619 is not already used by another equipment.

→ If necessary, change the IP address of the device.

- *IP ADDRESS:* Enter the IP address of the device.
- *NETMASK:* Enter the netmask of the network used.
- *GATEWAY:* Enter the gateway address of the network used.

DEVICE NAME: Enter the name of the device (default: "multiCELL"); See section 8.4 Entering text.
If "mode" = "DCP", you can only read the name of the device.

MAC ADDRESS: (read only) Check the MAC address of the device; See section 5.8 Additional markings (only for an Ethernet version).

ETHERNET UNITS: Choose the units in which the values are sent to the PLC.

UNIT PVN1-10 (PVN11-20): Choose the process variable network.

A PVN (Process Variable Network) is a data sent by a PLC to the device via the Ethernet network. PVN can be associated to an output, to a function, displayed into the process level or logged on a memory card. The default value of a PVN (until the first data sent by the PLC) is 0.0.
If the PLC stops to refresh the PVN (or if the Ethernet connection is broken), the PVN keeps its last valid value.

- *UNIT GROUP*: Assign a unit to the data coming from the PLC. The following choices are possible:
  - *ON/OFF:* Choose whether the value of the PVN is always ON or always OFF. If the PLC sends 00000000h to the PVN, then the PVN value is set to OFF. If the PLC sends any other value to the PVN, then the PVN value is set to ON. The following use cases are possible:
    - Allow the PLC to directly control a digital output (DOx) of the device. Then, configure the DO output as an ON/OFF output that uses the PVN (see section 9.26.1).
    - Allow the PLC to reset a totaliser. Refer to section 9.23.2.
    - Allow the PLC to freeze a totaliser. Refer to section 9.23.3.
    - Allow the PLC to participate in a boolean equation. Refer to section 9.15.1.
    - Allow the PLC to trigger the "System switch" event. Then, configure the "System switch" event in mode ON/OFF (see section 9.21).
  - *NO UNIT:* To allow the PLC to send a very high range of values.
  - *CUSTOM:* To enter a customized text for the unit and choose the displayed format of the PVN.
  - Selection of units related to the process variables. The following uses cases are possible:
    - Configure an arithmetic function that uses the PVN and a PV coming from a measurement sensor connected to the device. Then, assign the unit of the PV to the PVN. Refer to section 9.14.
    - Configure a PID function that uses the PVN and a PV coming from a measurement sensor connected to the device. Then, assign the unit of the PV to the PVN. Refer to section 9.18.
- *UNIT SELECTION*: If this menu point is proposed, choose the unit of the value coming from the PLC.
- *TEXT:* If the *UNIT GROUP* is set to *CUSTOM*, choose *MANUAL ENTRY* to enter a customized text or choose *UNIT LIST* to select a unit of the list.
- *FORMAT:* If the *UNIT GROUP* is set to *CUSTOM*, choose the displayed format of the process variable with different accuracies (0 / 0.0 / 0.00 / 0.000).

Choose a customised name for the process variable network; See section 9.10 Renaming a process variable.

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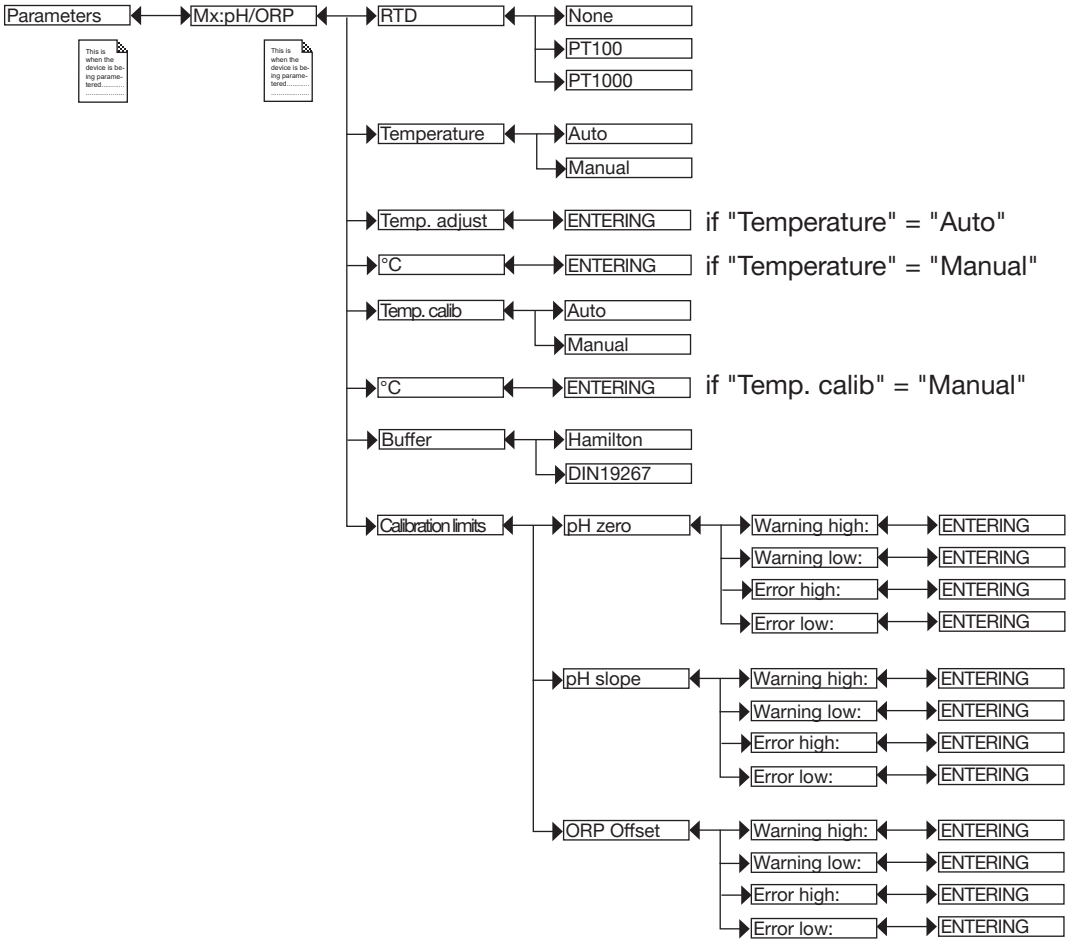
9.28 Setting the parameters of a pH/redox module

Refer to section 8.10 to access the "Parameters" menu.



RTD: Choose the type of temperature sensor connected to the module.

TEMPERATURE: Choose the value of the temperature used in the process (particularly to compensate for the pH measurement):

- choose "Auto": the temperature of the fluid is measured by the sensor.
- choose "Manual": enter the value of the process temperature (in °C) in the next field, e.g. when no temperature sensor is connected to the module.

ADJUST TEMP.: The measured temperature can be corrected by an offset value. Enter the offset value in °C.

TEMP. CALIBRATION: Choose the value of the temperature used when calibrating the probe/sensor:

- choose "Auto": the temperature of the fluid is measured by the sensor.
- choose "Manual": enter the value of the calibration temperature (in °C) in the next field, e.g. when no temperature sensor is connected to the module.

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BUFFER CALIB. : Choose the type of buffer solution used for automatic calibration of the pH probe/sensor, "Hamilton" solutions sold by Bürkert or solution conforming to DIN 19267:

- the device automatically recognises the pH of the following "Hamilton" solutions: 2, 4.01, 7, 10 and 12;
- the device automatically recognises the pH of the following "DIN19267" solutions: 1.09, 4.65, 6.79, 9.23 and 12.75;

CALIBRATION LIMITS: Enter the ranges outside of which a warning or error message is generated during calibration:

- PH ZERO:
  - WARNING HIGH: Enter the pH_0 value above which a warning message is displayed during calibration of the pH sensor.
  - WARNING LOW: Enter the pH_0 value below which a warning message is displayed during calibration of the pH sensor.
  - ERR. HIGH: Enter the pH_0 value above which an error message is displayed during calibration of the pH sensor.
  - ERR. LOW: Enter the pH_0 value below which an error message is displayed during calibration of the pH sensor.
- PH SLOPE:
  - WARNING HIGH: Enter the slope value above which a warning message is displayed during calibration of the pH sensor.
  - WARNING LOW: Enter the slope value below which a warning message is displayed during calibration of the pH sensor.
  - ERR. HIGH: Enter the slope value above which an error message is displayed during calibration of the pH sensor.
  - ERR. LOW: Enter the slope value below which an error message is displayed during calibration of the pH sensor.
- ORP OFFSET:
  - WARNING HIGH: Enter the oxidation reduction potential value above which a warning message is displayed during calibration of the redox sensor.
  - WARNING LOW: Enter the oxidation reduction potential value below which a warning message is displayed during calibration of the redox sensor.
  - ERR. HIGH: Enter the oxidation reduction potential value above which an error message is displayed during calibration of the redox sensor.
  - ERR. LOW: Enter the oxidation reduction potential value below which an error message is displayed during calibration of the redox sensor.

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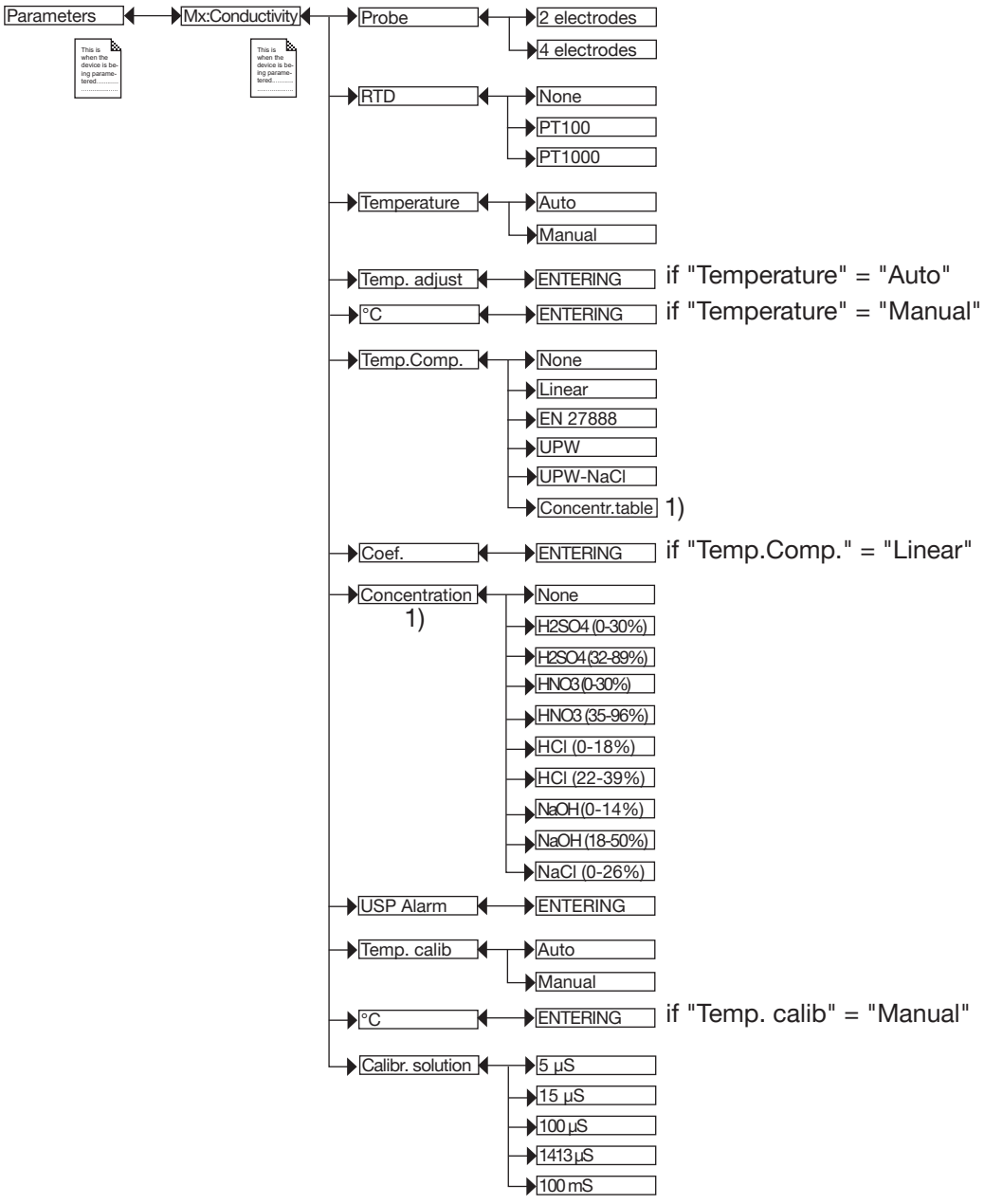
9.29 Setting the parameters of a conductivity module

Refer to section 8.10 to access the "Parameters" menu.



1) *This menu is available as an option (see section 9.5).*

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PROBE: Choose the type of conductivity probe, either with 2 or 4 electrodes, connected to the module.

RTD: Choose the type of temperature sensor connected to the module.

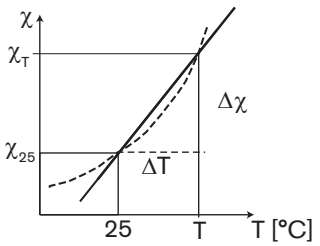
TEMPERATURE: Choose the value of the temperature used in the process:

- choose "Auto": the temperature of the fluid is measured by the sensor.
- choose "Manual": enter the value of the process temperature (in °C) in the next field, e.g. when no temperature sensor is connected to the module.

ADJUST TEMP. : The measured temperature can be corrected by an offset value. Enter the offset value in degrees Celsius.

TEMP. COMP. : Choose the type of temperature compensation to determine the fluid conductivity:

- in accordance with a linear percentage (select "linear"). Linear temperature compensation may be sufficiently accurate for your process, provided the temperature of your process is always > 0 °C. Enter a compensation of 0.00...9.99 %/°C in the subsequent "Coeff." field.
  Use the following graph and equation to calculate the mean value of the compensation coefficient α according to a temperature range ΔT and the associated conductivity range $\Delta\chi$:



$$\alpha = \frac{\Delta\chi}{\Delta T} \times \frac{1}{\chi_{25}}$$

- or according to the natural water law (choose "EN27888").
- or according to the ultra pure water law (choose "UPW").
- or according to the ultra pure water and sodium chloride laws (choose "UPW-NaCl").
- or according to the law of the concentration table (choose "Concentration table", available as an option) that has been chosen in the "Concentration" function hereafter.
- or deactivate temperature compensation (choose "None").

CONCENTRATION: Available as an option. Choose the mass concentration table for your fluid from the list offered. This data (%) is then available in the list of process variables for the conductivity module. The fluid concentration is determined using the measured and non-compensated values of the conductivity and the temperature, whatever the choice made in "Temp.Comp.".

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ALARM USP: Enter a conductivity value percentage from the table "USP <645>".

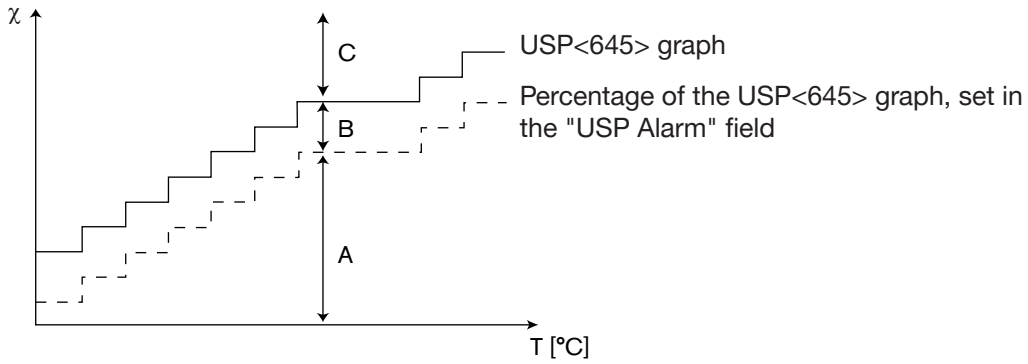

Table 10: Behaviour associated to the table USP<645>

Graph zone	Description	Name displayed in the user defined "Ux" view (see section 9.9)	Associated code in the datalogger (see section 9.22)	Status of the "ON/OFF" output (see section 9.26)
C	The conductivity of the fluid has exceeded the value in the table USP<645> at the corresponding temperature.	"> Max."	1	ON (output not inverted)
B	The conductivity of the fluid is between the percentage set in the function "USP Alarm" and the value in the table USP<645> at the corresponding temperature.	"USP Alarm"	2	ON (output not inverted)
A	The conductivity of the fluid is below the percentage set in the function "USP Alarm" at the corresponding temperature.	"OK"	0	OFF (output not inverted)

CALIB. TEMP. : Choose the value of the temperature used when calibrating the probe/sensor:

- choose "Auto": the temperature of the fluid is measured by the sensor
- choose "Manual": enter the value of the temperature (in °C) in the next field, e.g. when no temperature sensor is connected to the module.

CALIBRATION SOLUTION : Choose the calibration solution used for automatic calibration of the conductivity sensor.

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Menu Calibration

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10 CALIBRATION MENU

10.1 Safety instructions

WARNING

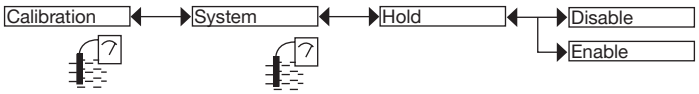
Risk of injury due to non-conforming adjustment.

Non conforming adjustment could lead to injuries and damage the device and its environment.

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

10.2 Enabling/disabling the Hold function

Refer to section 8.10 to access the "Calibration" menu.



The Hold mode is automatically deactivated when the device restarts after a power interruption, if the Hold mode was activated at the moment of the power cut-off.

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

To activate the HOLD mode:

→ access the "HOLD" function;

→ choose "Enable";

→ confirm by "OK".

When the device is in Hold mode:

- the display shows the icon H instead of the icon ;
- the current emitted on each 4...20 mA output is fixed at the last value of the process input associated with each output;
- each digital output is fixed at the state acquired at the moment the Hold function is activated;
- the device remains in Hold mode until the Hold function is disabled.

To disable the HOLD mode:

→ access the "HOLD" function;

→ choose "Disable"

→ confirm by "OK".

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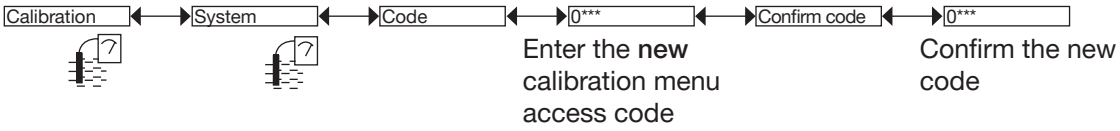
10.3 Modifying the Calibration menu access code

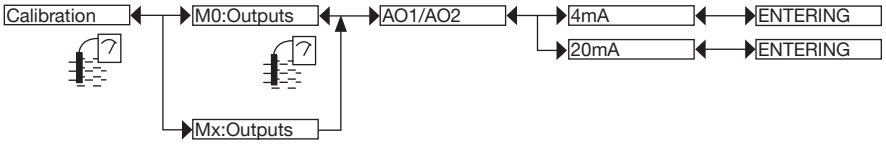
Refer to section 8.10 to access the "Calibration" menu. If the default access code "0000" is kept, the device does not request it to access the Calibration menu.



10.4 Adjusting the current outputs

Ensure that Hold mode is disabled before adjusting the current outputs: icon appears on the display.

Refer to section 8.10 to access the "Calibration" menu.



4 MA: Adjust the offset of the current output.

When the "4mA" function is selected, the device generates a current of 4 mA:

→ measure the current emitted by the 4...20 mA output using a multimeter;

→ enter the value given by the multimeter.

20 MA: Adjust the span of the current output.

When the "20mA" function is selected, the device generates a current of 20 mA:

→ measure the current emitted by the 4...20 mA output using a multimeter;

→ enter the value given by the multimeter.

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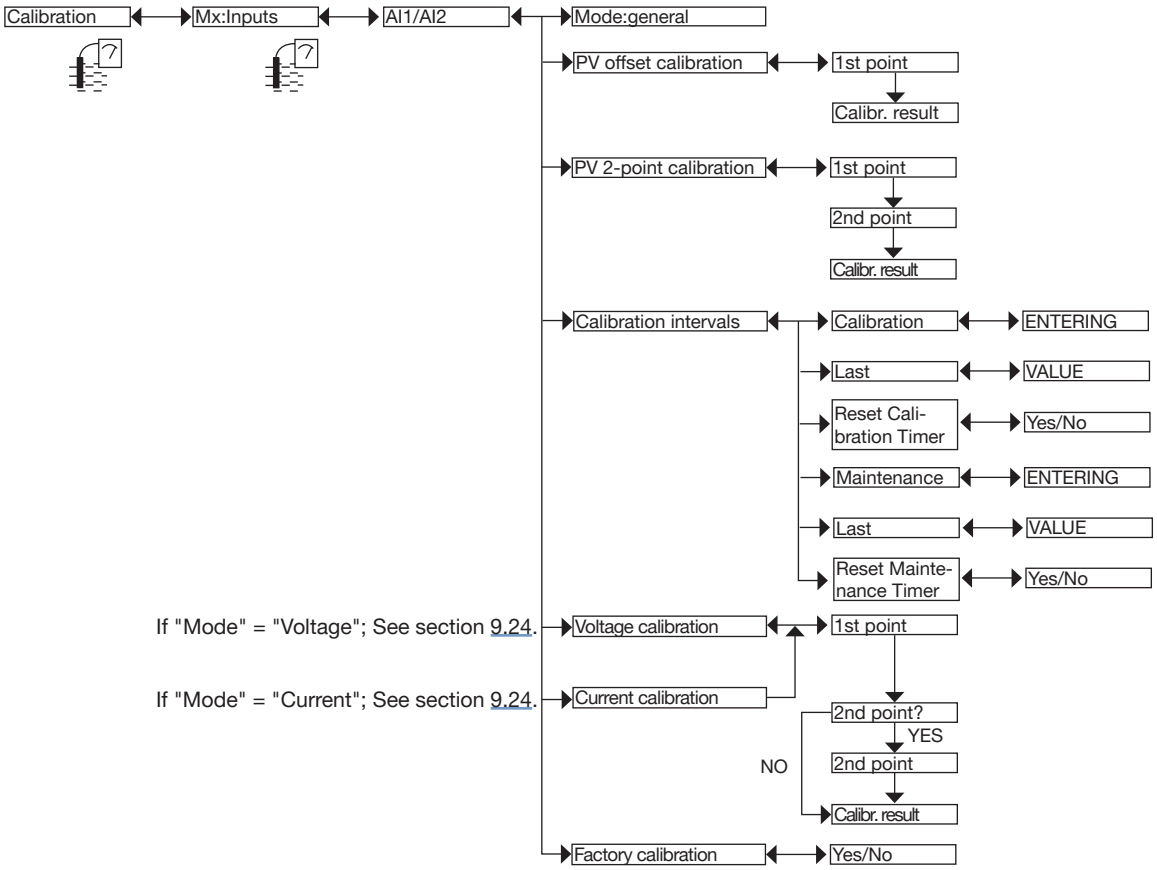
10.5 Calibrating an analogue input AI1 or AI2 connected to a sensor other than a chlorine sensor

Refer to section 8.10 to access the "Calibration" menu.



If a measuring sensor (other than a chlorine measuring sensor) is connected to an AI1 or AI2 analogue intput, the analogue input can be calibrated:

- either with respect to the measured value, at two points or at one point. See section 10.7 Calibrating an analogue input, AI1 or AI2, at two points, with respect to a measured value other than chlorine or section 10.8 Calibrating an analogue input, AI1 or AI2, at one point (offset), with respect to a measured value other than chlorine.
- or with respect to the current or voltage received on the input. See section 10.9 Calibrating an analogue input connected to a current output or a voltage output.

→ To read the date of the last calibration of an analogue input, see section 10.12.

→ To enter the periodicity of calibrations, see section 10.13.

→ To read the date of the last maintenance operation carried out on the sensor connected to the analogue input, see section 10.14.

→ To enter the periodicity of a maintenance operation to be carried out on the sensor connected to the analogue input, see section 10.15.

→ To return to the calibration parameters for the analogue input, as carried out in the factory, see section 10.16.

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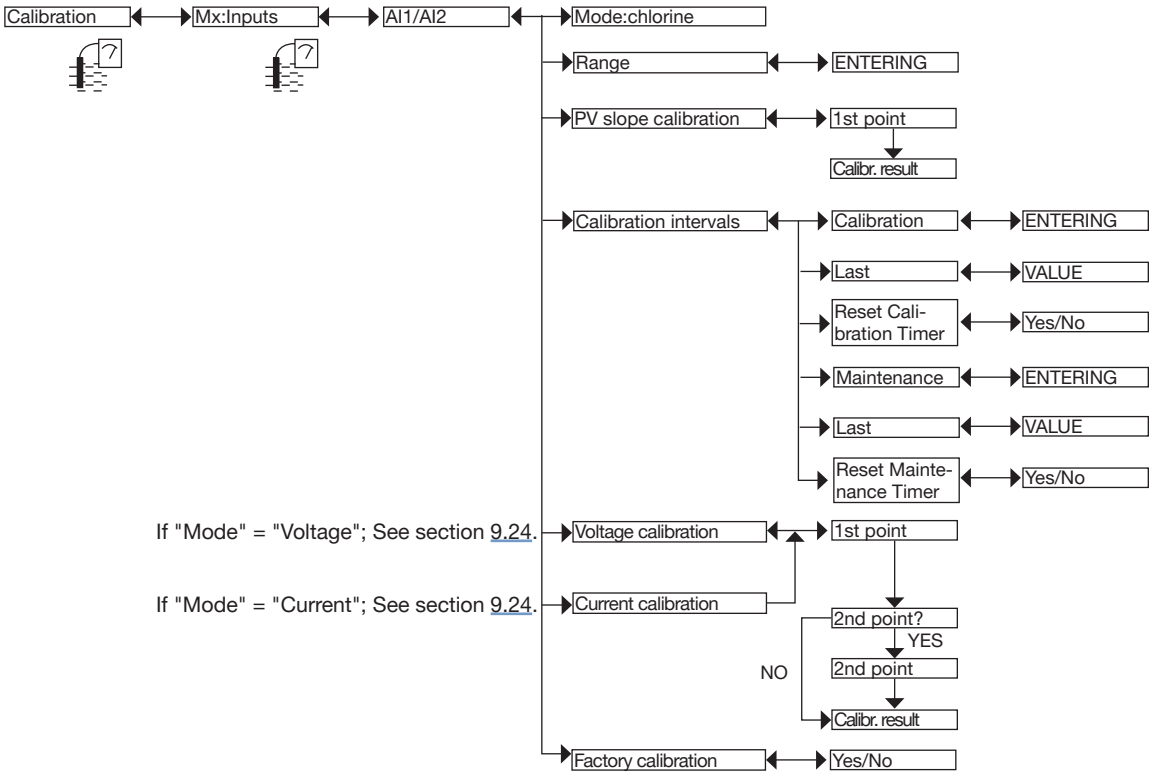
10.6 Calibrating an analogue input AI1 or AI2 connected to a chlorine sensor

Refer to section 8.10 to access the "Calibration" menu.



If a chlorine measuring sensor is connected to an AI1 or AI2 analogue intput, the analogue input can be calibrated:

- either with respect to the measured chlorine value, at one point. See section 10.10 Calibrating an analogue input, AI1 or AI 2, at 1 point (slope): example with the chlorine sensor Type 8232.
- or with respect to the current or voltage received on the input. See section 10.9 Calibrating an analogue input connected to a current output or a voltage output.

→ To enter the max. value of the chlorine measuring range, marked on the name plate of the chlorine sensor, see section 10.11.

→ To read the date of the last calibration of an analogue input, see section 10.12.

→ To enter the periodicity of calibrations, see section 10.13.

→ To read the date of the last maintenance operation carried out on the sensor connected to the analogue input, see section 10.14.

→ To enter the periodicity of a maintenance operation to be carried out on the sensor connected to the analogue input, see section 10.15.

→ To return to the calibration parameters for the analogue input, as carried out in the factory, see section 10.16.

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10.7 Calibrating an analogue input, AI1 or AI2, at two points, with respect to a measured value other than chlorine

This calibration does not replace the calibration of the measuring sensor connected to the analogue input.

Refer to section 8.10 to access the "Calibration" menu.

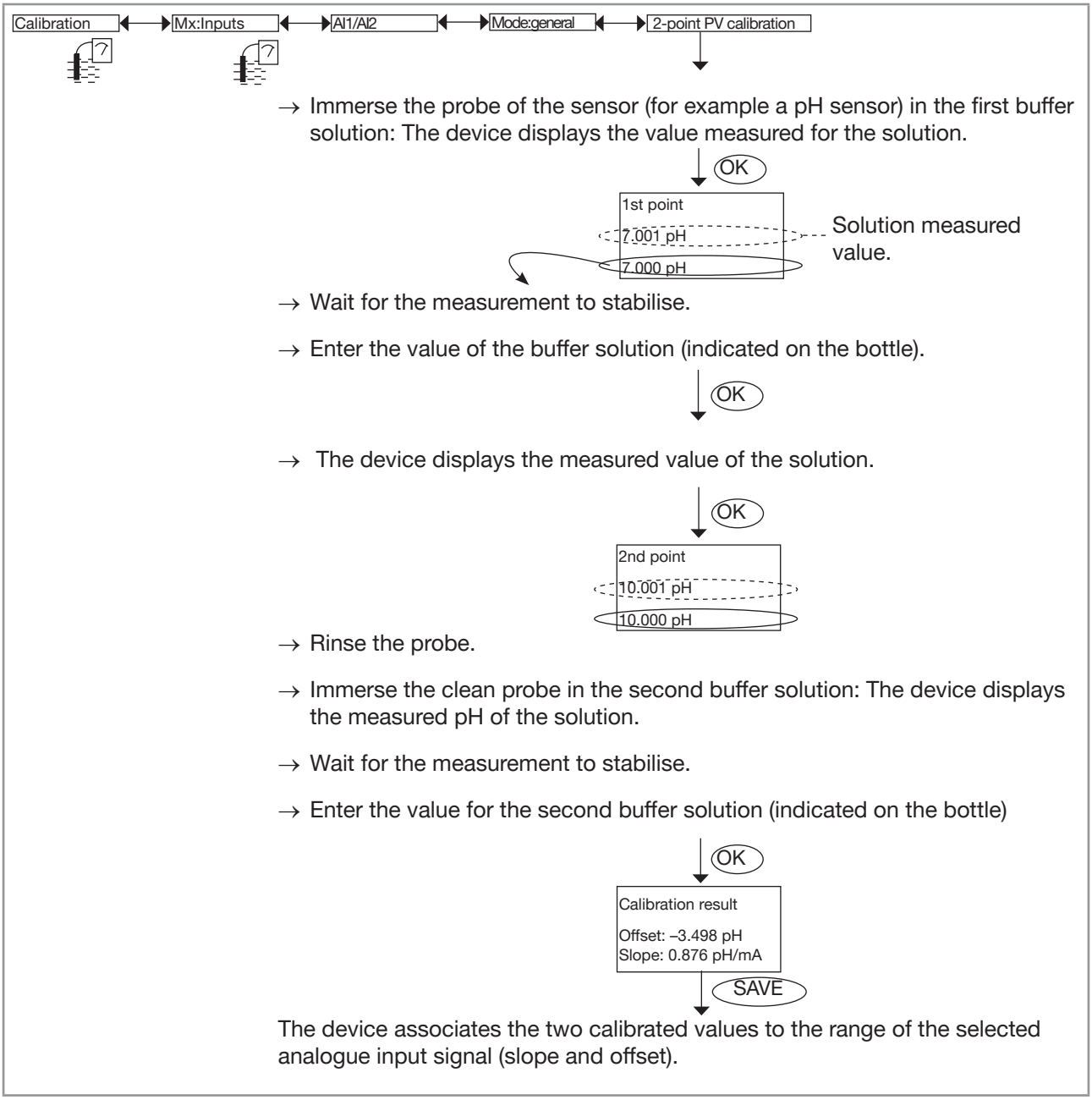

Fig. 96: Example for the calibration at 2 points of an analogue input with respect to the pH measured by an instrument having a 4...20 mA output

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10.8 Calibrating an analogue input, AI1 or AI2, at one point (offset), with respect to a measured value other than chlorine

This calibration does not replace the calibration of the measuring sensor connected to the analogue input.

Refer to section 8.10 to access the "Calibration" menu.

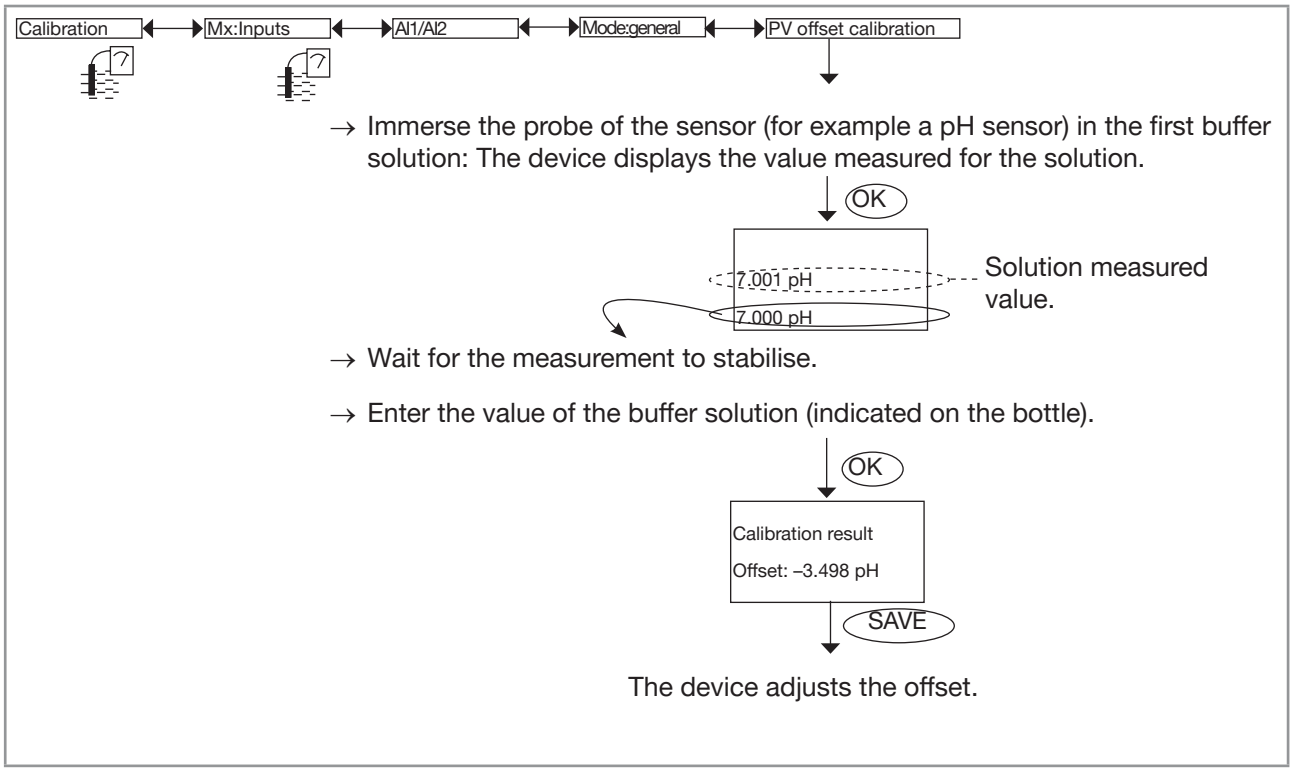

Fig. 97: Example for the calibration at 1 point of an analogue input with respect to the pH measured by an instrument having a 4...20 mA output

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10.9 Calibrating an analogue input connected to a current output or a voltage output

If an analogue input, AI1 or AI2, is connected to the current or voltage analogue output of an external instrument (for instance, the 4...20 mA output of a pressure measuring device Type 8311), calibrate the analogue input according to Fig. 98.

This calibration is used to precisely adjust the bounds of the analogue input to the bounds of the connected instrument.

Refer to section 8.10 to access the "Calibration" menu.

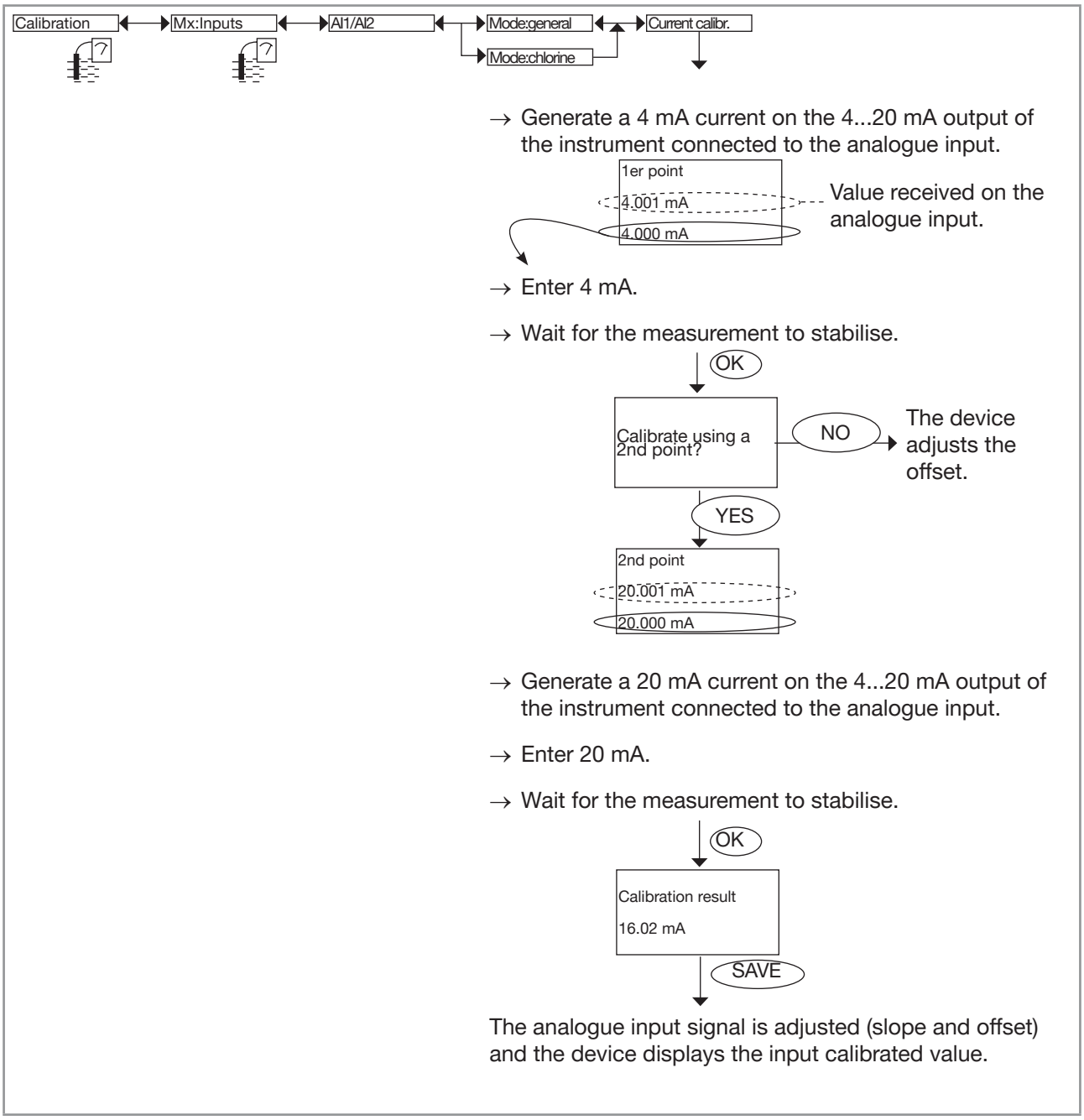

Fig. 98: Example for the calibration of an analogue input with respect to the current output of a pressure measuring device Type 8311

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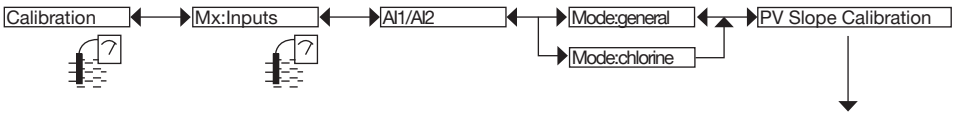
10.10 Calibrating an analogue input, AI1 or AI 2, at 1 point (slope): example with the chlorine sensor Type 8232

This function is used to determine the slope of the straight line of the measurement signal.

Refer to section 8.10 to access the "Calibration" menu.

→ Install the chlorine sensor in the process with respect to the related Operating instructions.

→ Connect the chlorine sensor to an analogue input, AI1 or AI2.

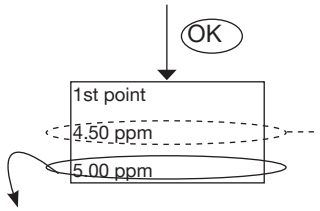


→ Activate the 1-point calibration function: The device saves the current value on the analogue input.

→ The device shows the measured value of chlorine.

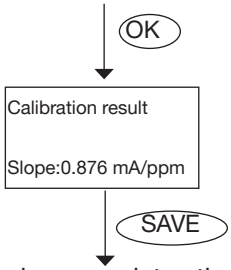
→ Take a sample of the solution to be measured.

→ With the DPD1 method, determine the chlorine concentration of the sample.



Solution measured value.

→ Enter the value of the chlorine concentration of the sample, that has been determined with the DPD1 method.



The device associates the calculated slope with the analogue input signal selected [1)]

1)

A warning/error message signals a slope < 25 % or > 400 %.

- Replace the electrolyte and/or the membrane.

Fig. 99: Example for the calibration of an analogue input with respect to the chlorine measured by an instrument having a 4...20 mA output

10.11 Entering the max. value of the chlorine measuring range

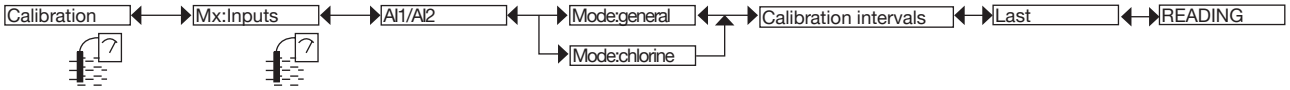
Refer to section 8.10 to access the "Calibration" menu.

→ Enter the max. value of the measuring range indicated on the name plate of the chlorine sensor.

Mx:Inputs

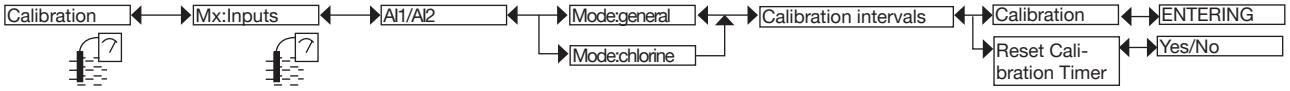
10.12 Reading the date of the last calibration of an analogue input

Refer to section 8.10 to access the "Calibration" menu.



10.13 Entering the periodicity of the calibrations

Refer to section 8.10 to access the "Calibration" menu.



On each due date, the device generates a "maintenance" event, signalled on the display by the icon 🔧, and a "warning" event, signalled on the display by the icon ⚠.

If a calibration is successfully performed, the events disappear and the countdown of days restarts.

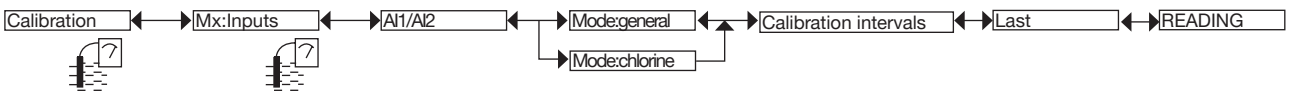
If the message "M0:W:Time lost" is generated, the calibration reminder message is not generated. See section 16.3.5.

→ Enter the number of days between two calibration reminders. Enter "0000 days" to disable this notification.

→ Select "Reset Calibration Timer" -> "Yes" to manually reset the delay until the next calibration.

10.14 Reading the date of the last maintenance of an analogue input

Refer to section 8.10 to access the "Calibration" menu.



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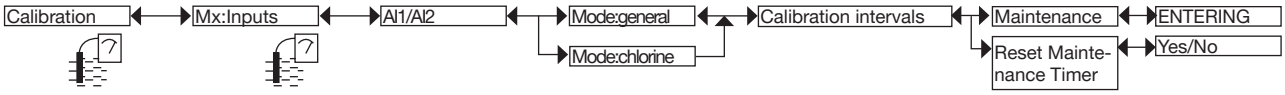
10.15 Entering the periodicity of a maintenance operation to be carried out on the sensor connected to the analogue input

Refer to section 8.10 to access the "Calibration" menu.



On each due date, the device generates a "maintenance" event, signalled on the display by the icon, and a "warning" event, signalled on the display by the icon ⚠.

If the message "M0:W:Time lost" is generated, the maintenance reminder message is not generated. See section 16.3.5.

→ Enter the number of days between two maintenance reminders.

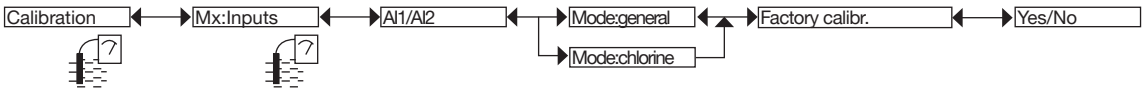
When the maintenance operation has been performed, you can choose ("Yes") or not ("No") to restart the countdown of days until the next maintenance operation in the menu "Reset maintenance Timer".

→ Select "Reset Maintenance Timer" -> "Yes" or -> "No"

→ Enter "0000 days" to disable the automatic reminder for the maintenance operation.

10.16 Restoring the factory calibration of the analogue inputs

Refer to section 8.10 to access the "Calibration" menu.



10.17 Resetting the totalisers

This function is available on the devices with analysis modules if the software option, "FLOW", is activated. See section 9.5.

Refer to section 8.10 to access the "Calibration" menu.

To remotely reset the value of a totaliser, see section 9.23.2.

To remotely freeze the last value of a totaliser, see section 9.23.3.

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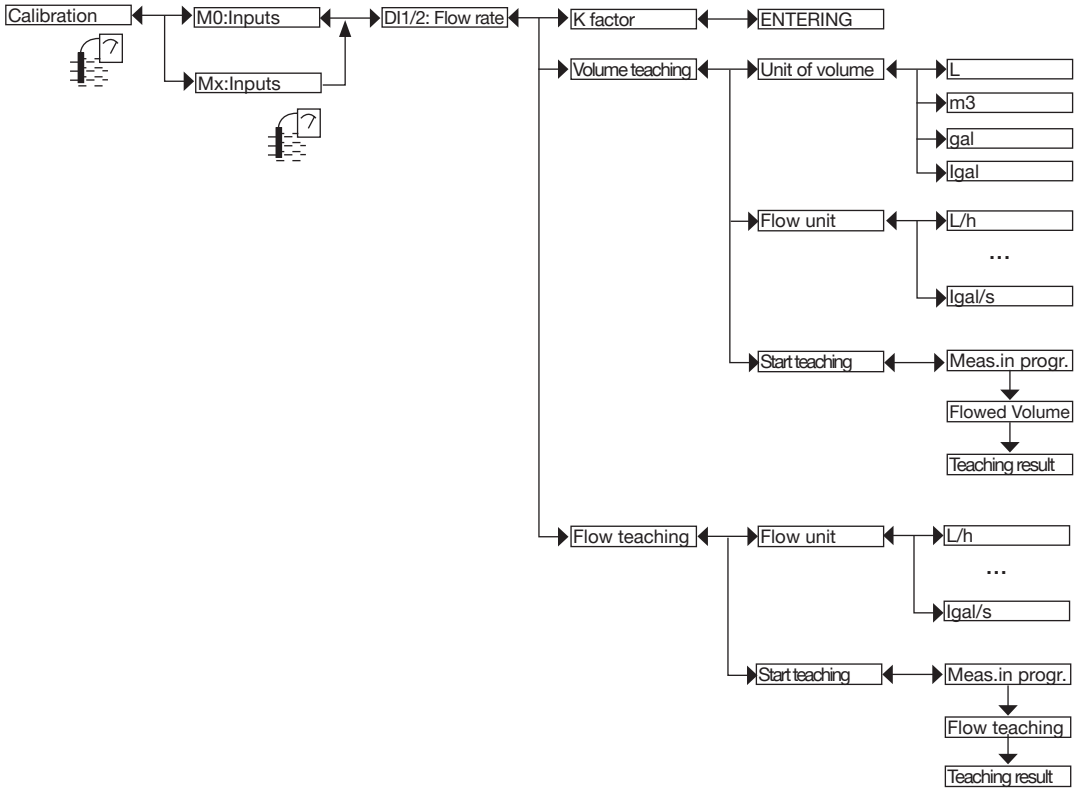
10.18 Entering the K factor for the used fitting or determining it using teach-in

This function is available on the devices with analysis modules if the software option, "FLOW", is activated. See section 9.5

Refer to section 8.10 to access the "Calibration" menu.



→ Use one of the following 3 methods to configure the pulse input of the device for a flow rate measurement:

- *K FACTOR*: Enter the K factor in pulse/litre unique to the fitting used. Refer to the user operating instructions of the fitting used.
- *VOLUME TEACHING*: Determine the K factor unique to your installation using a teach-in procedure by volume. Follow the procedure below.
- *FLOW TEACH*: Determine the K factor unique to your installation using a teach-in procedure by flow rate. Follow the procedure on next page.

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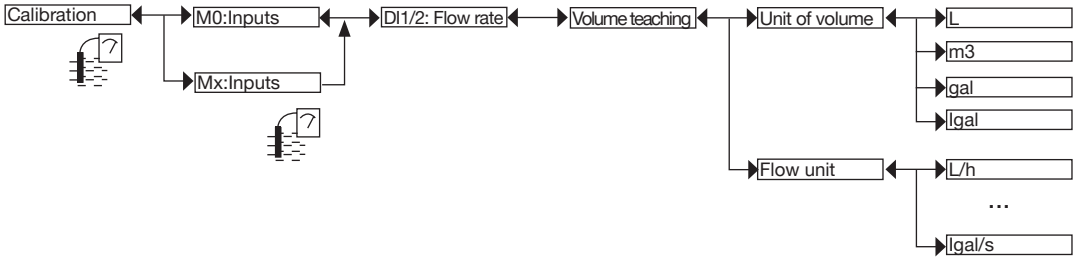
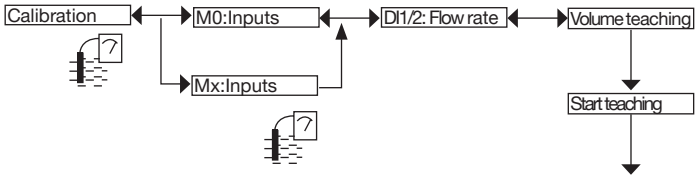
10.18.1 Detailed procedure for teach-in by volume

→ Prepare a tank capable of containing 100 litres, for example;

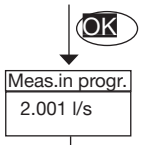
→ Choose the volume unit and the flow rate unit in which the teach-in is run:



→ Running teach-in by volume:

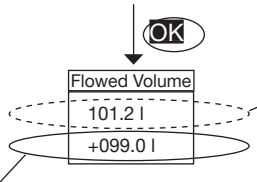


→ Open the valve to fill the tank.



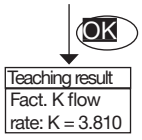
The device displays the instantaneous flow rate of the fluid.

→ When the tank is filled, close the valve.



The device displays the volume calculated with the current K factor.

→ Enter the actual volume of fluid in the tank.



The device displays the K factor calculated by teach-in.

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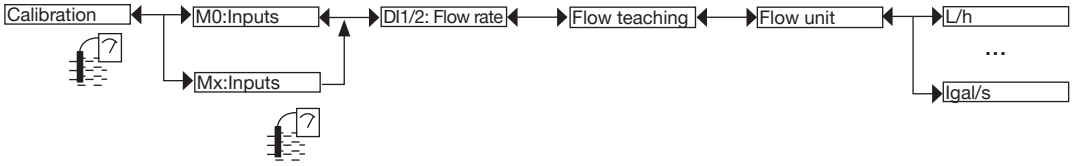
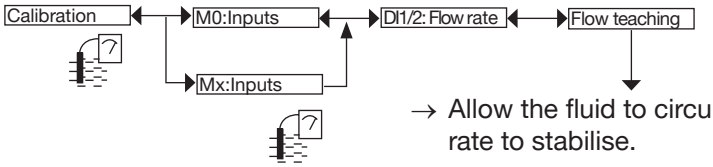
10.18.2 Detailed procedure for teach-in by flow rate

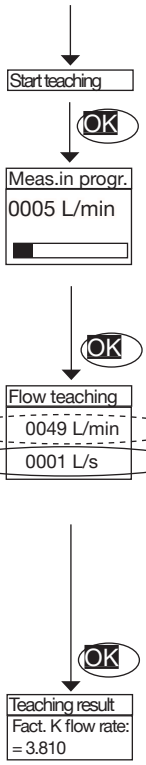
→ Choose the flow rate unit in which teach-in is run:



→ Run teach-in by flow rate:



→ Allow the fluid to circulate in the pipes and wait for the flow rate to stabilise.



The device calculates the flow rate measured in the pipe, with the current K factor, for 100 seconds [1].

The bargraph shows the time elapsed.

The device displays the flow rate calculated with the current K factor

→ Enter the value of the flow rate in the pipe.

The device displays the K factor calculated by teach-in.

[1] Measurement can be suspended at any time by clicking on "OK".

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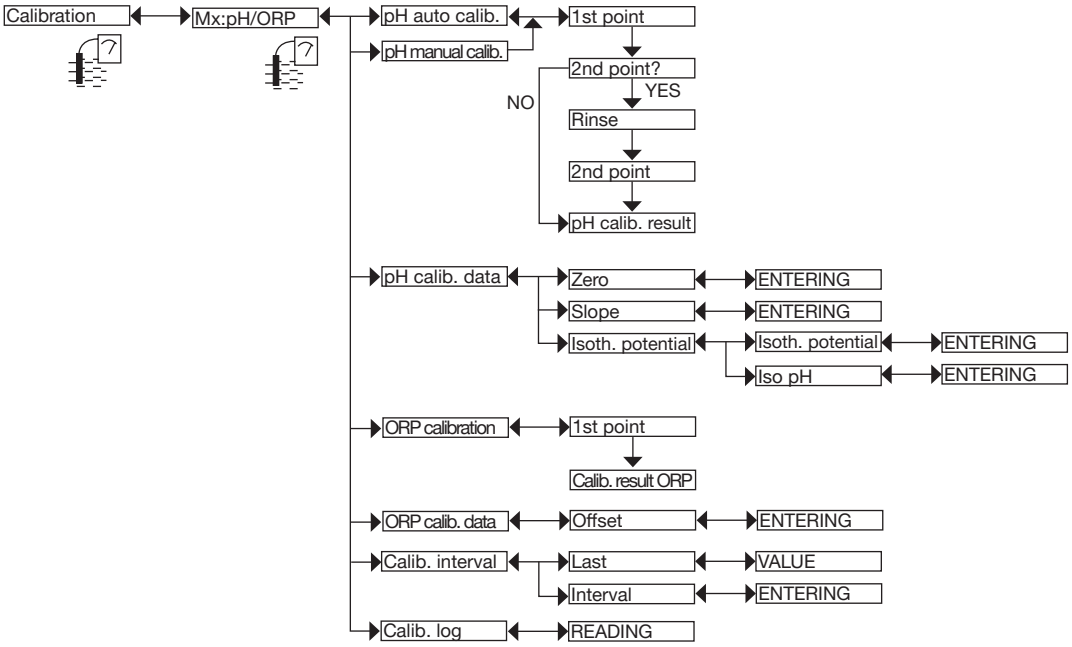
10.19 Calibrating a pH or redox sensor

Refer to section 8.10 to access the "Calibration" menu.



→ Use one of the following 3 methods to calibrate a pH sensor:

- *PH AUTO CALIBRATION*: Automatically calibrate the pH sensor; first choose the buffer solution used in the menu "Parameters -> Mx:pH/ORP -> Buffer". The device automatically recognises the pH of the solution used: When a sensor is calibrated automatically, the most recent calibration date is updated (function "LAST" in the submenu "CALIBRATION INTERVAL" below).
- *PH MANUAL CALIBRATION*: Calibrate the pH sensor using a 1- or 2-point procedure. See details on the following pages. When a sensor is calibrated manually, the most recent calibration date is updated (function "LAST" in the submenu "CALIBRATION INTERVAL" below).
- *PH CALIBRATION DATA*: Enter the zero values and the slope indicated on the certificate for the pH sensor, if provided. Always enter a negative value for the slope, even if the value given on the certificate is a positive value. This entry does not update the most recent calibration date (function "LAST" in the sub-menu "CALIBRATION INTERVAL" below).

→ Use one of the following 2 methods to calibrate a redox sensor:

- *ORP CALIBRATION*: Manually calibrating the redox sensor using the 1-point method See details on the following pages.
- *ORP CALIBRATION DATA*: Enter the offset value indicated on the certificate for the redox sensor, if provided.

CALIBRATION INTERVAL: Read the date of the most recent manual or automatic calibration and enter the periodicity of calibration, in days: each time a calibration is due, the device generates a "maintenance" event, signalled on the display by the icon , and a "warning" event, signalled on the display by the icon ⚠. Configure "0000 days" in order not to use the function.

If the message "M0:W:Time lost" is generated, the calibration reminder message is not generated. See section 16.3.5.

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- The "warning" event may be associated with one and/or other of the digital outputs (see section 9.26).
- See also section 16.3 If you encounter problems.

CALIBRATION LOG: Read the latest valid calibration values.

10.19.1 Manually calibrating the pH or redox sensor

- The pH sensor can be calibrated according to a 1-point or a 2-point procedure.
- The redox sensor can only be calibrated according to a 1-point procedure.

- Modify the default calibration limits before calibrating your sensor (see section 9.28).
- In order not to interrupt the process, activate the HOLD function (see section 10.2).
- Before each calibration, correctly clean the electrode with a suitable product.
- In a 2-point calibration, the buffer solutions used must be at the same temperature.
- Set the periodicity of calibrations in the "Calibration Interval" function (see page 161): each time a calibration is due, the device generates a "maintenance" event and a "warning" event.

10.19.2 Detailed procedure for the 1- or 2-point calibration of a pH sensor

- The 1-point calibration procedure is used for rapid calibration by adjusting the zero of the measurement graph with a buffer solution with a known pH (to calibrate a pH sensor: see below) or a known oxidation reduction potential (to calibrate a redox sensor: see page 164).
- The 2-point calibration procedure is used for accurate calibration of zero and the slope of the measurement graph of the pH sensor. This operation requires 2 buffer solutions: in general a first solution with a pH of 7 and a second solution with a pH very close to that of the value to be measured. See next page.

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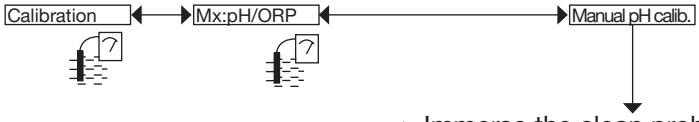
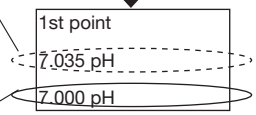
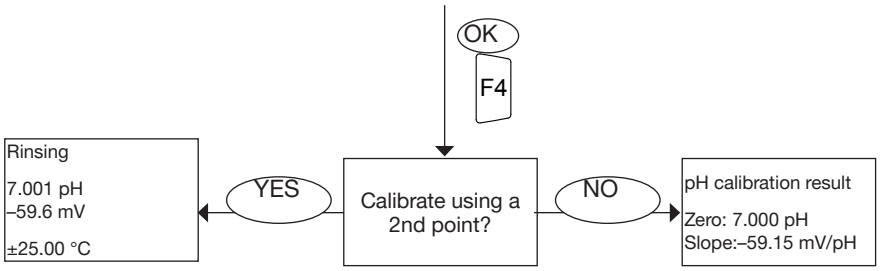


→ Immerse the clean probe in the first buffer solution: the device displays the measured pH of the solution.



→ Enter the pH of the buffer solution (indicated on the bottle)

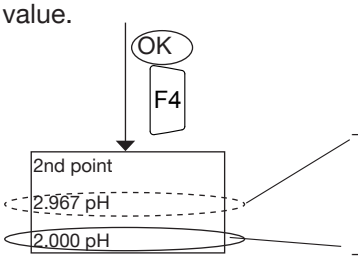
→ Wait until the measured pH stabilises.



→ Rinse the probe.

→ confirm rinsing by "OK" when the pH reaches the desired value.

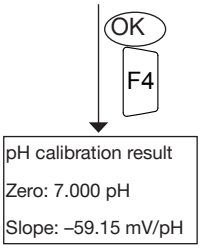
The 8619 displays the calibration result. [1)]



→ Immerse the clean probe in the second buffer solution: the device displays the measured pH of the solution.

→ Enter the pH of the second buffer solution (indicated on the bottle).

→ Wait until the measured pH stabilises.



The device displays the calibration result [1)]

1)

- a possible "warning" message indicates either an error in the solution or the ageing of the probe.
- a possible "error" message indicates that the probe must be replaced.

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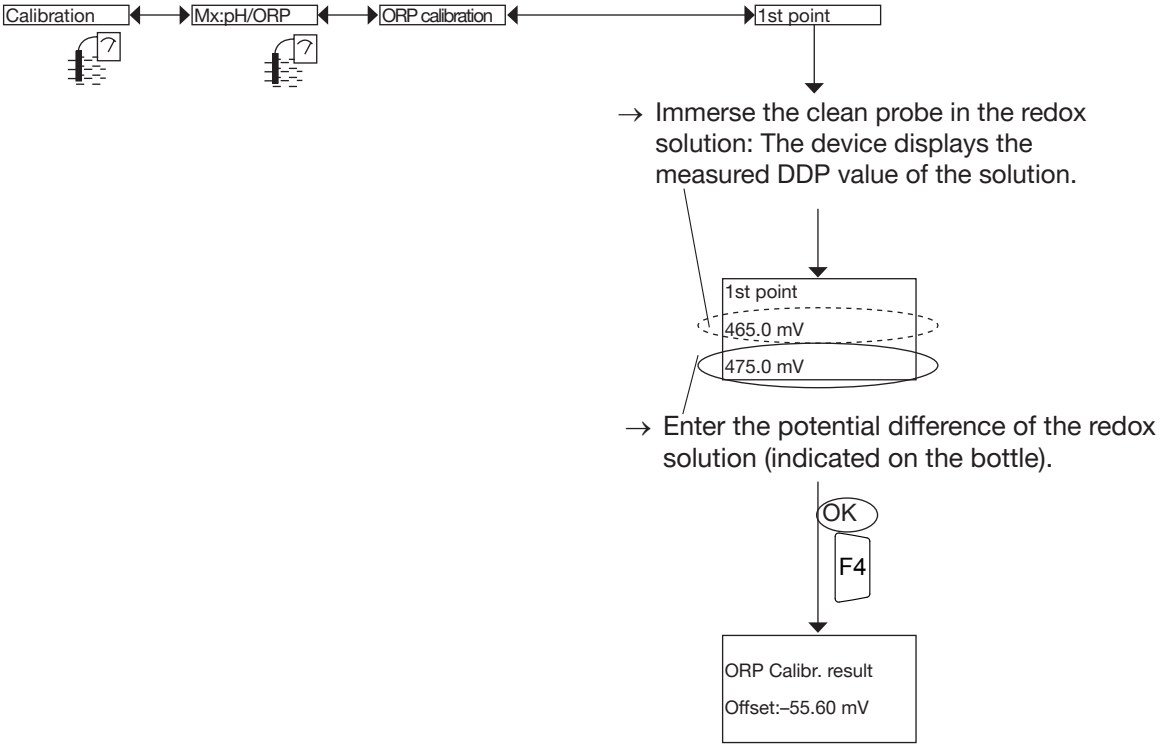
10.19.3 Detailed procedure for the calibration of the oxidation reduction potential sensor (1-point method only)

The 1-point calibration procedure is used for a quick calibration by adjusting the zero of the measurement graph with a buffer solution with a known oxidation reduction potential.



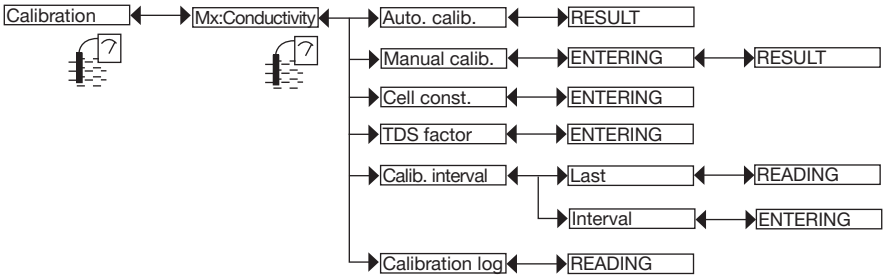
The device displays the calibration result [1)]

1)

- a possible "warning" message indicates either an error in the solution or the ageing of the probe.
- a possible "error" message indicates that the probe must be replaced.

10.20 Calibrating a conductivity sensor

Refer to section 8.10 to access the "Calibration" menu.



→ Use one of the following 3 methods to calibrate a conductivity sensor:

- *AUTOMATIC CALIBRATION*: Calibrate the conductivity sensor by automatically determining its specific C constant; choose the reference solution used in the menu "Parameters -> Mx:conductivity -> Calibration solution".
- *MANUAL CALIBRATION*: Calibrate the conductivity sensor by determining its specific C constant. See details of the procedure below.
- *CELL CONST.*: Read the most recent C constant determined by one of the calibration functions or modify it. This entry does not update the most recent calibration date (function "LAST" in the sub-menu CALIB INTERVAL below).

TDS FACTOR: Enter the conversion factor between conductivity and quantity of dissolved solids (TDS) appropriate to your fluid.

CALIBRATION INTERVAL: Read the date of the last calibration (function "LAST") and set the periodicity of calibrations, in days (function "INTERVAL"): each time a calibration is due, the device generates a "maintenance" event, signalled on the display by the icon and a "warning" event, signalled on the display by the icon ⚠. Set "0000 days" in the "INTERVAL" function in order not to use the function.

If the message "M0:W:Time lost" is generated, the calibration reminder message is not generated. See section 16.3.5.

- The "warning" event may be associated with one and/or other of the digital outputs (see section 9.26).
- See also "If you encounter problems" in section 16.3.

CALIBRATION LOG: Read the latest valid calibration values.

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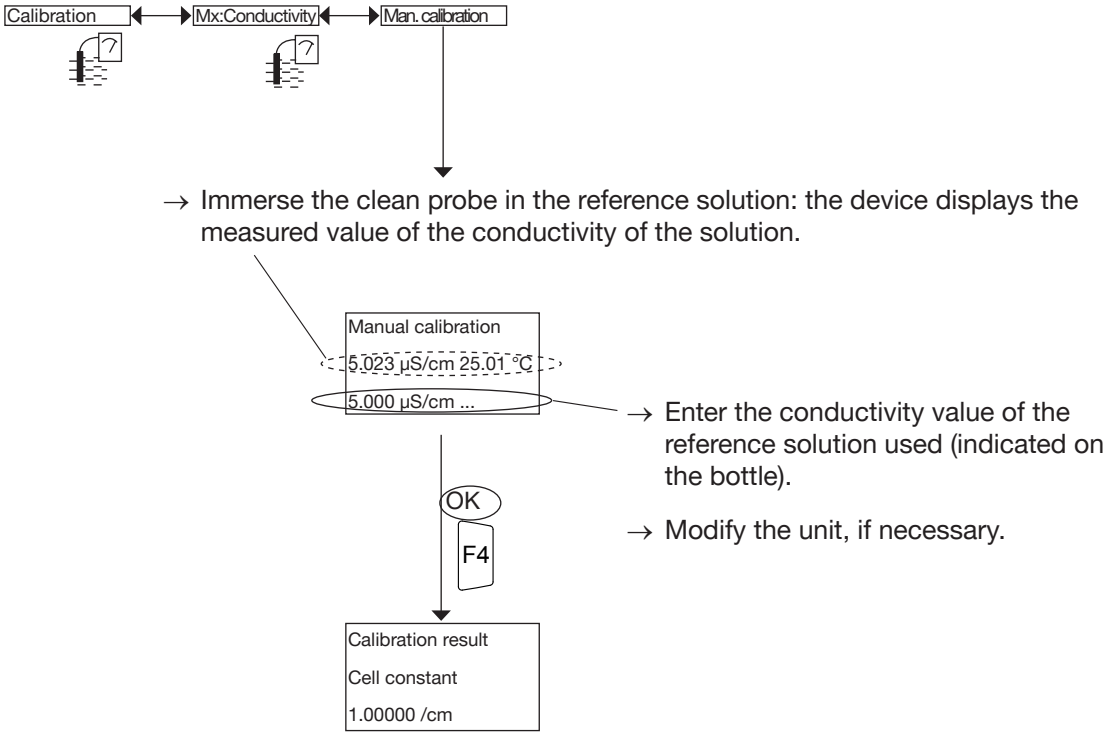
10.20.1 Details of the calibration procedure for a conductivity sensor

Calibration consists in determining the cell constant specific to each sensor using a solution with a known conductivity.

- In order not to interrupt the process, activate the HOLD function (see section 10.2).
- Before each calibration, correctly clean the electrode with a suitable product.
- Set the periodicity of calibrations in the "Interval" function of the "calibration interval" submenu (see above). Each time a calibration is due, the device generates a "maintenance" event and a "warning" event.



The device displays the calibration result.

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Menus Diagnostics, Tests and Information

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11 DIAGNOSTICS MENU

11.1 Safety instructions

WARNING

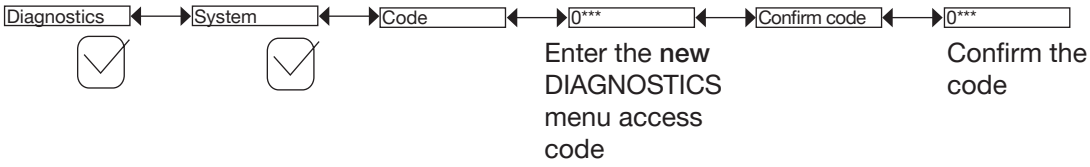
Risk of injury due to non-conforming adjustment.

Non conforming adjustment could lead to injuries and damage the device and its environment.

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

11.2 Modifying the "Diagnostics" menu access code

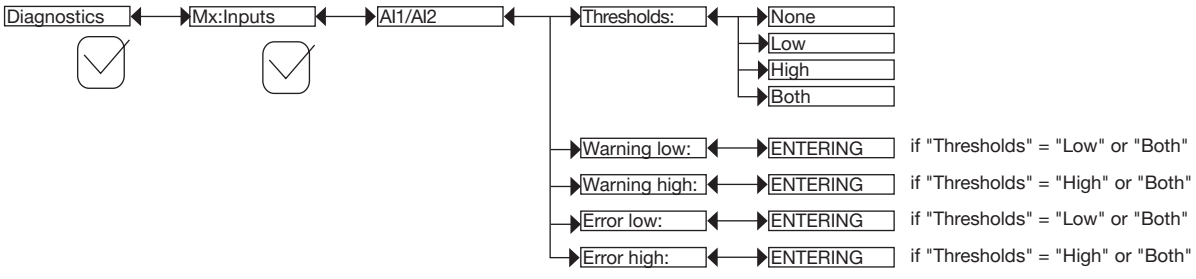
Refer to section 8.10 to access the "Diagnostics" menu. If the default access code "0000" is kept, the device does not request it to access the Diagnostics menu.



11.3 Monitoring the current or voltage value received on the analogue inputs

This function is used to define the behaviour of the limits entered by the user are reached.

Refer to section 8.10 to access the "Diagnostics" menu.



A malfunction in your process may be revealed by too low or too high value received on the analogue input.

To be warned when the value received on the analogue input is out of range:

→ choose which thresholds have to be monitored, in the "Thresholds" function, and then

→ set one or two threshold values outside of which the 8619 generates a "warning" event and displays the icons ☹ and ⚠;

→ set one or two threshold values outside of which the 8619 generates an "error" event and displays the icons ☹ and ⓧ .

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When a "warning" or "error" event is generated by the 8619:

→ go into the "Information" menu to read the cause of generation of this event;

→ correct the problem according to the instructions given in section 16.3.

- The "warning" event may also be associated with one and/or other digital outputs. See section 9.26.
- A current of 22 mA may be emitted on one and/or other of the current outputs when an "error" event related to either the monitoring of the fluid pH, redox, conductivity or temperature values or the monitoring of an analogue input is generated. See section 9.25.
- See also "If you encounter problems" in section 16.3.

WARN. LOW: Enter the analogue input value below which a "warning" event is generated.

WARN. HIGH: Enter the analogue input value above which a "warning" event is generated.

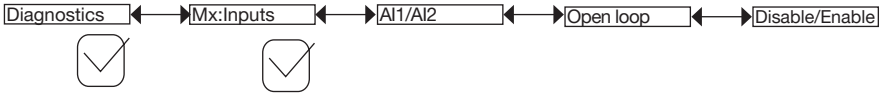
ERR. LOW: Enter the analogue input value below which an "error" event is generated.

ERR. HIGH: Enter the analogue input value above which an "error" event is generated.

11.4 Detecting an open loop on a voltage input

This function is available for an analogue input configured in "voltage" mode.

Refer to section 8.10 to access the "Diagnostics" menu.



DISABLE/ENABLE: Activate or deactivate the open loop detection.

When the function has been activated, an "error" event is generated and the message "Mx:E:AIx open" registered in the data logger if no source is connected to the voltage input or if the wiring is incorrect.

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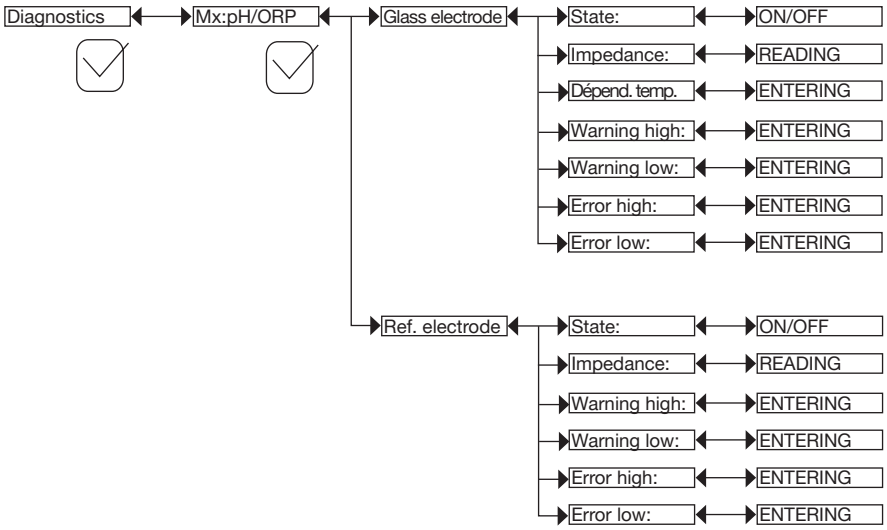
11.5 Monitoring the pH or redox values

This function is used to define the behaviour of the device if problems arise on the pH probe (glass electrode and/or reference electrode) or the redox probe (reference electrode only).

Refer to section 8.10 to access the "Diagnostics" menu.



A malfunction in your process or on the measurement probe may be revealed by too low or too high value of the impedance.

To be warned when the impedance measurement is out of range:

→ activate monitoring of fluid impedance in the "Status" function, and then

→ set an impedance range outside of which the 8619 generates a "warning" event and displays the icons ☹ and ⚠;

→ set an impedance range outside of which the 8619 generates an "error" event and displays the icons ☹ and ⊗ .

When a "warning" or "error" event is generated by the 8619:

→ go into the "Information" menu to read the cause of generation of this event;

→ and/or read the measured impedance value;

→ if necessary, clean the probe and/or recalibrate the measurement sensor;

→ if necessary, check the process.

- The "warning" event may also be associated with one and/or other digital outputs. See section 9.26.
- A current of 22 mA may be emitted on one and/or other of the current outputs when an "error" event related to either the monitoring of the fluid pH, redox, conductivity or temperature values or the monitoring of an analogue input is generated. See section 9.25.
- See also section 16.3 If you encounter problems.

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STATE: Choose to activate or deactivate monitoring of the impedance of the electrode selected.

This monitoring is done by the generation of a "warning" event if the impedance range defined in the "Warn Hi/Lo" functions below is exceeded and an "error" event if the impedance range defined in the "Err Hi/Lo" functions below is exceeded.

IMPEDANCE: Read the impedance, measured in real time, on the electrode selected.

TEMP. DEPEND. : Temperature coefficient of correction for the impedance measurement of a fluid. The default coefficient is valid for probes sold by Bürkert

WARN. HIGH: Enter the impedance value above which a "warning" event is generated.

WARN. LOW: Enter the impedance value below which a "warning" event is generated.

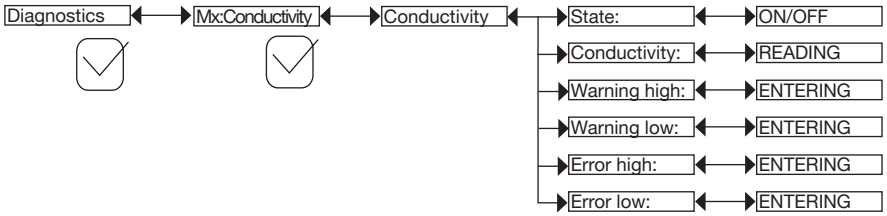
ERR. HIGH: Enter the impedance value above which an "error" event is generated.

ERR. LOW: Enter the impedance value below which an "error" event is generated.

11.6 Monitoring the conductivity of the fluid

This function is used to monitor the fluid conductivity and define the device's behaviour if the ranges defined are exceeded.

Refer to section 8.10 to access the "Diagnostics" menu.



A malfunction in your process or on the measurement cell may be revealed by too low or too high a fluid conductivity.

To be warned when the conductivity is out of range:

→ activate monitoring of fluid conductivity in the "Status" function, and then

→ set a fluid conductivity range outside of which the 8619 generates a "warning" event and displays the icons ☹ and ⚠.

→ set a fluid conductivity range outside of which the 8619 generates an "error" event and displays the icons ☹ and ⓧ .

When a "warning" or "error" event is generated by the 8619:

→ go into the "Information" menu to read the cause of the event generation

→ and/or read the measured conductivity value.

→ If necessary, clean the cell and/or recalibrate the sensor.

→ If necessary, check the process.

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- The "warning" event may also be associated with one and/or other digital outputs. See section 9.26.
- A current of 22 mA may be emitted on one and/or other of the current outputs when an "error" event related to either the monitoring of the fluid pH, redox, conductivity or temperature values or the monitoring of an analogue input is generated. See section 9.25.
- See also section 16.3 If you encounter problems.

STATE: Choose whether or not to activate monitoring of fluid conductivity.

This monitoring is done by the generation of a "warning" event if the fluid conductivity range defined in the "Warn Hi/Lo" functions below is exceeded and an "error" event if the fluid conductivity range defined in the "Err Hi/Lo" functions below is exceeded.

CONDUCTIVITY: Read the fluid conductivity measured in real time by the sensor.

WARN. HIGH: Enter the fluid conductivity value above which a "warning" event is generated.

WARN. LOW: Enter the fluid conductivity value below which a "warning" event is generated.

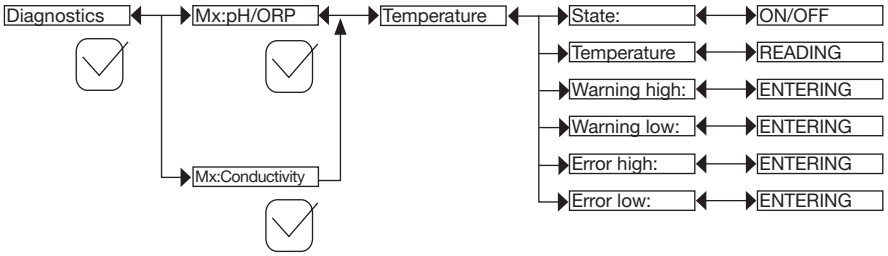
ERR. HIGH: Enter the fluid conductivity value above which an "error" event is generated.

ERR. LOW: Enter the fluid conductivity value below which an "error" event is generated.

11.7 Monitoring the temperature of the fluid

This function is used to monitor the fluid conductivity and define the device's behaviour if the ranges defined are exceeded.

Refer to section 8.10 to access the "Diagnostics" menu.



A malfunction in your process or on the temperature sensor may be revealed by too low or too high a fluid temperature or by an incorrect temperature measurement.

To be warned when the temperature measurement is out of range:

→ activate monitoring on the fluid temperature in the "Status" function, and then

→ set a temperature range (in °C) outside of which the 8619 generates a "warning" event and displays the icons ☹ and ⚠;

→ set a temperature range (in °C) outside of which the 8619 generates an "error" event and displays the icons ☹ and ⊗ .

When a "warning" or "error" event is generated by the 8619:

→ go into the "Information" menu to read the cause of the event generation

→ and/or read the measured temperature value.

→ check whether the temperature sensor is working correctly by measuring a fluid with a known temperature. If the temperature sensor is faulty, return the device to Bürkert;

→ if the temperature sensor is not the cause of the problem, check the process.

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- The "warning" event may also be associated with one and/or other digital outputs. See section 9.26
- A current of 22 mA may be emitted on one and/or other of the current outputs when an "error" event related to either the monitoring of the fluid pH, redox, conductivity or temperature values or the monitoring of an analogue input is generated. See section 9.25.
- See also "If you encounter problems" in section 16.3.

STATE: Choose whether or not to activate monitoring of the fluid temperature.

This monitoring is done by the generation of a "warning" event if the fluid conductivity range defined in the "Warn Hi/Lo" functions below is exceeded and an "error" event if the fluid conductivity range defined in the "Err Hi/Lo" functions below is exceeded.

TEMPERATURE: Read the fluid temperature measured in real time by the temperature sensor.

WARN. HIGH: Enter the fluid temperature value above which a "warning" event is generated.

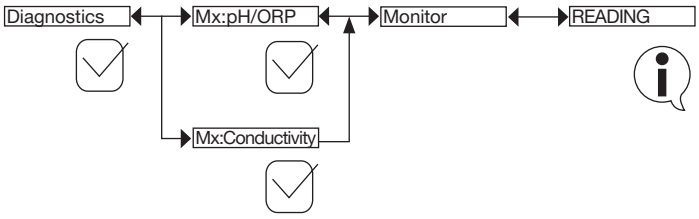
WARN. LOW: Enter the fluid temperature value below which a "warning" event is generated.

ERR. HIGH: Enter the fluid temperature value above which an "error" event is generated.

ERR. LOW: Enter the fluid temperature value below which an "error" event is generated.

11.8 Reading the parameters of the pH, redox or conductivity sensor

Refer to section 8.10 to access the "Diagnostics" menu.



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12 TESTS MENU

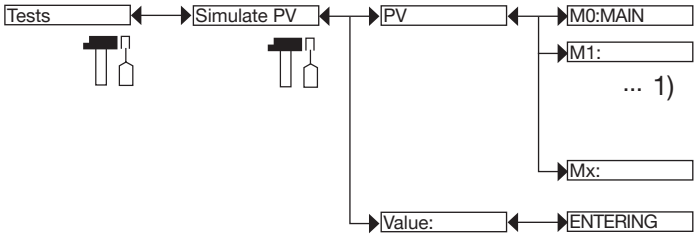
12.1 Modifying the "Tests" menu access code

Refer to section 8.10 to access the "Tests" menu. If the default access code "0000" is kept, the device does not request it to access the "Tests" menu.

12.2 Verifying the correct behaviour of the outputs by simulating a process variable

The icon T is displayed in place of the icon whenever the correct operation test is run on an output. During the test, this PV no longer reacts depending on the physical parameter measured, the value entered by the user (PVC) or the value coming from the PLC (PVN).

Refer to section 8.10 to access the "Tests" menu.



1) The choices offered depend on the modules fitted and/or the options activated. See section 9.5 Consulting and/or activating the available software options and section 15 Process variables.

To exit the "Tests" menu, press the dynamic key, "ABORT".

PV: Choose the process variable to simulate. The options available depend on the modules fitted.

VALUE: Enter the value to simulate.

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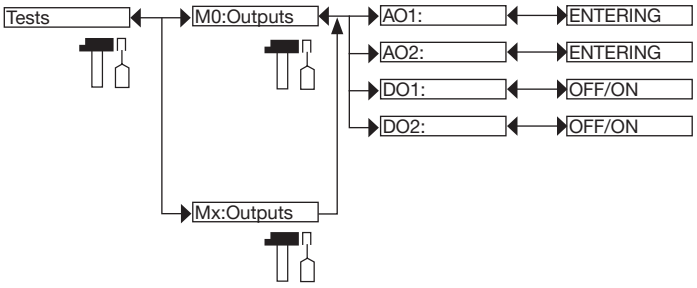
12.3 Checking that the outputs are working correctly

The icon T is displayed in place of the icon whenever the correct operation test is run on an output. During the test, this output no longer reacts, depending on the physical parameter measured.

Refer to section 8.10 to access the "Tests" menu.



To exit the "Tests" menu, press the dynamic key, "ABORT".

AO1: Check that current output 1 on the selected module is working correctly by entering a current value and then selecting "OK".

AO2: Check that current output 2 on the selected module is working correctly by entering a current value and then selecting "OK".

DO1: Check that digital output 1 on the module selected is working correctly by selecting the state "ON" or "OFF" and then "OK".

DO2: Check that digital output 2 on the module selected is working correctly by selecting the state "ON" or "OFF" and then "OK".

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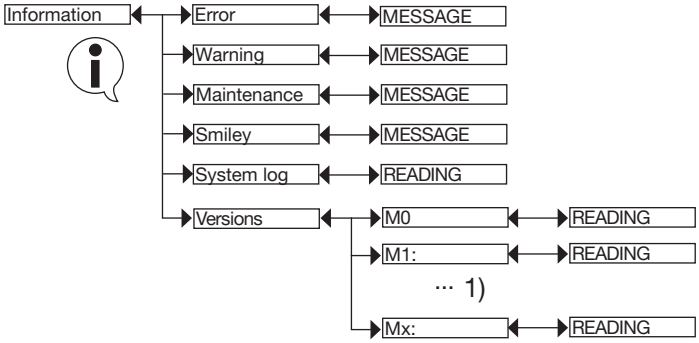
13 INFORMATION MENU

Refer to section 8.10 to access the Information menu.



1) The choices offered depend on the modules fitted

This menu is used to read:

- A short description of the reason why the following icons are generated and displayed by the 8619:
  - ERROR:
  - WARNING: ⚠
  - MAINTENANCE:
  - SMILEY: or

See also section 16.3 If you encounter problems.

- and:
  - "SYSTEM LOG" function: read all the messages generated by the 8619 including "error", "warning" and "maintenance" events.
  - "VERSIONS" function:
    for modules for the acquisition/conversion of measured physical parameters, read the software version of the concerned module
    for the M0:MAIN board, read the serial number of the device ("S/N"), the article number for the device ("Product"), etc .

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Menu structure

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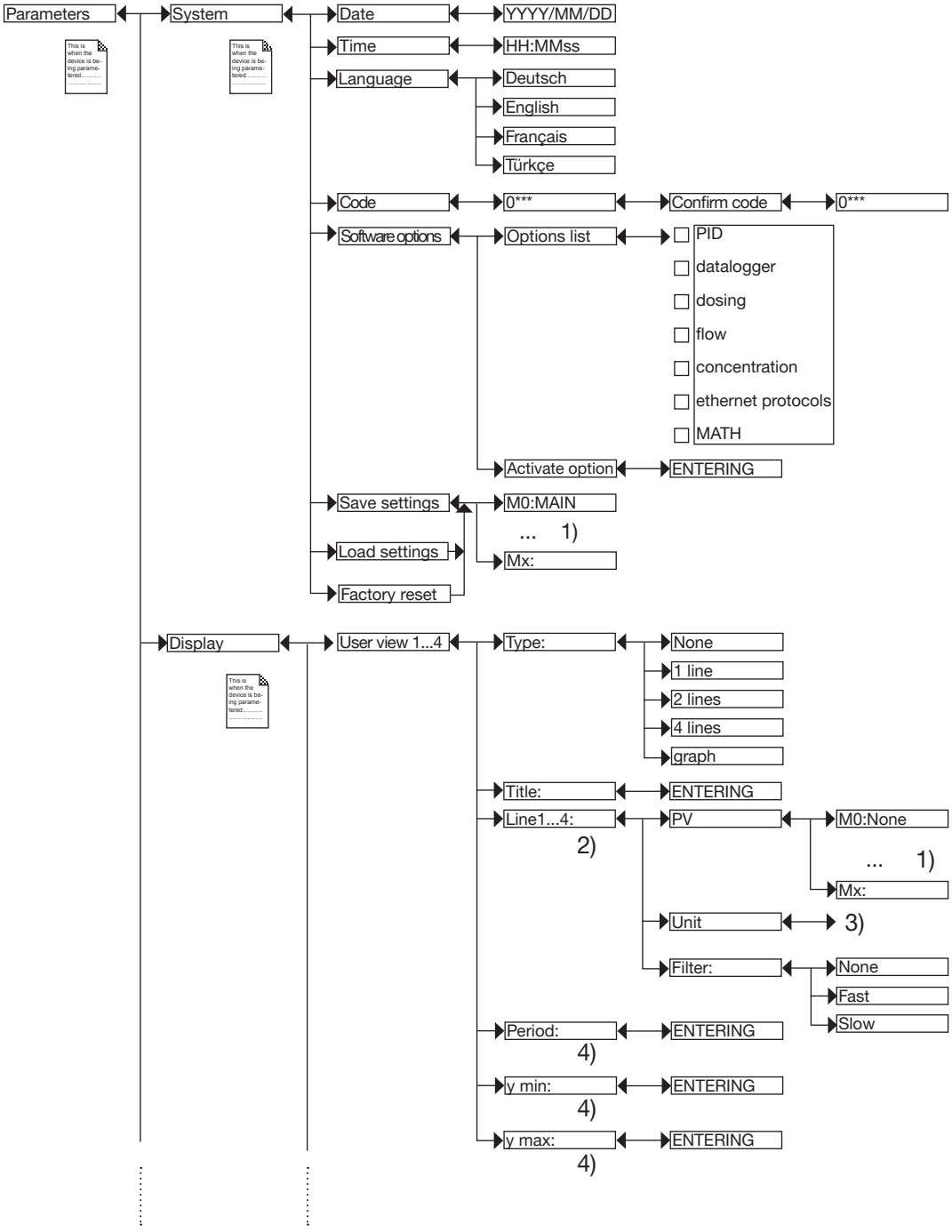
14 STRUCTURE OF THE CONFIGURATION MENUS

Refer to section 8.10 to access the Configuration level.



1) *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.*
2) *If "Type" = 1, 2 or 4 "lines".*
3) *The choices offered depend on the chosen "PV".*
4) *If "Type" = "graph".*

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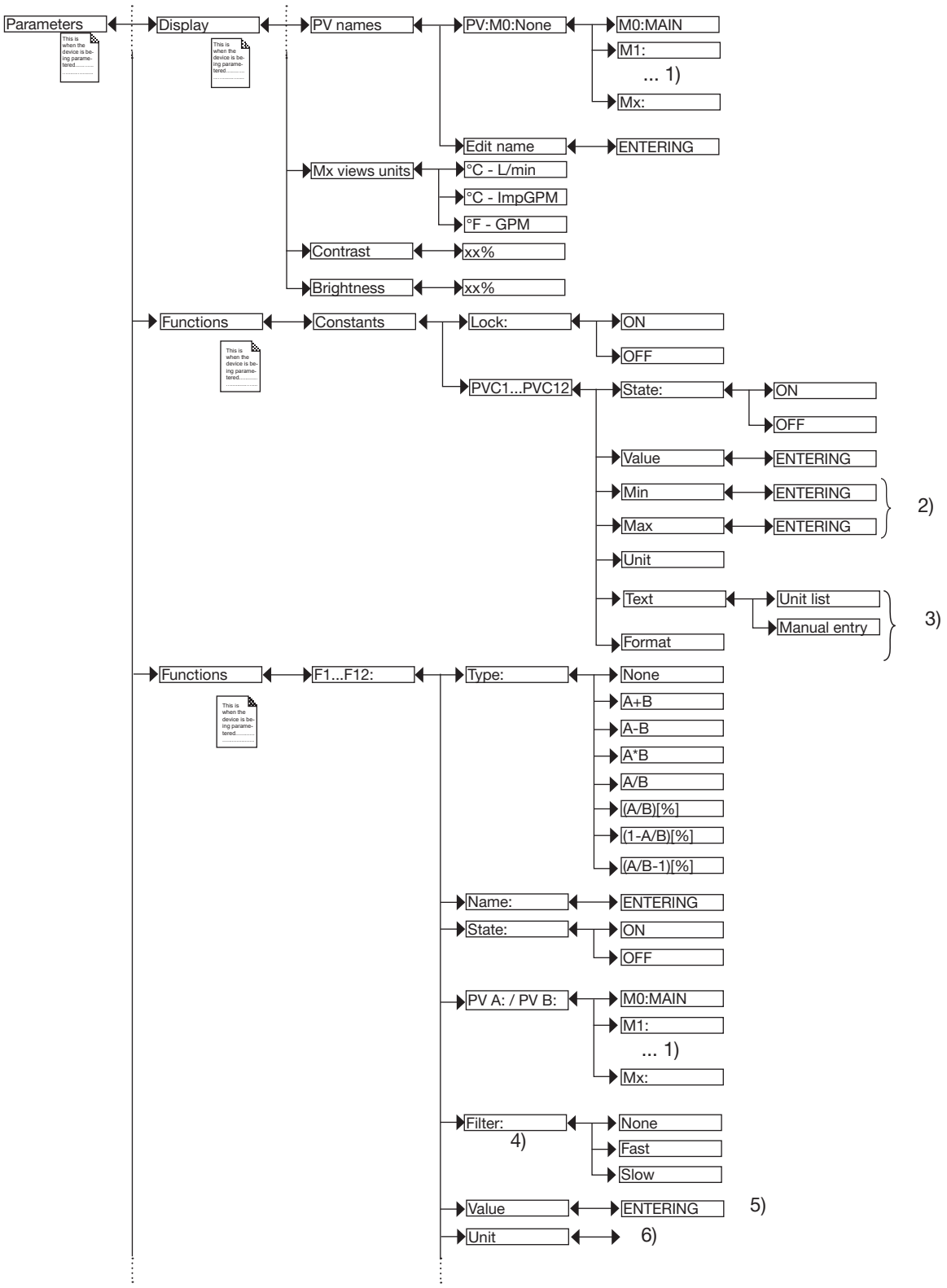

[1] *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.*
[2] *If "Unit" ≠ "ON/OFF"*
[3] *Only if "Unit" = "Custom"*
[4] *If PV is not a constant.*
[5] *If "PV A: / PV B:" is a constant.*
[6] *The choices offered depend on the choice made in "PV A: / PV B:" above*

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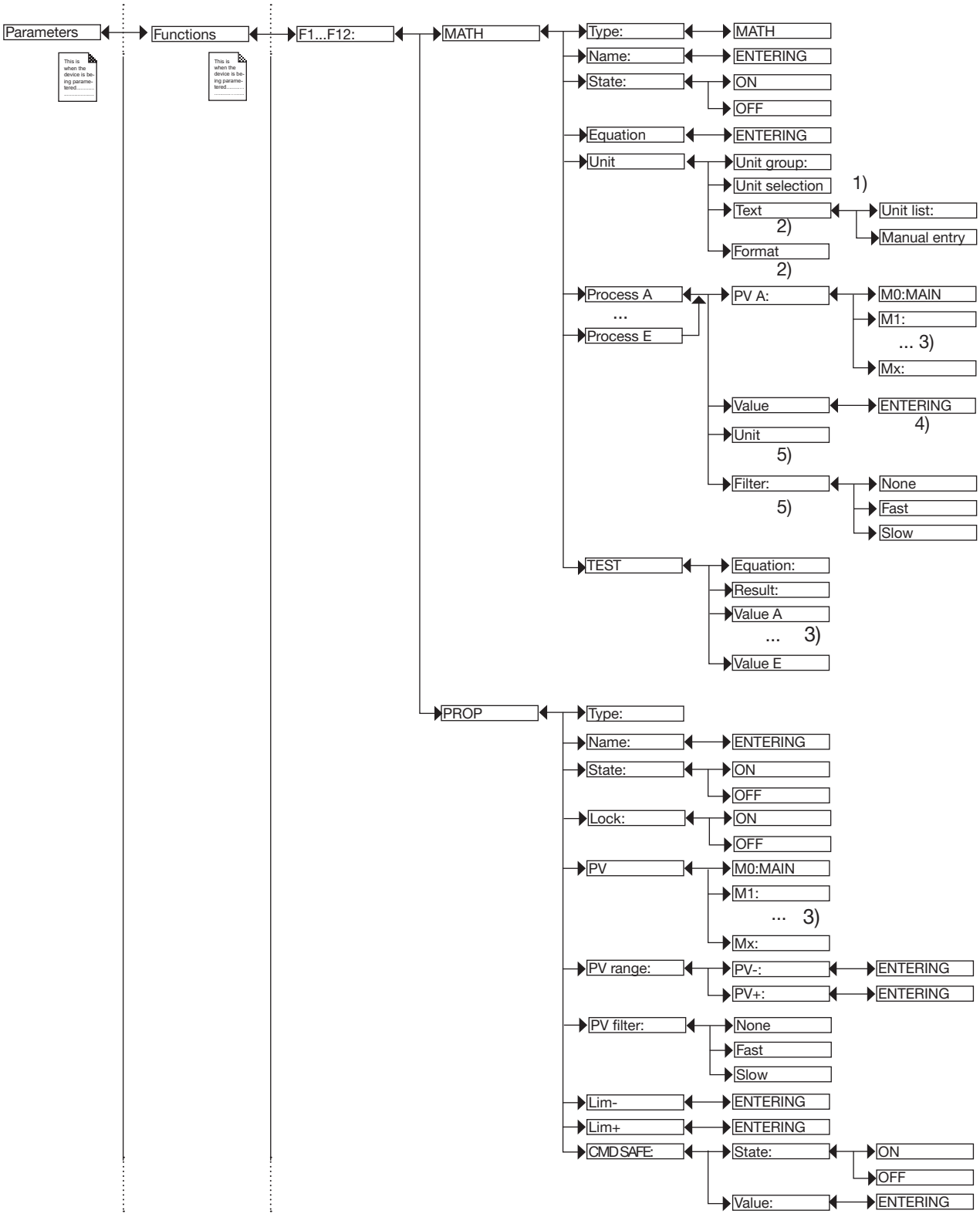

1) *If "Unit group" ≠ "ON/OFF" and ≠ "Custom"*
2) *If "Unit group" = "Custom"*
3) *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.*
4) *If "PV A:...PV E:" = "Constant"*
5) *If "PV A:...PV E:" ≠ "Constant"*

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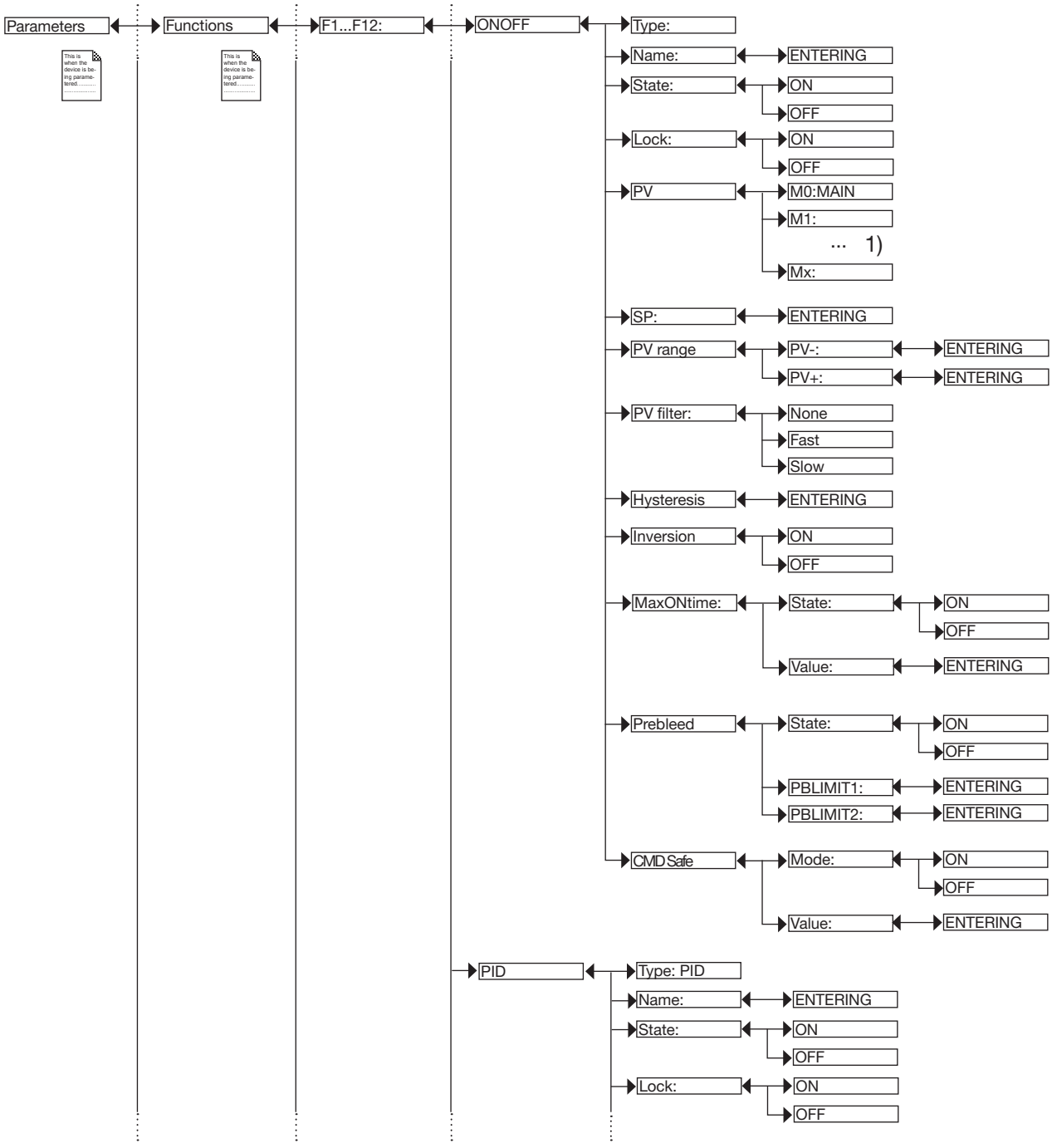

1) The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.

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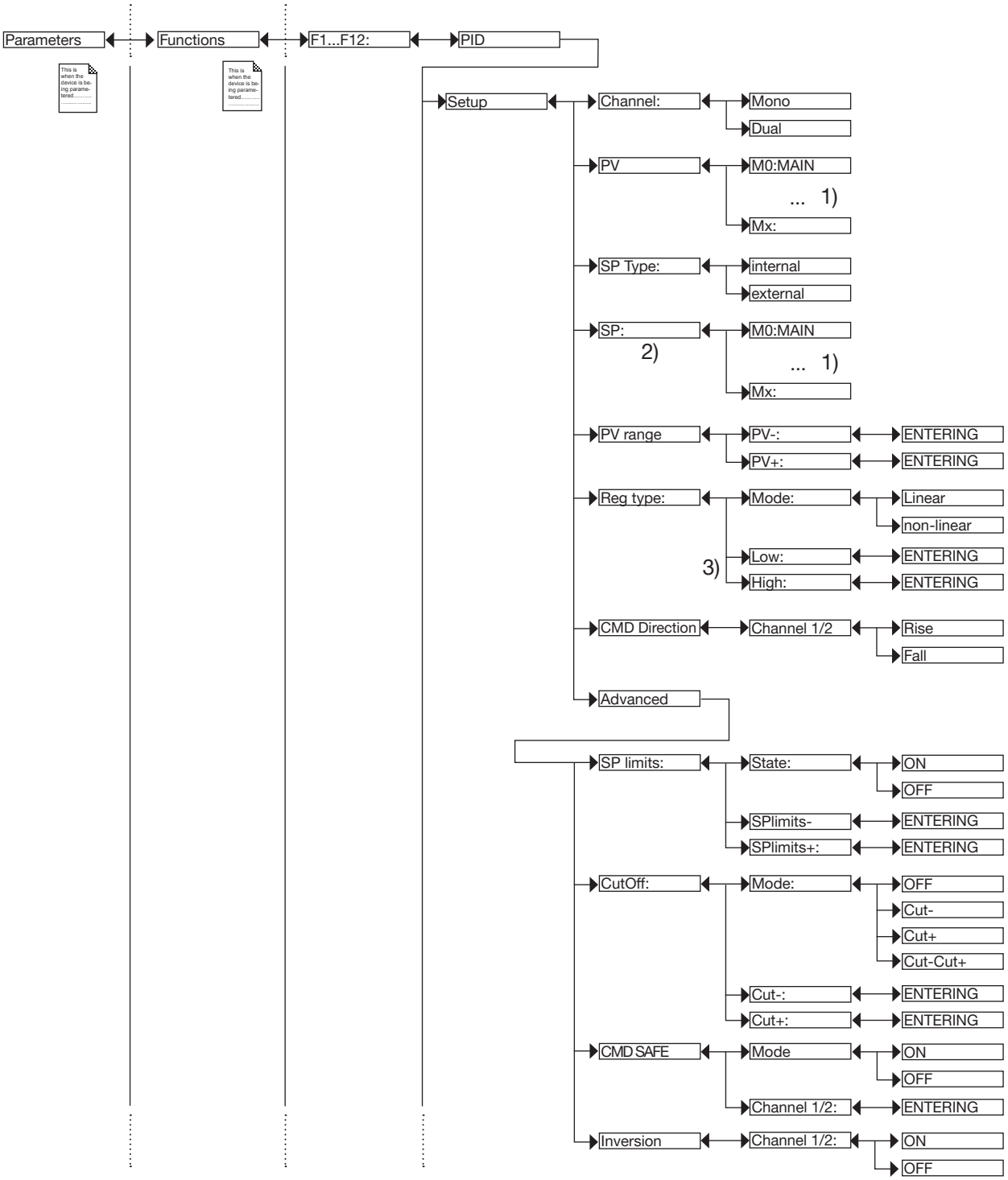

1) The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.
2) This function is present if "SP Type" = "external"
3) These functions are present if "Regulation" = "non-linear"

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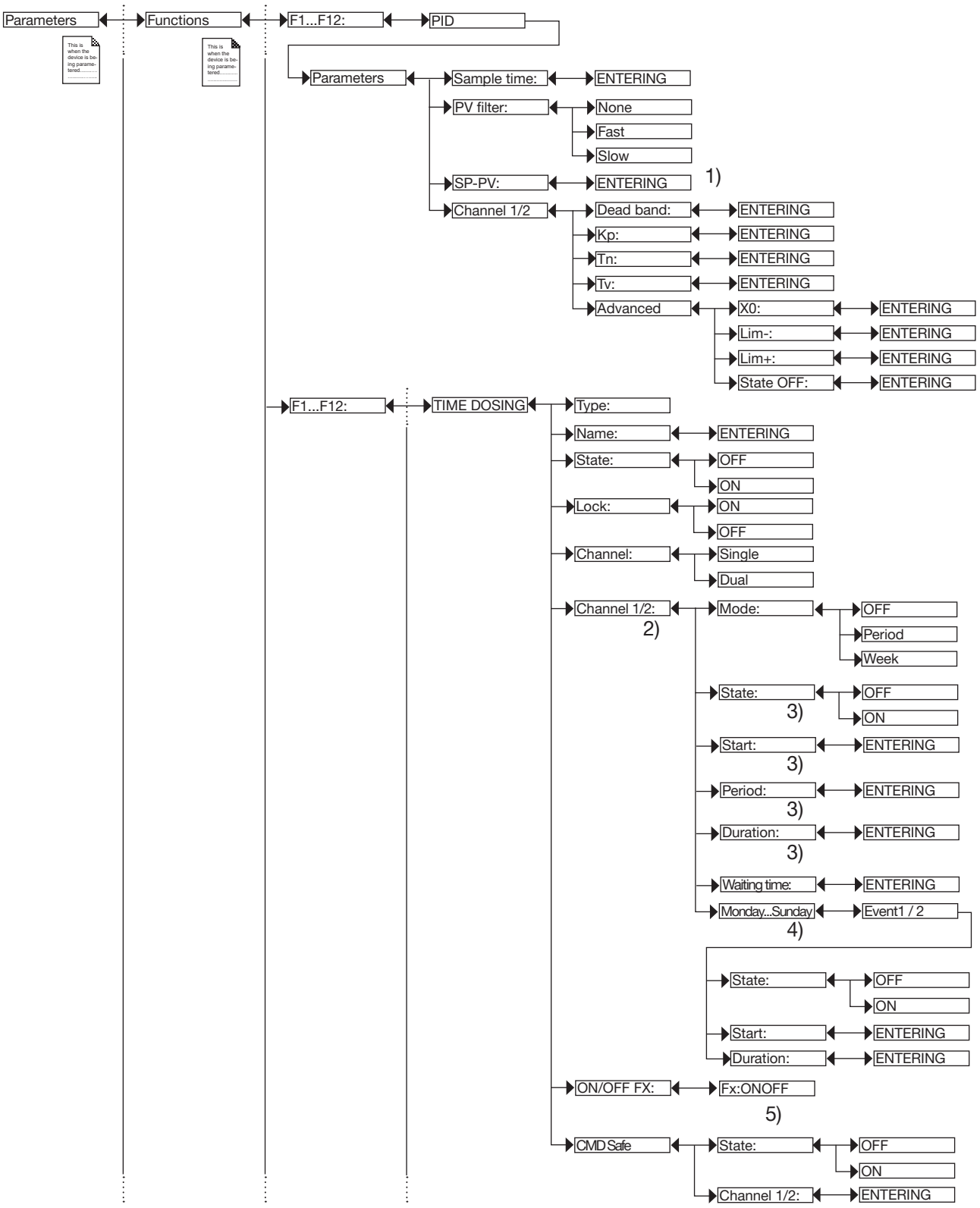

1) *If "SP Type"= "Internal", see section 9.18, page 112.*
2) *"Channel2" is present if "Channel" = "Dual"*
3) *These functions are present only if "Mode" = "Period"*
4) *These functions are present only if "Mode" = "Week"*
5) *"Fx:" represents the ONOFF function declared "active"*

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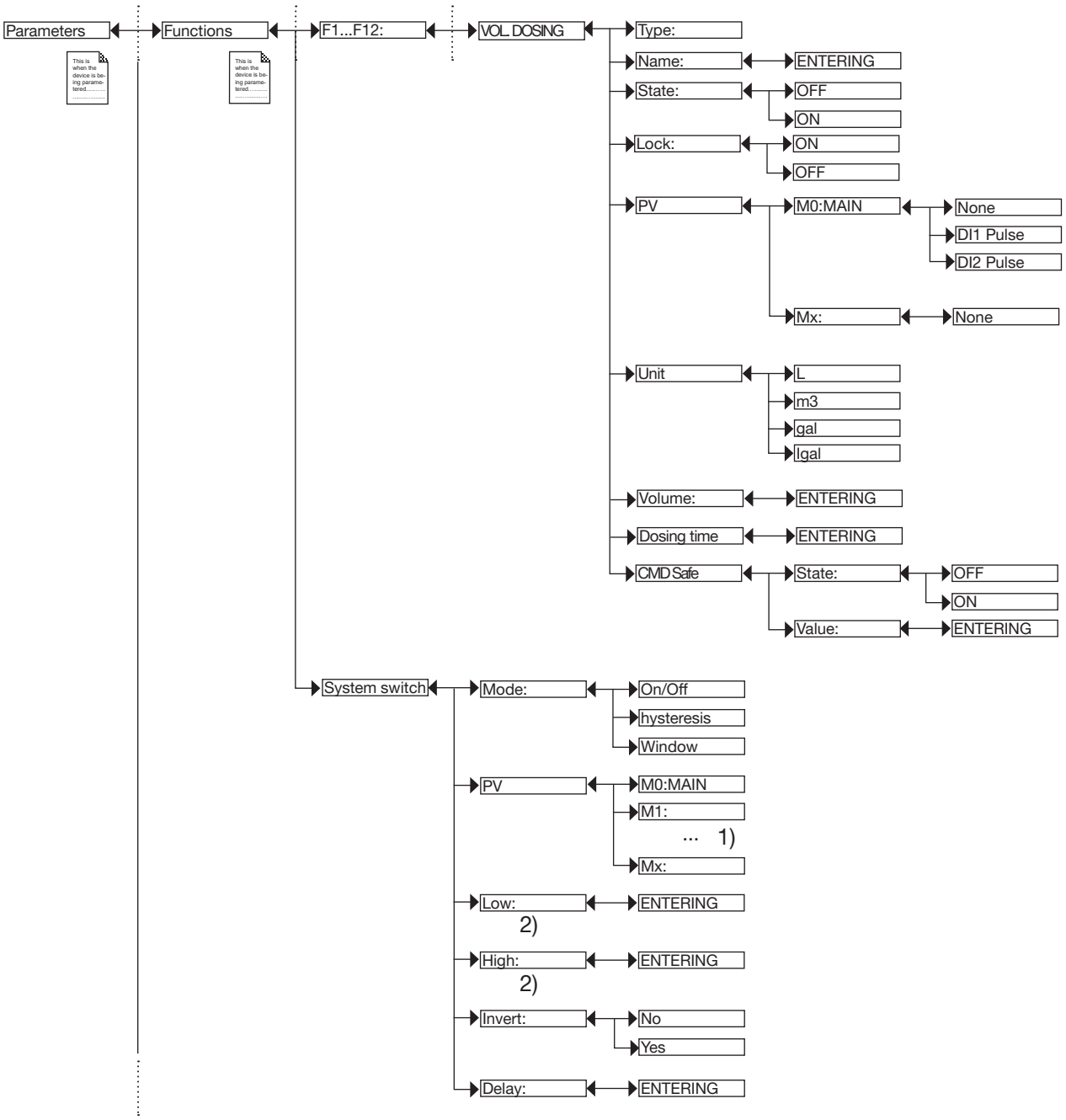

1) The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.
2) These functions are present if "Mode" ≠ "ON/OFF"

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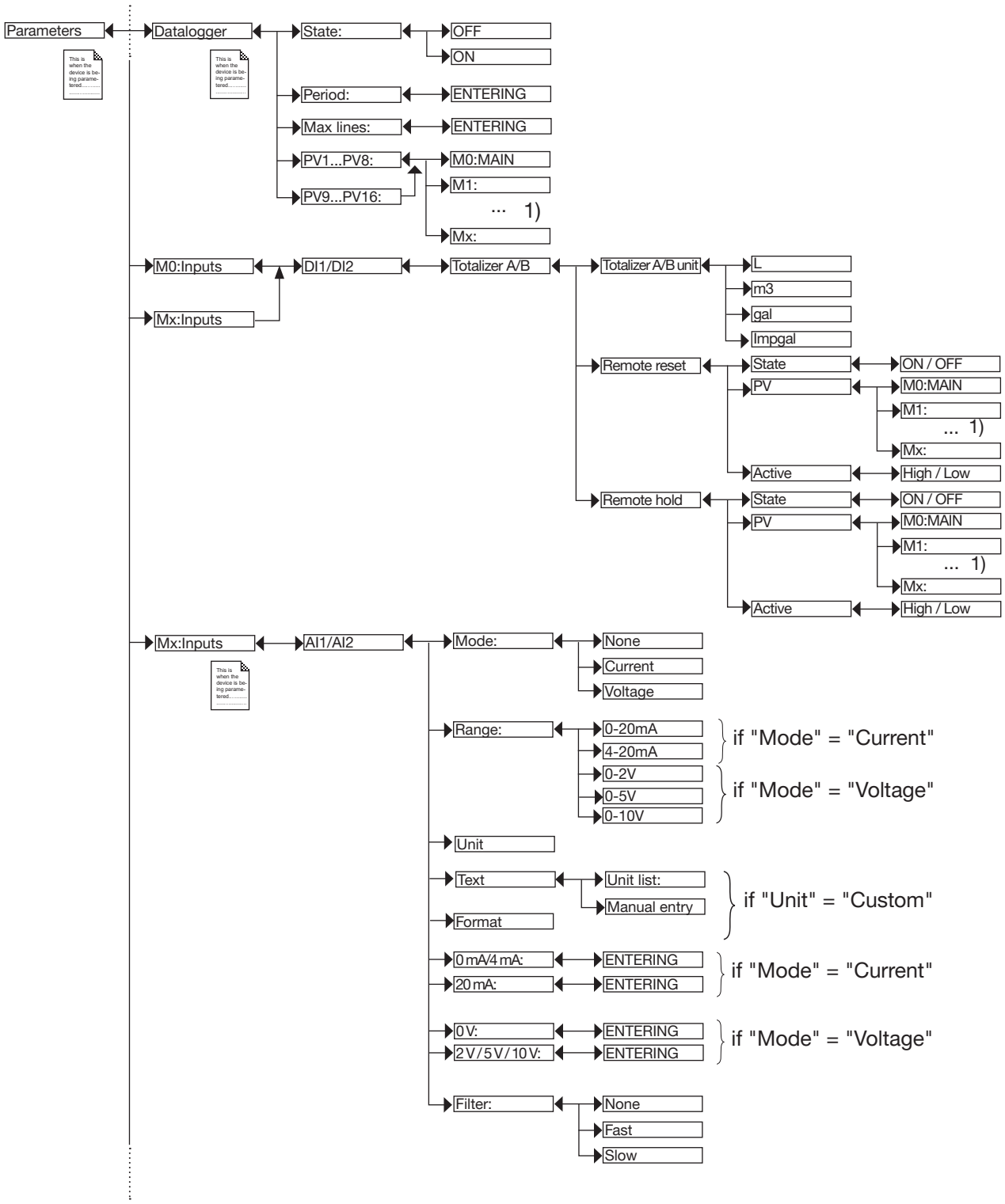

1) *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.*

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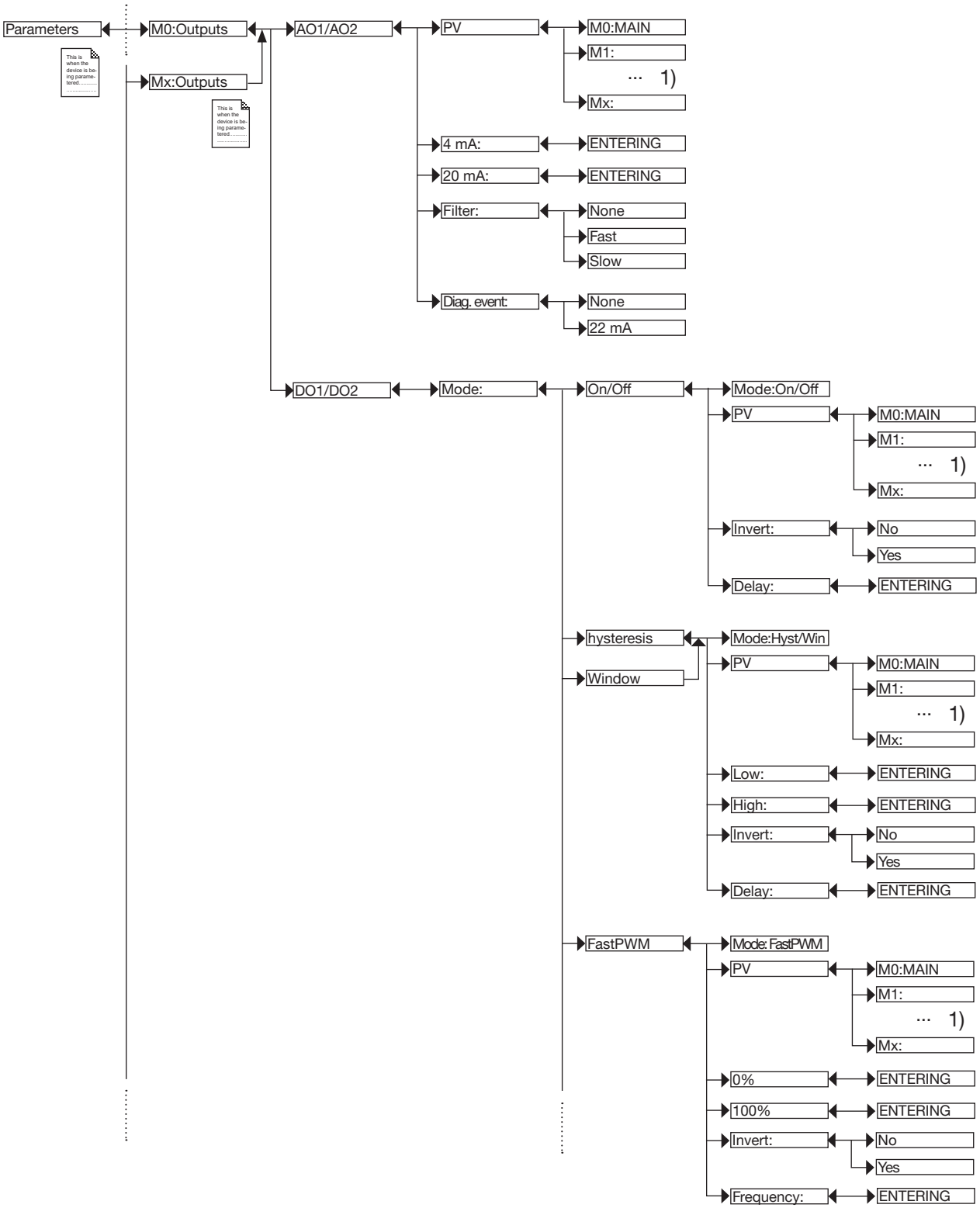

1) The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.

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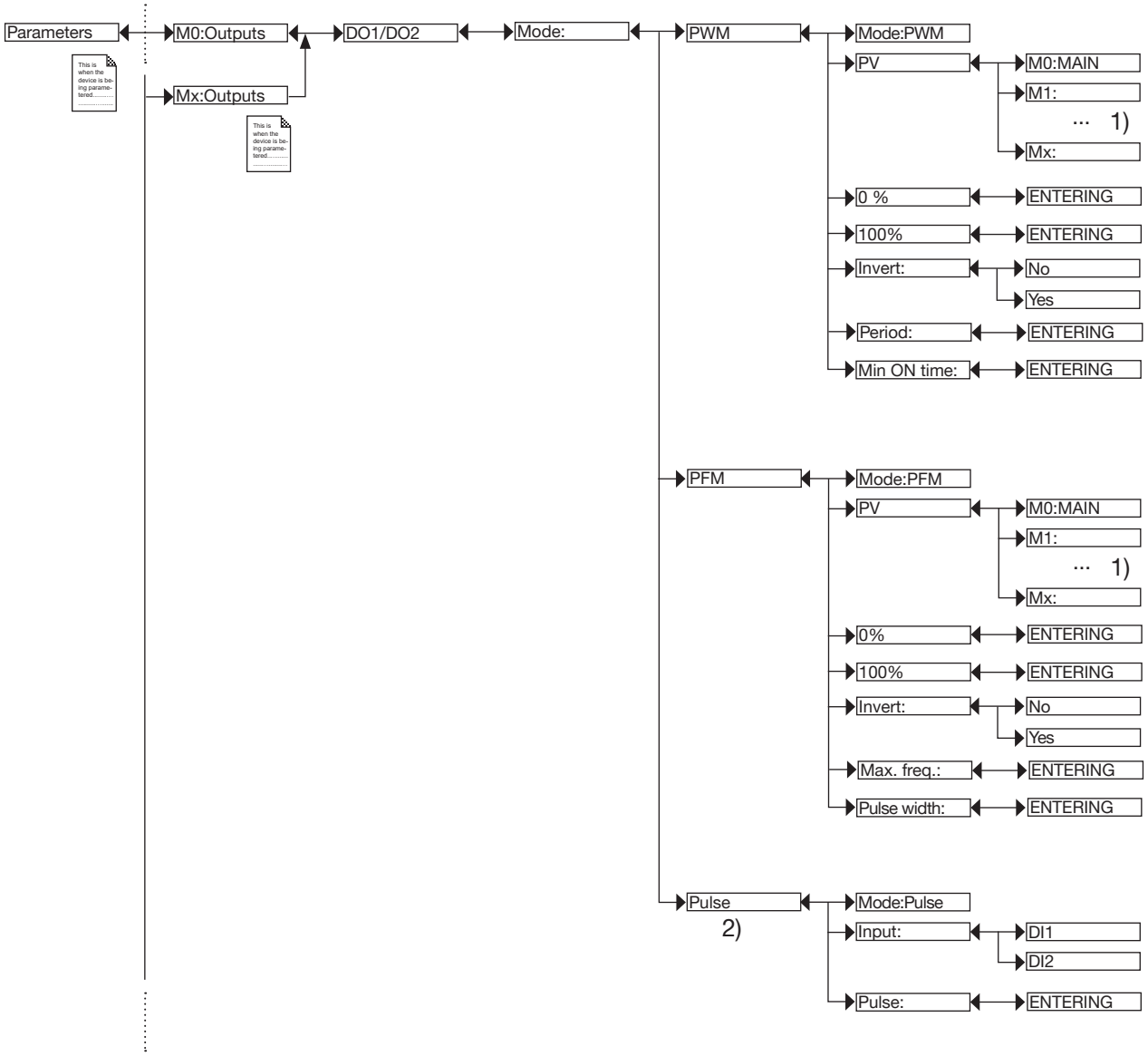

1) *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.*
2) *Function possible only for the DO1 and DO2 outputs on the MAIN board M0 and only if the software option "FLOW" is activated (see section 9.5).*

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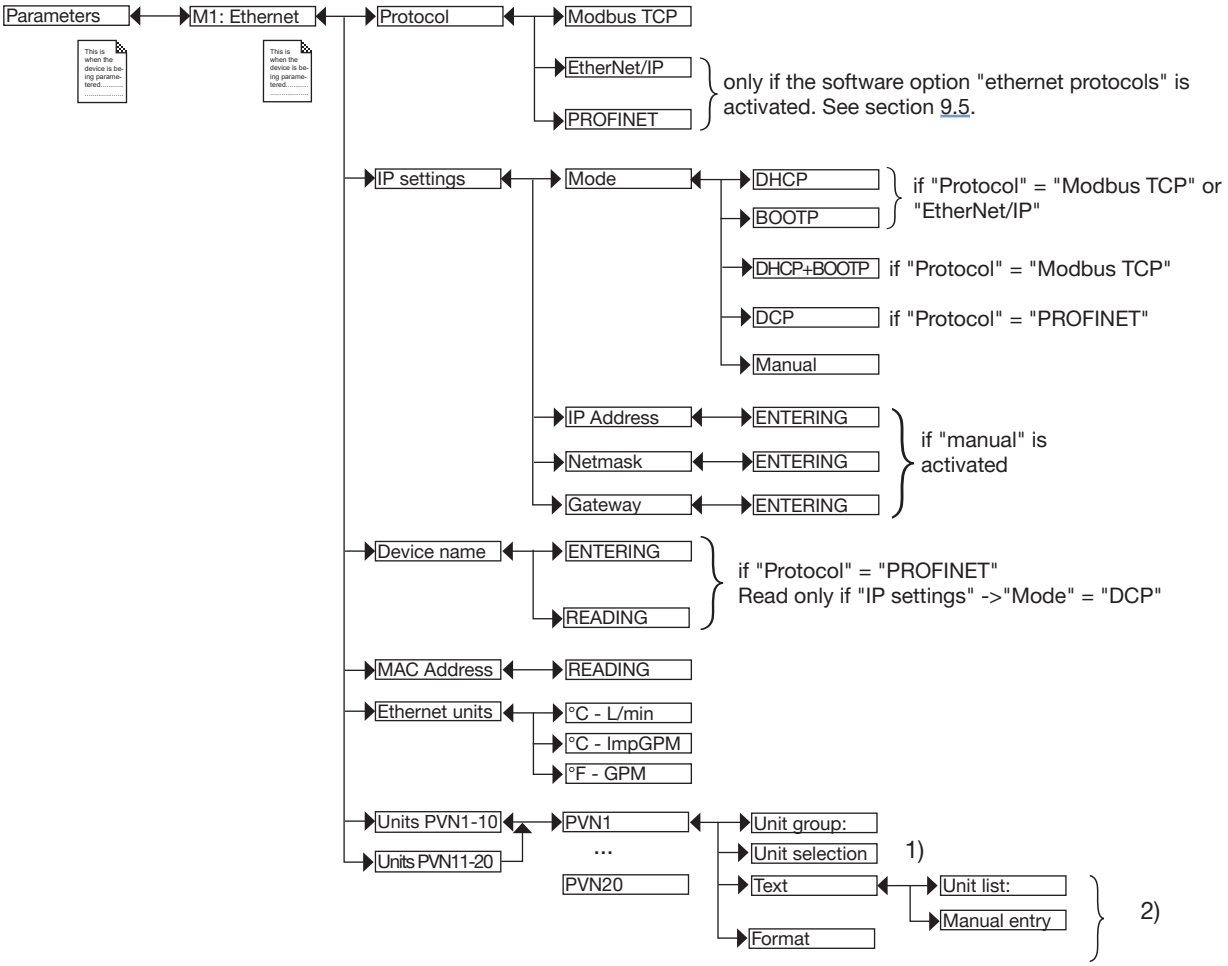

1) *If "Unit group" ≠ "ON/OFF" and ≠ "Custom"*
2) *If "Unit group" = "Custom"*

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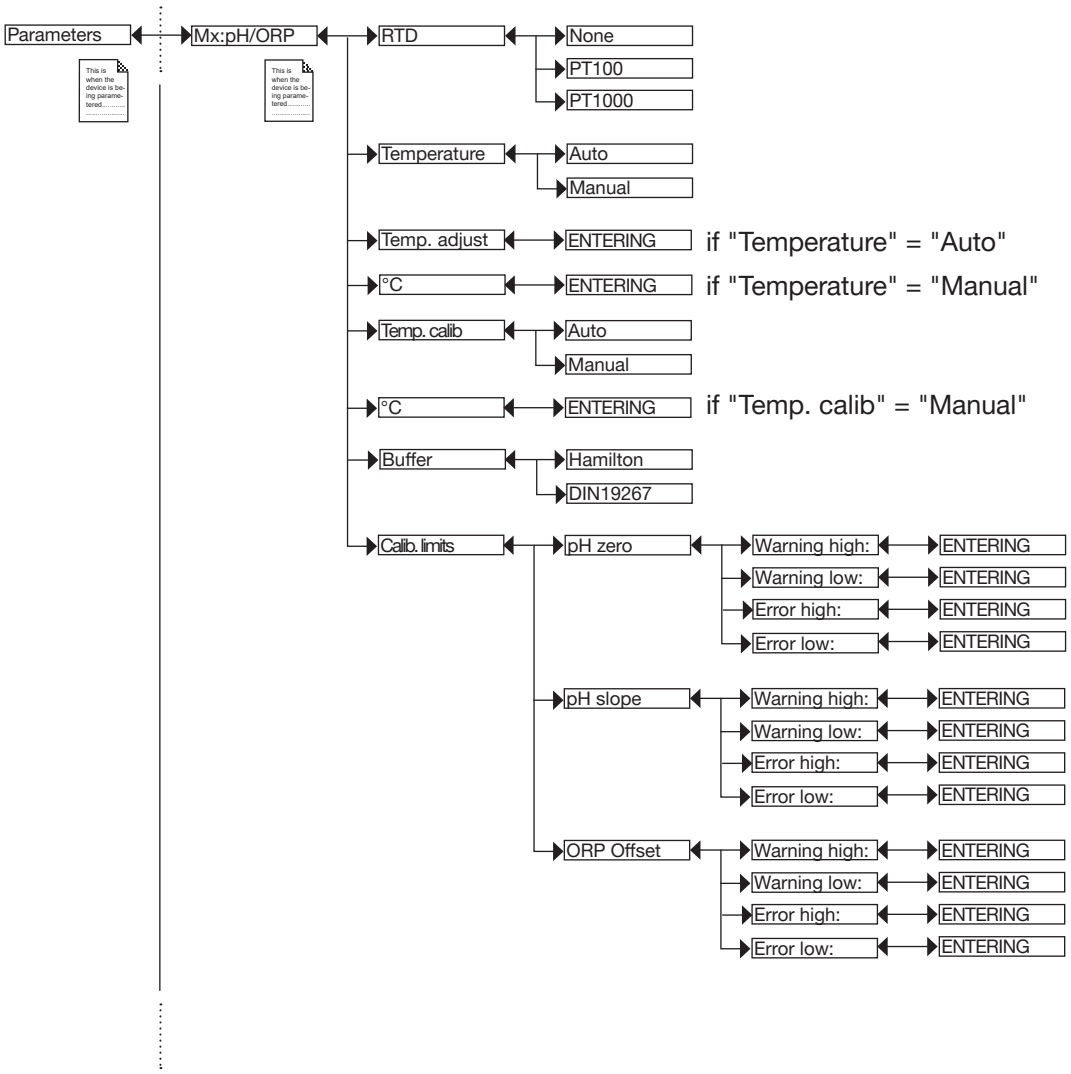

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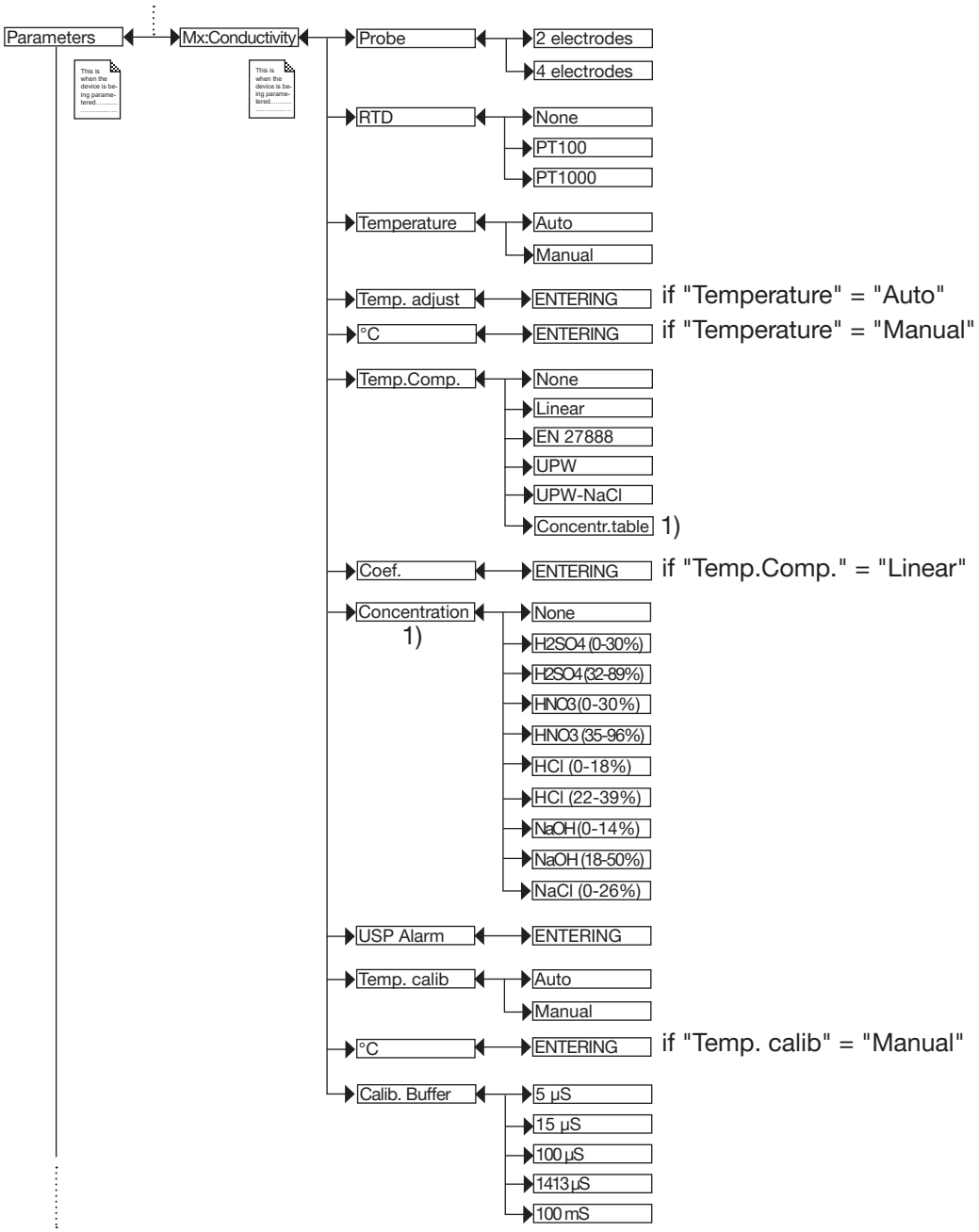

[1] *This menu is available as an option (see section 9.5).*

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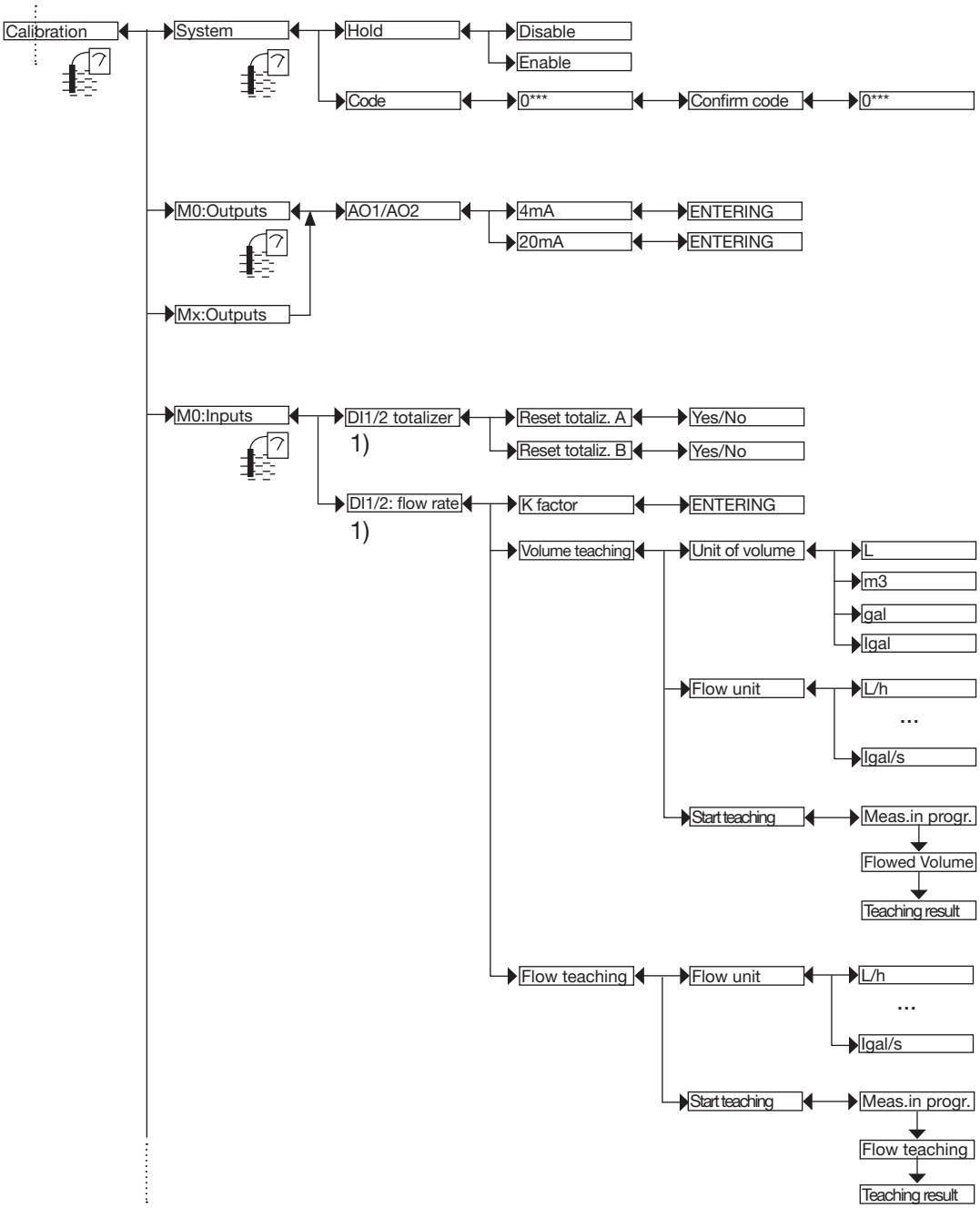

[1] *This menu is available as an option (see section 9.5).*

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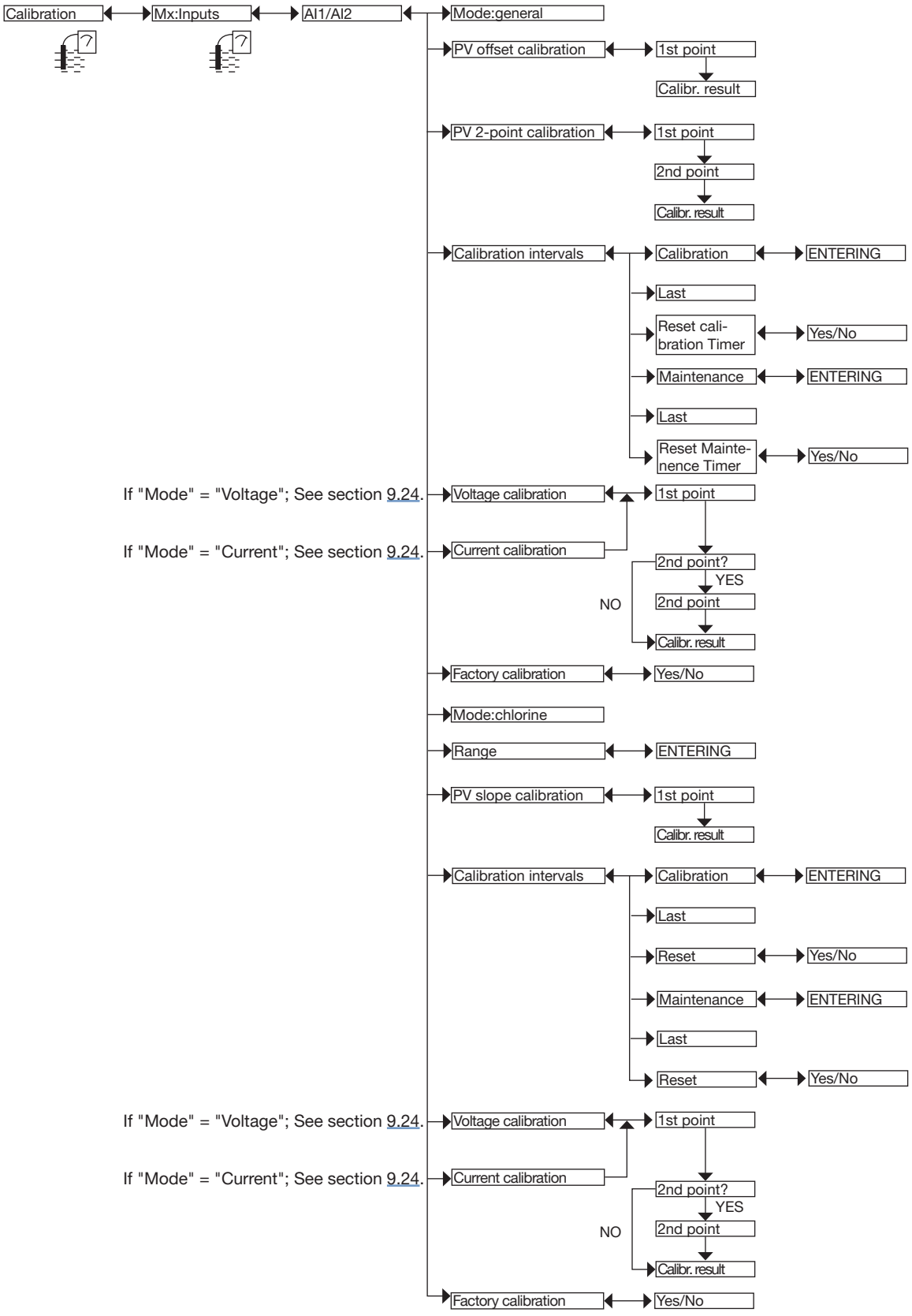

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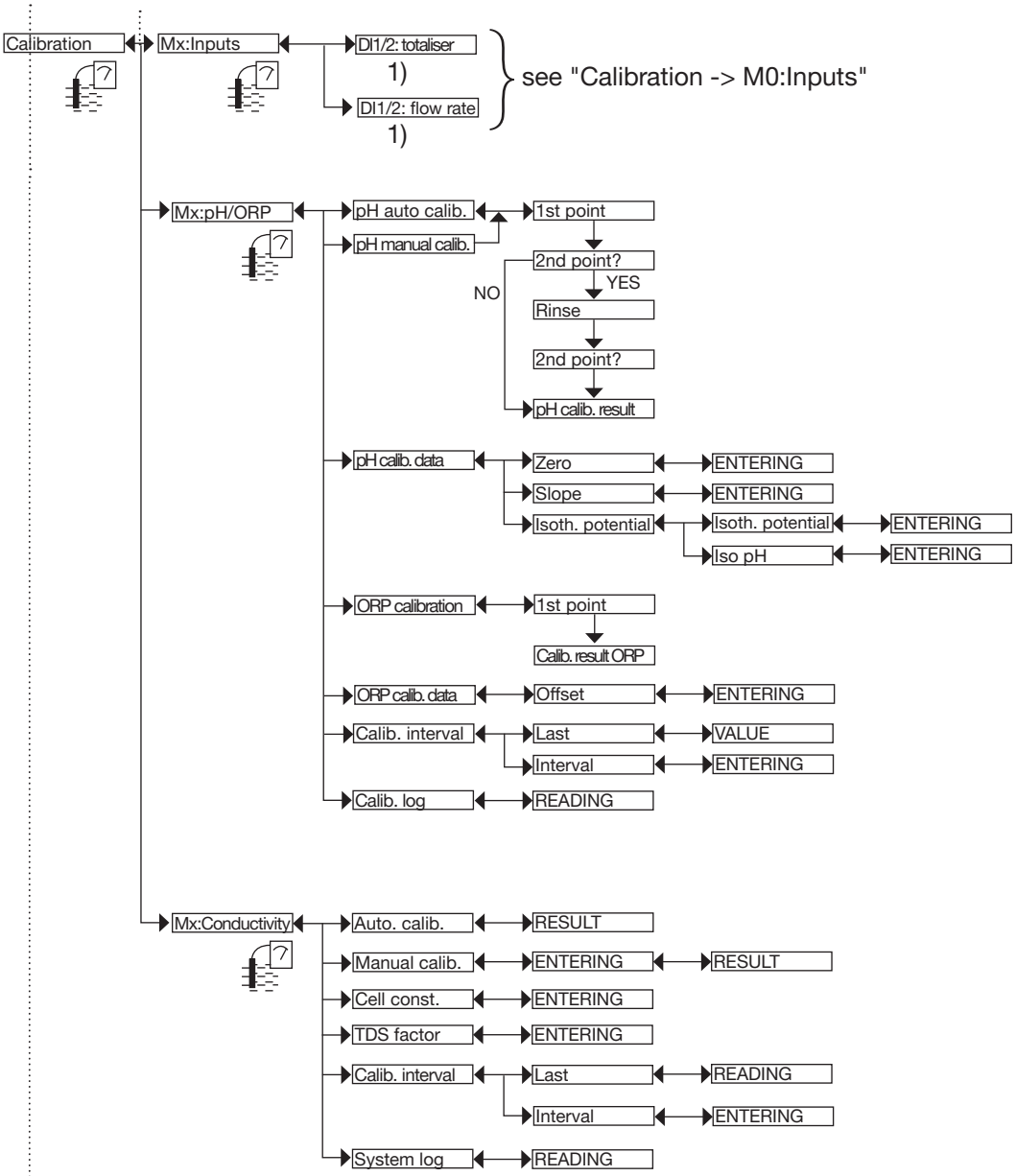

1) This menu is available as an option (see section 9.5).

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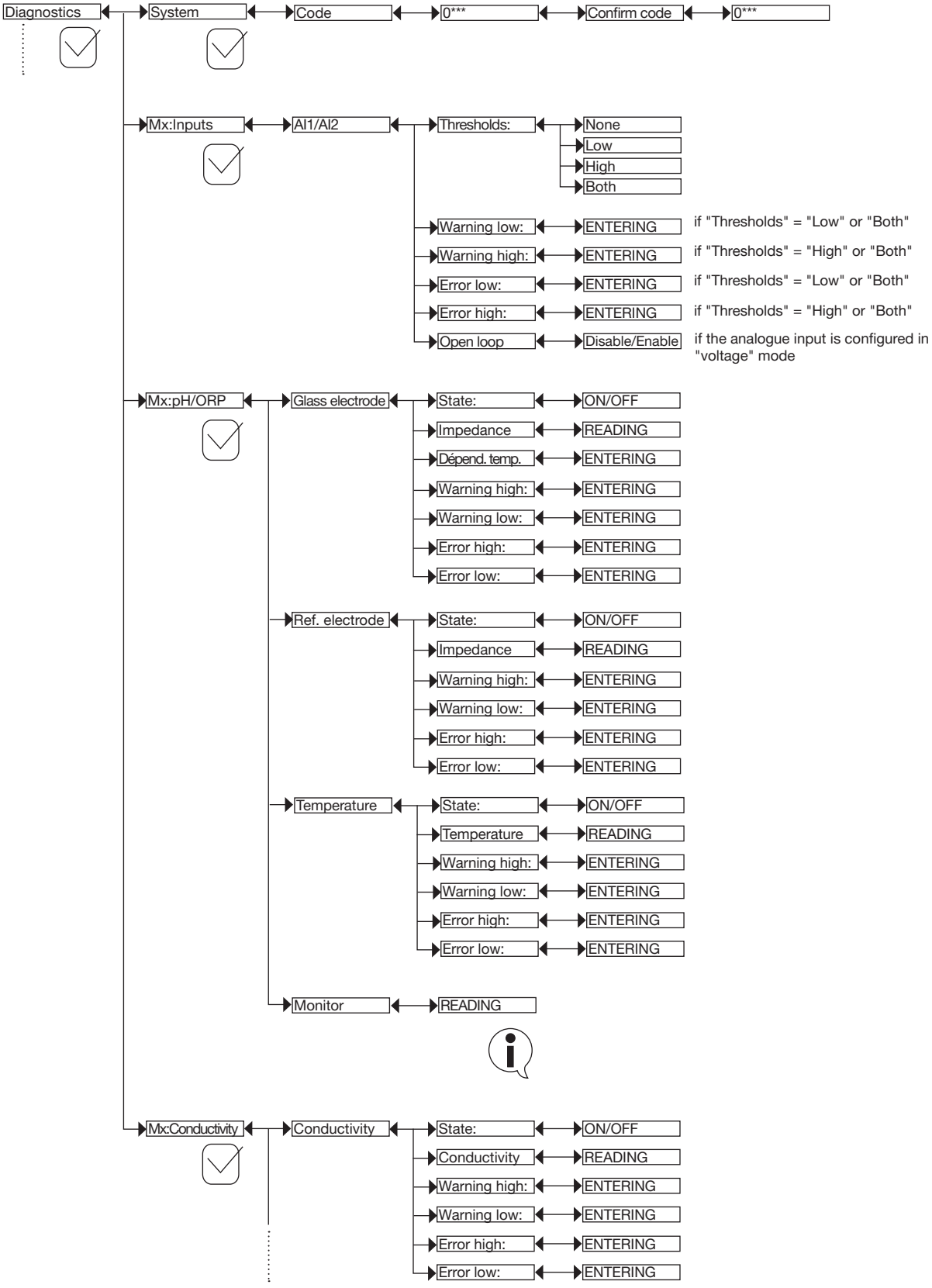

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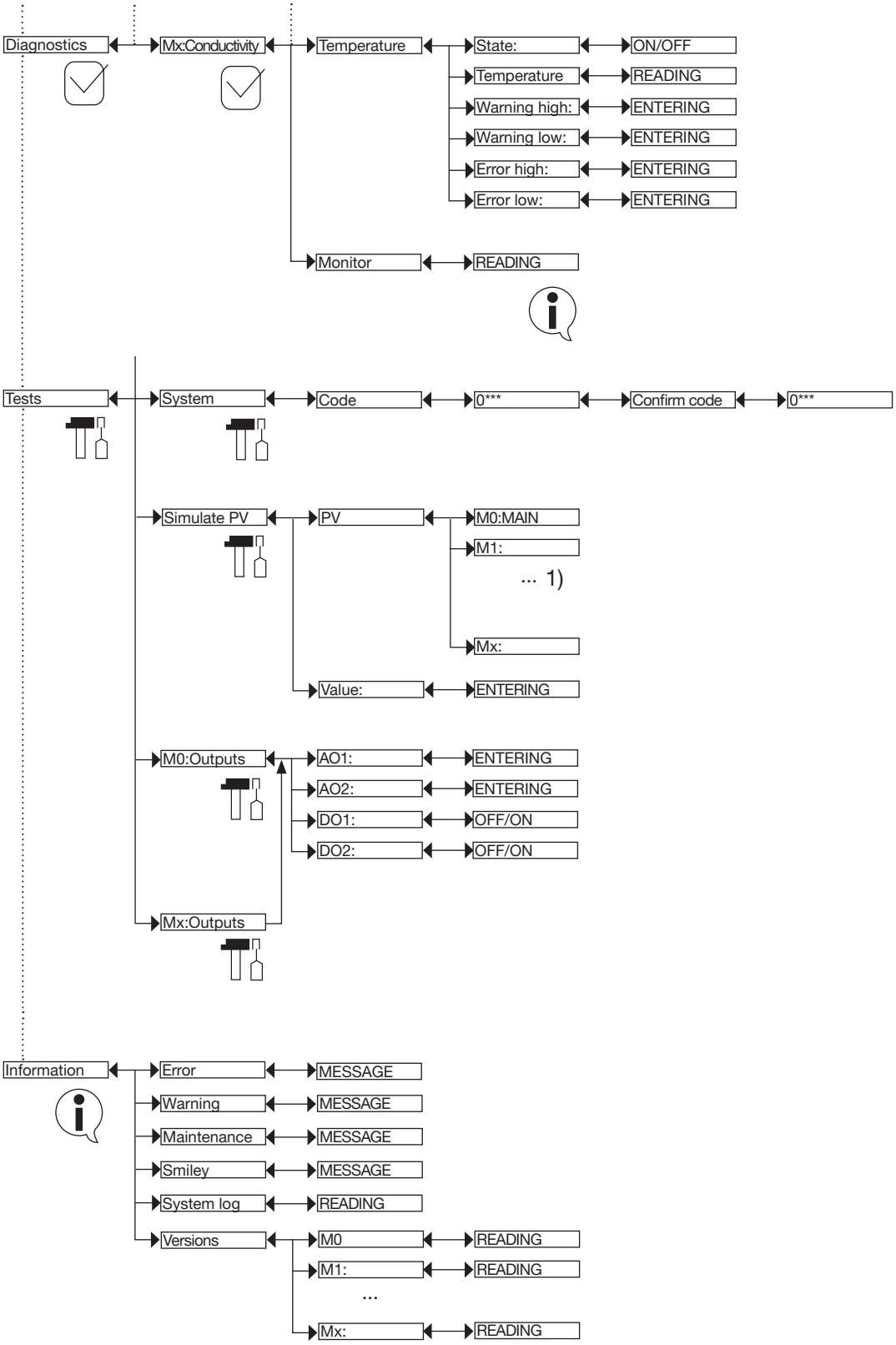

[1] *The choices offered depend on the modules fitted and/or the options activated. See section 9.5 and section 15.*

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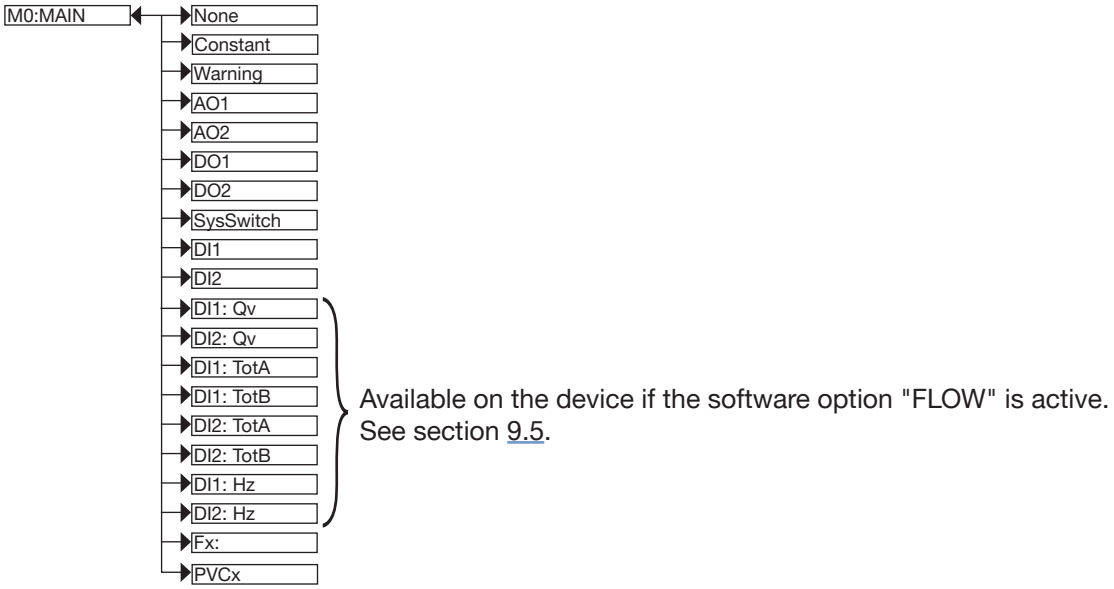
15 PROCESS VARIABLES

This chapter describes the process variables (PV) that are available on each extension module. The PV can be e.g. process inputs, PVNs, PVCs. The list of avalaible PVs depends on the modules fitted and on the options activated:

- Section 15.1 describes the PV available on the M0:Main board.
- Section 15.2 describes the PV available on the M1:Ethernet module.
- Section 15.3 describes the PV available on the input module.
- Section 15.4 describes the PV available on the pH/ORP module.
- Section 15.5 describes the PV available on the conductivity module.
- Section 15.6 describes the PV available on the additionnal output module.

15.1 On the M0:MAIN board



Only the compatible PVs are displayed.

Example: for the configuration of an analog output (AO), the PVs "Warning", "SysSwitch", "DI1" and "DI2" are not displayed.

"Constant" = value entered by the user

"Warning" = event generated by the device

"AOx" = analogue output

"DOx" = digital output

"System switch" = when the corresponding event is configured and activated

"DIx" = digital input

"DIx Qv" = flow rate on digital input DIx

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"DIx TotA" = totaliser A on digital input DIx

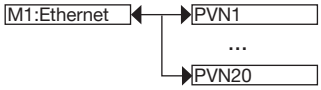
"DIx TotA" = totaliser B on digital input DIx

"DIx Hz" = frequency on digital input DIx

"Fx:" = result of the functions that are activated and configured

"PVCx" = process variable whose value can be defined by the user

15.2 On the M1:Ethernet module



Only the compatible PVs are displayed.

Example: for the configuration of an analog output (AO), the PVNs with units defined as ON/OFF are not displayed.

A PVN (Process Variable Network) is a data sent by a PLC to the device via the Ethernet network. PVN can be associated to an output, to a function, displayed into the process level or logged on a memory card. The default value of a PVN (until the first data sent by the PLC) is 0.0.
If the PLC stops to refresh the PVN (or if the Ethernet connection is broken), the PVN keeps its last valid value.

Refer to the supplement related to the digital communication for the Type 8619, available at country.burkert.com

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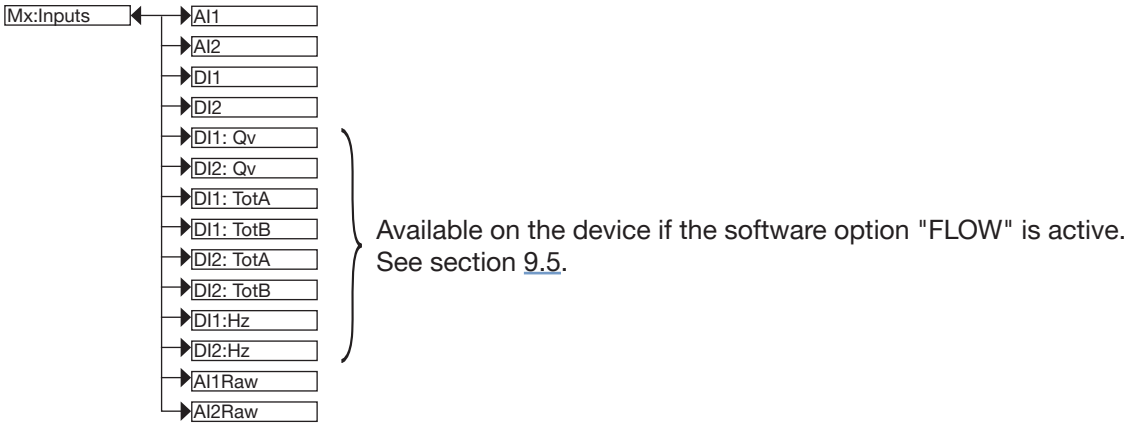
15.3 On the input module



Only the compatible PVs are displayed.

Example: for the configuration of an analog output (AO), the PVs "DI1" and "DI2" are not displayed.

"AIx" = scaled physical value (see section 9.24).

"DIx" = digital input

"DIx Qv" = flow rate on digital input DIx

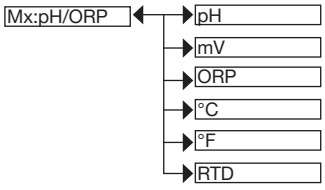
"DIx TotA" = totaliser A on digital input DIx

"DIx TotA" = totaliser B on digital input DIx

"AIxRaw" = current or voltage standard signal on analogue input AIx

"DIx Hz" = frequency on digital input DIx

15.4 On the pH/redox module



Only the compatible PVs are displayed.

Example: if you configure a digital output (DO) in "On/Off" mode, no PV of the pH/redox extension module is displayed.

"pH" = measured pH of the fluid

"mV" = measured pH of the fluid in mV

"ORP" = measured oxidation reduction potential of the fluid in mV

"°C" = measured temperature of the fluid in °C

"°F" = measured temperature of the fluid in °F

"RTD" = input resistance of the temperature stage in Ω

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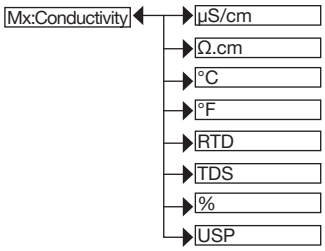
15.5 On the conductivity module



Only the compatible PVs are displayed.

Example: for the configuration of an analog output (AO), the PV "USP" is not displayed.

"µS/cm" = measured conductivity of the fluid

"Ω.cm" = resistivity

"°C" = measured temperature of the fluid in °C

"°F" = measured temperature of the fluid in °F

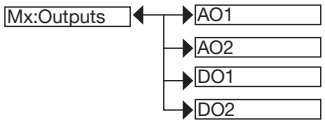
"RTD" = input resistance of the temperature stage in Ω

"TDS" = quantity of dissolved solids in the fluid in ppm

"%" = mass concentration of the fluid (software option)

"USP" = state of the USP function. See Table 10, in section 9.29.

15.6 On the additional outputs module



Only the compatible PVs are displayed.

"AOx" = analogue output

"DOx" = digital output

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Maintenance and Troubleshooting

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16 REPAIR AND MAINTENANCE

16.1 Safety instructions

DANGER

Risk of injury due to electrical voltage.

- If a 12...36 V DC wall-mounted version is installed either in a wet environment or outdoors, all the electrical voltages must be of max. 35 V DC.
- Before carrying out work on the system, disconnect the electrical power for all the conductors and isolate it.
- All equipment connected to the device must be double insulated in relation to the mains according to the standards UL/EN 61010-1.
- Observe all applicable accident protection and safety regulations for electrical equipment.

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.

16.2 Maintenance of the device

The device can be cleaned with a duster slightly moistened with water with possible addition of a detergent compatible with the materials it is made of.

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

16.3 If you encounter problems

The following table gives the association between the LEDs described in chapter 8.3 the icons and the types of events generated by the device.

LEDs		Displayed icons					Type of event and possible cause
LED A (left)	LED B (right)	Smiley	Error	Warning	Maintenance		
purple (blinking)	purple (blinking)	any					The DCP mode of the Profinet protocol is active on a device with an Ethernet module.
green	green	☺					Normal operating and default icon if no diagnostic function is active on the device.
green	red	☹	⊗				"Error" event linked to the diagnostic. Refer to chapter 11.
red	green	☺	⊗				"Error" event linked to the device.
green	orange	☺		⚠			"Warning" event linked to the diagnostic. Refer to chapter 11.
orange	green	☺		⚠			"Warning" event linked to the device.

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LEDs		Displayed icons					Type of event and possible cause
LED A (left)	LED B (right)	Smiley	Error	Warning	Maintenance		
green	orange	☺		⚠	🔧		"Maintenance" event linked to a calibration. Refer to chapter 10.13, chapter 10.15, chapter 10.19, chapter 10.20.
any colour	any colour	any smiley				☒	Problem linked to the datalogger.

16.3.1 Miscellaneous problems

Problem	Recommended action
On a wall mounting version, the display is not lit although the device is supplied with power.	→ Check that the ribbon cable which links the display to the electronics board is connected. → If the ribbon cable is connected, check the wiring.

16.3.2 "Error" events related to the monitoring of process parameters (Red LED B (right) and icons ⊗ and ☹ displayed)

When an error event related to the monitoring of the process parameters is generated:

- The 4...20 mA output(s) generate a current of 22 mA if "Diag. events" is configured as "22 mA" (see section 9.25).
- The transistor outputs operate normally.

Message displayed in the "Information" menu	Meaning	Recommended action
"Mx:E:AIx low"	The value of the analogue input of the "Mx:Inputs" module is out of range. This message is displayed if monitoring of the analogue input is activated for the "Mx" module, depending on the ERROR LOW threshold defined (see section 11.3).	→ Check the wiring of the input. → Make sure the connected instrument functions correctly.
"Mx:E:AIx high"	The value of the analogue input of the "Mx:Inputs" module is out of range. This message is displayed if monitoring of the analogue input is activated for the "Mx" module, depending on the ERROR HIGH threshold defined (see section 11.3).	→ Check the wiring of the input. → Make sure the connected instrument functions correctly.
"Mx:E:AIx open"	An open loop has been detected on the analogue input configured in voltage mode. This message is displayed if detection of an open loop is activated for module "Mx" (see section 11.4).	→ Check the wiring of the input. → Make sure the connected instrument functions correctly.

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Message displayed in the "Information" menu	Meaning	Recommended action
"Mx:E:Glass imped."	The impedance of the measurement electrode on the "Mx" module is out of range. This message is displayed if monitoring of the impedance of the measurement electrode on the "Mx" module is activated, depending on the ERROR LOW and ERROR HIGH thresholds defined (see section 11.5).	→ Go to the "Diagnostics" menu to read the impedance value of the pH electrode (section 11.5). → If necessary, clean the probe then recalibrate the measurement sensor or replace the probe.
"Mx:E:Ref. imped."	The impedance of the reference electrode is out of range. This message is displayed if monitoring of the impedance of the reference electrode is activated, depending on the ERROR LOW and ERROR HIGH thresholds defined (see section 11.5).	→ Go to the "Diagnostics" menu to read the impedance value of the reference electrode (section 11.5). → If necessary, clean the probe then recalibrate the measurement sensor or replace the probe.
"Mx:E:Conductivity"	The fluid conductivity is out of range. This message is displayed if monitoring of the fluid conductivity on the "Mx" module is activated, depending on the ERROR LOW and ERROR HIGH thresholds defined (see section 11.6).	→ Go to the "Diagnostics" menu to read the fluid conductivity value (section 11.6). → If necessary, clean the measuring cell and/or recalibrate the sensor.
"Mx:E:Temperature"	The fluid temperature is out of range. This message is displayed if monitoring of the fluid temperature on the "Mx" module is activated, depending on the ERROR LOW and ERROR HIGH thresholds defined (see section 11.7).	→ Go to the "Diagnostics" menu to read the value of the temperature measured (section 11.7). → If necessary, check whether the temperature sensor is working correctly by measuring a fluid with a known temperature. → If the temperature sensor is faulty, return it to the manufacturer. → If the temperature sensor is not the cause of the problem, check the process.
"Mx:E:RTD open"	The temperature sensor is not connected to the "Mx" module. This message may only be displayed if the measurement mode of the temperature for module "Mx" is set to "automatic" (see section 9.28 and/or 9.29).	→ Connect a temperature sensor to the "Mx" module or set the temperature value used in the process to "Manual" mode (see section 9.28 and/or 9.29).

→ To get information on a message which is not listed, contact Bürkert.

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16.3.3 "Error" events related to a problem with the device (Red LED A (left) and icons ⊗ and ☺ displayed)

When an error event related to a problem with the device is generated:

- The 4...20 mA output(s) generate a current of 22 mA.
- The transistor outputs operate normally.

Message displayed in the "Information" menu	Meaning	Recommended action
"Mx:E:ORP sat." "Mx:E:pH sat."	The pH and/or redox value is not being correctly measured due to the saturation of the input stage of the measuring board.	→ Check the correct wiring of the earth points. → Check the equipotential surfaces of the installation.
"M0:E:Mx com."	The link to the extension module is interrupted.	→ Switch the power supply off then on again. → If the error persists, return the device to Bürkert.
"Mx:E:Memory FR"	Factory data is lost. The process continues but the accuracy of the device is modified.	→ Switch the power supply off then on again. → If the error persists, return the device to Bürkert.
"Mx:E:Memory UR" "Mx:E:Memory UW"	User data for the sensors is lost.	→ Switch the power supply off then on again. → Check the parameters of all the sensors then save them again. → If the error persists, return the device to Bürkert.
"Mx:E:Memory CR" "Mx:E:Memory CW"	The calibration parameters of the "Mx" module are lost.	→ Switch the power supply off then on again. → If the error originates in the "M0" main board, perform a new teach-in. → If the error originates in an "Mx" module, calibrate the sensor connected to this module again. → If the error persists, return the device to Bürkert.
"Mx:E:RTClock"	The clock is faulty. The process continues.	→ Return the device to Bürkert.
"Mx:E:totalisers lost"	The last values of the totalisers are lost. The values saved upon the next-to-last power-down are retrieved.	→ Switch the power supply off then on again. → If the error persists, return the device to Bürkert.
"Mx:E:total+backup lost"	The values of the totalisers are definitely lost. The totalisers are reset.	→ Switch the power supply off then on again. → If the error persists, return the device to Bürkert.

→ To get information on a message which is not listed, contact Bürkert.

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16.3.4 "Warning" events related to the monitoring of process parameters (Orange LED B (right) and icons ⚠ and ☹ displayed)

When a "warning" event related to the monitoring of the process parameters is generated:

- The 4...20 mA output(s) operate normally.
- The transistor outputs configured in "warning" mode switch.

Message displayed in the "Information" menu	Meaning	Recommended action
"Mx:W:AIx low"	The value of the analogue input of the "Mx:Inputs" module is out of range. This message is displayed if monitoring of the analogue input is activated for the "Mx" module, depending on the WARNING threshold defined Defined LOW (see section 11.3).	→ Check the wiring of the input. → Make sure the connected instrument functions correctly.
"Mx:W:AIx high"	The value of the analogue input of the "Mx:Inputs" module is out of range. This message is displayed if monitoring of the analogue input is activated for the "Mx" module, depending on the WARNING threshold defined Defined HIGH (see section 11.3).	→ Check the wiring of the input. → Make sure the connected instrument functions correctly.
"Mx:W:Ref imped."	The impedance of the reference electrode on the "Mx" module is out of range. This message is displayed if monitoring of the impedance of the reference electrode is activated on the "Mx" module, depending on the WARNING LOW and WARNING HIGH thresholds defined (see section 11.5).	→ Go to the "Diagnostics" menu to read the impedance value of the reference electrode (section 11.5). → If necessary, clean the probe then recalibrate the measurement sensor or replace the probe.
"Mx:W:Glass imped."	The impedance of the measurement electrode on the "Mx" module is out of range. This message is displayed if monitoring of the impedance of the measurement electrode is activated on the "Mx" module, depending on the WARNING LOW and WARNING HIGH thresholds defined (see section 11.5).	→ Go to the "Diagnostics" menu to read the impedance value of the measurement electrode (section 11.5). → If necessary, clean the probe then recalibrate the measurement sensor or replace the probe.
"Mx:W:Conductivity"	The fluid conductivity is out of range. This message is displayed if monitoring of the fluid conductivity is activated on the "Mx" module, depending on the WARNING LOW and WARNING HIGH thresholds defined (see section 11.6).	→ Go to the "Diagnostics" menu to read the fluid conductivity value (section 11.6). → If necessary, clean the cell then recalibrate the measurement sensor.

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Message displayed in the "Information" menu	Meaning	Recommended action
"Mx:W:Temperature"	The fluid temperature is out of range. This message is displayed if monitoring of the fluid temperature is activated on the "Mx" module, depending on the WARNING LOW and WARNING HIGH thresholds defined (see section 11.7).	→ Go to the "Diagnostics" menu to read the value of the temperature measured (section 11.7). → If necessary, check whether the temperature sensor is working correctly by measuring a fluid with a known temperature. → If the temperature sensor is faulty, return it to the manufacturer. → If the temperature sensor is not the cause of the problem, check the process.
"W:concent.OOR"	The fluid conductivity or the fluid concentration is outside the calculation range.	→ Make sure the fluid temperature and the fluid conductivity are correct for the configured calculation of the concentration (section 9.29).

→ To get information on a message which is not listed, contact Bürkert.

16.3.5 "Warning" events related to a problem with the device (Orange LED A (left) and icons ⚠ and ☺ displayed)

When a "warning" event related to a problem with the device is generated:

- The 4...20 mA output(s) operate normally
- The transistor outputs configured in "warning" mode switch.

Message displayed in the "Information" menu	Meaning	Recommended action
"M0:W:Time lost"	The date and time are lost. If a time dosing cycle is set, the dosing cycle can not be carried out. See section 9.19. If calibration or maintenance intervals are set, the calibration or maintenance reminder message is not generated. See section 10.13, 10.15, 10.19 or 10.20.	→ Set the date and time again (see section 9.2).
"M0:W:ON/OFF time"	The duration defined for the "Max-ONtime" parameter in the ON/OFF function has been exceeded (see section 9.17).	→ Deactivate then reactivate the ON/OFF function.
"M0:W:Pulse x lim."	In "Pulse" mode, the volume entered for a pulse is incorrect (see section 9.26.7).	→ Enter an appropriate volume. → Check the K-factor.
"M0:W:Pulse x 1:1"	In "Pulse" mode, the volume entered for a pulse is incorrect (see section 9.26.7).	→ Enter an appropriate volume. → Check the K-factor.

→ To get information on a message which is not listed, contact Bürkert.

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16.3.6 "Maintenance" events related to calibration (Orange LED B (right) and icons 🔧, ⚠ and ☹ displayed)

When a "maintenance" event related to calibration is generated:

- The 4...20 mA output(s) operate normally.
- The transistor outputs configured in "warning" mode switch.

Message displayed in the "Information" menu	Meaning	Recommended action
"MxM:Time to cal."	A calibration is due on the sensor in the "Mx" module. The periodicity of calibrations is set in the "INTERVAL" function in the "CALIBRATION INTERVAL" menu (see section 10, page 148).	→ Calibrate the sensor (section 10, page 148).
"W:AI1 cal."	A calibration is due for AI1. The periodicity of the calibrations is set in chapter 10.13.	→ Do a calibration of AI1. Refer to chapters 10.5 to 10.10. → Reset the delay until the next calibration. Refer to chapter 10.13.
"W:AI2 cal."	A calibration is due for AI2. The periodicity of the calibrations is set in chapter 10.13.	→ Do a calibration of AI2. Refer to chapters 10.5 to 10.10. → Reset the delay until the next calibration. Refer to chapter 10.13.
"W:AI1 maint."	A maintenance operation is due for AI1. The periodicity of the maintenance operations is set in chapter 10.15.	→ Do the necessary maintenance operation on AI1. → Reset the delay until the next maintenance operation. Refer to chapter 10.15.
"W:AI2 maint."	A maintenance operation is due for AI2. The periodicity of the maintenance operations is set in chapter 10.15.	→ Do the necessary maintenance operation on AI2. → Reset the delay until the next maintenance operation. Refer to chapter 10.15.

→ To get information on a message which is not listed, contact Bürkert.

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16.3.7 Error messages during data saving

The following error messages may be displayed when saving data (see section 9.6).

Message displayed	Meaning	Recommended action
"Missing memory card"	No memory card has been inserted into the device or the memory card has not been formatted.	→ Insert a memory card into the device (see section 5). → Format the memory card.
"Datalogger is enabled"	The memory card is already used by the datalogger.	→ Deactivate the "data logging" (see section 9.22).
«File open»	The file cannot be created.	→ Format the memory card.
"Memory card write"	Write problem of the file.	→ Check that the memory card is not write protected. → Check that there is enough free space on the memory card.

→ To get information on a message which is not listed, contact Bürkert.

16.3.8 Error messages during data loading

The following error messages may be displayed when loading data (see section 9.7).

Message displayed	Meaning	Recommended action
"Missing memory card"	No memory card has been inserted into the device or the memory card has not been formatted.	→ Insert a memory card into the device (see section 5). → Format the memory card.
"Datalogger is enabled"	The memory card is already used by the datalogger.	→ Deactivate the "data logging" (see section 9.22).
«File open»	The file with the saved data cannot be read: • Either because the two devices are not compatible. • Or, because the data saving failed.	To check the compatibility between the devices: → Save the data from each device (on two different memory cards). → Check that the file names are the same. → If the file names are different, enter the configuration by hand.
"Memory card read"	The file with the saved data is corrupted.	→ Use another file.
«Incompatible module»	You are trying to transfer data saved from one module to another module of a different type (e.g. the data saved from a pH module to a conductivity module).	→ Load data to a module of the same type.

→ To get information on a message which is not listed, contact Bürkert.

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16.3.9 Messages during datalogging (icon displayed)

The error messages associated to the icon , can be transmitted during datalogging (see section 9.22).

Message displayed in the system log	Meaning	Recommended action
"M0:MC read only"	The card is write protected.	Authorise writing on the card by pushing the lock lever.
"M0:MC failure"	Problem on the memory card.	→ Make sure there is a memory card in the device. → Format the memory card. → If the problem persists, change the memory card.
"M0:MC full"	The memory card is full.	→ Insert an empty memory card or delete data on the current card. → If the problem persists, format the card using a PC. → If the problem persists, change the memory card type.
"M0:MC data loss"	The card was removed when the datalogger was "ON". Data is lost.	Always deactivate the datalogger before removing the memory card from the device (see section 9.22).

→ To get information on a message which is not listed, contact Bürkert.

16.3.10 Miscellaneous messages

Message displayed in the system log	Meaning	Recommended action
"M0:Power on"	The device is switched on.	-
"Too big value"	During the configuration of an arithmetic function (see section 9.14), you want to enter the value of the constant but the other item is set to "NONE".	→ First configure the item that is not a constant.

→ To get information on a message which is not listed, contact Bürkert.

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17 SPARE PARTS AND ACCESSORIES

CAUTION

Risk of injury and/or material 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
4 plastic fasteners for the 8619 multiCELL	560225
4 plastic screws for the cover of the 8619 multiCELL WM	565193

Accessory	Article number
8 GB memory card	564072
Assembly kit for the 8619 multiCELL WM	564596
Adapter for cable glands M20x1.5 with interface connector RJ45-M12 code D	569242
pH sensor connection cable, 3 m	561904
pH sensor connection cable, 5 m	561905
pH sensor connection cable, 10 m	561906
Pt1000 temperature sensor connection cable, 3 m	561907
Pt1000 temperature sensor connection cable, 5 m	427113
Pt1000 temperature sensor connection cable, 10 m	554822
Variopin cable, 3 m	554855
Variopin cable, 5 m	554856
Variopin cable, 10 m	554857
Software option: PID	561836
Software option: datalogger	561837
Software option: dosing	561838
Software option: flow	561839
Software option: concentration	561840
Software option: Ethernet protocols (Modbus TCP, PROFINET, EtherNet/IP	569286
Software option MATH	569848

17.1 Additional documentation

For the configuration of an Ethernet version, refer to the supplement related to the digital communication at: country.burkert.com

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18 PACKAGING AND 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.

19 STORAGE

NOTICE

Poor storage can damage the device.

- Store the device in a dry place away from dust.
- Storage temperature: –20...+70 °C,
  limited to –10...+70 °C if the memory card with article number 564072 is inserted.

20 DISPOSAL

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.

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