BEST WATER TECHNOLOGY

For You and Planet Blue.

DIOMEDE

SALINOMETER / TIMER KIT

FOR MANAGING COOLING TOWERS

INSTALLING, COMMISSIONING AND MAINTENANCE

VERY IMPORTANT:

Read this manual carefully prior to any connection, turning the power supply on or use. Failure to comply with its instructions will nullify the **BWT PERMO** guarantee.

We reserve the right to make any technical changes to this manual without notice.
The specifications that are included are for information purposes only and the photos and diagrams are non-contractual.

CONTENTS

1. GENERAL INFORMATION FOR USERS

Being aware of these will help you use this manual better.

The following parts are highlighted:

- Lists
- Instructions

Operating advice...

INFORMATION

The purpose of a comment is to make your work easier.

Electrical safety instructions...

WARNING

Indicates a potentially dangerous situation.
If you do not comply with this instruction, there is a risk of death or serious injury.

Prudence instructions....

PRUDENCE

Identifies a situation that is potentially dangerous for you.
If you do not comply with this instruction, there is a risk of personal injury or physical damage.

Equipment safety instructions...

IMPORTANT

Identifies a situation that is potentially dangerous for the equipment.
If you do not comply with this instruction, there is a risk of physical damage.

Environmental protection instructions.

RECYCLING and …

DEEE. (EC Directive)

2. SAFETY SECTION

2.1. Use for the intended purpose

- "Diomède" is a microprocessor that controls al the functions required for managing a cooling tower. (cooling tower)
- "Diomède" is only intended to be used for the purposes described herein.
- Any other use or transformation is forbidden.

2.2. Safety instructions

IMPORTANT

- *If an error message has been produced, "Diomède" will restart controlling (possibly in an unexpected way) once the cause has been eliminated. Before looking for the cause of the error message, stop the equipment completely (press the M/A button) and prevent it against a potential re-start.*
- *Avoid an overdose of dangerous fluid if the measuring cell fails or is dismantled! Adjust your installation as necessary.*
- *You must comply with the instructions contained herein. The equipment's use must comply with the technical data and specifications contained herein!*
- *The "Diomède" should only be used by trained and qualified staff.*
- *Do not use the equipment in the open air without specific protection (hood, roof to protect against the weather)! The unit can be damaged by direct sunlight.*

2.3. Compliance with standards

The "Diomède" equipment complies with the following standards:

EC Directive on low voltages (73/23/CEE), version 93/44/CEE.

EC Directive on electromagnetic compatibility (83/336/CEE), version 92/31/CEE.

Electrical safety as per EN 61010-1.

Interfering electrical radiation as per EN 55011, group 1 / Class B.

Tolerance of interference as per IEC 801-2, -3, -4 or DIN VDE 0843, parts 2, 3, 4 or EN 50082-2.

EN 60335-1 Safety of electrical equipment for domestic use.

EN 50081-1 Electromagnetic Compatibility, interfering radiation, residential.

EN 50082-2 Electromagnetic Compatibility, interfering radiation, industrial.

EN 60555-2 Electromagnetic compatibility, retroactions in electrical power supply networks, harmonic oscillations.

EN 60555-3 Electromagnetic compatibility, retroactions in electrical power supply networks, voltage fluctuations.

3. STORAGE AND TRANSPORT

Transport and store **"Diomède"** in its original packaging.

RECYCLING

Do not throw the packaging away after use. Keep it or recycle it in an approved centre.

Protect it from humidity and the effects of chemical products.

Environmental conditions for transport and storage:
- Temperature: -10°C to 40°C
- Relative humidity: < 95% relative humidity, without condensation

4. ASSEMBLY AND INSTALLATION

The solenoid valves and biocide or inhibitor proportional dosing pumps being controlled are provided with their primary power supply directly by the equipment (230/250V 50/60Hz).
Internal fuses are accessible for each element.

The equipment does not have an on/off switch. It is immediately operational when connected to a mains power supply.

The **"Diomède"** complies with applicable electrical equipment specifications. It complies with the following standards:
- Power supply voltage
- Electrical safety as per EN 61010-1.
- Interfering electrical radiation as per EN 55011, group 1 / Class A.

4.1. Safety instructions

WARNING:

- *Comply with the normal and national safety procedures for the installation.*
- *The equipment's electrical installation should only be performed by qualified technicians with appropriate certification!*
- *The connection values marked on the equipment must be the same as the mains supply!*
- *The mains connection cables and the data cables must not be positioned against each other (risk of interference!). If this is unavoidable, take appropriate anti-interference measures! Excessive interference can cause a dysfunction and represents a risk for the equipment*

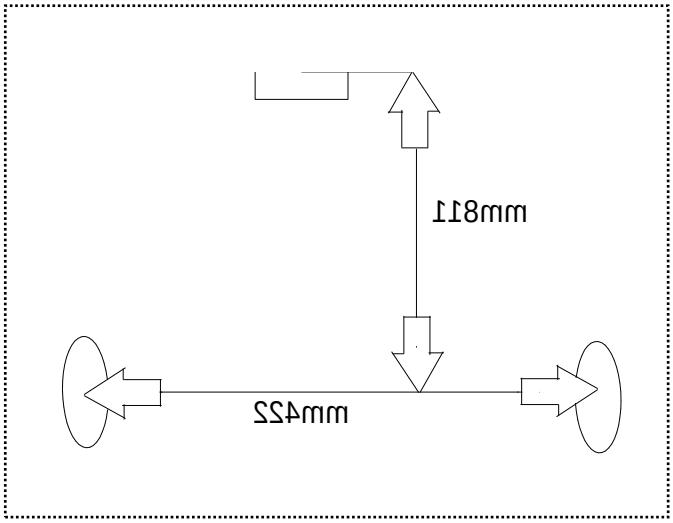
4.2. Mechanical installation

COMMENT:

The equipment must be in a position that makes it easy to read and control (at eye level if possible).

The drilling template attached hereto allows the **"Diomède"** unit to be attached to the wall by screws.

The case is fixed by opening the lower terminal access port and attaching the lower part using the two lateral oblong holes and by using the external hook at the rear of the case to fix the upper part.



Drilling template for **"Diomède"** case

4.3. Electrical installation

WARNING

Bundle the cables together using cable clips 30cm from the terminals! The cores carrying the mains voltage must not come into contact with the low voltage terminals if they come undone in the event of an error!

Make connections according to the wiring diagram that is provided (see relevant paragraph).

4.4. "Diomède" electrical installation

Opening the equipment

WARNING

- *The equipment must only be opened by a qualified person!*
- *Before opening the "Diomède" for maintenance or other interventions, make sure that the equipment is disconnected from the mains electricity supply and that no voltage can be applied to the terminals during the intervention!*
- *In general, the equipment must only be opened when it is fixed to the wall.*

- To open the case and access the connection terminals, unscrew the two screws that hold the terminal cover in position on the lower part of the case.
- The fuses and all connection terminals are accessible.

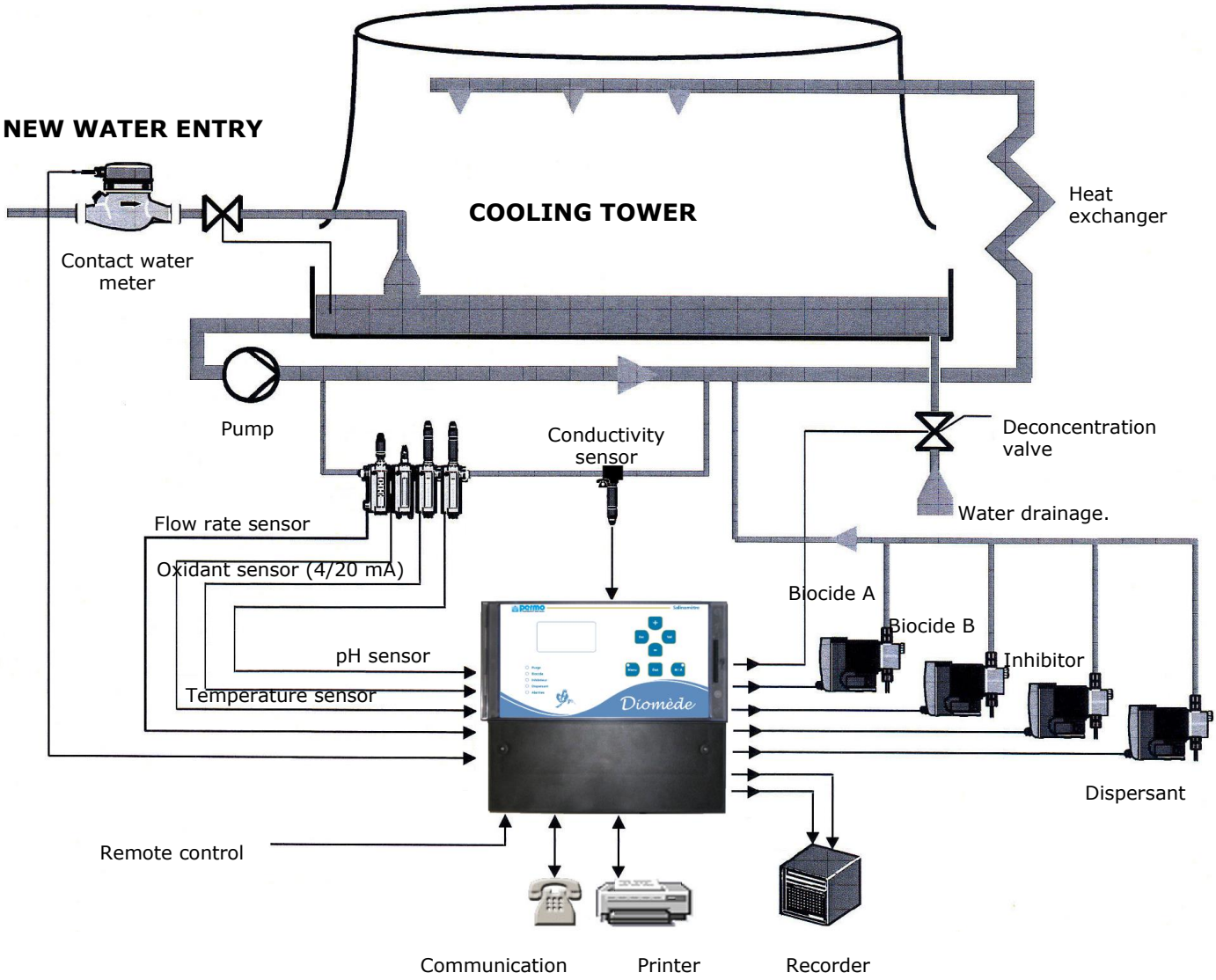
Electrical installation

Remove an appropriate number of covers from the compression gland holes for the number of cables.

- Remove an adequate length of the cable sheath (depending on the position of the terminals). Slide the screw connector, the pressure ring and the seal onto the cable and insert it into the tapping.
- Tighten the connectors and lock them with a spanner. Cut the wires at the exact length and remove about 7 mm of insulation then place them in the appropriate terminals according to the wiring diagram.
- Use crimping lugs for multi-core wires.

5. OPERATIONAL DESCRIPTION

5.1. Cooling tower description (air cooling tower)



The water that evaporates from the cooling tower is replaced by providing new water. An independent level switch ensures a constant water level. These actions cause the mineral salt level to increase in the circulating water. To reduce these levels, the deconcentration valve has to be opened at set intervals. This loss is compensated for by providing new water.

In order to prevent corrosion and scale forming in the cooling tower, an inhibitor or dispersant is added in proportion to the quantity of new water added.

In order to ensure that the cooling tower water does not become infected with microbes, biocides have to be added regularly.

5.2. "Diomède" operational description

The **"Diomède"** equipment is a compact and economical installation which controls the different elements that are necessary for a cooling tower to operate. It can ensure all the operational functions (deconcentration and biocide, inhibitor and dispersant injections) and the monitoring functions (records, communication by cable or telephone) during development.

The **"Diomède"** controls the deconcentration using the circulating water's resistive conductivity (Conductimeter mode) or using the volume of water added to the cooling circuit (volumetric mode).

In independent mode, it controls the inhibitor and dispersant pumps in proportion to the opening of the deconcentration valve or using a contact water meter in the tower's water supply circuit.

Daily and weekly timers can control up to two biocide pumps. The **"Diomède"** also has control functions such as the forced deconcentration prior to adding biocides or deconcentration locking after a biocide injection.

The **"Diomède"** processes the conductivity input signal, displays the measured value and thereby controls the cooling tower's salt level by activating or deactivating the deconcentration control. It also has compensation inputs for the conductivity cell temperature and two 0/20 – 4/20mA inputs that are compatible with pH sensors and oxidant measurements. Its two 0/20 – 4/20mA analogical outputs are used to transfer data on conductivity, temperature, pH or oxidant to a parameter recording system.

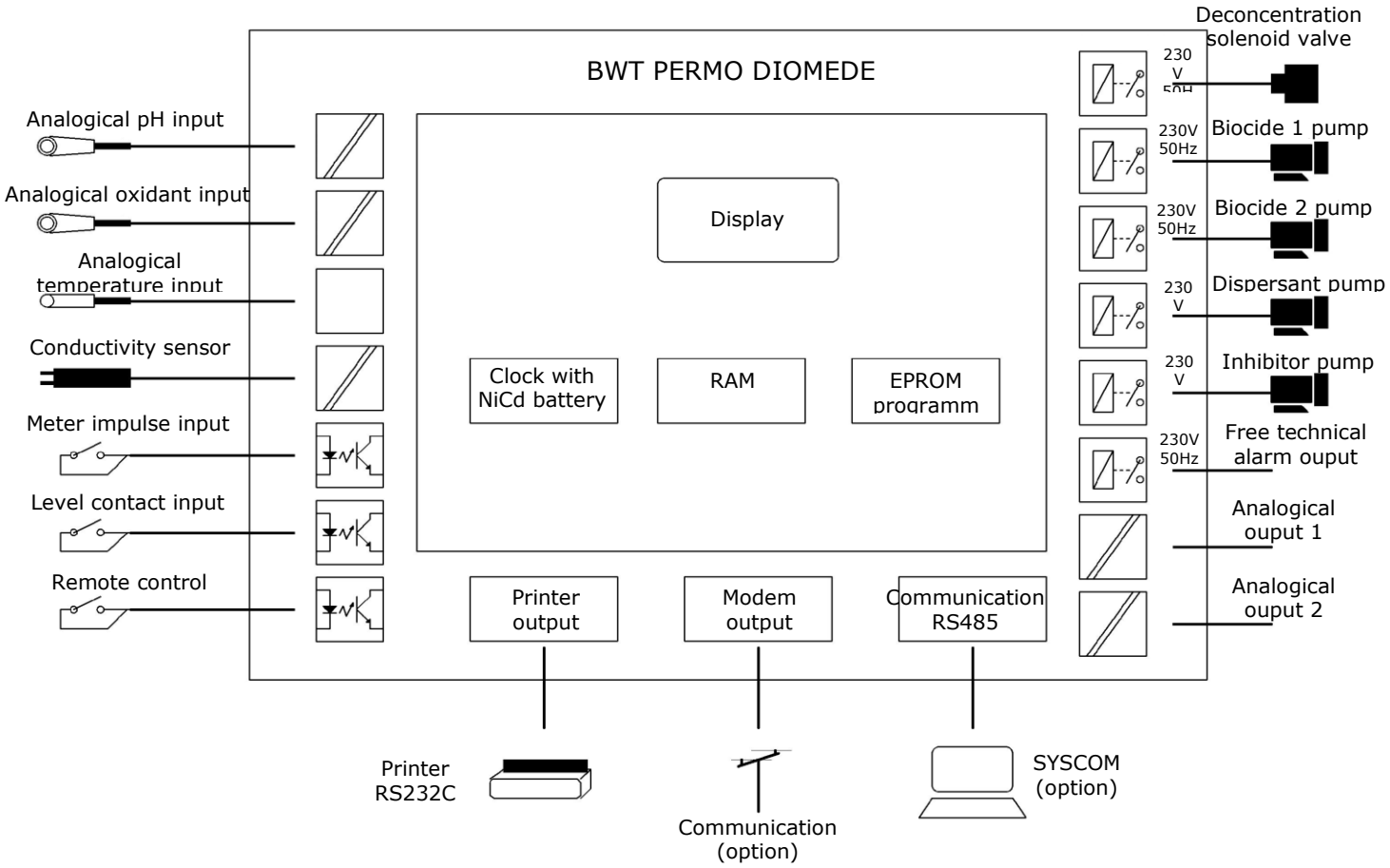
During development, the **"Diomède"** can communicate these data using a RS485 bus link or its internal Modem (compatibility by plug-and-play internal modem in order to comply with different national standards)

e.g.: if the cooling process is interrupted, the **"Diomède"** regulator can be stopped using the **"M/A"** button. It can also be slaved to an external control and automatically switch to 'suspended mode'.

In the event of an error, depending on its configuration, it can trigger an alarm.

The **"Diomède"** is a simple device that has all the power controls that are required by the different elements (deconcentration solenoid valve, biocide, inhibitor and dispersant pumps) which it controls directly using the primary power supply in accordance with the cabling diagram.

The user can activate or deactivate the biocide controls and modify the biocide and dispersant injection criteria by adjusting the settings.

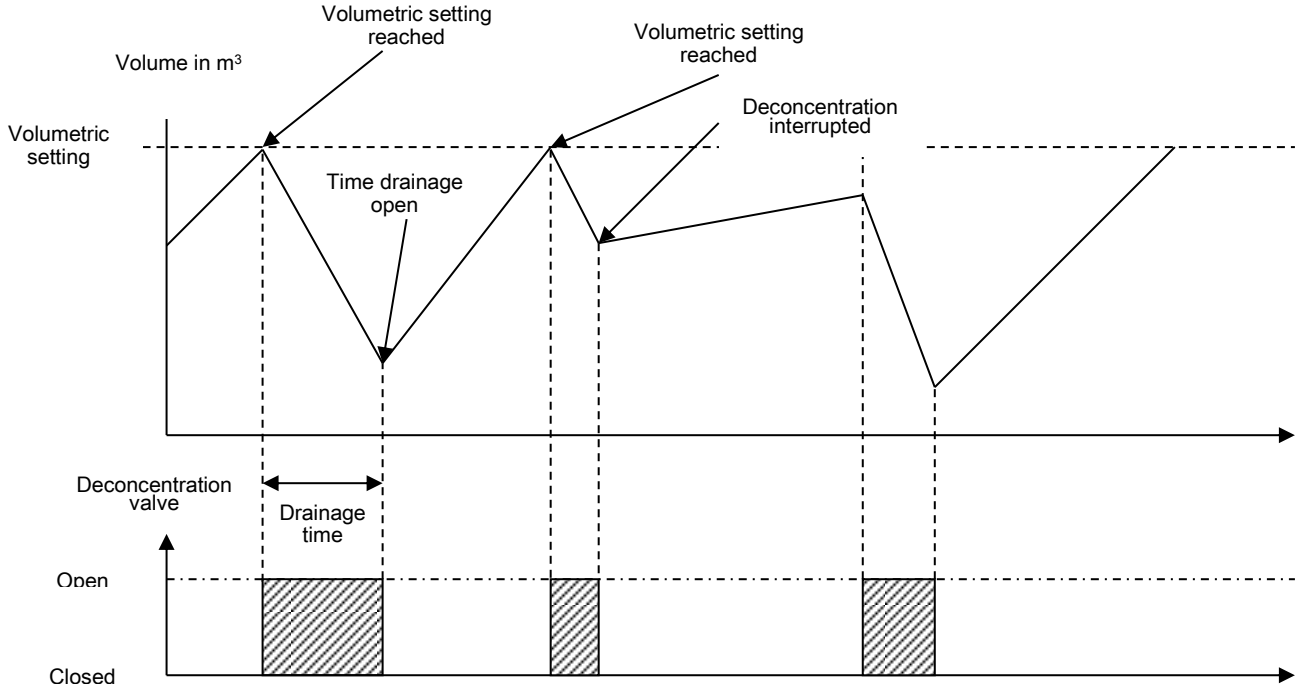


The flow rate impulse meter input is used to measure the volume of water added to the cooling circuit in 'volumetric mode' or slaved to the operation of the inhibitor and dispersant pumps. It can also be deactivated by the user.

The flow rate contact input is used to suspend the **"Diomède"** regulation function if no water is flowing in the circuit being analysed.

When the auxiliary 4/20mA inputs are activated, they can receive data from compatible sensors for pH, chlorine, bromine, ozone or hydrogen peroxide using configurable measurement scales. If the pH function is selected, it is possible to regulate the cooling tower water as acidic or basic by programming the alarm relay.

5.3. Deconcentration in 'volumetric mode'



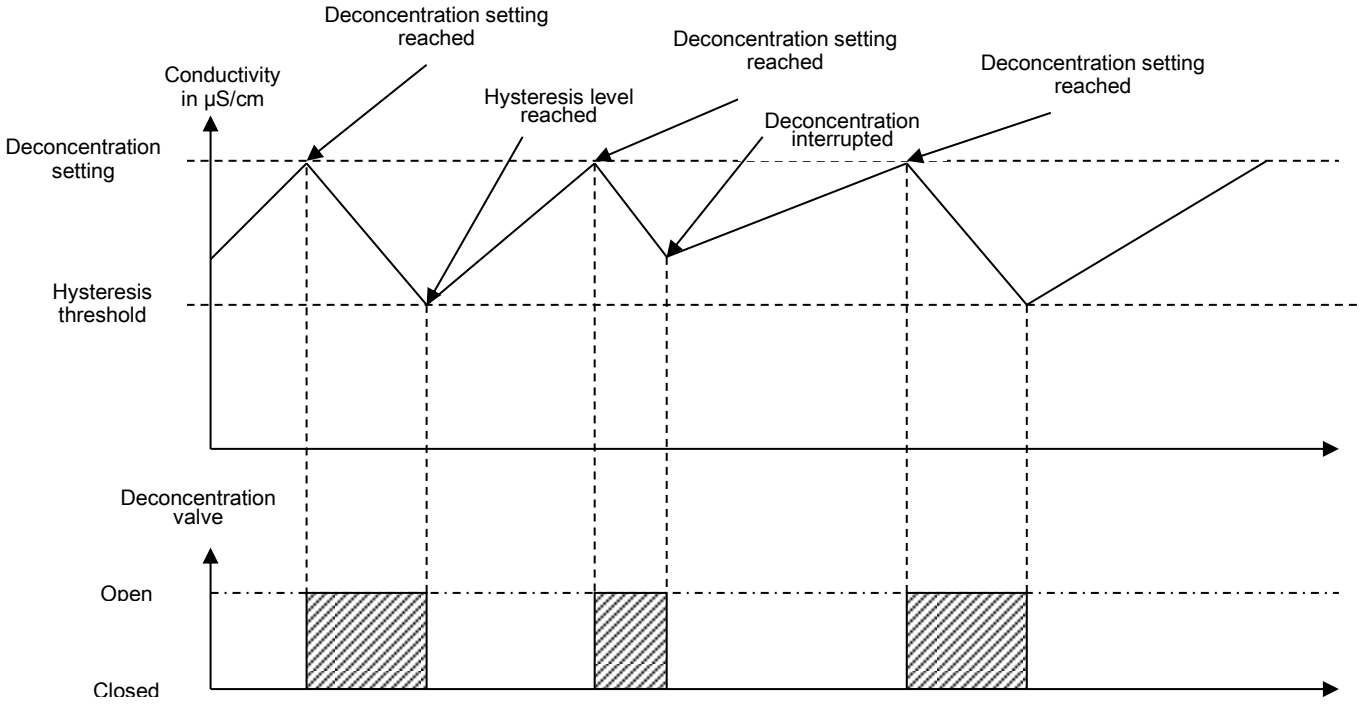
The above figure shows the different deconcentration processes in **volumetric mode**. The deconcentration valve opens and closes based on the limit settings. It opens when the cumulative volume limit setting for the water added to the cooling tower circuit is reached. The conductivity falls in proportion to the time the deconcentration valve is open. Note: conductivity measurements are not essential. This mode allows the tower to be deconcentrated without having to measure the salt concentration. This is thus a safety mode for use in the event that the conductivity sensor fails. When the valve closes, the proportion of the volume setting is subtracted from the cumulative volume at the moment it closes.

If the deconcentration valve's opening is interrupted, its cycle is recorded, the conductivity increases in proportion to the interruption time and the cycle restarts as soon as the equipment is back in service in order to complete the remaining programmed opening time.

This operating mode requires an impulsion water meter in order to measure the cumulative water volume. It is essential, in this case, to programme the **"Diomède"** with the number of litres per impulsion for the water meter.

The volume drained is proportional to the diameter of the deconcentration drainage circuit. Determine the appropriate drainage time based on the volumetric setting to ensure that the drainage time does not result in a dangerous emptying of the tower's water circuit.

5.4. Deconcentration in 'conductimetric mode'



The above figure shows the different deconcentration processes in **conductimetric mode**. The deconcentration valve opens and closes based on the limit settings. It opens if conductivity reaches or exceeds the 'deconcentration setting'. The conductivity is reduced by adding fresh water which is controlled by the automatic water level control system. Once the conductivity reaches the 'hysteresis value' or falls below this value, the **"Diomède"** closes the deconcentration valve. If the cycle is manually interrupted or if the tower circuits stops, the **"Diomède"** records the deconcentration cycle status and restarts the cycle as soon as the tower next becomes active.

5.5. Description of biocide dosing

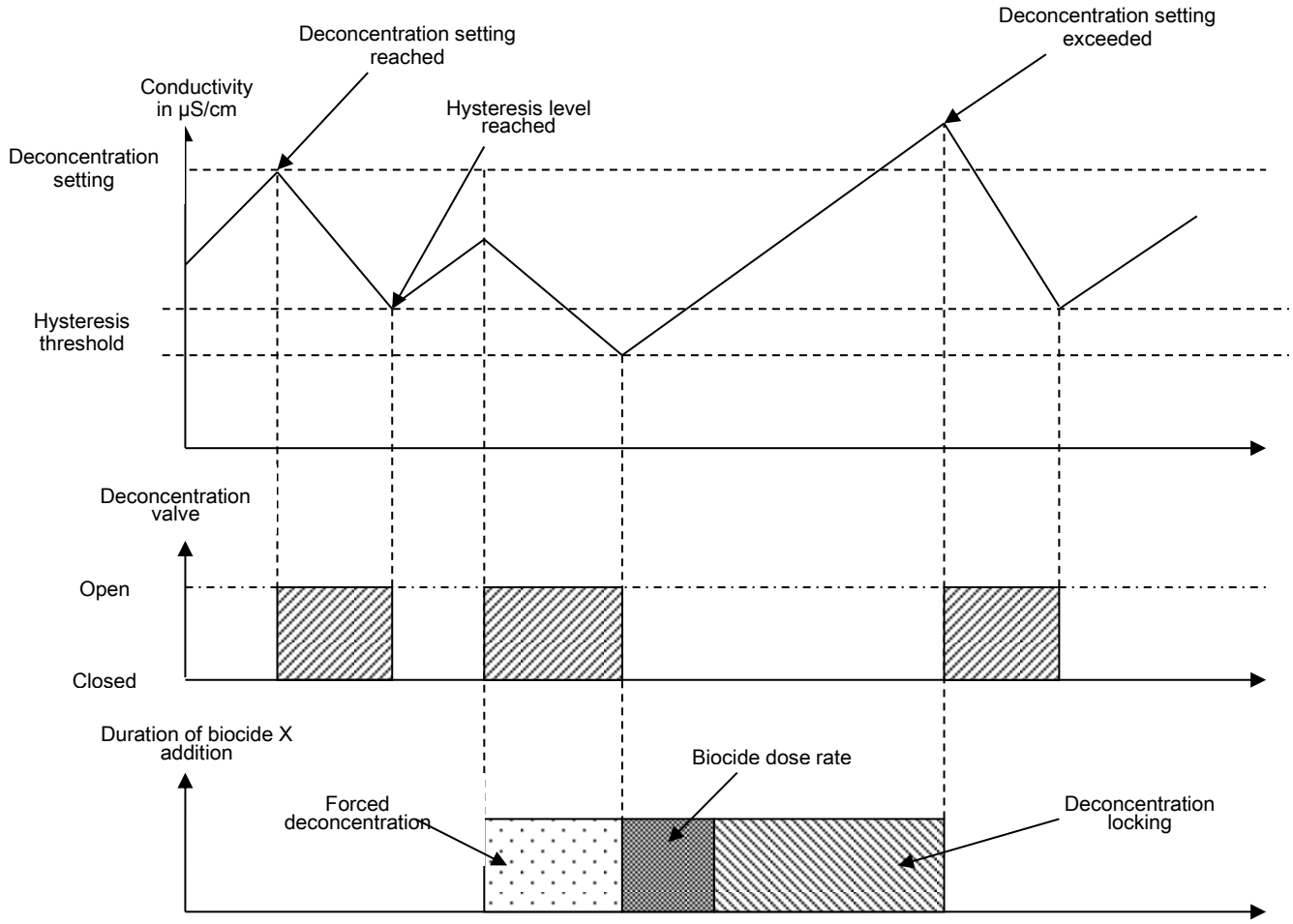
The **"Diomède"** can dose up to two different biocides. The biocides are controlled by timers with the option of up to 8 dose rates per cycle, different cycles for winter or summer, for each day of the week and 1 to 9 weeks per cycle.
This means it is possible to adjust 4 x 8 dose rates depending on the type of biocide, winter or summer and the number of doses per day of the week over a programmable cycle of 1 - 9 weeks.

It is also possible to programme a forced deconcentration before each biocide injection and deconcentration locking afterwards for each winter or summer period.

The **"Diomède"** can also operate in an automatic mode with the seasons being programmed by the user, depending on where it is located in the world. It can also operate in winter or summer mode only.

The two biocides A & B can be enabled or disabled by the technician before the equipment is commissioned.

5.6. Summary of biocide addition



5.7. Injection of biocides A & B in timer mode

The **"Diomède"** contains a timer that is used to programme dosing sequences for the biocides.
When this function is programmed on the unit (see the 'biocides enabling or disabling' diagram), biocides can only be injected during the period when dosing is enabled by the timer. If draining (deconcentration) is occurring, the biocide cycle has priority (drainage stops).
Conversely, drainage can not be started during the biocide injection phase managed by the "Diomède" unit's timer.

5.8. Injection of biocide A in continuous oxidant mode

This function is only available for biocide A. The continuous oxidant mode allows the biocide to be adjusted based upon the setting for the oxidant level and a hysteresis threshold defined by the user.
This continuous oxidant mode for biocide A has no effect on the biocide B operation or on drainage opening.

e.g.:

When biocide A is operating, biocide B can also be operating when it is in timer mode (see timer mode above). Drainage will occur only if biocide B is not operating.

5.9. Injection of biocide A in oxidant / timer mode

The "Diomède" allows an injection of biocide A to be made slaved to an internal clock. This function combines the functions described above (timer and continuous oxidant).
When this mode is selected, the timer allows biocide A injection during a programmed period depending on the oxidant setting. When the programmed period is over, biocide injection ceases until the next programmed period.
Injections of biocide B are not effected by biocide A operation.

5.10. Forced deconcentration

Forced deconcentration is part of injecting biocide. The time can be programmed in hours and minutes and is deducted from the total timer time (biocide A or B).

5.11. Deconcentration locking

The deconcentration valve remains shut whilst biocide is being added and for a period afterwards (so that the biocide can break down). This time is programmed by the user for each type of biocide.

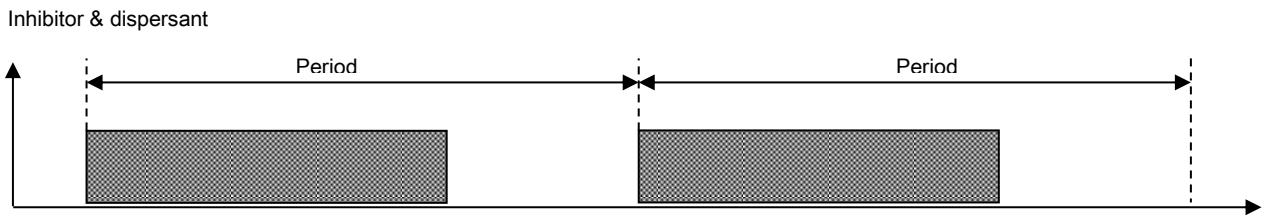
5.12. Description of inhibitor and dispersant dosing

The **"Diomède"** has three different methods for dosing the inhibitor and dispersant:

- Continuous or periodical
- % drainage mode
- External contact mode

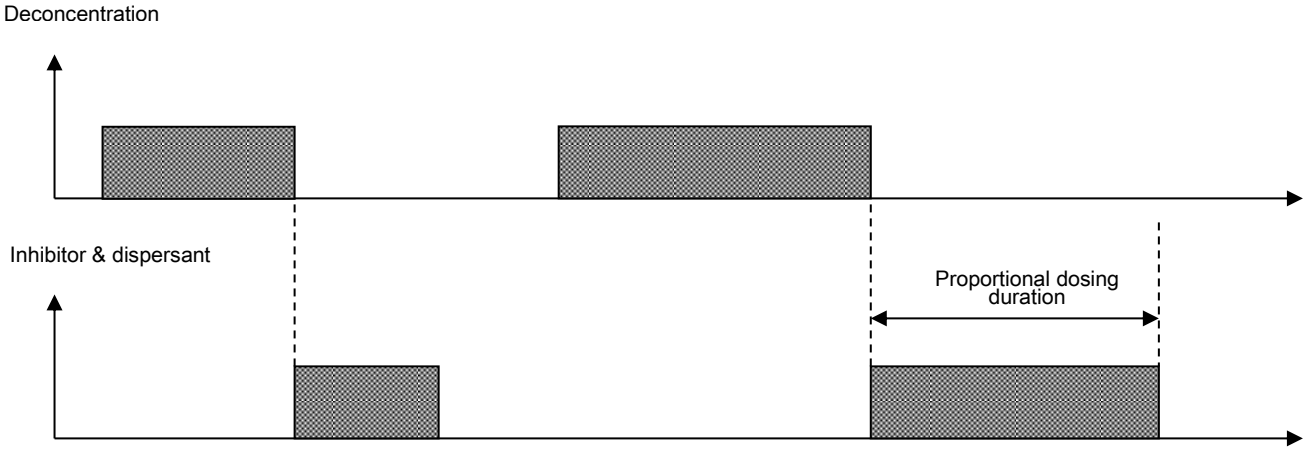
5.13. Continuous or periodical mode

The **"Diomède"** operates the inhibitor and dispersant pumps periodically. A certain amount is added at the start of each period. The addition of inhibitor and dispersant is suspended during deconcentration.



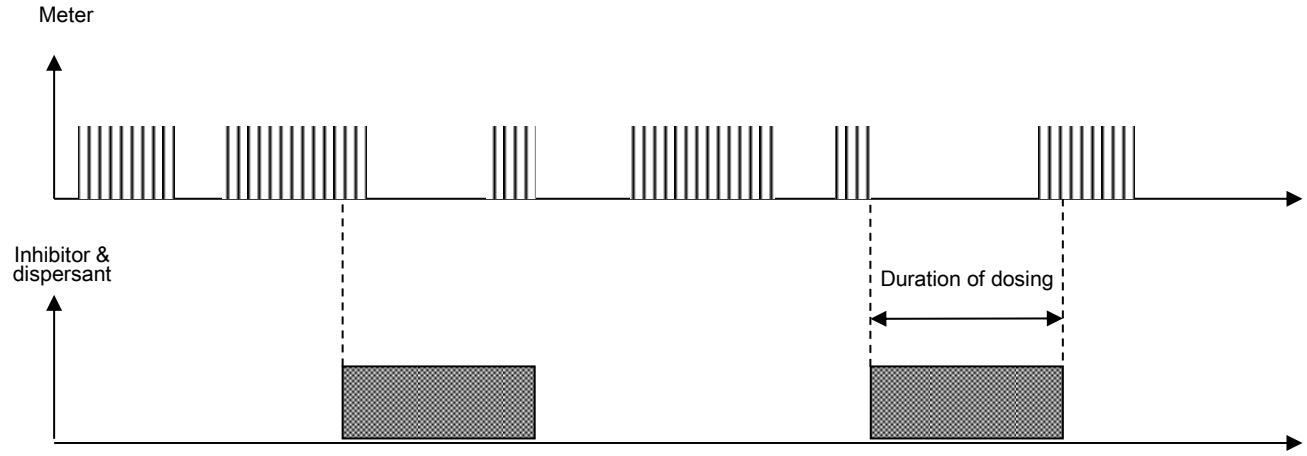
5.14. % drainage mode

Inhibitor or dispersant are added only after a deconcentration. The "Diomède" determines the duration of the deconcentration and adjusts the dose in proportion to the deconcentration duration based on the deconcentration % setting.



5.15. Contact mode

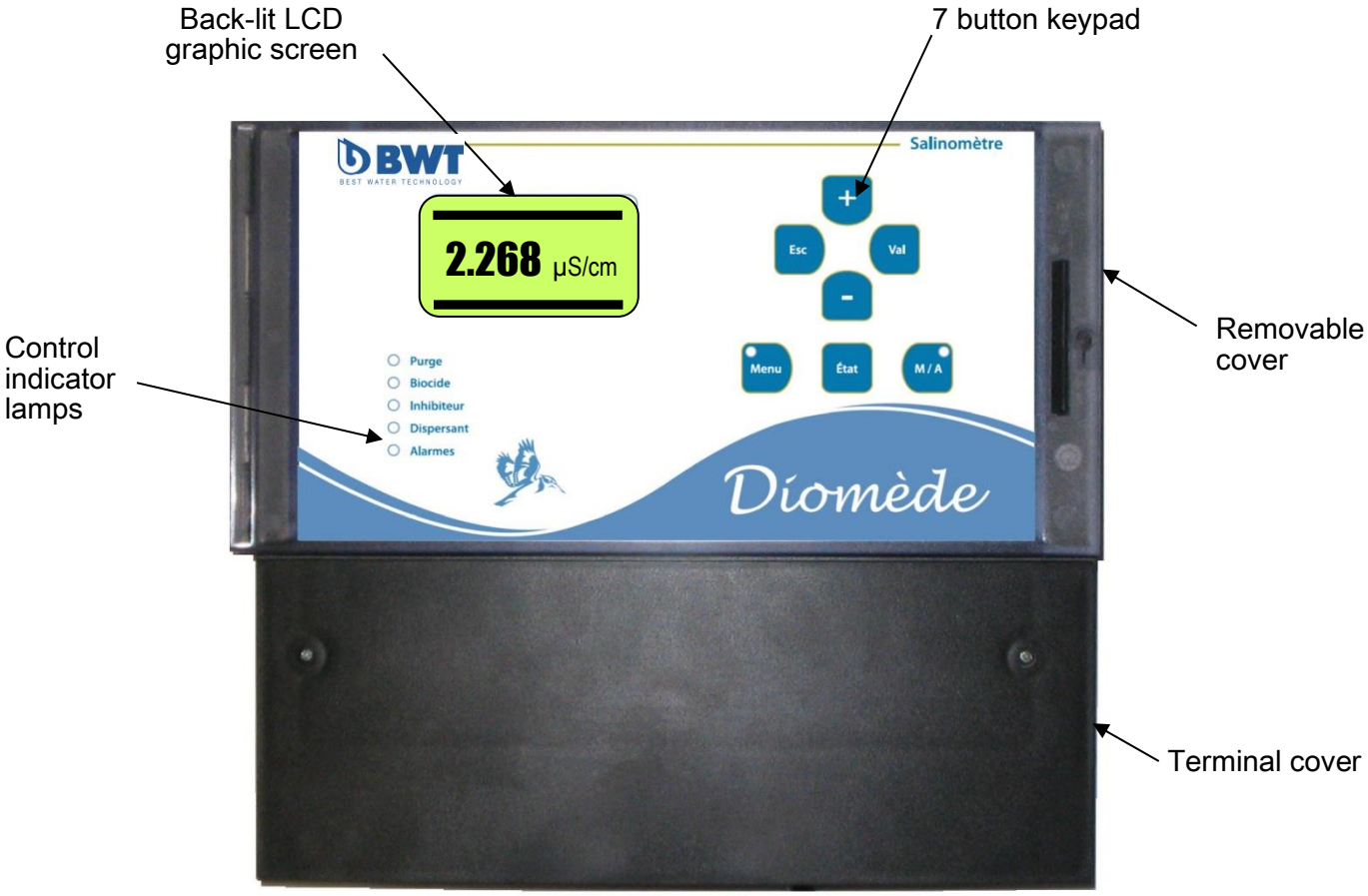
In contact mode, the inhibitor or dispersant is added in proportion to the added water.
A contact water meter in the water supply measures the volume of water added and sends a signal to the "Diomède". It is best to use a contact water meter with an impulsion interval of 1-100 litres.
The number of impulsions is counted until the required quantity is reached and the operation of the inhibitor and dispersant pumps programmed.



5.16. Electrical design

The equipment processes input signals taking account of the correction gain and user settings. The result is displayed and provided to other equipment using standard communication formats.

6. OVERVIEW OF THE EQUIPMENT / CONTROL ELEMENTS



6.1. Keyboard buttons

Menu	**Menu key** Key with indicator lamp that is used to go the programming menus when the unit is stopped.
M / A	**M/A key** Key with indicator lamp used to turn the regulation and dosing function on or off.
Val	**Val key** Used to transfer, confirm or save a displayed value.
État	**Status key** Used to view the status and the active timer settings. Displays the history when the unit is stopped.

+	**Plus key** Used to move from one menu item to another, increase a displayed number and change the adjustable scale.
Esc	**Esc key** Used to exit the control menu and return to a displayed numerical value.
-	**Minus key** Used to move from one menu item to another, decrease a displayed number and change the adjustable scale.

6.2. Function keys

The **M/A** and **Menu** keys both have an indicator lamp which act as follows:

Green indicator unlit: None of the **"Diomède"** regulation functions are operating. The analogical 0/4 mA outputs are active if they have not been programmed to be controlled. The dosing cycles for biocides, inhibitor and dispersant are stopped or suspended.
This status is required to allow access to the programming functions via the **Menu** key of the **"Diomède"**.

Green indicator lit: All of the **"Diomède"** regulation functions are operating.
All the equipments inputs and outputs are active, provided they have been programmed.
The **Menu** key can not be used. None of the other keys have any action except the **Etat** key which displays the meter statuses.

Green indicator blinking: All the **"Diomède"** regulation and dosing functions are suspended.
The **Menu** key can not be used. None of the other keys have any action except the **Etat** key which displays the meter statuses.

This situation occurs when:

- The remote control input is turned off.
- The level contact has detected a lack of circulating water in the tower's circuit.
- A major error has been detected and the equipment has switched to stand-by.

Both indicators are unlit:

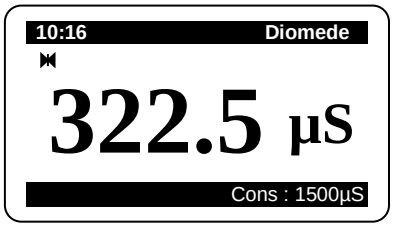
The equipment is waiting for an instruction.
The general operation is stopped. The dosing pumps are turned off.
The **Etat** key displays the cycle, alarms, data, printer output and reset history menus.
In this function, the **Val** key is used to view each history. The **Esc** key is used to return to the previous screen. The **Plus** & **Minus** keys change the selected history.

Yellow indicator lit: The **"Diomède"** dialogue menus can be accessed. The user must select the relevant functions and confirm any new instructions.

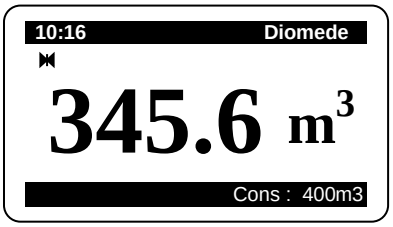
6.3. Permanent displays 1 & 2

Permanent displays depending on operating mode

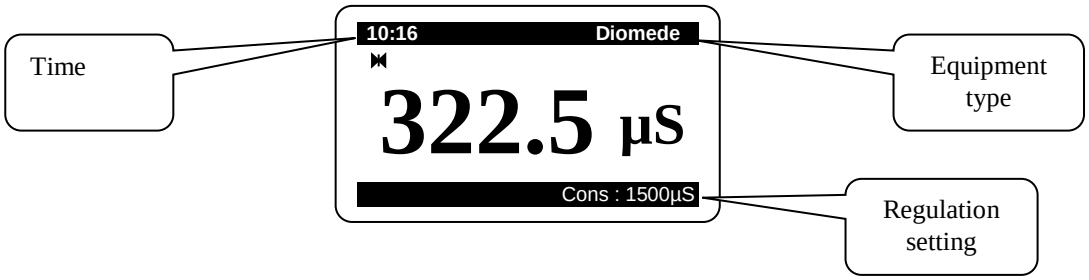
In mode1 Conductimetric



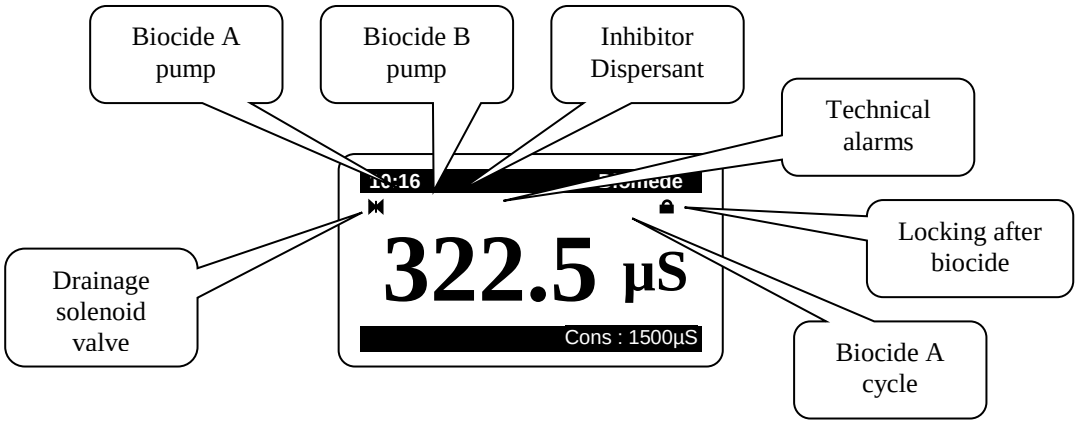
In Mode2 Volumetric



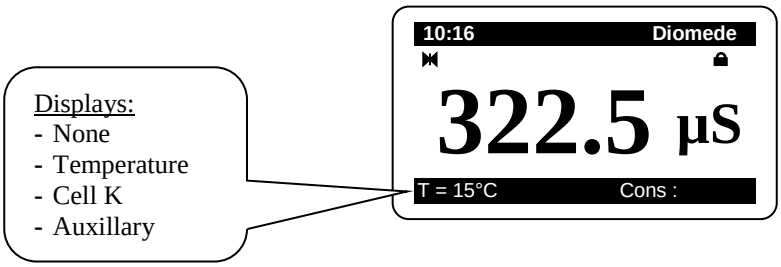
Displays time, equipment model and regulation setting



Displays equipment status

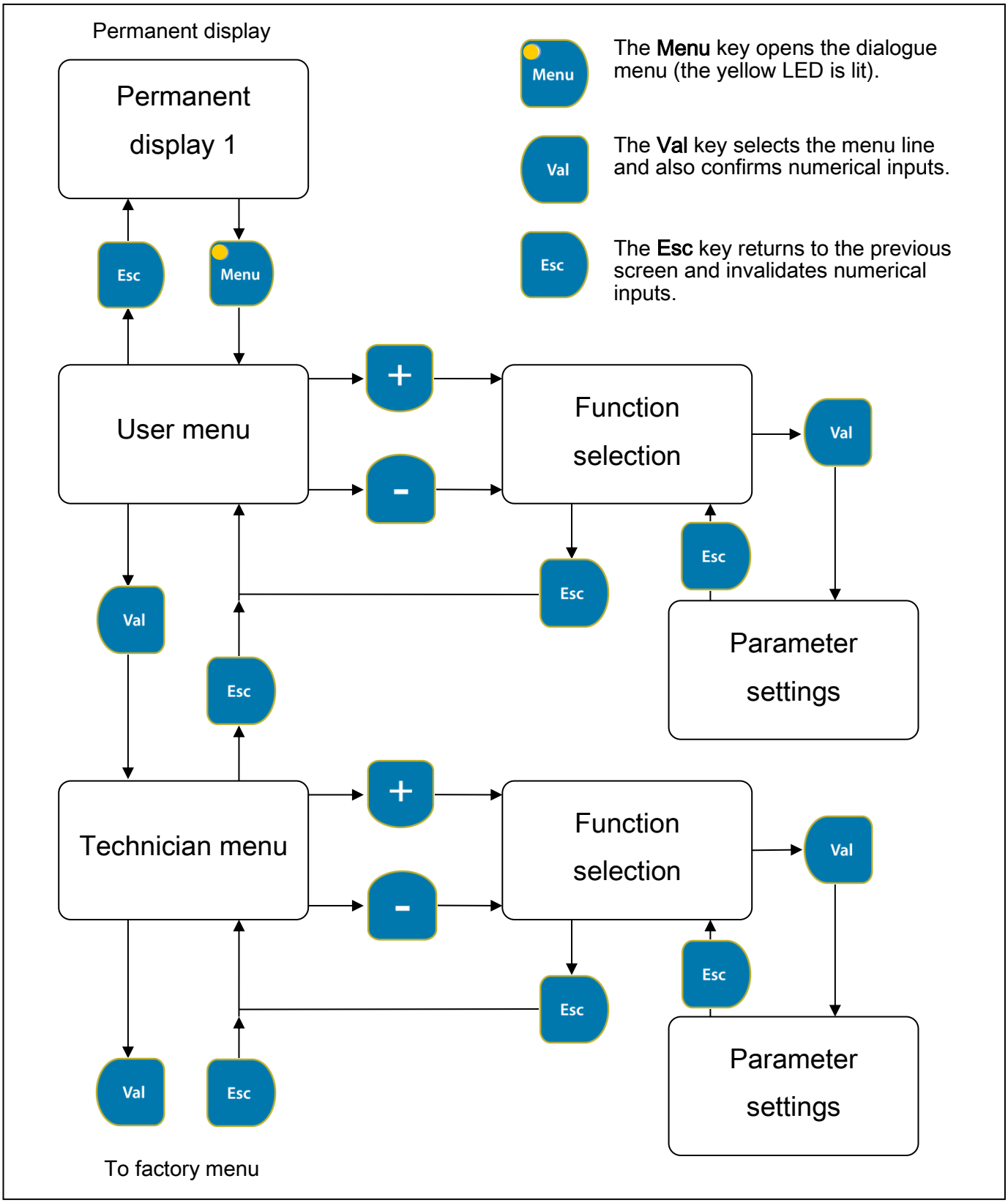


Displays auxiliary parameters (only if defined in the **Factory** menu)



7. CONTROL

7.1. Control diagram



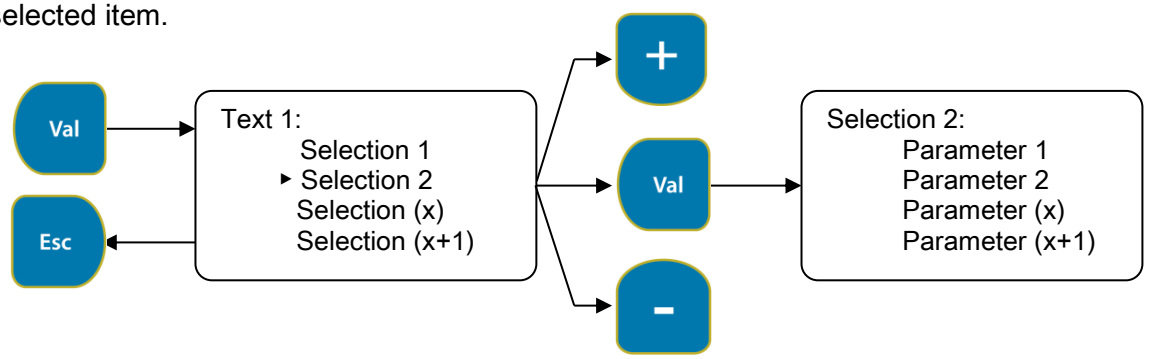
INFORMATION

- *Access to User and Factory menus can be locked by different access codes. This means that the corresponding functions can be locked for different authorised access levels.*
- *The number of functions that are enabled depends on the functions selected in the Factory menu. Their nature depends on the choices made.*
- *The equipment's regulation function must be disabled by pressing the M/A key before the User menu can be accessed. The green LED in the key is extinguished.*
- *If the user does not press any key for one minute, the equipment automatically exits the current menu without recording any change and returns to permanent display 1.*

Adjusting settings:

The **Val** key is used to open the setting(s) adjustment screen. A horizontal cursor identifies the selected item.

The **Plus** key selects the higher function to be changed. A cursor indicates the desired choice.

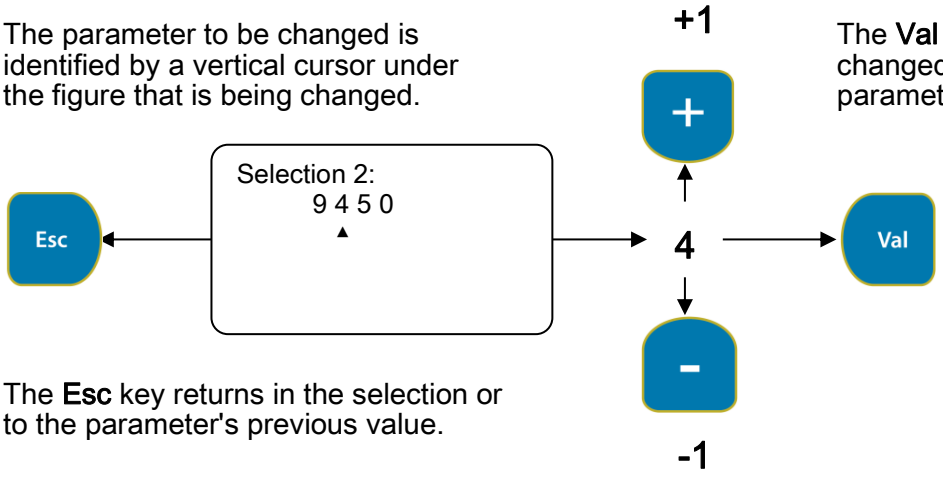


The **Esc** key goes back in the settings or to the previous menu.

The **Minus** key selects the lower function to be changed. A cursor indicates the desired choice.

The parameter to be changed is identified by a vertical cursor under the figure that is being changed.

The **Val** key confirms the changed value for the parameter.



The **Esc** key returns in the selection or to the parameter's previous value.

7.2. Control Menus

The **"Diomède"** has several control menus. All the values are preset at initialisation and can be changed by the user in the 'User', 'Technician' and 'Factory' menus. The **"Diomède"** is delivered with no access restrictions to the different menus so that all the adjustable factors can be changed during commissioning.

INFORMATION

It is important to read this manual before making any changes to the settings in the Factory and Technician menus. Incorrect use can lead to operational anomalies.

7.3. Access Codes

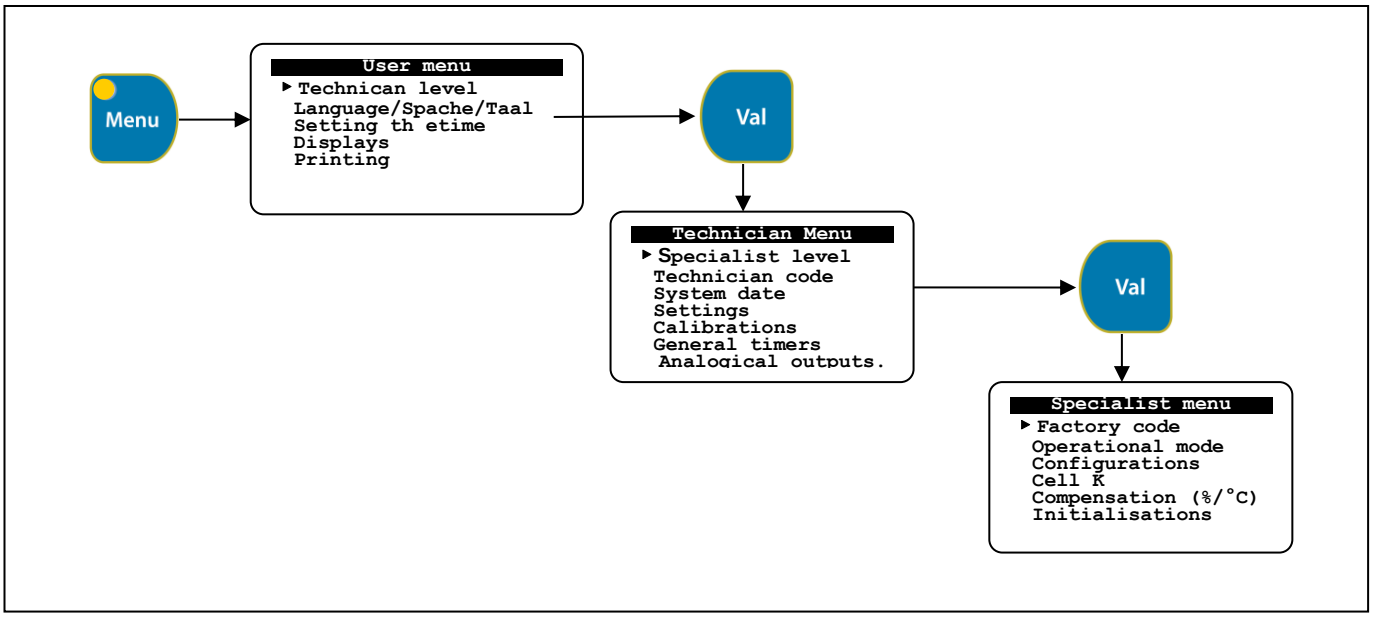
Access to the Technician and Factory menus can be prevented by using a different password for each menu. The **"Diomède"** is delivered without password thereby allowing unrestricted access to all its functions. When a password is programmed for one of the menus, access becomes password controlled. By ascendance, if access to the Technician is protected, access to the Factory menu is also restricted.

INFORMATION

Programming a password requires that the password is known. If it is forgotten, the system is locked and you have to contact the nearest BWT PERMO agency for an intervention.

8. OVERVIEW OF CONTROL MENU

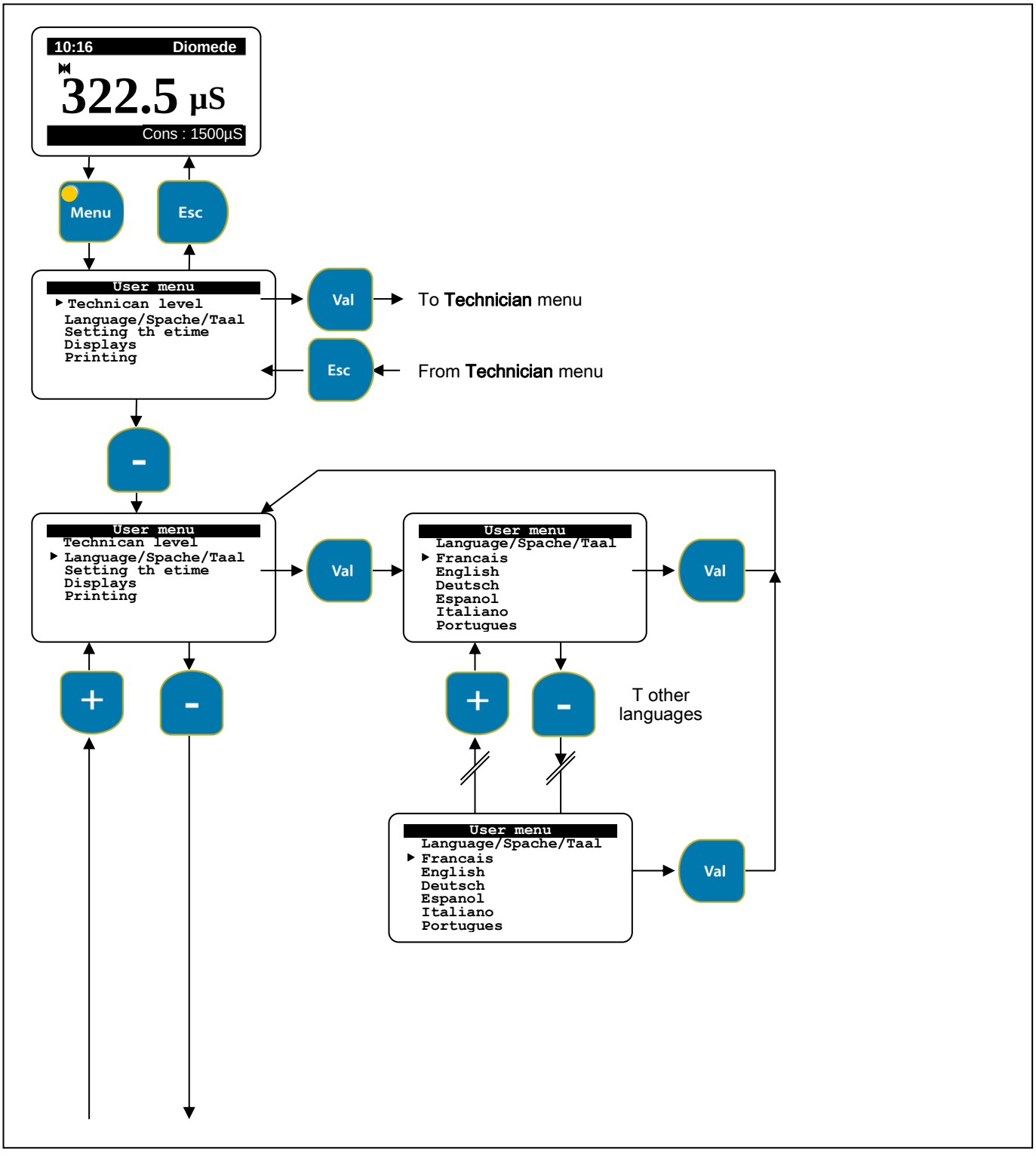
8.1. Overview of the different successive menus



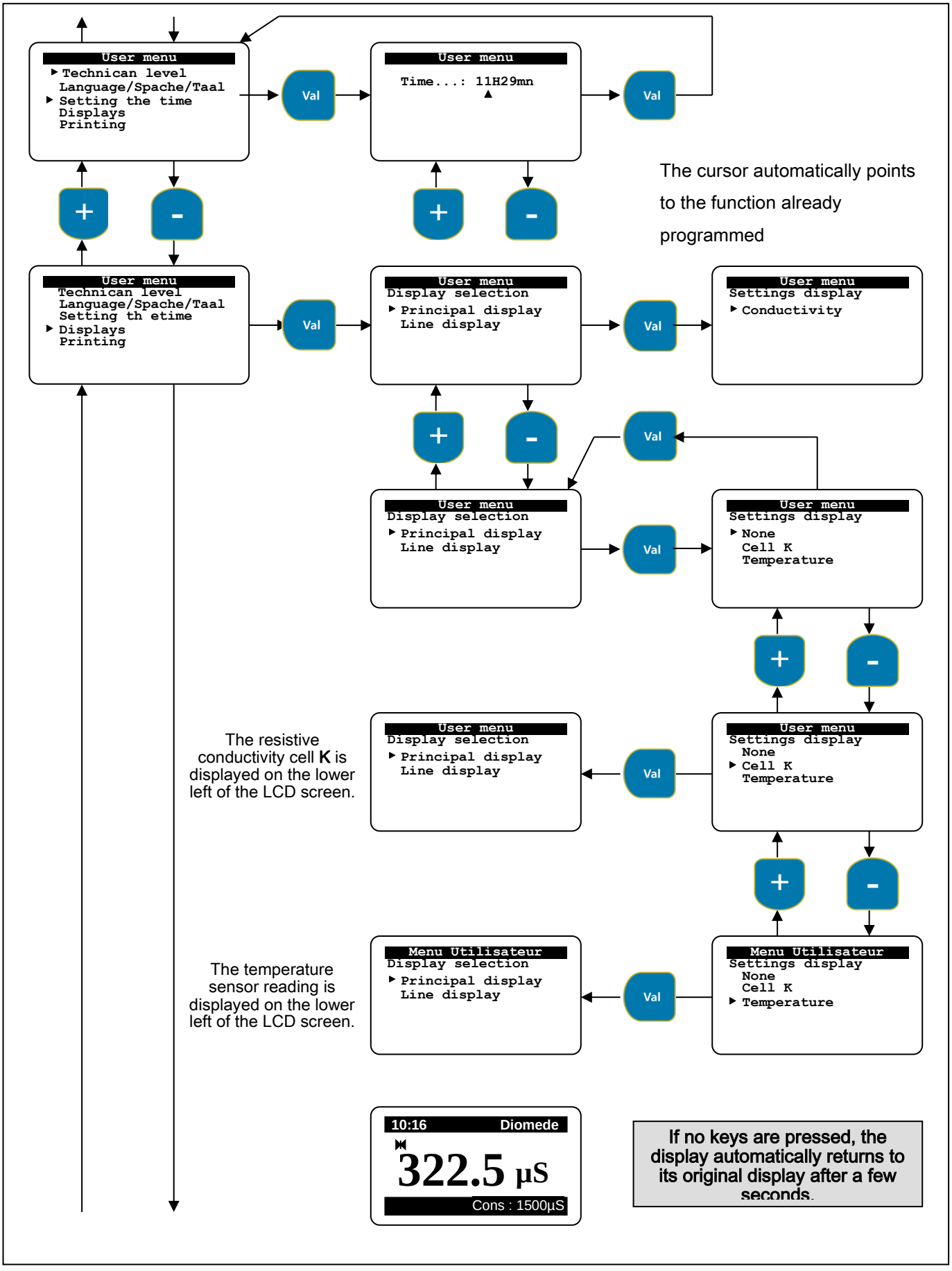
INFORMATION

The different settings menus are explained in the following sections.

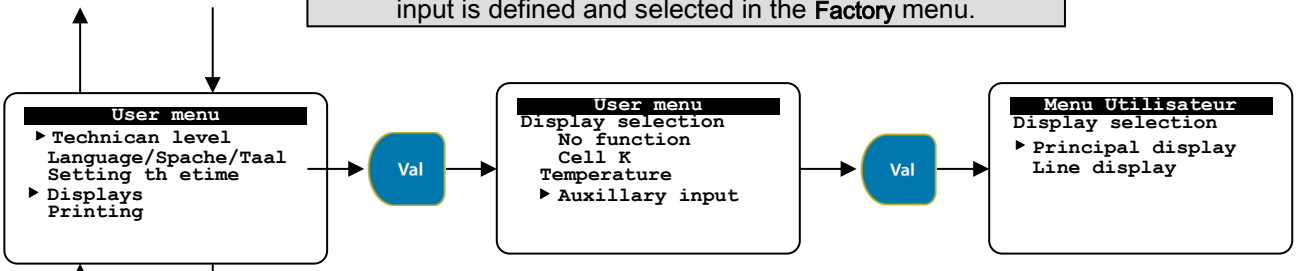
8.2. Overview of User menu

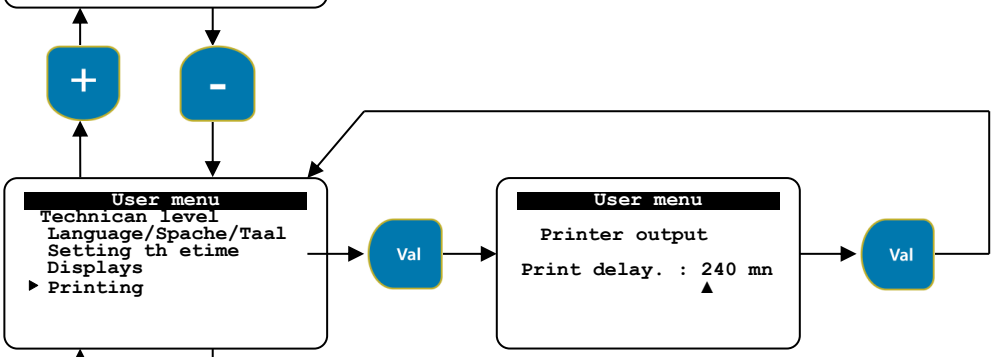


Control


User menu
Technican level
Language/Spache/Taal
Setting the time
Displays
Printing
Val
User menu
Time...: 11H29mn
Val
+
-
+
-
The cursor automatically points to the function already programmed
User menu
Technican level
Language/Spache/Taal
Setting th etime
Displays
Printing
Val
User menu
Display selection
Principal display
Line display
Val
User menu
Settings display
Conductivity
+
-
Val
User menu
Display selection
Principal display
Line display
Val
User menu
Settings display
None
Cell K
Temperature
+
-
The resistive conductivity cell K is displayed on the lower left of the LCD screen.
User menu
Display selection
Principal display
Line display
Val
User menu
Settings display
None
Cell K
Temperature
+
-
The temperature sensor reading is displayed on the lower left of the LCD screen.
Menu Utilisateur
Display selection
Principal display
Line display
Val
Menu Utilisateur
Settings display
None
Cell K
Temperature
10:16 Diomede
322.5 µS
Cons : 1500µS
If no keys are pressed, the display automatically returns to its original display after a few seconds.

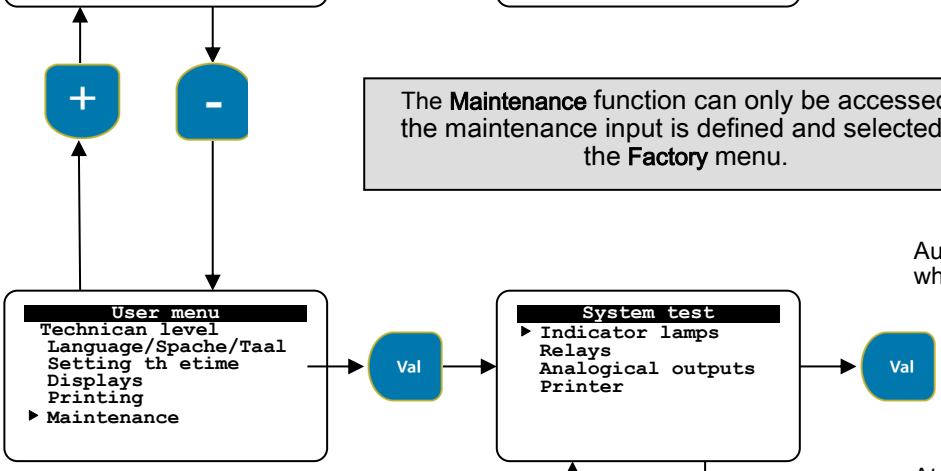
The **Auxiliary input** function can only be accessed if the auxiliary input is defined and selected in the **Factory** menu.





The maximum value possible is 240 minutes. A delay of 0 minutes invalidates the printer output.

The **Maintenance** function can only be accessed if the maintenance input is defined and selected in the **Factory** menu.

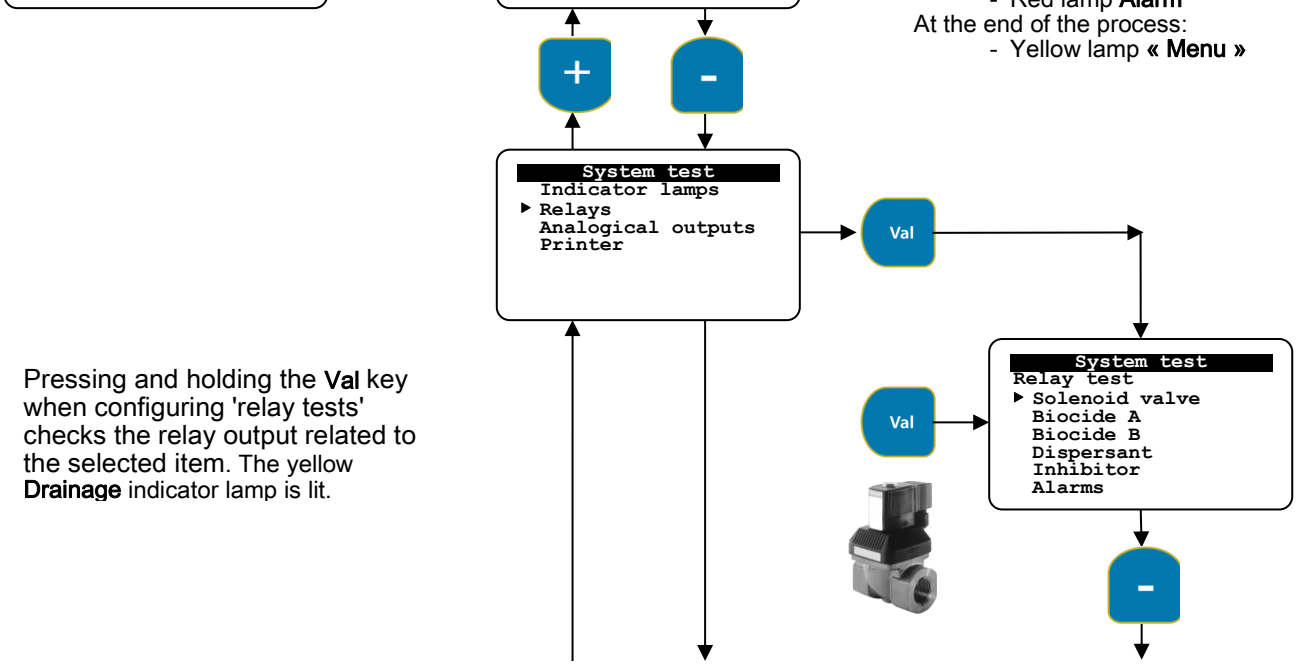


Automatic test of indicator lamps when the **Val** key is pressed.

- Green lamp **M/A**
- Yellow lamp **Menu**
- Yellow lamp **Drainage**
- Yellow lamp **Biocide**
- Yellow lamp **Inhibitor**
- Yellow lamp **Dispersant**
- Red lamp **Alarm**

At the end of the process:

- Yellow lamp **« Menu »**



Pressing and holding the **Val** key when configuring 'relay tests' checks the relay output related to the selected item. The yellow **Drainage** indicator lamp is lit.

Control

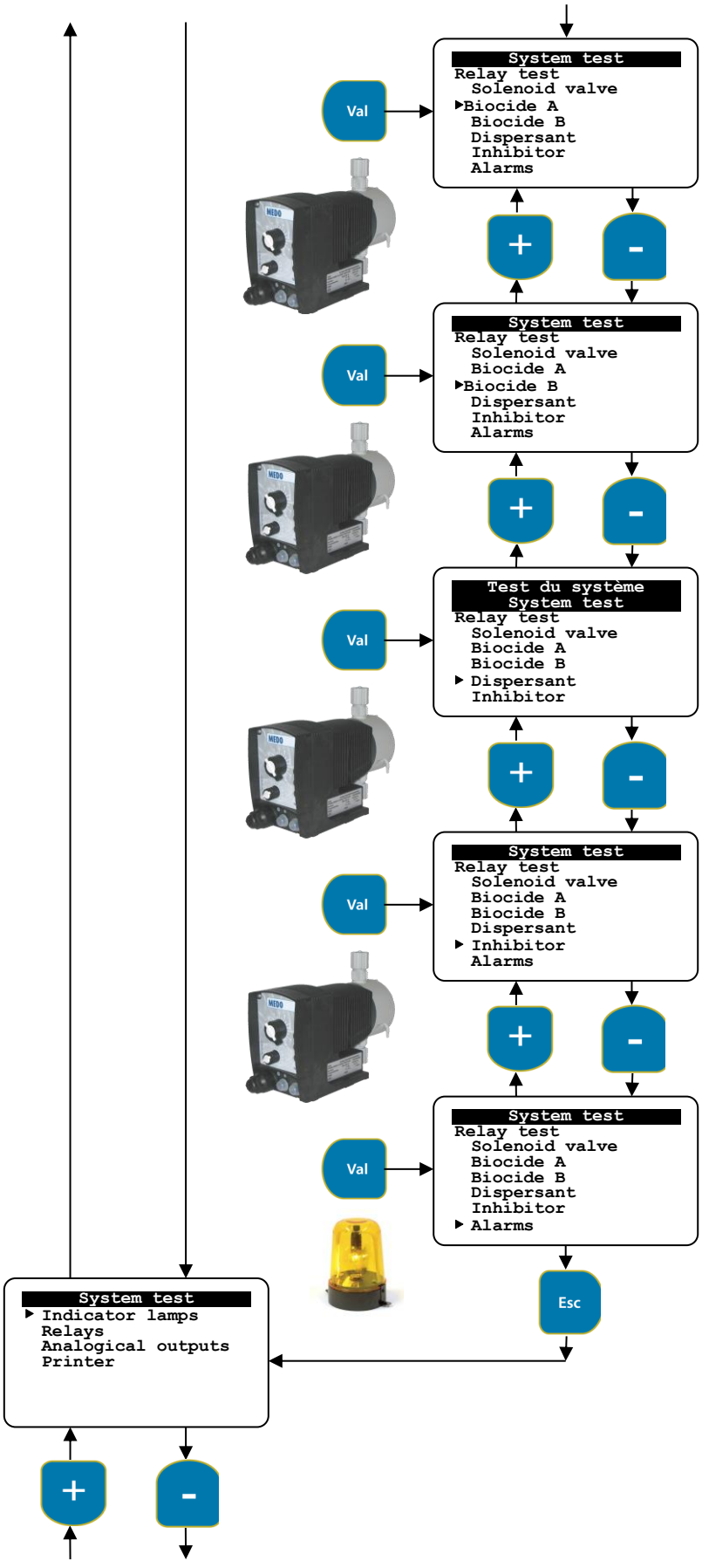
Pressing and holding the **Val** key when configuring 'relay tests' checks the relay output related to the selected item. The yellow **Biocide** indicator lamp is lit.

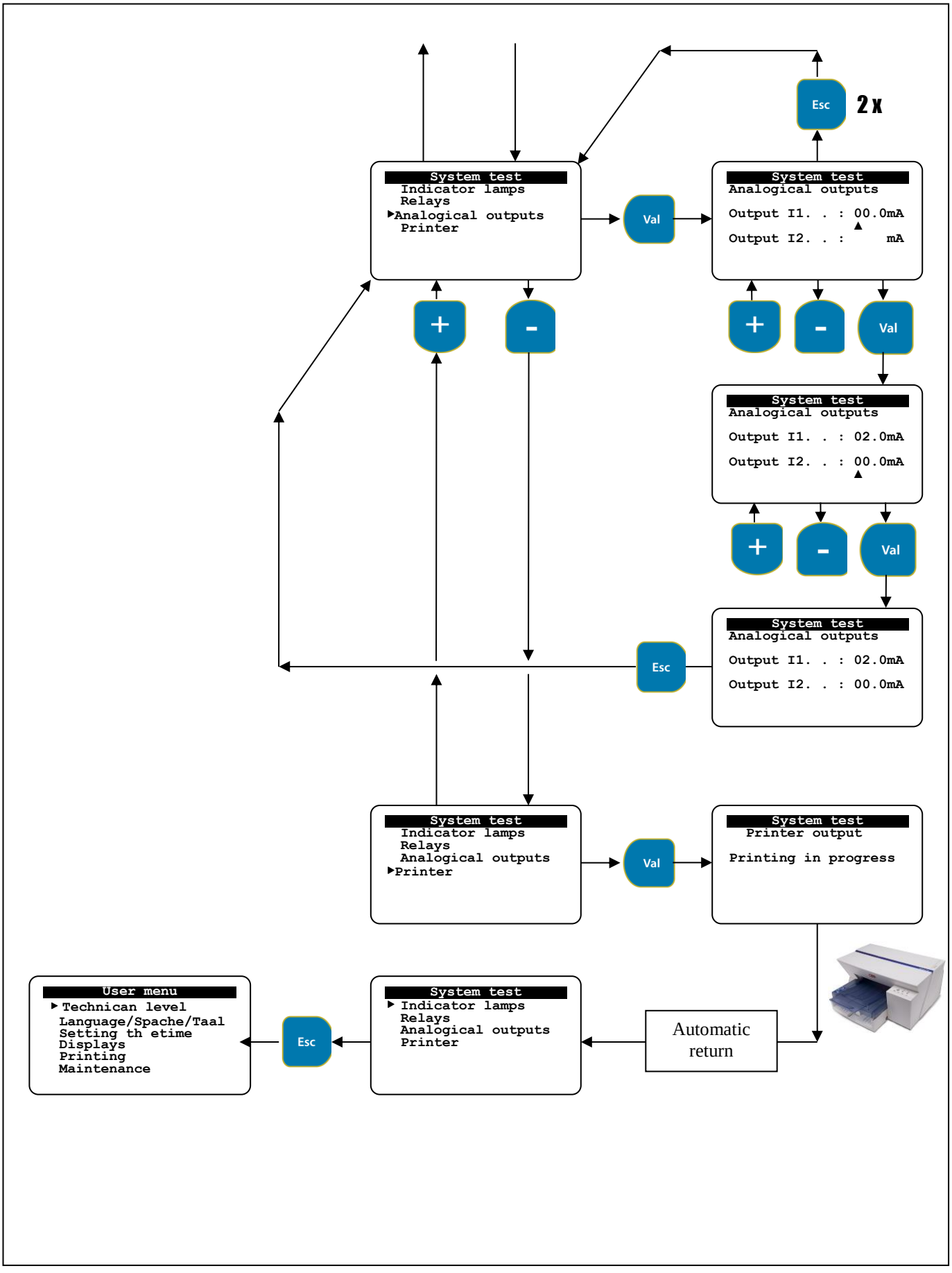
Pressing and holding the **Val** key when configuring 'relay tests' checks the relay output related to the selected item. The yellow **Biocide** indicator lamp is lit.

Pressing and holding the **Val** key when configuring 'relay tests' checks the relay output related to the selected item. The yellow **Dispersant** indicator lamp is lit.

Pressing and holding the **Val** key when configuring 'relay tests' checks the relay output related to the selected item. The yellow **Inhibitor** indicator lamp is lit.

Pressing and holding the **Val** key when configuring 'relay tests' checks the relay output related to the selected item. The yellow **Alarm** indicator lamp is lit.




Esc
2 x
System test
Indicator lamps
Relays
▸Analogical outputs
Printer
Val
System test
Analogical outputs
Output I1. . : 00.0mA
Output I2. . : mA
+
-
Val
System test
Analogical outputs
Output I1. . : 02.0mA
Output I2. . : 00.0mA
+
-
Val
System test
Analogical outputs
Output I1. . : 02.0mA
Output I2. . : 00.0mA
Esc
System test
Indicator lamps
Relays
Analogical outputs
▸Printer
Val
System test
Printer output
Printing in progress
User menu
▸ Technican level
Language/Spache/Taal
Setting th etime
Displays
Printing
Maintenance
Esc
System test
▸ Indicator lamps
Relays
Analogical outputs
Printer
Automatic return

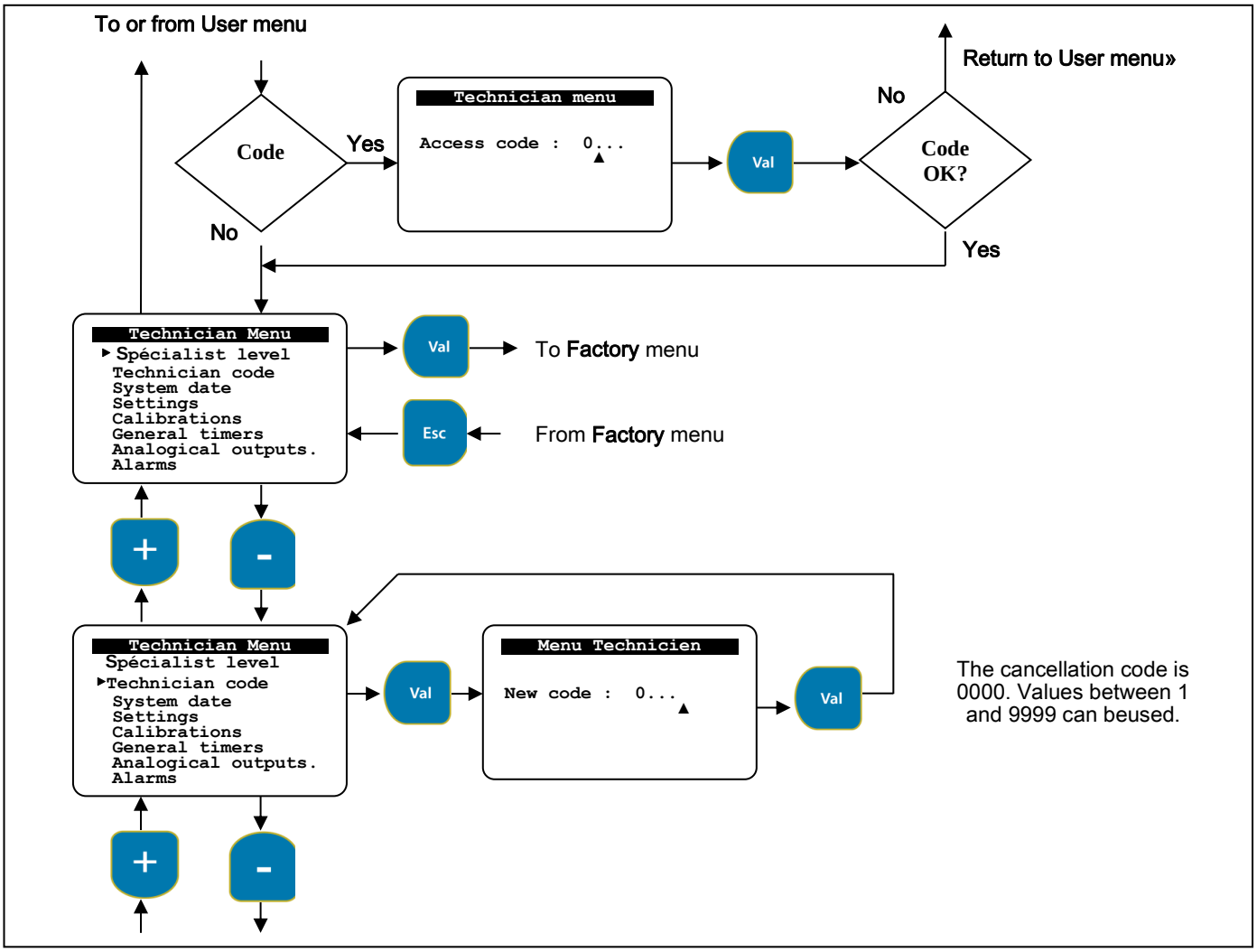
To simulate the 0/20mA analogical outputs, enter an output current value and confirm. Once confirmed, the current is applied to the corresponding output.
Any current value between 0 and 20mA can be simulated. The cursor is faded after each confirmation. During this period, pressing the ESC key exits the simulation programme.

Conducting a printing test requires a series printer with the following programming characteristics:
- RS232C format
- 8 bits, without parity, 1 'start' bit and 1 'stop' bit.
- Transmission speed: 1200 baud.

INFORMATION

Reminder: maintenance tests are only accessible if this function has been authorised in the Factory menu.
If this has not been done, the Maintenance message is not displayed.

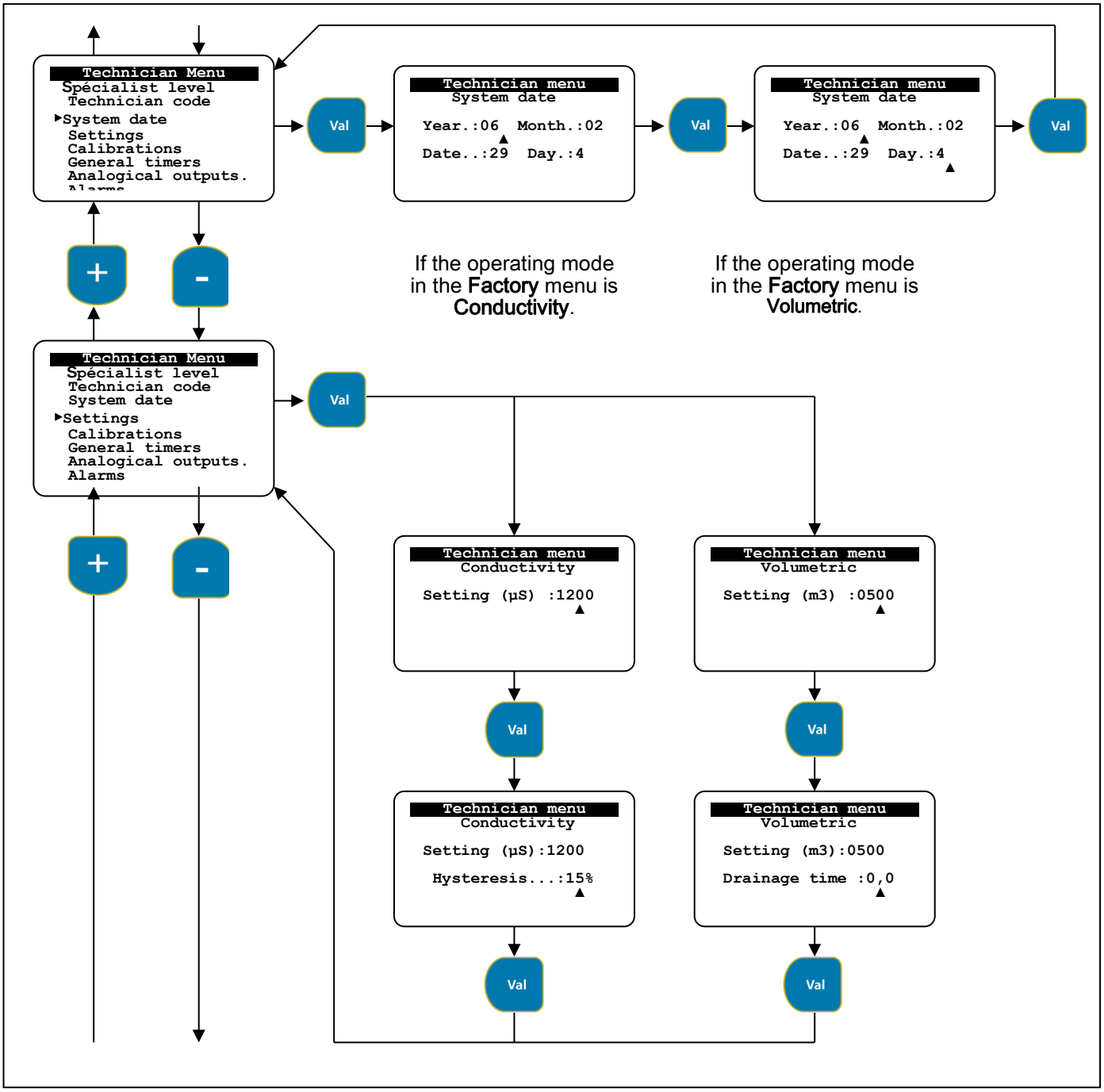
8.3. Overview of Technician menu



Access to the Technician menu can be controlled by an access code! The corresponding functions are otherwise inaccessible and can not be changed.
In order to change or cancel the access code, it has to be used to enter the Technician menu than access the 'technician code' line to change or cancel it. Remember, 0000 is the cancellation code.

IMPORTANT

- *If an access code is used for the technician level, then access to the Factory level is also protected!*
- *Be careful to note the code entered. If it is forgotten, a BWT PERMO technician will have to make an intervention!*



System date:

The system date must be entered carefully. This information is necessary to ensure that the internal clocks used in the deconcentration procedures function correctly.
Enter the year (e.g.: 2007), the month (from 1 to 12), the day of the month (1 to 28, 29, 30 or 31) and, lastly, the day of the week (from 1 to 7).
The programme automatically manages leap years and the number of days per month (30/31days).

Deconcentration settings:

IMPORTANT

The deconcentration settings depend on the operating mode programmed in the Factory menu. In Conductivity mode, the setting is expressed in µS , in volumetric mode, it is expressed in m³ .

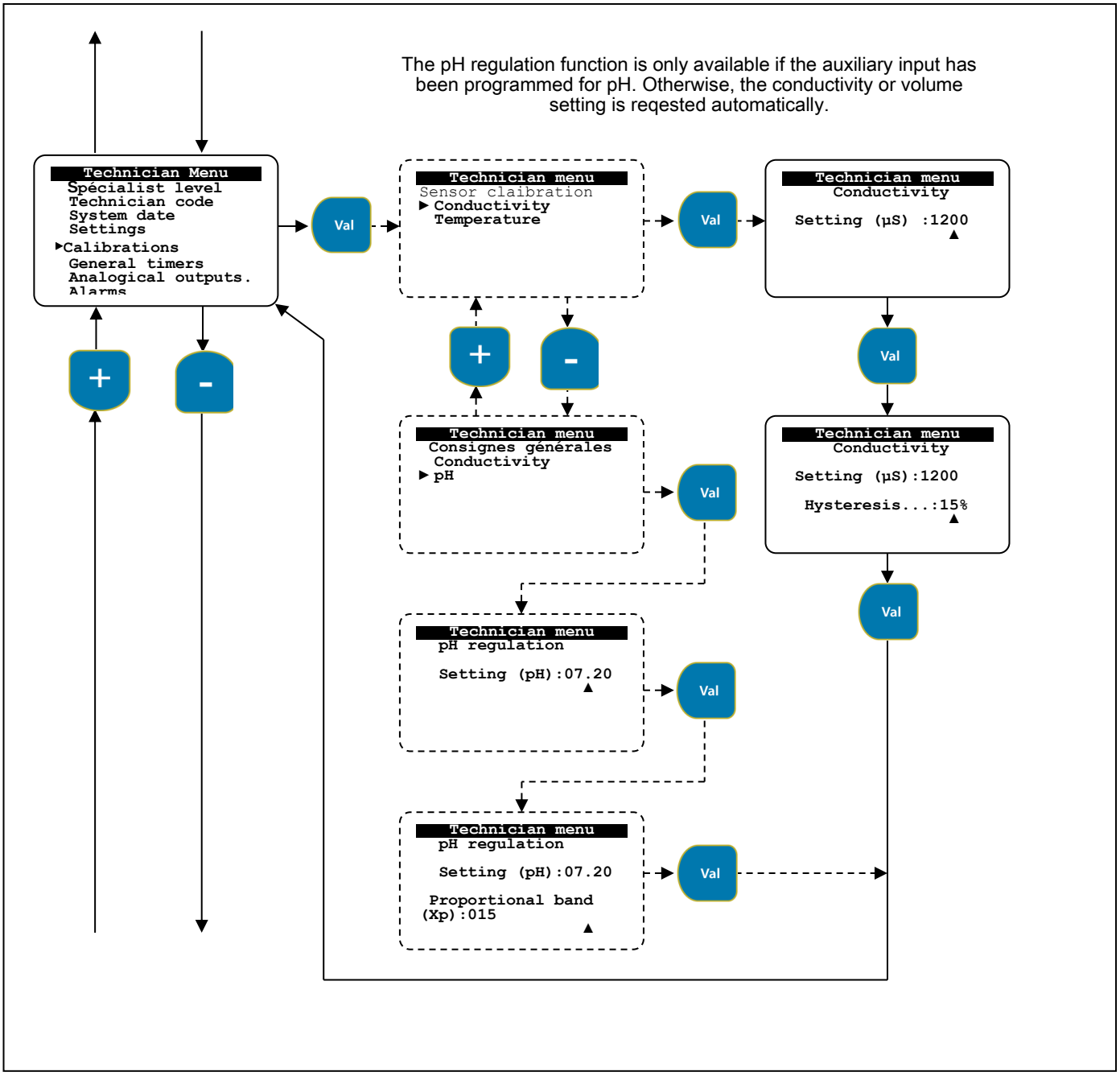
Operating parameters for deconcentration settings:

Parameter	Description of Conductivity mode	Range
Setting (µS)	The menu displays the setting already programmed. It is the high value at which the deconcentration valve opens.	0 to 4999 µS/cm
Hysteresis (%)	The low value at which the deconcentration valve closes. It is calculated by the microprocessor. e.g.: If the setting is 1200µS with hysteresis at 10%, the value which closes the valve will be: 1200µS x 10% = 120, thus 1200 – 120 = 1080 µS/cm.	0 to 29%

Parameter	Description of Volumetric mode	Range
Setting (m^3)	The menu displays the setting already programmed. It is the high value at which the deconcentration valve opens. When the deconcentration valve closes, the volume setting is subtracted from the cumulative volume. The cumulative volume is displayed on the permanent display.	0 to 4,999 m^3
Drainage time (s)	This is the time during which the drainage valve stays open once the volumetric threshold is reached. This time corresponds to a given quantity of water drained.	00h00 to 99h59

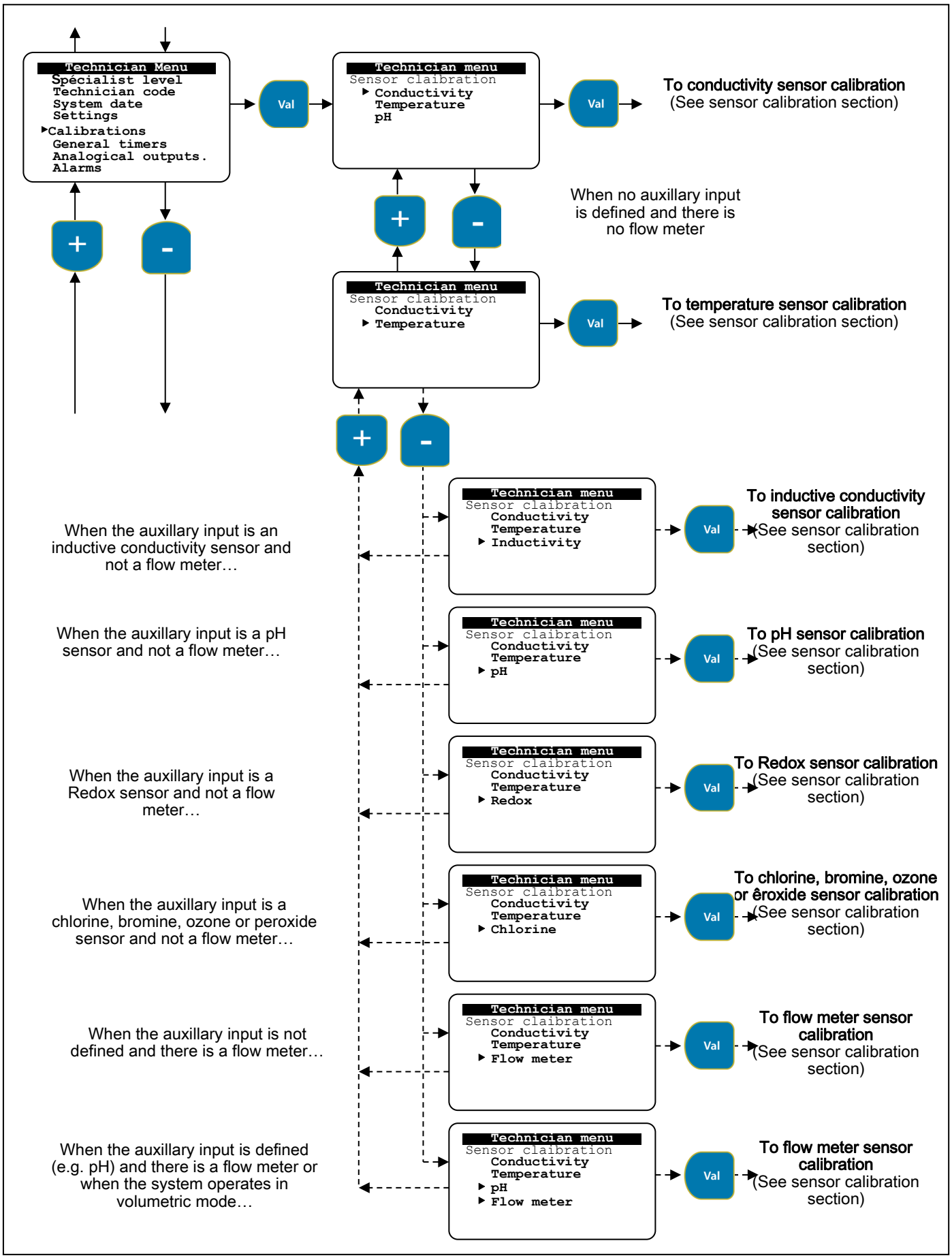
INFORMATION

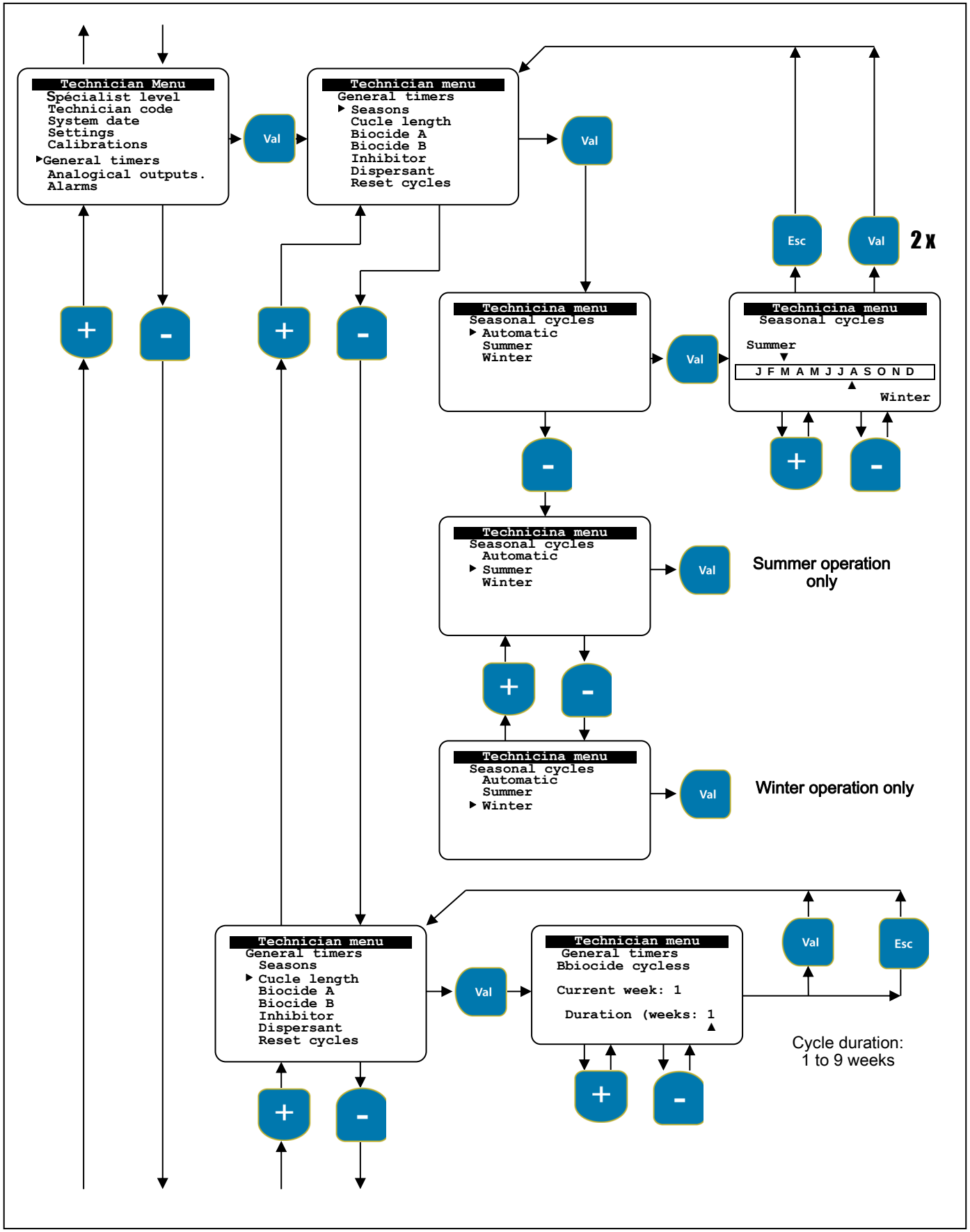
If the user or an external instruction stops the equipment during the drainage cycle, the deconcentration valve closes and the cycle is suspended.
When the equipment is restarted, the cycle continues.



pH setting in the auxiliary value regulator:

Parameter	Description of pH regulator	Range
Setting (pH)	The menu displays the setting already programmed. This is the level at which the regulator sets the pH for the water in the cooling tower.	00.00 - 14.00 pH
Proportional band (Xp)	This is the definition factor for the proportional range. A factor of 1 equals the measurement scale. A factor of 100 equals 100 x the measurement scale or a pH value of 0.14 for the regulator's maximum action.	1 - 255


Technician Menu
Spécialist level
Technician code
System date
Settings
Calibrations
General timers
Analogical outputs.
Alarms
Val
Technician menu
Sensor claibration
Conductivity
Temperature
pH
Val
To conductivity sensor calibration
(See sensor calibration section)
+
-
When no auxillary input is defined and there is no flow meter
Technician menu
Sensor claibration
Conductivity
Temperature
Val
To temperature sensor calibration
(See sensor calibration section)
+
-
When the auxillary input is an inductive conductivity sensor and not a flow meter…
Technician menu
Sensor claibration
Conductivity
Temperature
Inductivity
Val
To inductive conductivity sensor calibration
(See sensor calibration section)
When the auxillary input is a pH sensor and not a flow meter…
Technician menu
Sensor claibration
Conductivity
Temperature
pH
Val
To pH sensor calibration
(See sensor calibration section)
When the auxillary input is a Redox sensor and not a flow meter…
Technician menu
Sensor claibration
Conductivity
Temperature
Redox
Val
To Redox sensor calibration
(See sensor calibration section)
When the auxillary input is a chlorine, bromine, ozone or peroxide sensor and not a flow meter…
Technician menu
Sensor claibration
Conductivity
Temperature
Chlorine
Val
To chlorine, bromine, ozone or êroxide sensor calibration
(See sensor calibration section)
When the auxillary input is not defined and there is a flow meter…
Technician menu
Sensor claibration
Conductivity
Temperature
Flow meter
Val
To flow meter sensor calibration
(See sensor calibration section)
When the auxillary input is defined (e.g. pH) and there is a flow meter or when the system operates in volumetric mode…
Technician menu
Sensor claibration
Conductivity
Temperature
pH
Flow meter
Val
To flow meter sensor calibration
(See sensor calibration section)


Technician Menu
Spécialist level
Technician code
System date
Settings
Calibrations
General timers
Analogical outputs.
Alarms
Val
Technician menu
General timers
Seasons
Cucle length
Biocide A
Biocide B
Inhibitor
Dispersant
Reset cycles
Val
Esc
Val
2 x
+
-
+
-
Technicina menu
Seasonal cycles
Automatic
Summer
Winter
Val
Technicina menu
Seasonal cycles
Summer
J F M A M J J A S O N D
Winter
+
-
-
Technicina menu
Seasonal cycles
Automatic
Summer
Winter
Val
Summer operation only
+
-
Technicina menu
Seasonal cycles
Automatic
Summer
Winter
Val
Winter operation only
Technician menu
General timers
Seasons
Cucle length
Biocide A
Biocide B
Inhibitor
Dispersant
Reset cycles
Val
Technician menu
General timers
Bbiocide cycless
Current week: 1
Duration (weeks: 1
Val
Esc
Cycle duration:
1 to 9 weeks
+
-
+
-

Automatic seasonal cycle management::

The **"Diomède"** manages the cycle of the seasons automatically. This function uses the concepts of summer and winter to do this.

The user has to define the periods during which the summer and winter seasons actually occur depending on their latitude.

The **"Diomède"** has 8 summer timers and 8 winter timers for each biocide. This means that between them the biocides have 32 different timers that can be programmed by the user.

Once the 'Automatic' function has been selected, place the cursor on the first month of summer for the region.

Confirm this month then place the winter cursor on the first month of winter for the region_.
Once this has been done, the biocide timers for the different seasons are selected automatically.

Summer only seasonal management:

The automatic season management system is inactive.
The **"Diomède"** only uses the summer timers for biocide injections.

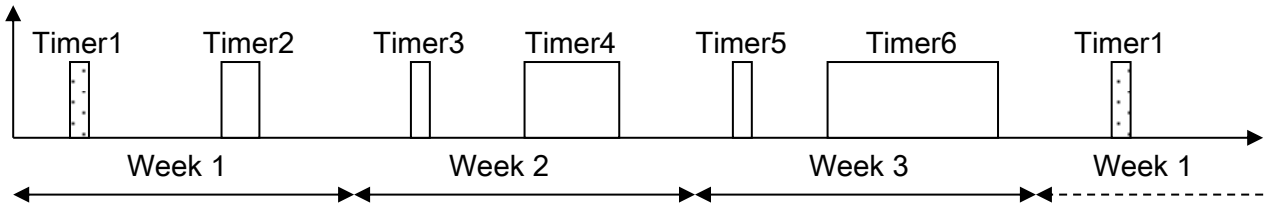
Winter only seasonal management:

The automatic season management system is inactive.
The **"Diomède"** only uses the winter timers for biocide injections.

Managing the duration of biocide cycles:

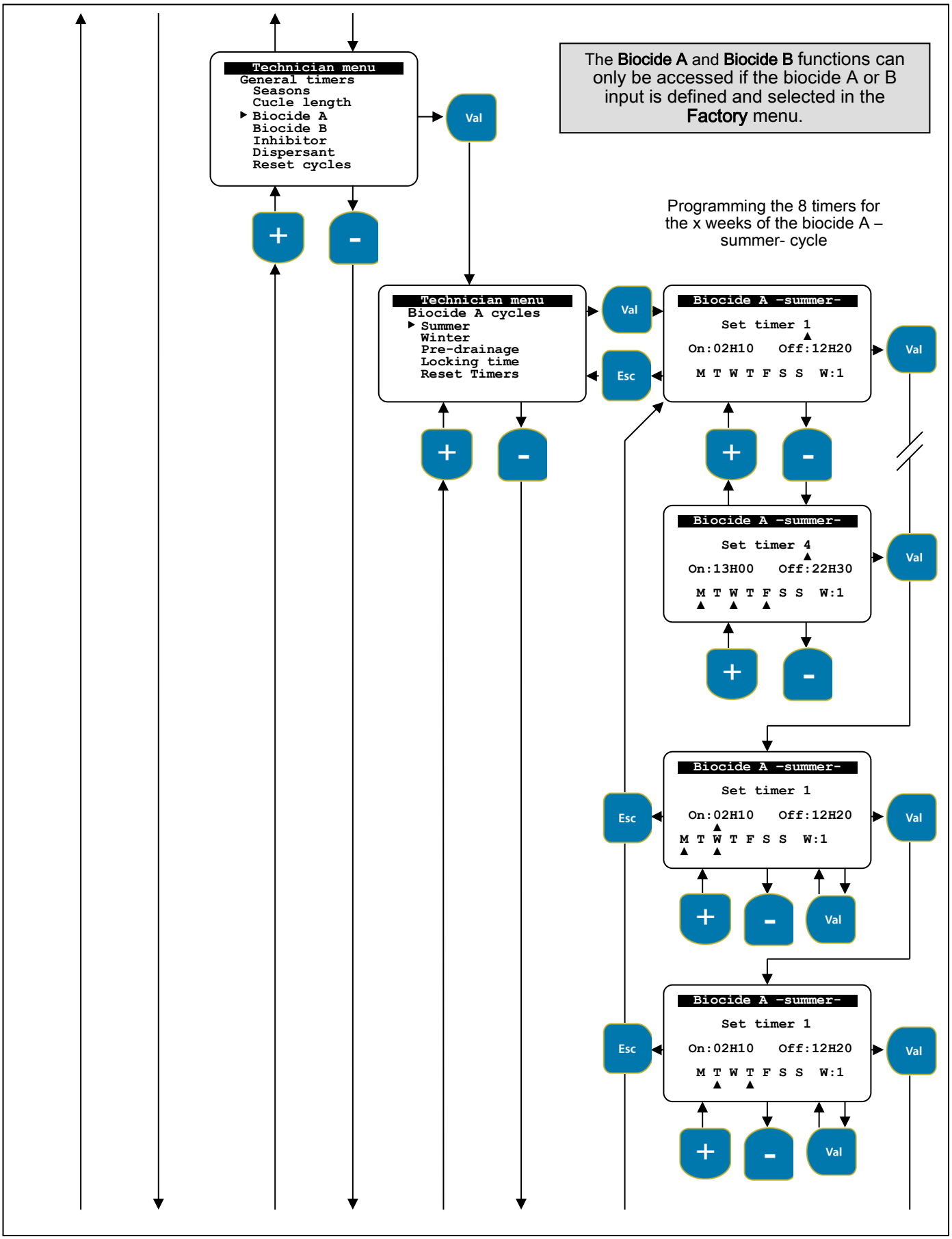
Each biocide has 8 different timers. Each timer can be allocated to a week in a 1 to 9 week cycle.

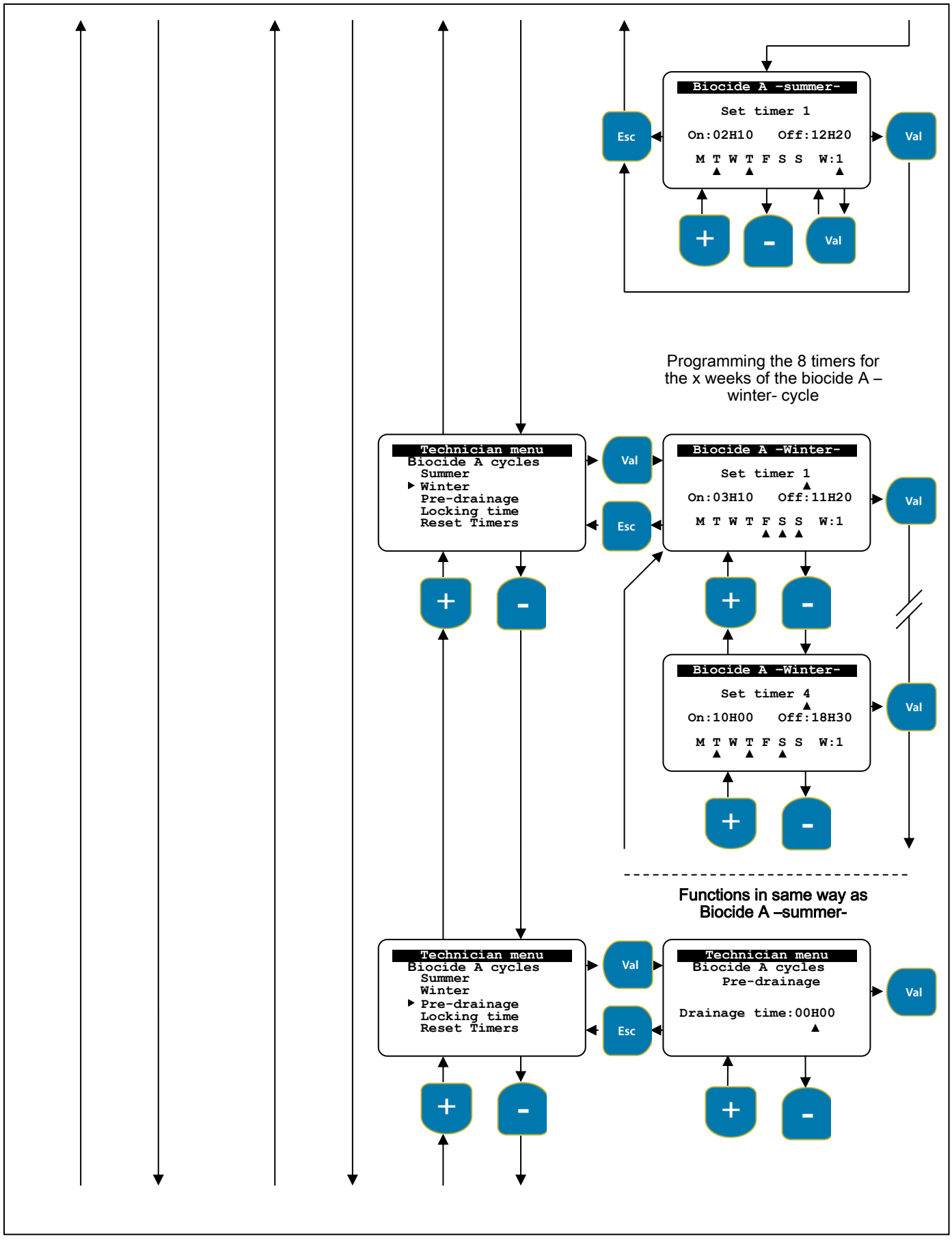
e.g.: You have programmed a 3 week cycle. The timers could be allocated as follows:

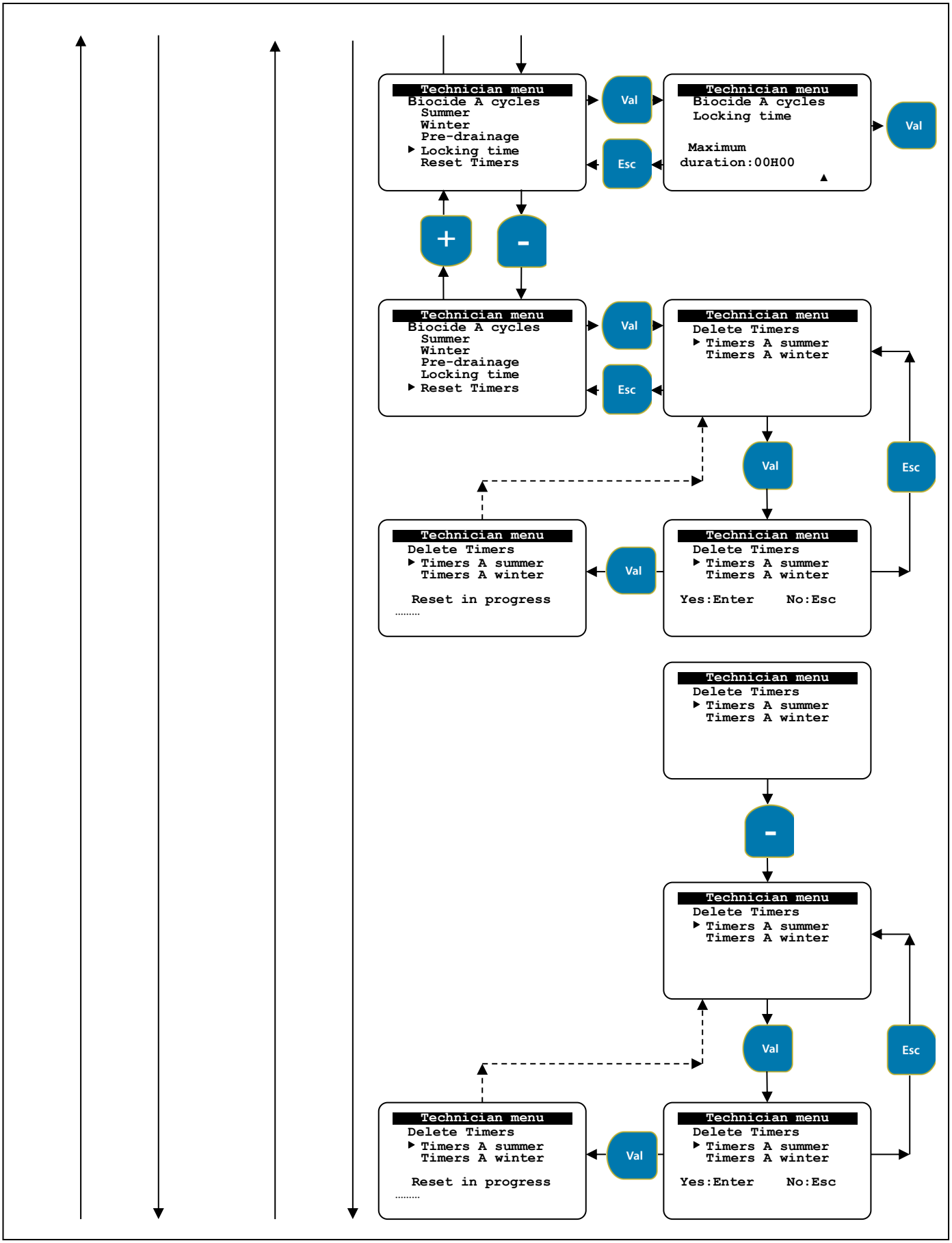


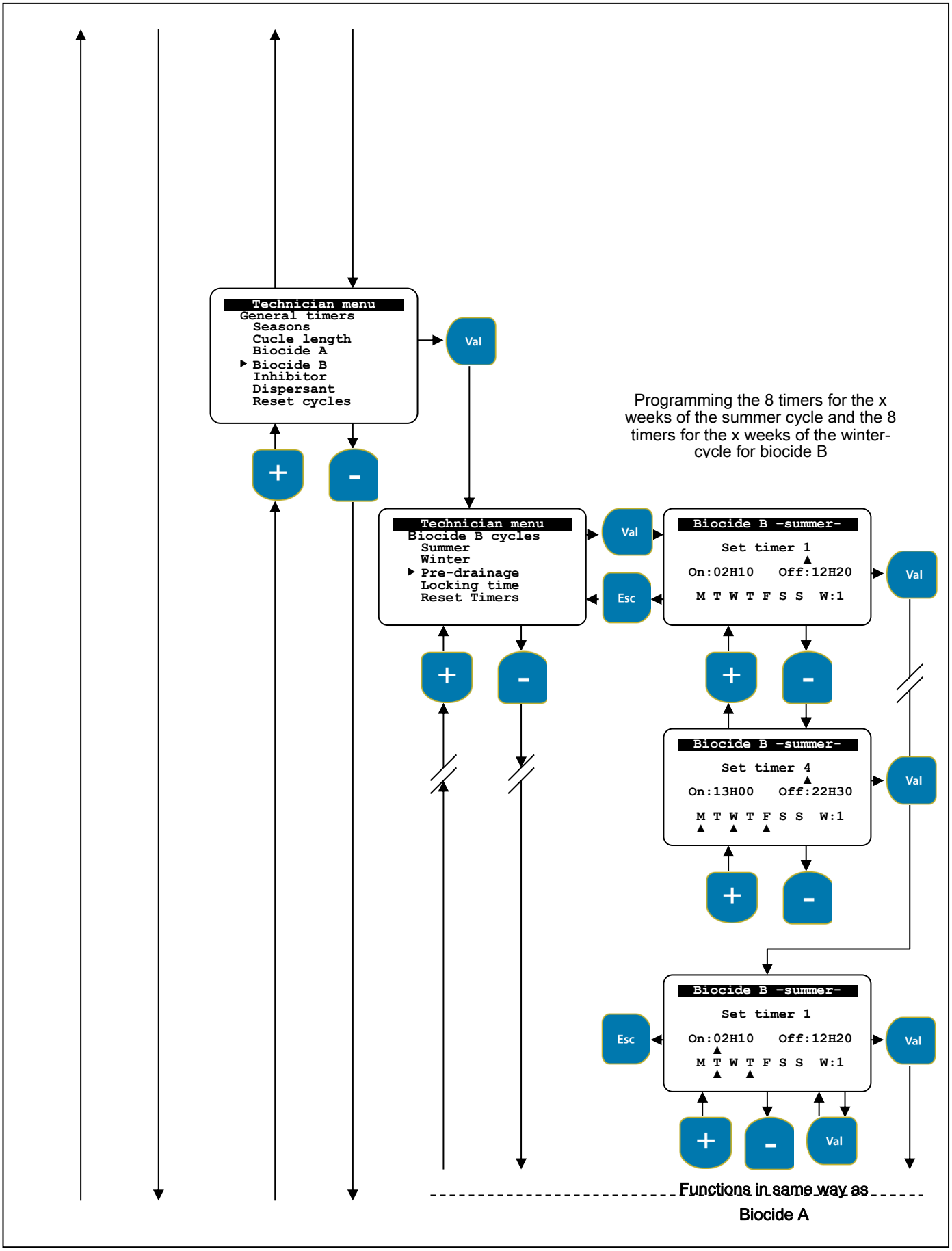
INFORMATION

If the number of weeks is changed, the different timers have to be reprogrammed to allocate them to the relevant active weeks!.
The menus are not available when using biocide A in continuous oxidant regulation mode.


Technician menu
General timers
Seasons
Cucle length
Biocide A
Biocide B
Inhibitor
Dispersant
Reset cycles
Val
+
-
The Biocide A and Biocide B functions can only be accessed if the biocide A or B input is defined and selected in the Factory menu.
Programming the 8 timers for the x weeks of the biocide A – summer- cycle
Technician menu
Biocide A cycles
Summer
Winter
Pre-drainage
Locking time
Reset Timers
Esc
Biocide A -summer-
Set timer 1
On:02H10 Off:12H20
M T W T F S S W:1
Set timer 4
On:13H00 Off:22H30


Biocide A -summer-
Set timer 1
On:02H10 Off:12H20
M T W T F S S W:1
Esc
Val
+
-
Val
Programming the 8 timers for the x weeks of the biocide A – winter- cycle
Technician menu
Biocide A cycles
Summer
Winter
Pre-drainage
Locking time
Reset Timers
Val
Esc
+
-
Biocide A -Winter-
Set timer 1
On:03H10 Off:11H20
M T W T F S S W:1
Val
+
-
Biocide A -Winter-
Set timer 4
On:10H00 Off:18H30
M T W T F S S W:1
Val
+
-
Functions in same way as Biocide A –summer-
Technician menu
Biocide A cycles
Summer
Winter
Pre-drainage
Locking time
Reset Timers
Val
Esc
+
-
Technician menu
Biocide A cycles
Pre-drainage
Drainage time:00H00
Val
+
-


Technician menu
Biocide A cycles
Summer
Winter
Pre-drainage
Locking time
Reset Timers
Val
Esc
Technician menu
Biocide A cycles
Locking time
Maximum
duration:00H00
Val
+
-
Technician menu
Biocide A cycles
Summer
Winter
Pre-drainage
Locking time
Reset Timers
Val
Esc
Technician menu
Delete Timers
Timers A summer
Timers A winter
Val
Esc
Technician menu
Delete Timers
Timers A summer
Timers A winter
Reset in progress
Val
Technician menu
Delete Timers
Timers A summer
Timers A winter
Yes:Enter No:Esc
Technician menu
Delete Timers
Timers A summer
Timers A winter
-
Technician menu
Delete Timers
Timers A summer
Timers A winter
Val
Esc
Technician menu
Delete Timers
Timers A summer
Timers A winter
Reset in progress
Val
Technician menu
Delete Timers
Timers A summer
Timers A winter
Yes:Enter No:Esc


Technician menu
General timers
Seasons
Cucle length
Biocide A
Biocide B
Inhibitor
Dispersant
Reset cycles
Val
+
-
Programming the 8 timers for the x weeks of the summer cycle and the 8 timers for the x weeks of the winter-cycle for biocide B
Technician menu
Biocide B cycles
Summer
Winter
Pre-drainage
Locking time
Reset Timers
Val
Esc
Biocide B -summer-
Set timer 1
On:02H10 Off:12H20
M T W T F S S W:1
Biocide B -summer-
Set timer 4
On:13H00 Off:22H30
M T W T F S S W:1
Biocide B -summer-
Set timer 1
On:02H10 Off:12H20
M T W T F S S W:1
Functions in same way as Biocide A

Programming biocide A and B timers:

IMPORTANT

The biocide A and B timers are only accessible if they have been enabled in the Factory menu.

INFORMATION

A biocide can be stopped without losing the programmes in the different timers. When it is restarted, the timers are once again active.
In order to ensure risk-free operation, use the Reset timers function before any re-programming.

The method of programming is identical for the different timers for each biocide and in their summer and winter modes.

Each timer has the following structure:

Parameter	Description of timers	Range
Set timer x	Indicates the number of the timer being programmed	1 - 8
On	Time biocide injection starts. Expressed in hours and minutes.	00H00 to 23H59
Off	Time biocide injection stops. Expressed in hours and minutes.	00H00 to 23H59
M T W T F S S ▲	Defines the day in the selected week. The selected day flashes in reverse colours during programming. When the plus and minus keys are pressed, a cursor appears to identify the selected day for the timer's operation.	
W=x	Defines the active week in the cycle of weeks. The selected days are only active during the selected week.	1 to x Maximum x = 9

INFORMATION

If the start time 'on' is the same as the stop time 'off,' the timer will not operate the corresponding biocide pump.

Biocide injection conditions:

See section 5: Operational description

For safety and to stabilise measured conductivity and temperature values, biocide injection can not be started during the first 30 seconds after the **"Diomède"** starts receiving electrical power.

Pre-drainage or forced deconcentration before injecting biocide A or B:

INFORMATION

The pre-drainage depends on the "Diomède" operating mode.

The pre-drainage is different for biocide A and biocide B. However, it operates in the same way for both summer and winter modes for the same biocide.

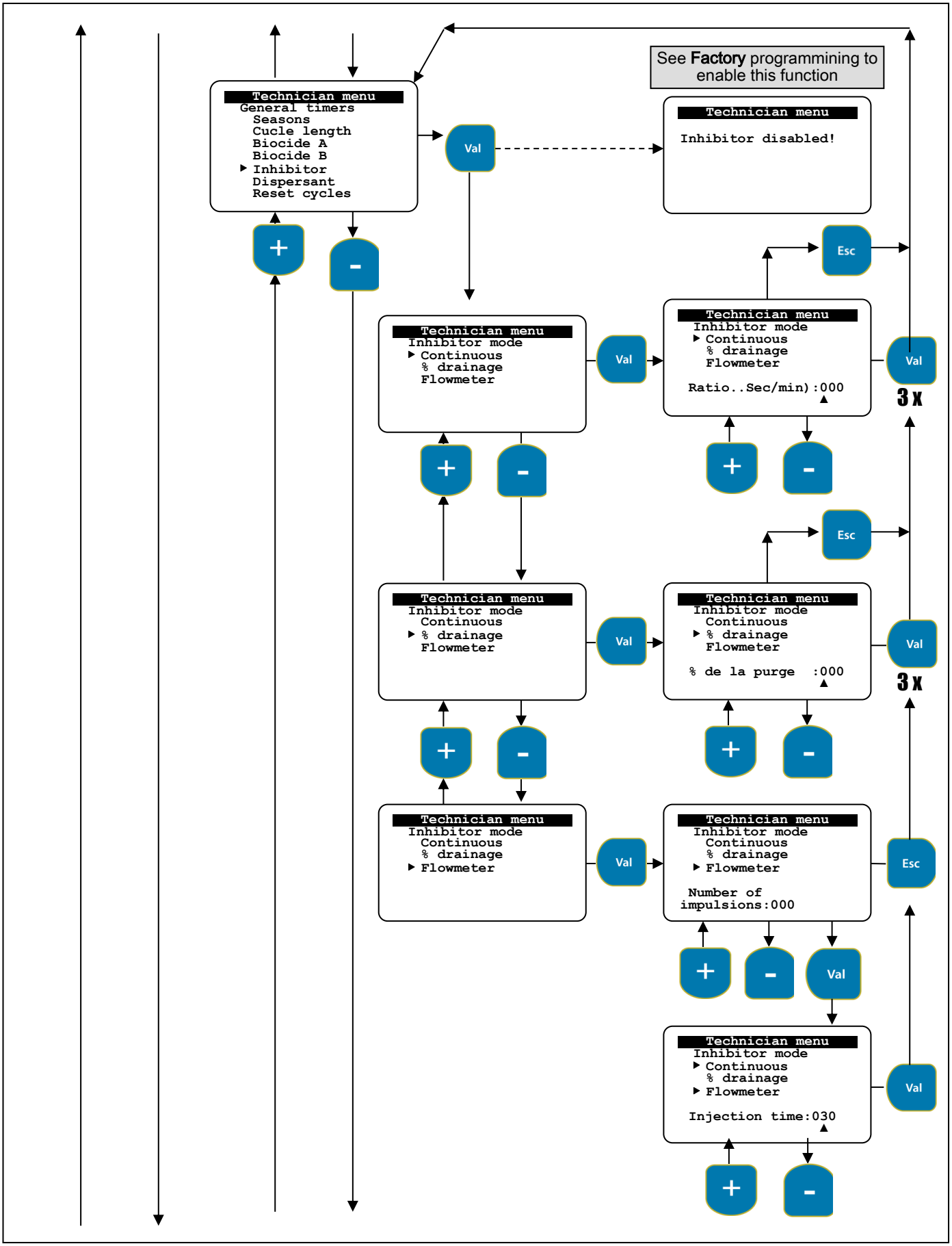
Parameter	Description of pre-drainage in volumetric mode	Range
Pre-drainage	A drainage time is triggered as soon as the biocide cycle starts. This time is expressed on hours and minutes.	0H00 to 3H59

Biocide A or B locking time:

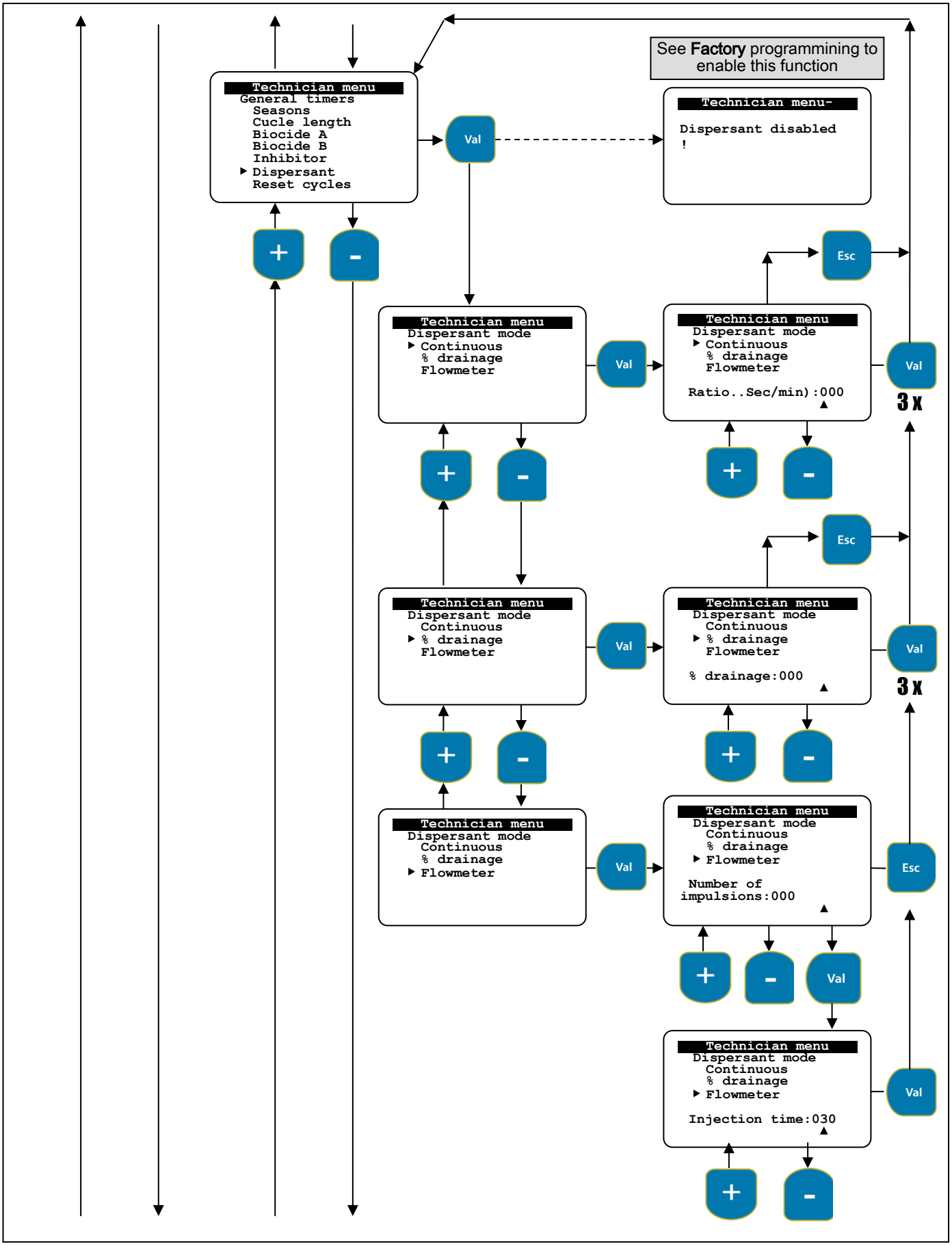
The time that the deconcentration valve is locked is different for biocide A and biocide B. It is identical in winter and summer modes for each biocide.

Parameter	Description of locking time	Range
Duration of locking	The locking time is expressed on hours and minutes. This time locks the deconcentration valve in the shut position after the end of a biocide cycle.	0H00 to 7H59

Control


See Factory programming to enable this function
Technician menu
General timers
Seasons
Cucle length
Biocide A
Biocide B
Inhibitor
Dispersant
Reset cycles
Val
Technician menu
Inhibitor disabled!
Esc
Technician menu
Inhibitor mode
Continuous
% drainage
Flowmeter
Ratio..Sec/min):000
3 x
% de la purge :000
Number of impulsions:000
Injection time:030
+
-

Control


See Factory programming to enable this function
Technician menu
General timers
Seasons
Cucle length
Biocide A
Biocide B
Inhibitor
Dispersant
Reset cycles
Val
Technician menu-
Dispersant disabled
!
+
-
Esc
Technician menu
Dispersant mode
Continuous
% drainage
Flowmeter
Ratio..Sec/min):000
3 x
% drainage:000
Number of impulsions:000
Injection time:030

Inhibitor & dispersant:

The corrosion inhibitor and dispersant can be added by three different operating modes:

- Continuous...
- % of time drainage valve is open…
- Based on a ratio to the number of impulsions from an external contact.

For safety reasons, the inhibitor and dispersant injection can not be started in the first 30 seconds after the **"Diomède"** starts to receive electrical power.
If the deconcentration cycle is active, inhibitor or dispersant injection is delayed.

Continuous mode:

The inhibitor or dispersant is added at regular intervals for regular periods every minute.

Parameter	Description of continuous mode	Range
Continuous	The inhibitor or dispersant are added continuously or at regular intervals. The function is suspended during drainage.	
Ratio	When adding at regular intervals, a ratio of seconds per minute determines the inhibitor or dispersant injection time.	0 to 60s / minute

% deconcentration mode:

Inhibitor or dispersant are added in proportion to the length of time the deconcentration valve is open.

Parameter	Description of % deconcentration mode	Range
% drainage	Inhibitor or dispersant are added after deconcentration in proportion to the length of time the deconcentration valve is open.	
%	The ratio is set as a % between the length of deconcentration and the duration of inhibitor or dispersant addition.	0 - 100%

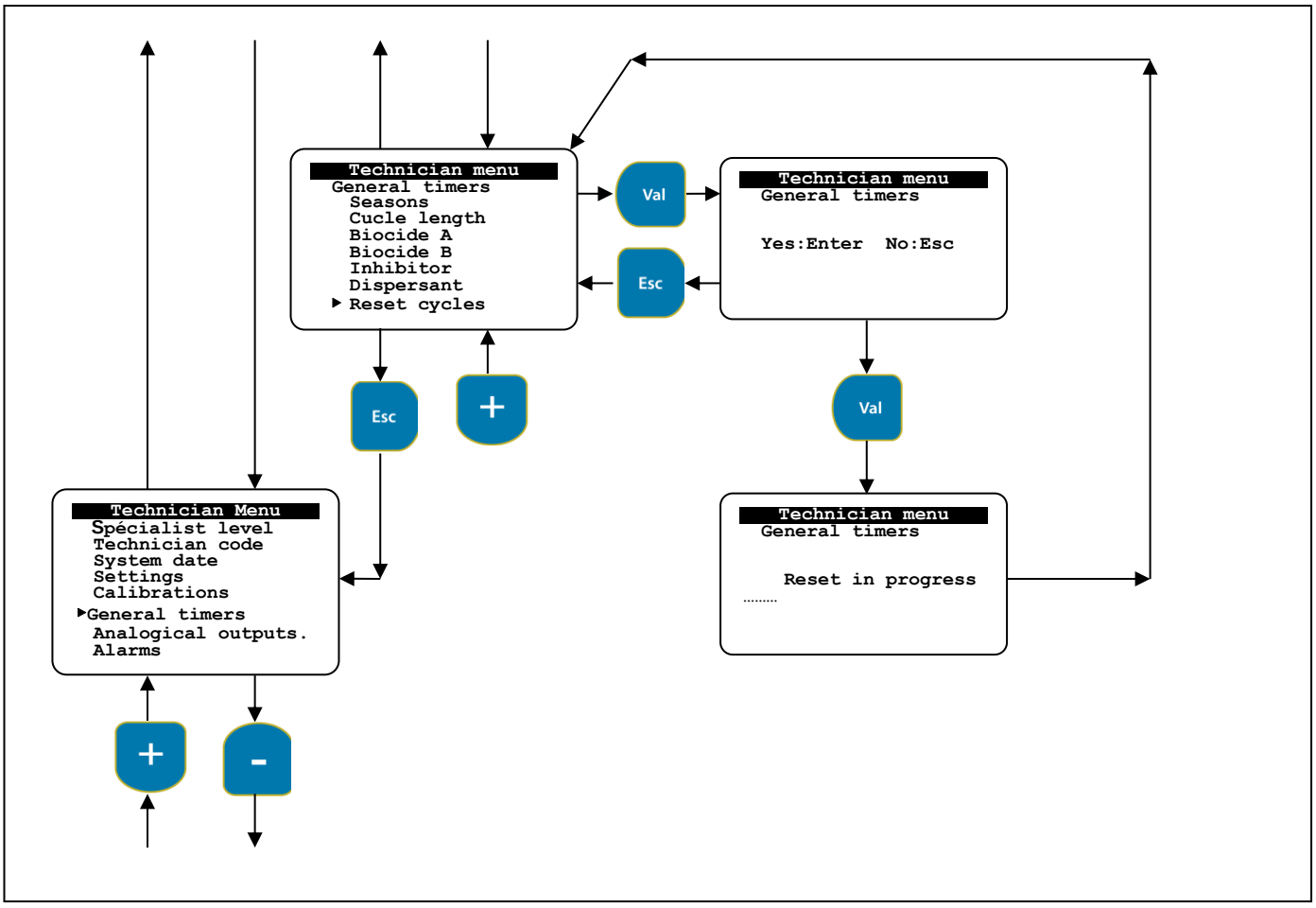
External contact mode:

Inhibitor or dispersant are added following a preset number of impulsions during a defined period.

Parameter	Description of % deconcentration mode	Range
Meter	Inhibitor or dispersant is added when a predefined number of impulsions has been received. When the number of impulsions is reached, inhibitor or dispersant is added for a preset period.	
Number of impulsions	Setting the number of impulsions.	0 - 200
Injection duration	Setting the injection time in seconds.	0 - 99s

INFORMATION

The external contact volumetric mode is only available if the flow meter function is enabled in the Factory menu.



Reset timers:

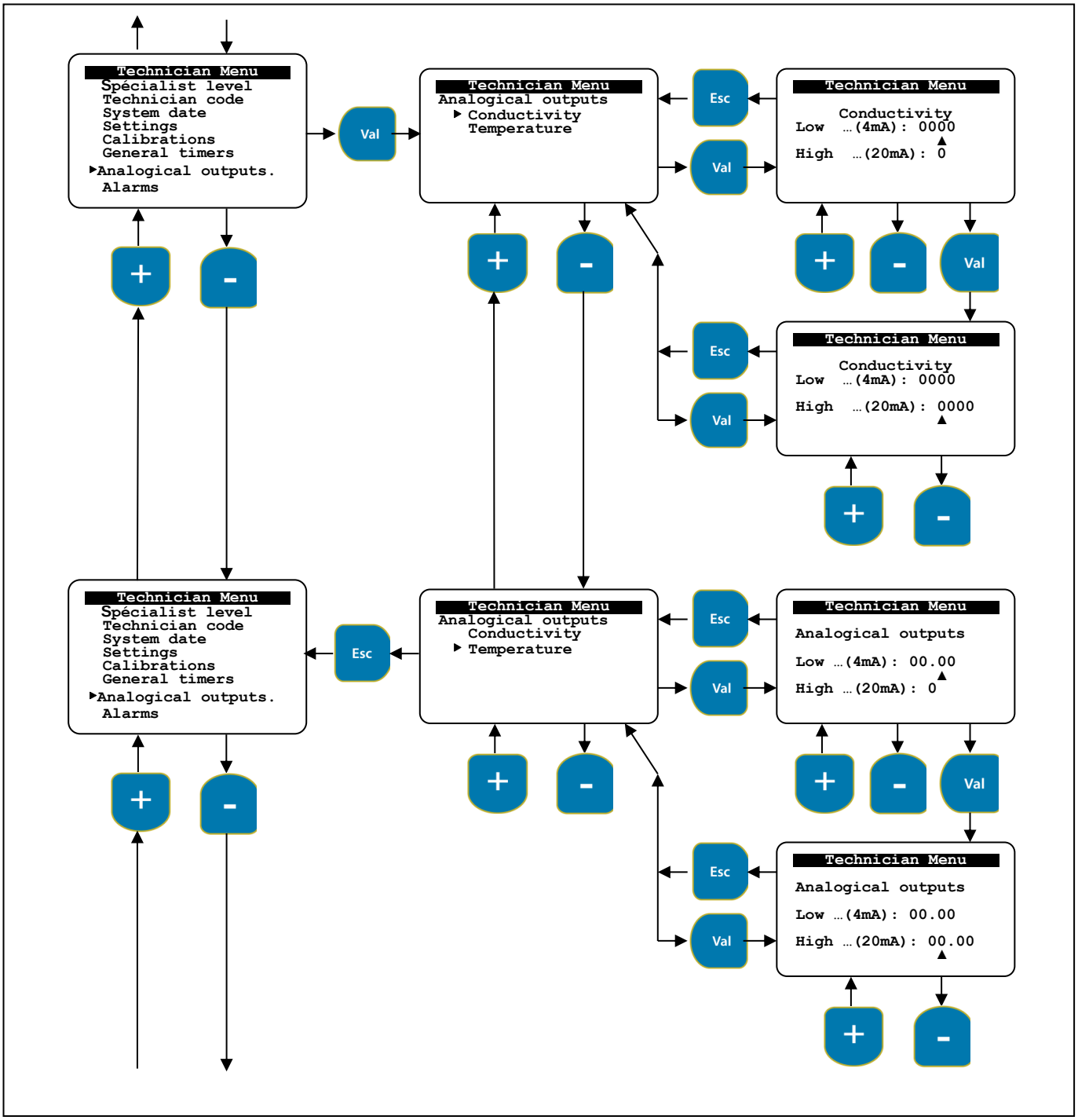
This function resets all the **Timers** to zero.

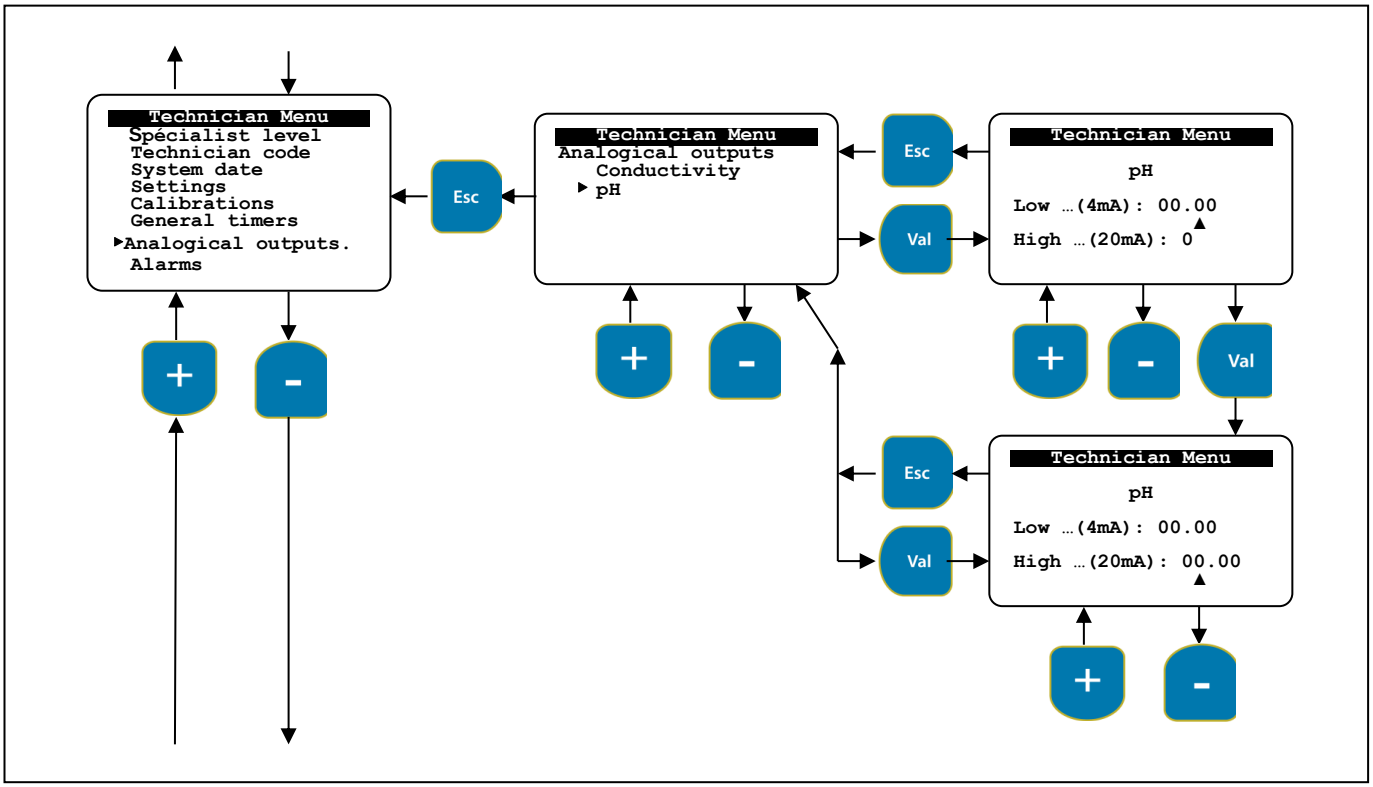
Remember, the **general timers** are:

- Seasons,
- Cycle length,
- Biocide A & Biocide B,
- Inhibitor,
- Dispersant.

The allocation of the 2 analogical outputs depends on the programming done in the **Factory** menu.

If the second analogical output is not allocated, only conductivity can be allocated to output 1. If the second output is allocated, it can be used for temperature or the value allocated to the auxiliary input. The output type (0…20mA ; 4…20mA ; 20…0mA or 20…4mA) is also selected in the **Factory** menu.





Definition of analogical output scales:

The **"Diomède"** has two 0…20mA analogical outputs.
The first analogical output is normally allocated to communicating the conductivity value.
The second can be programmed in the Factory menu. It can communicate either the temperature or the value of the auxiliary input.

The communication mode (0…20mA ; 4…20mA ; 20…0mA or 20…4mA) is also selected in the Factory menu.

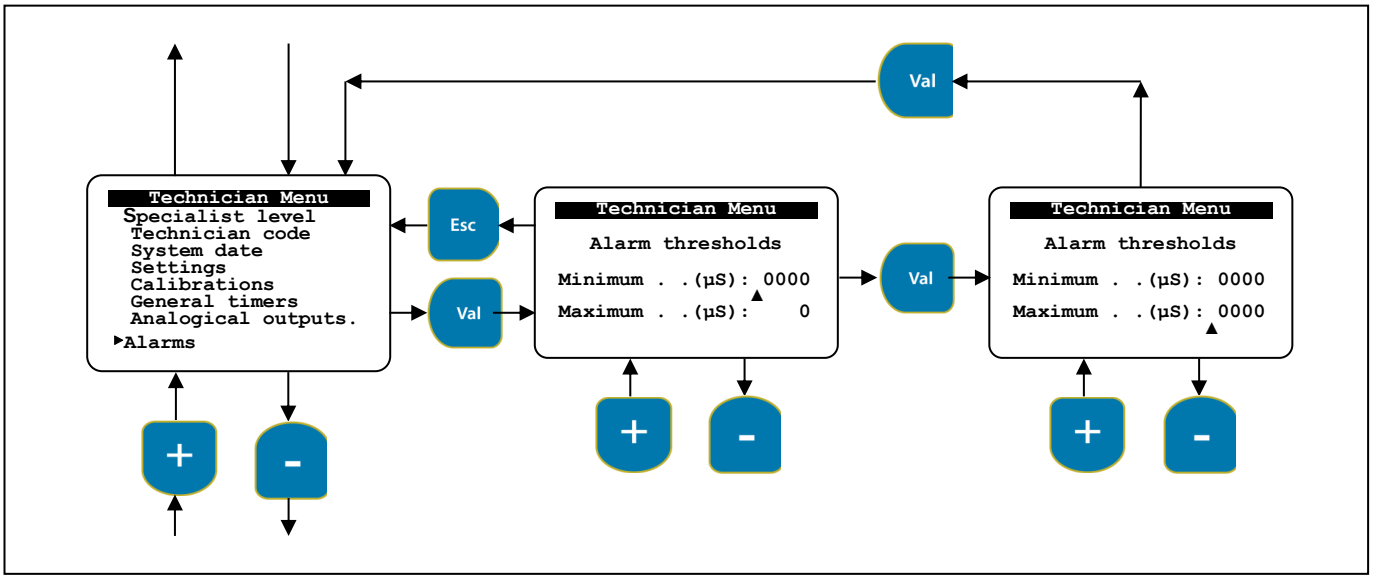
This function consists of allocating values for the maximum and minimum limits for each selected parameter.

IMPORTANT

If the second analogical output is not defined, only the first is used. The menu leads directly to setting the minimum and maximum conductivity values.

INFORMATION

The analogical outputs are generators. They provide the current required to power the different receivers (recorder or automation).



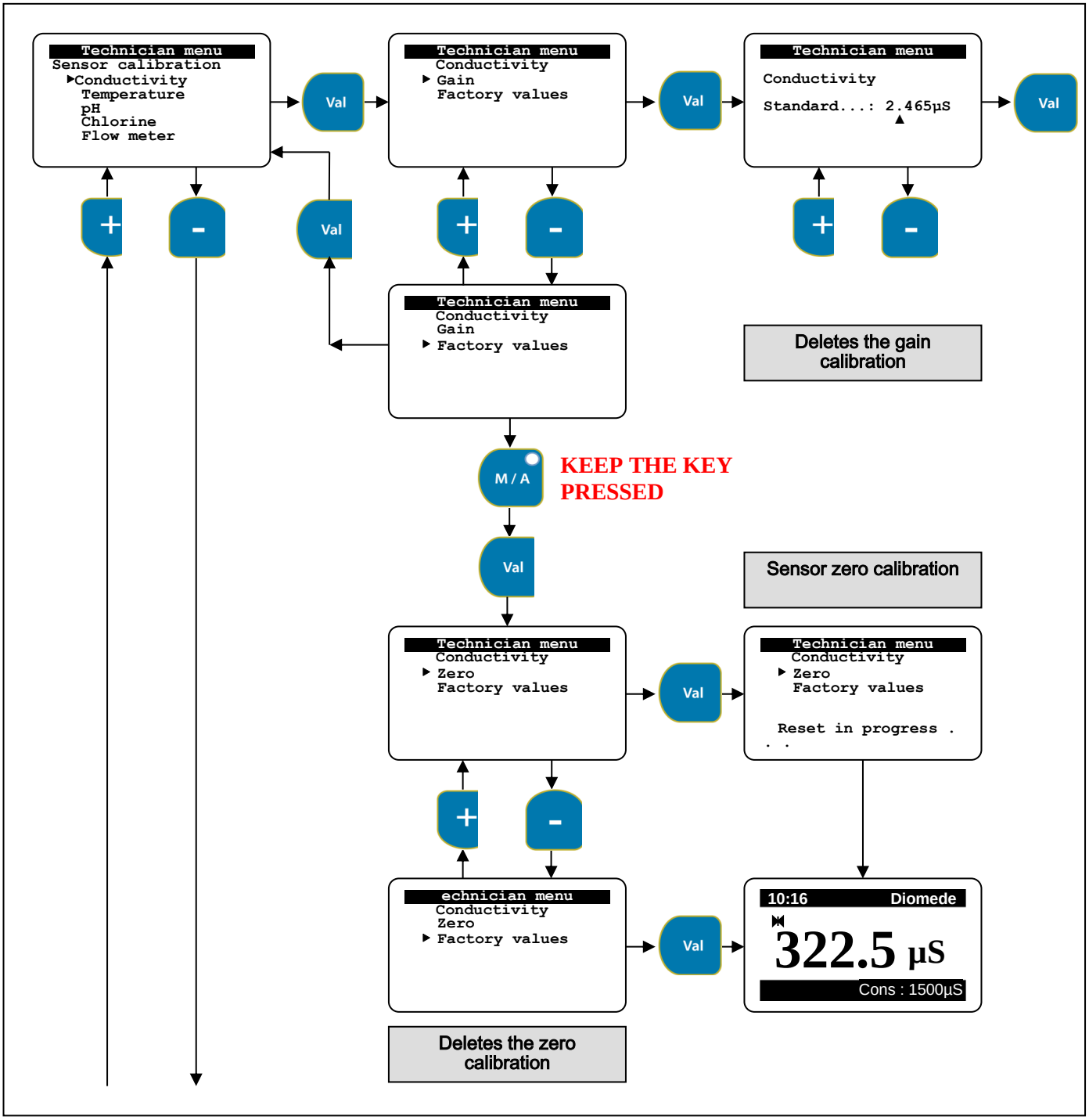
Definition of maximum and minimum conductivity alarms:

The **"Diomède"** has a relay dedicated to the alarm function. It is triggered outside the user-defined limits.

IMPORTANT

The alarm relay can be used for the pH regulation function. If this is the case, it is not possible to have an alarm output.

8.4. Calibrating resistive conductivity (or cell constant)



IMPORTANT

Make sure the theoretical constant for the equipment is correct for the conductivity cell before calibrating the conductivity cell.
This value can be found at the bottom of the "Diomède" LCD screen if a request is made to display this theoretical constant.
The theoretical constant can be programmed in the Factory menu.

Determining the conductimeter measurement chain zero:

Disconnect the conductivity cell. Once the value has stabilised, follow the instructions in the chronogram and select the conductivity cell's zero then confirm.
Zero will be set automatically. Reconnect the cell and calibrate the gain.

Determining the conductivity cell slope or gain:

IMPORTANT

You can calibrate the conductivity sensor with or without temperature compensation.
If you select calibration without temperature, you have to disable the programmed temperature coefficient.
If you select calibration with the temperature sensor, it must be placed in the calibration liquid at the same time as the conductivity sensor.

To determine the precise cell constant for the sensor, place it in the calibration solution which has a known conductivity at ambient temperature. If you are not using the temperature sensor, disable the cell's temperature coefficient.
The **"Diomède"** then displays the conductivity value that it has calculated with the current settings.
Once the value has stabilised, follow the instructions in the chronogram and select the conductivity cell's calibration. Indicate the true value of the standard then confirm.
The **"Diomède"** then recalculates the value of the cell constant and displays the new measured value.

Parameter	Description of conductivity calibration	Range
Conductivity	Measured conductivity value for K=1 with automatic scale switching. (x1, x10 and x100)	0 to 10mS
Accuracy	The measurement accuracy (after calibration) depends on the non-amplified measurement scale (EM = 100µS when K=1)	1% EM
Resolution	The display resolution depends on the automatic measurement scale (EMA) and the display unit. (DU)	1% UA
Zero	Maximum correction.	10% EM
Gain	Maximum gain (or slope) correction	0.2x to 5x

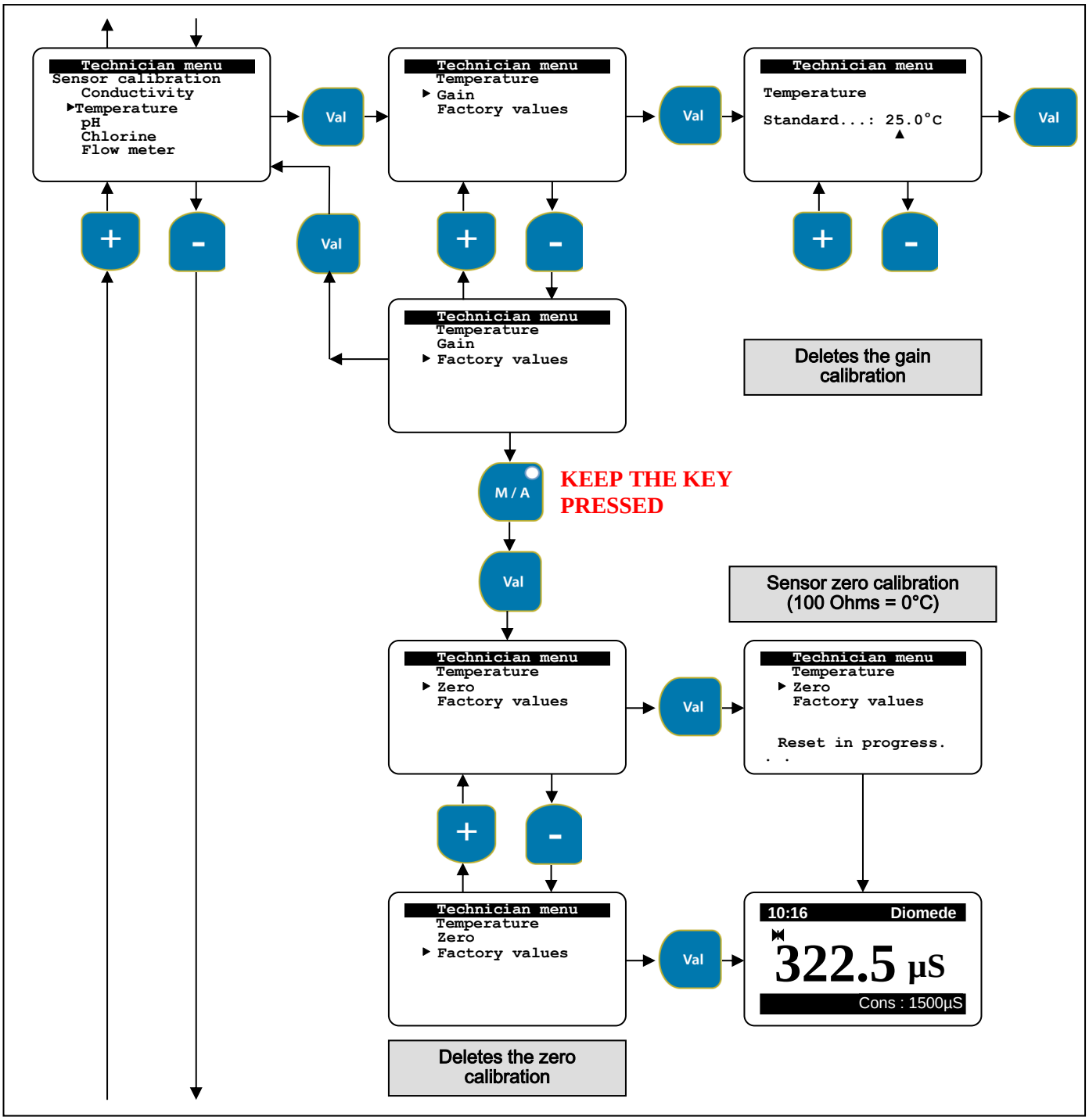
IMPORTANT

It is not possible to calibrate the inductive sensor.
The settings for the inductive sensor must be adjusted; see section 8.12: analogical input 1.
Available sensors:

- *0-2 mS code P0060485 (requires 24 volt external power supply)*
- *0-10 mS code P0060486 (requires 24 volt external power supply)*

If the value is greater than the inductive sensor's scale, the system goes into error status.
The minimum safety current provided to the sensor is 3.4 mA.

8.5. Calibrating the temperature sensor (4/20 mA input)



IMPORTANT

The "Diomède" measures water temperature via the 4/20 mA analogical input.
The "Diomède" does not usually need to be calibrated for the 0°C value.
However, calibration may be necessary when using connecting cables that are longer than 3m.
Make sure that you have a 100Ω 0.1% resistance to calibrate the 0°C value before starting to calibrate the temperature system.

Determining 0°C in the temperature measurement chain:

- Disconnect the temperature sensor at the cable end.
- Replace the temperature sensor with the calibration resistance.
- Wait until the measured value stabilises.
- If the display value is not 0°C, conduct the zero calibration in accordance with the chronogram above.
- Exit the calibration mode and check that the temperature display shows 0°C.
- Disconnect the calibration resistance and reconnect the temperature sensor.

IMPORTANT

This process calibrates the measurement system and not the temperature sensor.

Determining the temperature gain or slope:

IMPORTANT

The "Diomède" measures temperature using a temperature sensor. It can easily be calibrated if the temperature of the cooling tower water is known. This procedure requires a qualified technician.

If you know the exact temperature of the water in the cooling tower circuit, you can calibrate the temperature gain by following the instructions in the chronogram above.

- Wait until the temperature display stabilises.
- Open the calibration menu
- Select the calibration value that equals the real temperature of the circuit
- Confirm and check the new temperature displayed on the screen.

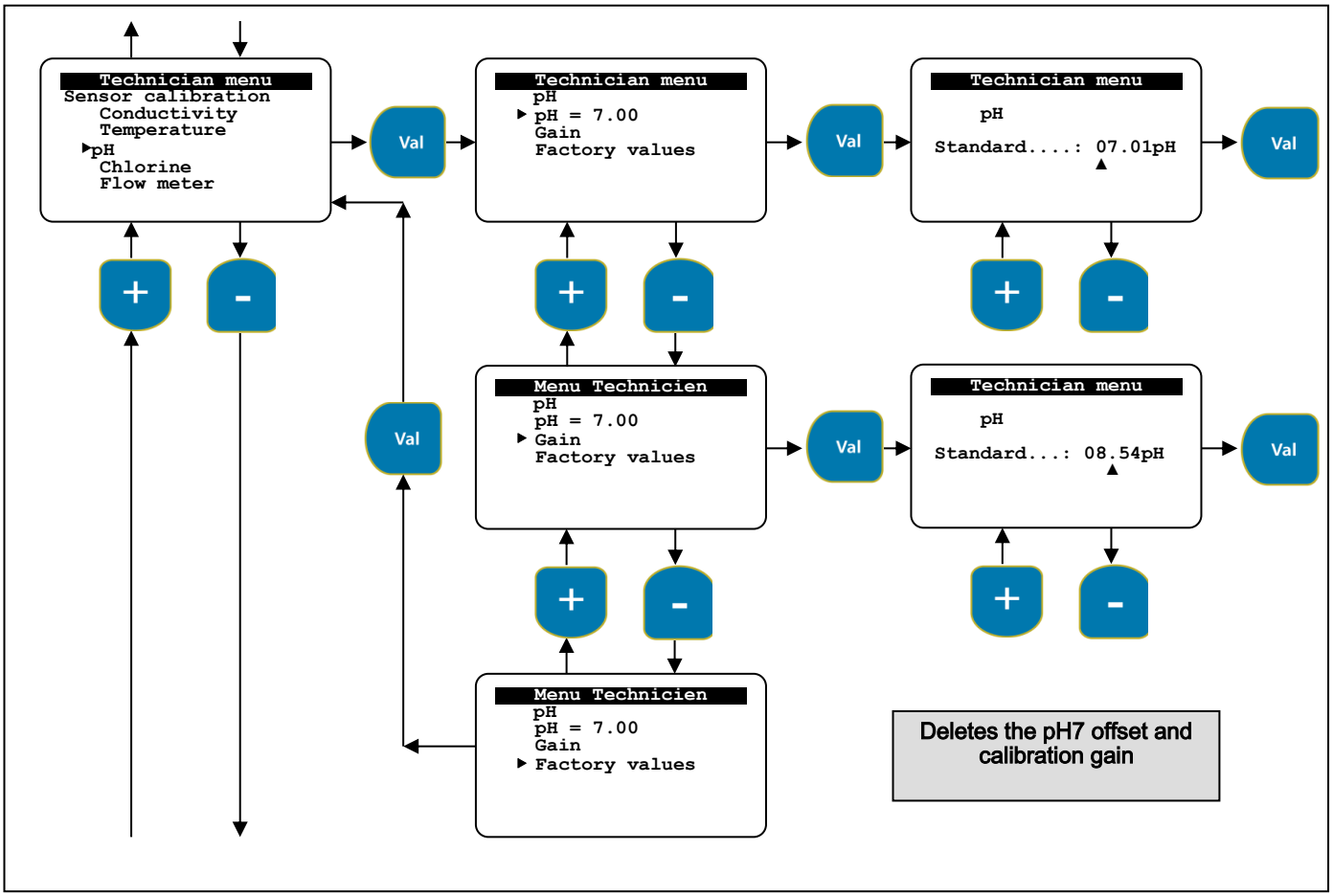
Characteristics of the temperature measurement system:

Parameter	Description of temperature measurement	Range
Temperature	Value of temperature from a temperature sensor.	0 - 100°C
Accuracy	Accuracy of measurement (after calibration)	+/- 0.5°C
Resolution	Display resolution	0.1°C
Zero	Maximum correction for 0°C.	+/- 5°C
Gain	Maximum gain (or slope) correction	0.5x to 2x

8.6. Calibrating the pH sensor

INFORMATION

The pH sensor can only be used with an external measurement converter with characteristics of 4/20 mA for pH 0 to 14.
The converter receives its power supply from the "Diomède".



IMPORTANT

Make sure you have ph7 calibration liquid and a calibration liquid for the gain before calibrating the pH sensor. f e.g.: pH = 4.01 !
This pH value can be found at the bottom of the "Diomède" LCD screen if a request is made to display this figure
The display can be changed in the Factory menu.

Calibrating pH=7:

Proceed as follows:

- Remove the sensor from the measurement chamber...
- Place it in the pH 7.01 buffer solution...
- Wait for the measured value on the LCD screen to stabilise...

- If the display value is not pH=7.01, conduct the calibration in accordance with the chronogram above...
- Select Calibrating pH=7.00 and confirm…
- Exit calibration mode and check that the pH displayed is 7.01...
- Replace the sensor in the measurement chamber if you are not calibrating the sensor's gain (or slope).
- …

8.7. Calibrating the pH sensor gain or slope:

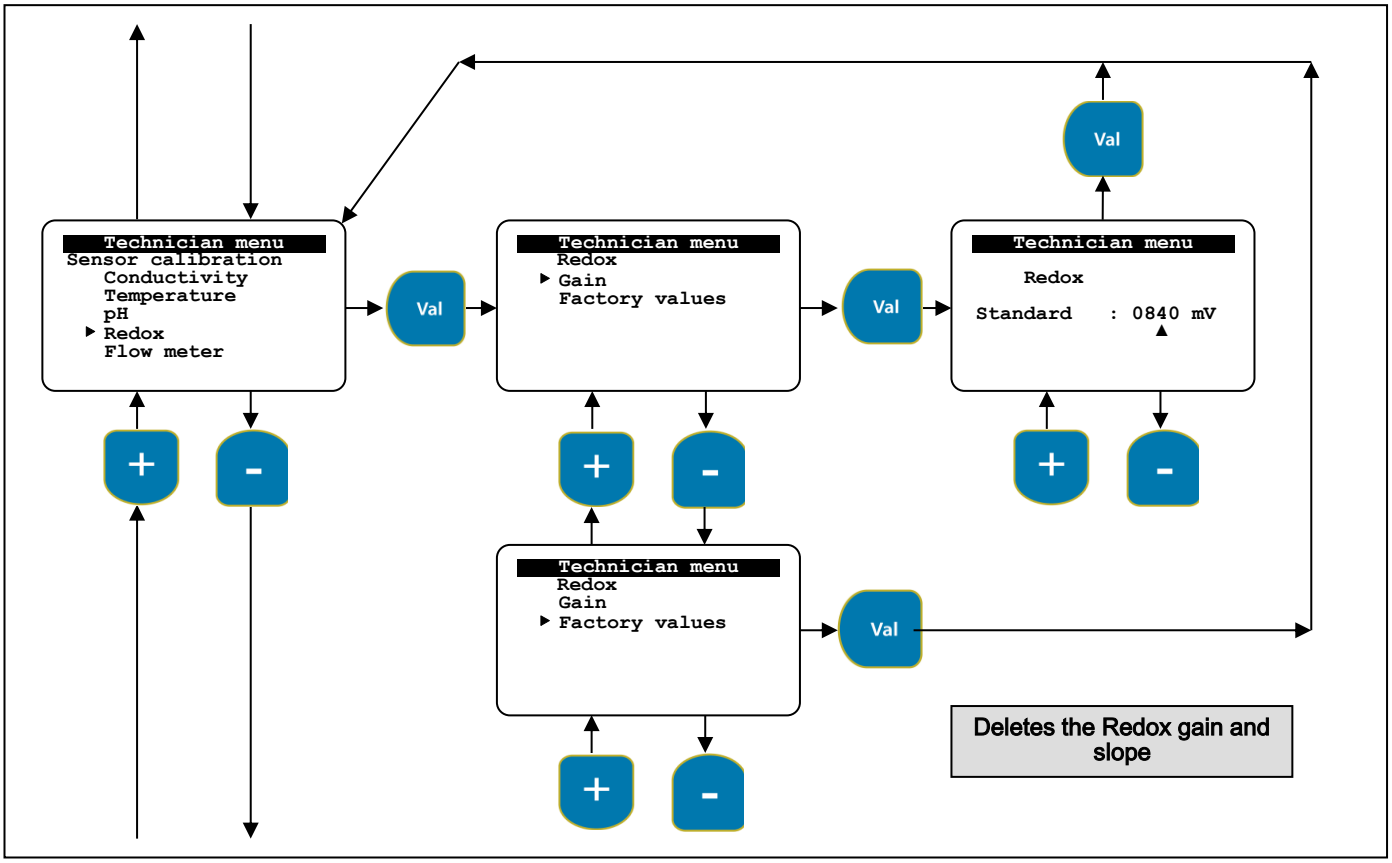
- Remove the sensor from the pH=7.01 reference liquid...
- Rinse it with fresh water...
- Place it in the calibration liquid (e.g.: pH=4.01)...
- Wait for the measured value on the LCD screen to stabilise...
- If the display value is not pH=4.01, conduct the calibration in accordance with the chronogram above...
- Select calibrate gain and adjust the calibration value, if necessary, then confirm...
- Exit calibration mode and check that the pH displayed is 4.01...
- Replace the sensor in its chamber.

After completing calibration, check the cooling tower water pH with a photometer and compare it with the displayed value. The pH value should be the same as the photometer value.

Parameter	Description of pH measurement	Range
pH	pH value corresponding to the 4…20mA input current.	0 to 14pH
Accuracy	Accuracy of measurement (after calibration)	0.05pH
Resolution	Display resolution	0.01pH
pH7 variance	Maximum acceptable value for pH=7 calibration	+/- 2pH
Gain	Maximum gain (or slope) correction	0.2x to 5x

8.8. Calibrating the Redox (or ORP) sensor

The Redox or ORP value measurement is always considered to be a positive value.



INFORMATION

The Redox sensor can only be used with an external measurement converter with characteristics of 4/20 mA for 0 to 1000mV.
The converter receives its power supply from the "Diomède".

IMPORTANT

Make sure you have a calibration liquid before starting to calibrate the Redox sensor. e.g.: 325mV!
This Redox value can be found at the bottom of the "Diomède" LCD screen if a request is made to display this figure
The display can be changed in the Factory menu.

8.9. Calibrating the Redox sensor gain or slope:

- Remove the sensor from the measurement chamber...
- Place it in the calibration liquid (e.g.: 325mV)...
- Wait for the measured value on the LCD screen to stabilise...
- If the display value is not 325mV, conduct the calibration in accordance with the chronogram above...
- Select calibrate gain and adjust the calibration value, if necessary, then confirm...
- Exit calibration mode and check that the Redox displayed is 325mV...
- Replace the sensor in its chamber.

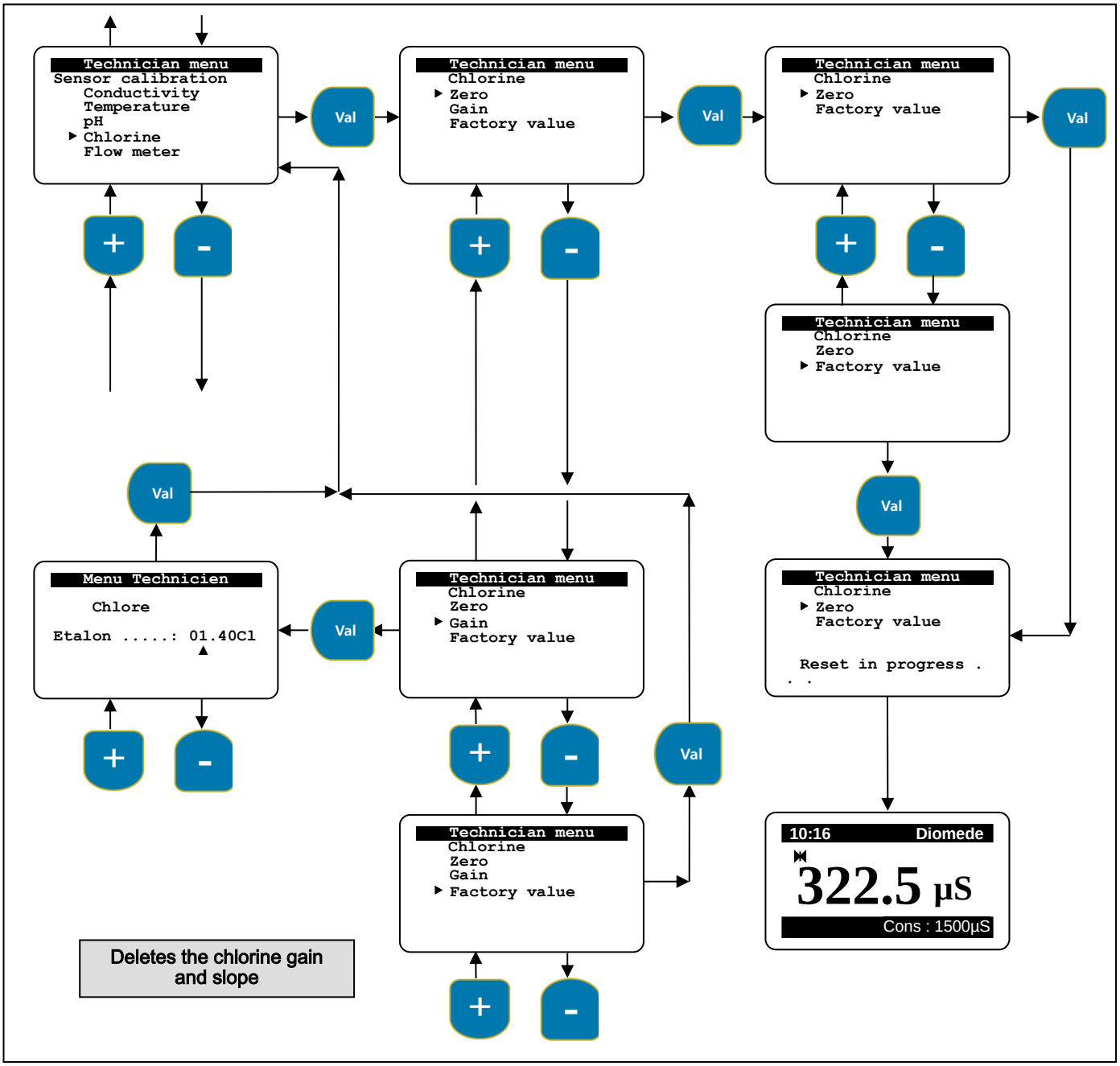
Parameter	Description of Redox measurement	Range
Redox	Redox value corresponding to the 4/20 mA input current.	0 - 1,000mV
Accuracy	Accuracy of measurement (after calibration)	5mV
Resolution	Display resolution	1mV
Gain	Maximum gain (or slope) correction	0.2x to 5x

8.10. Calibrating chlorine, bromine, ozone and peroxide sensors

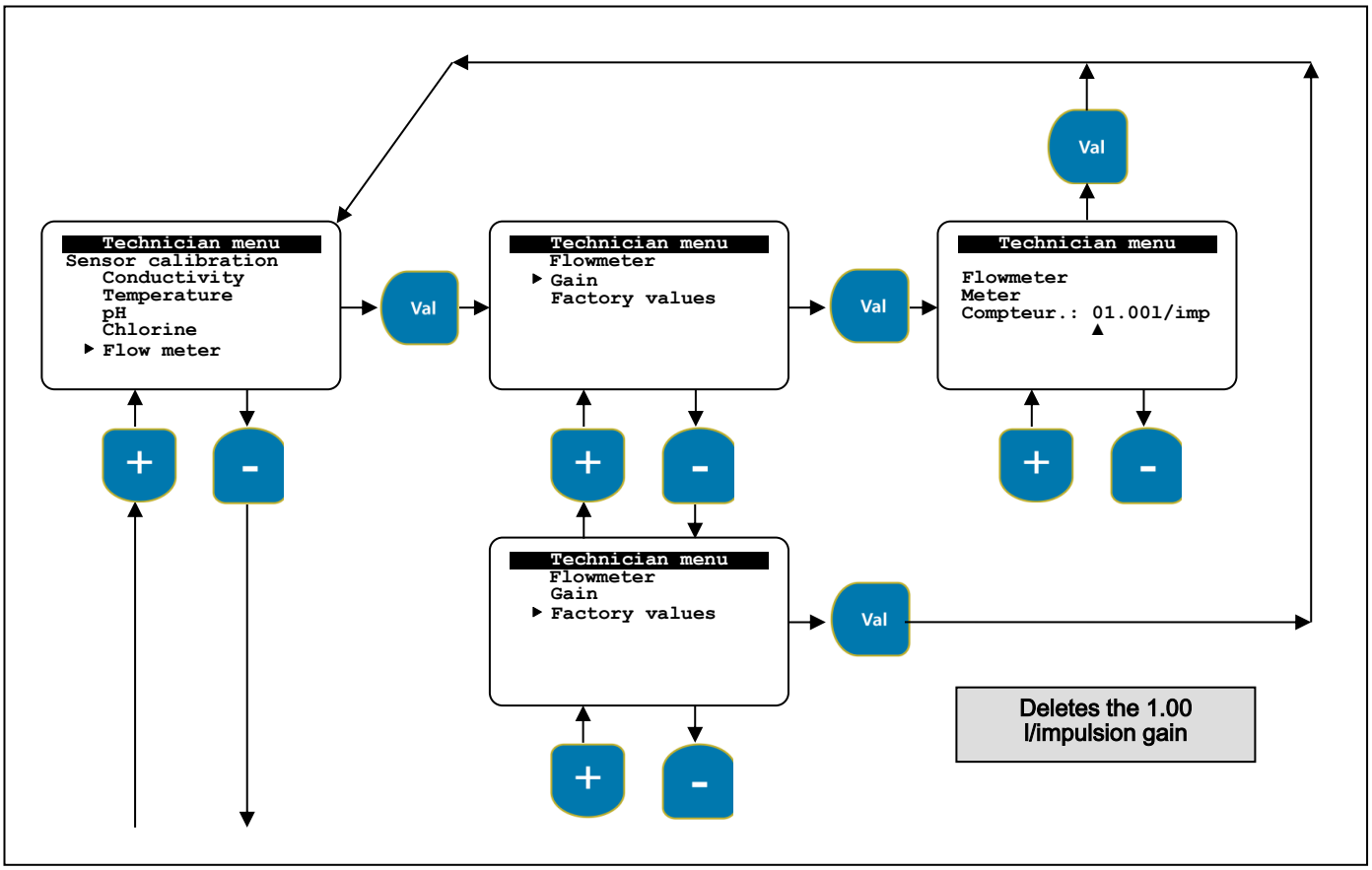
The calibration method for chlorine, bromine, ozone and peroxide is the same for all the values. It adapts to all the measurement scales used by the different values.

IMPORTANT

You must have a photometer and the relevant reagents before starting to calibrate the chlorine, bromine, ozone and peroxide sensors.

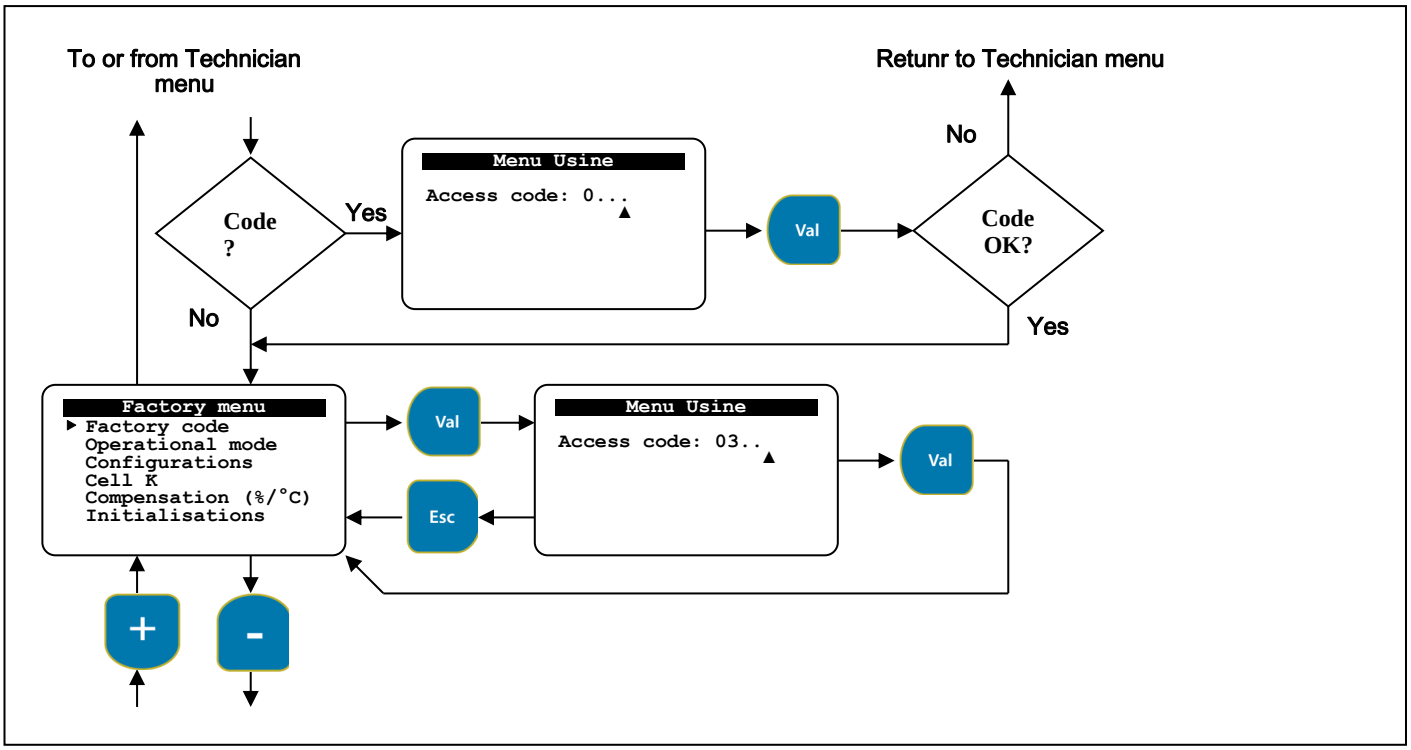


8.11. Calibrating the impulsion flow meter



Enter the volume value that corresponds to each flow meter impulsion.

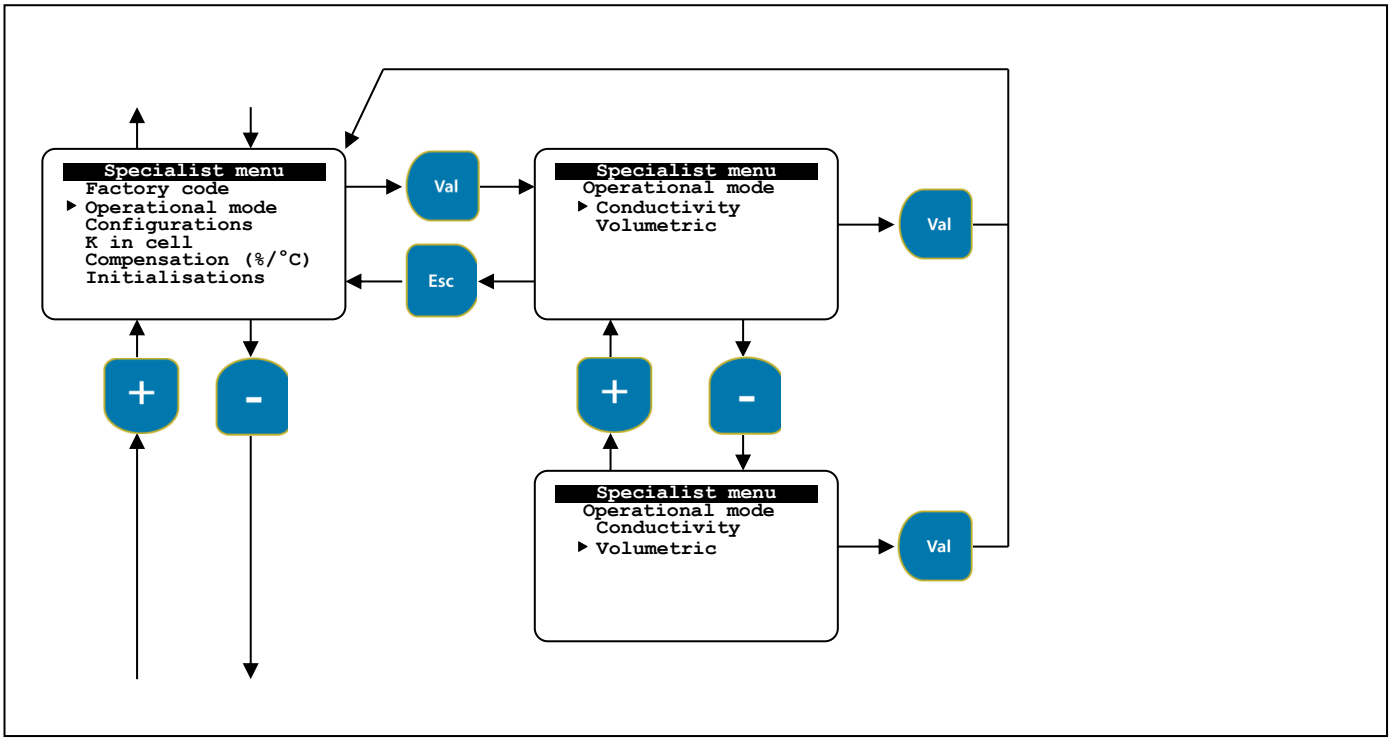
8.12. Overview of the Factory menu



Access to the **Factory** menu can be controlled by an access code. The corresponding functions are otherwise inaccessible and can not be changed.
In order to change or cancel the access code, it has to be used to enter the **Factory** menu than access the **Factory Code** line to change or cancel it. Remember, **0000** is the cancellation code.

IMPORTANT

- *Be careful to note the code entered. If it is forgotten, a BWT PERMO technician will have to make an intervention!*



IMPORTANT

- *The operating mode selected determines the different "Diomède" programmes. It is essential that the selection is made prior to any programming*
- *The volumetric mode requires an impulsion meter. A conductimeter is not required.*
- *The conductivity mode requires the presence of a resistive of inductive conductivity sensor.*

It is important to define the **"Diomède"** operating mode.
Two operating modes can be used:

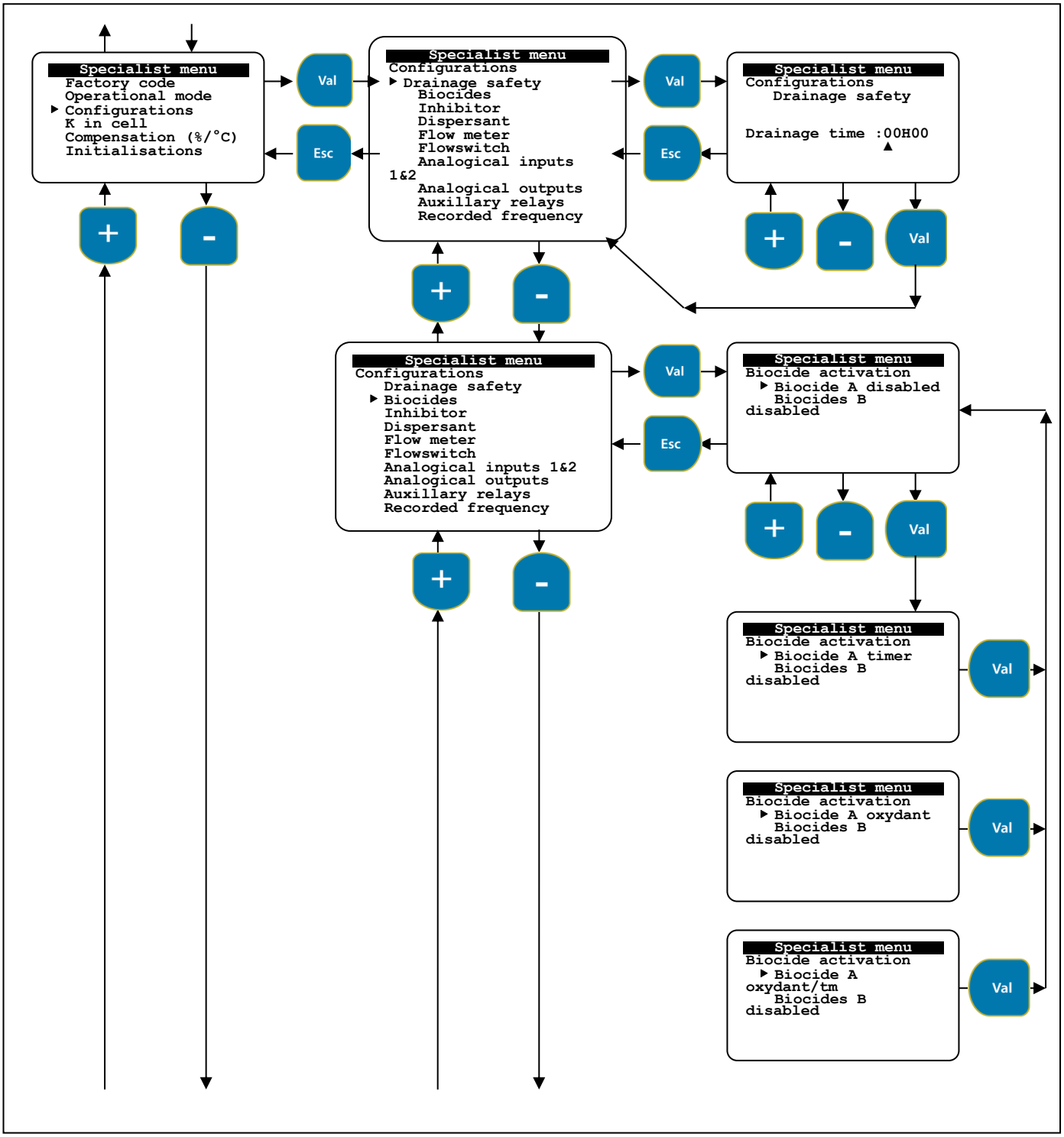
- Conductivity mode
- Volumetric mode

Conductivity mode:

This is the **"Diomède"** default mode. It involves continuous measurement of the cooling tower water's conductivity and drainage based on a preset level defined in µS
See: Conductivity Mode section)

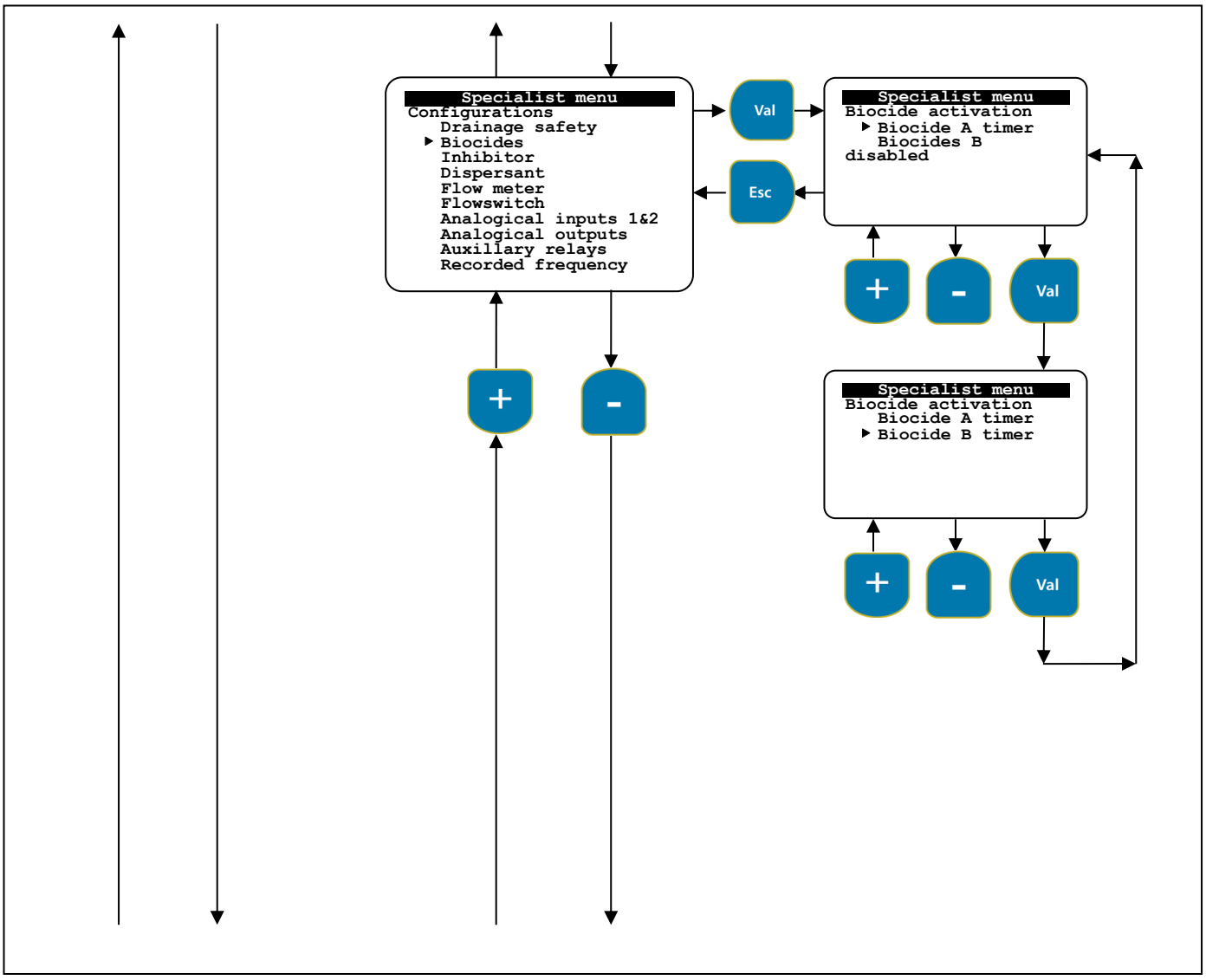
Volumetric mode:

This is the **"Diomède"** emergency mode. If the conductivity measurement system fails, the user can activate this mode and ensure that the cooling tower can continue to operate. It involves acquiring an impulsion meter that measures the volume of water flowing. In preset volume operation, drainage is triggered at a programmed time.



INFORMATION

The biocide A modes (oxidant and oxidant/timer) are only available after declaring an oxidant sensor on analogical input 2 (see page 68).

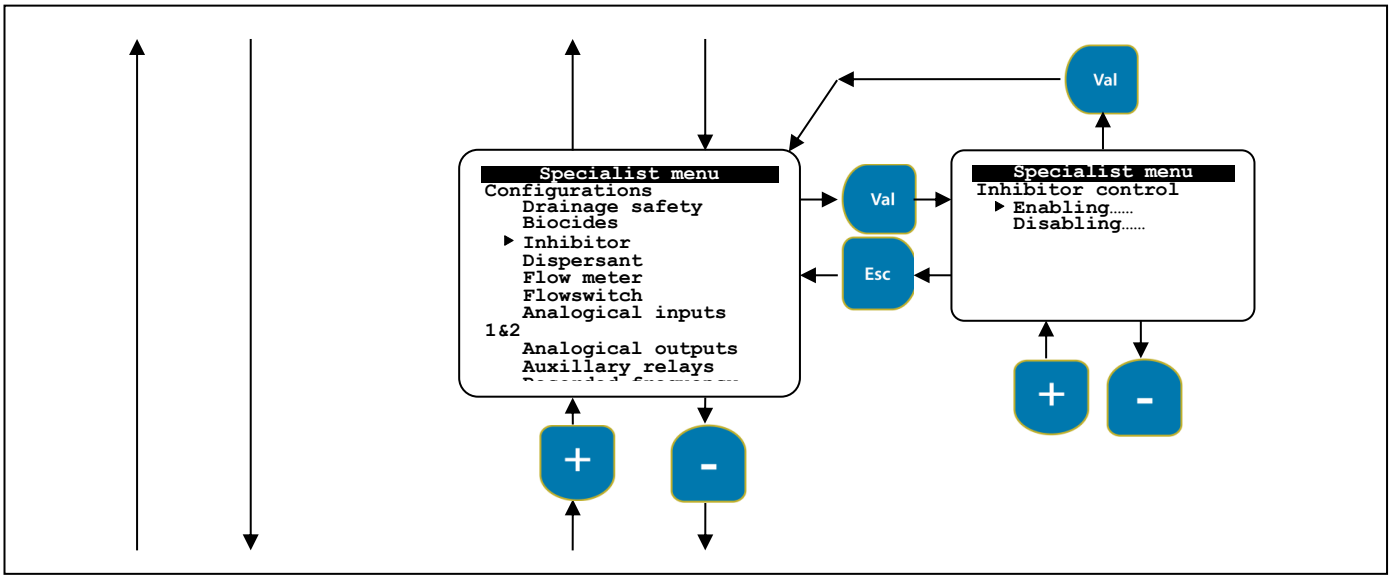


Enabling or disabling biocides:

This function allows biocides A and B to be enabled or disabled.

INFORMATION

If a biocide is disabled, the programming functions for this biocide in the Technician menu are inaccessible.

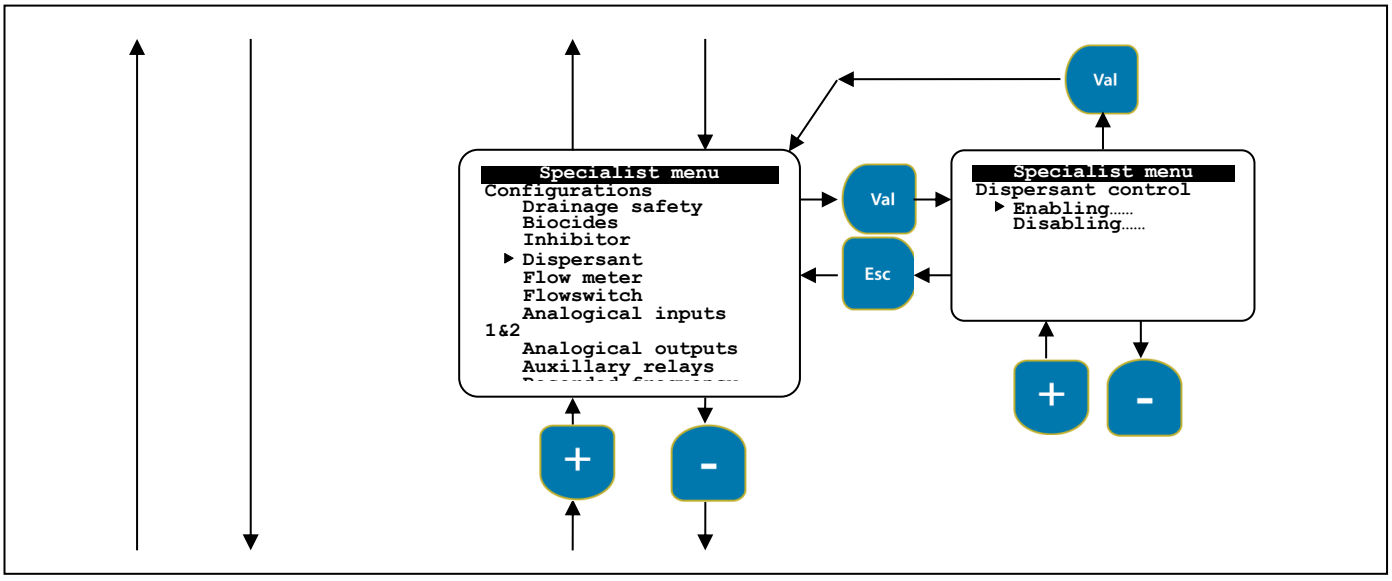


Inhibitor enabling or disabling:

This function allows inhibitor to be enabled or disabled.

INFORMATION

If inhibitor is disabled, the programming functions for inhibitor in the Technician menu are inaccessible.

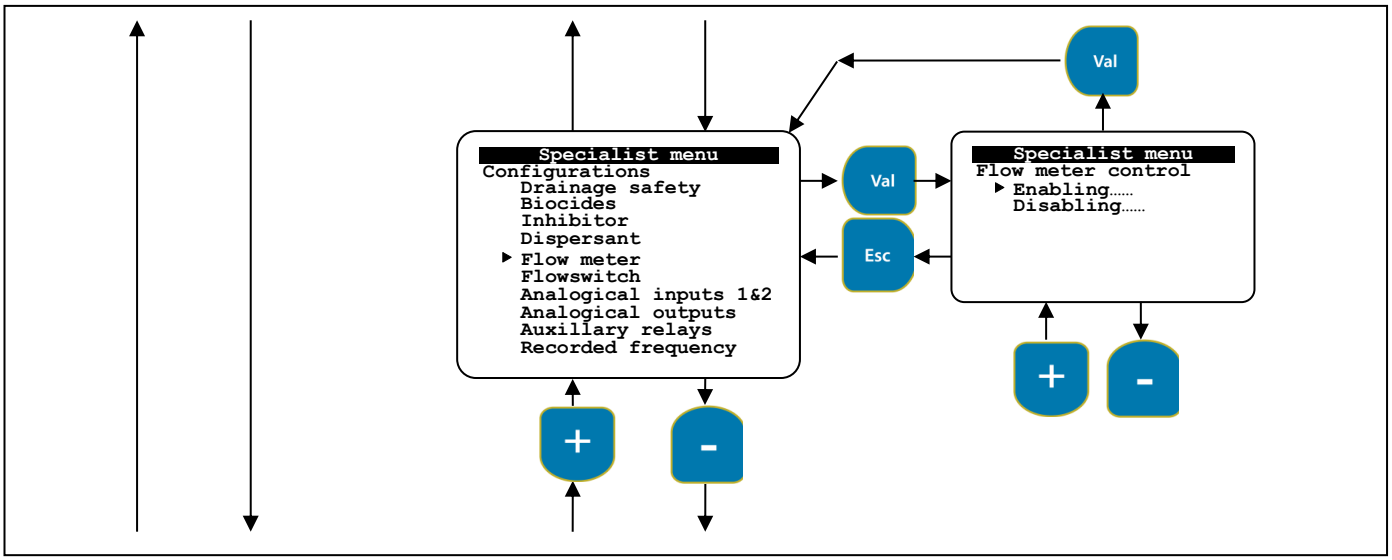


Dispersant enabling or disabling:

This function allows dispersant to be enabled or disabled.

INFORMATION

If dispersant is disabled, the programming functions for dispersant in the Technician menu are inaccessible.

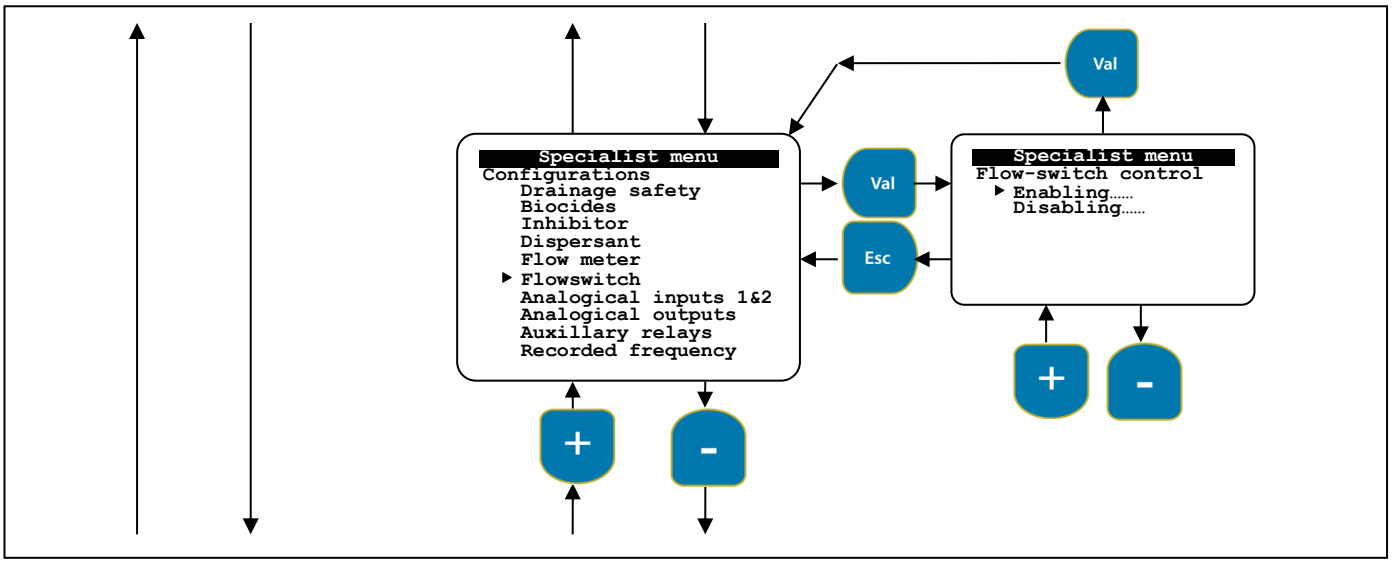


Flow meter enabling or disabling:

This function is used to enable or disable the flow meter input.

IMPORTANT

In volumetric mode, this function is automatically enabled.

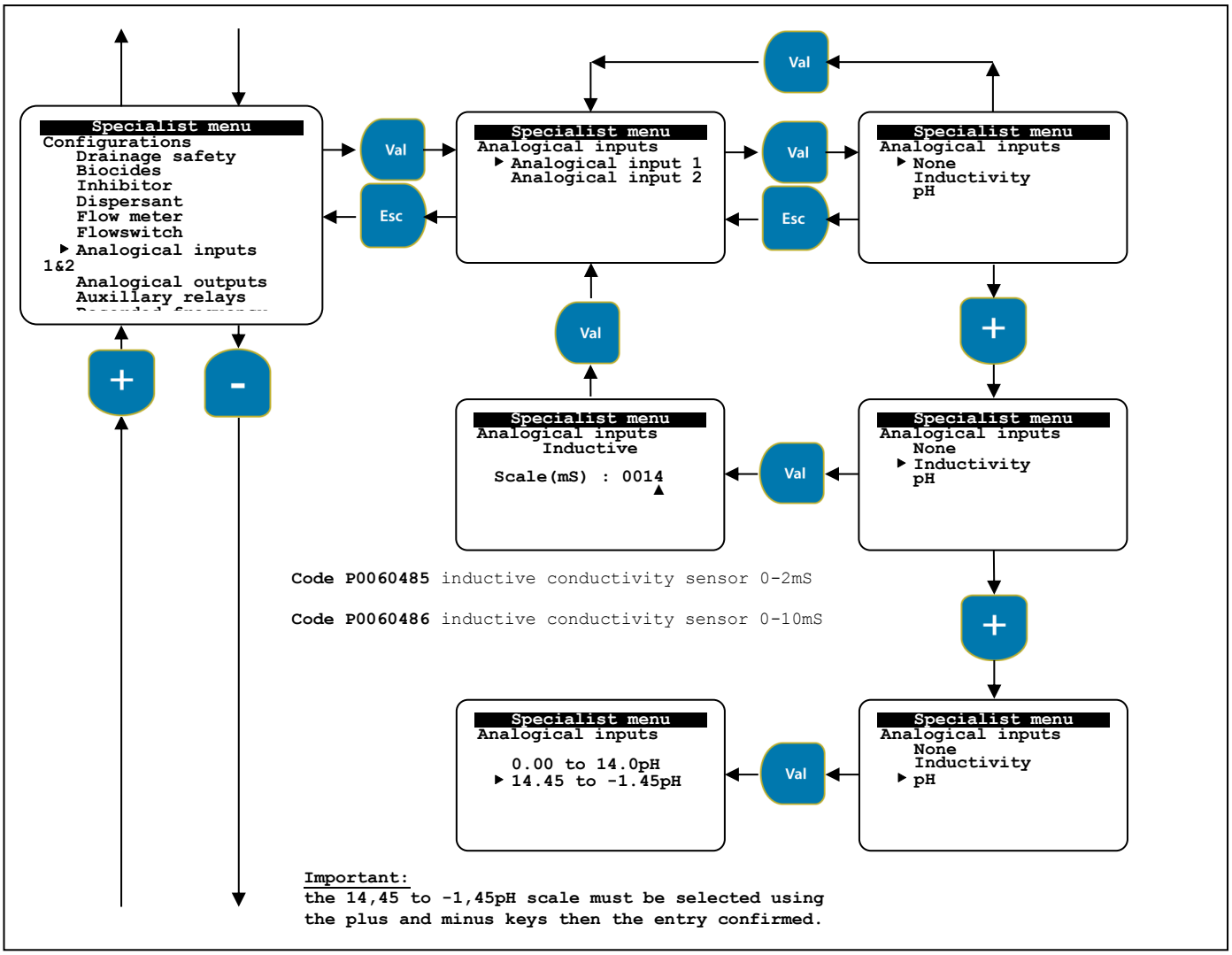


Flow-switch enabling or disabling:

This function is used to enable or disable the Flow-switch function, i.e. control the level or the flow rate. If it is disabled, the **"Diomède"** ignores the data from this input and does not suspend its processing. When enabled, the Flow-switch input is taken into account and can allow **"Diomède"** operation to be suspended.

IMPORTANT

In volumetric mode, this function is automatically enabled.

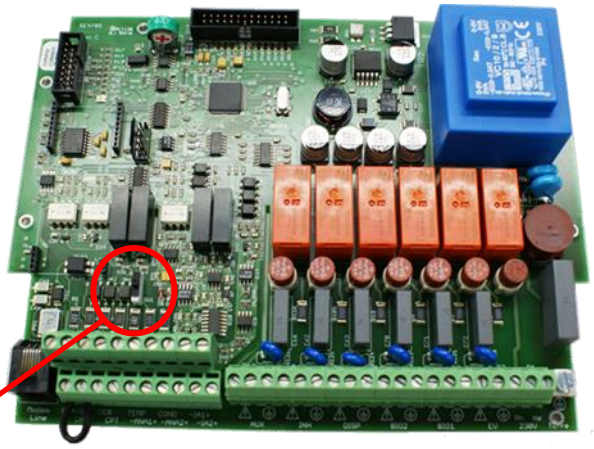


IMPORTANT

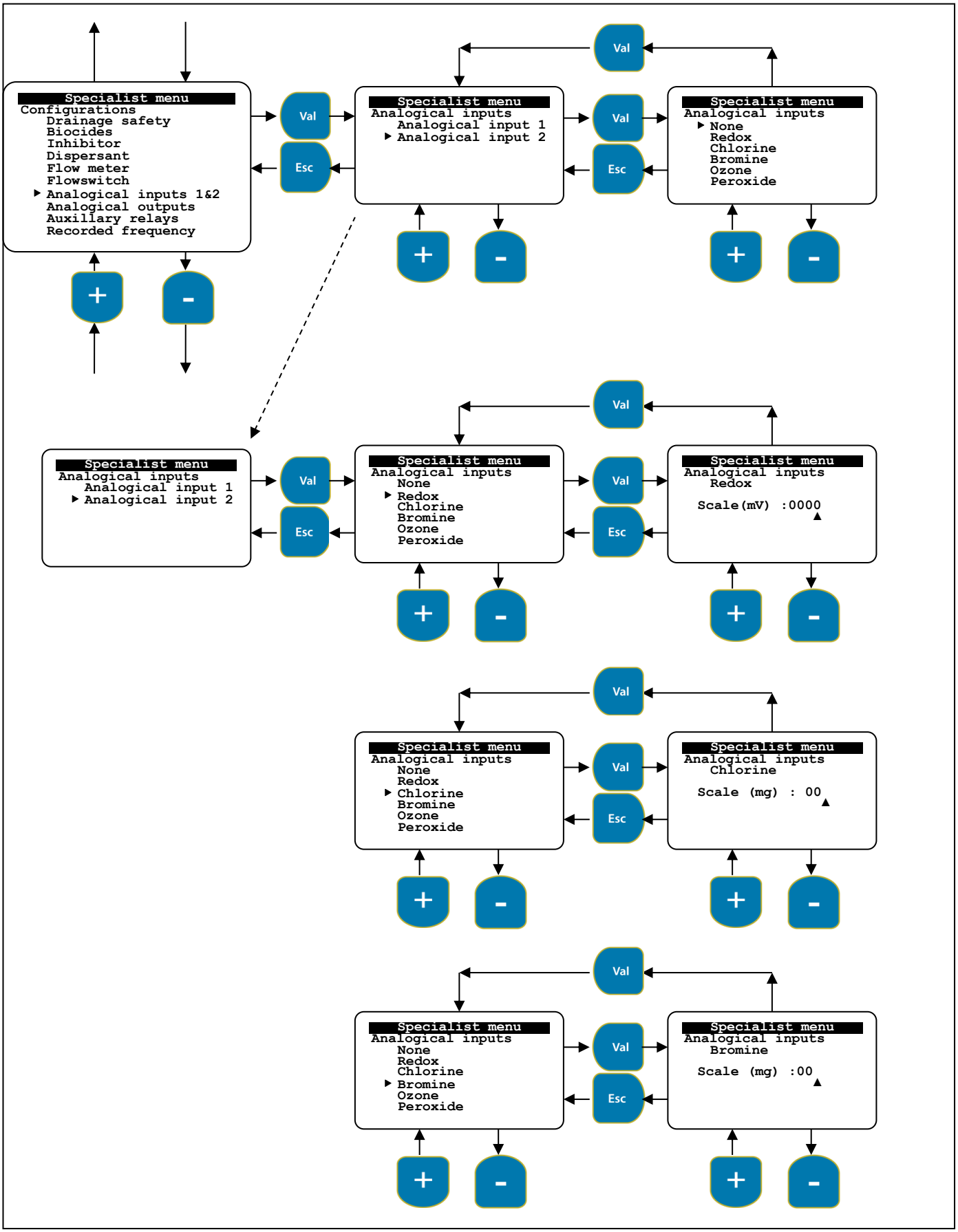
Configuring Switch SW1 (position as in photo)

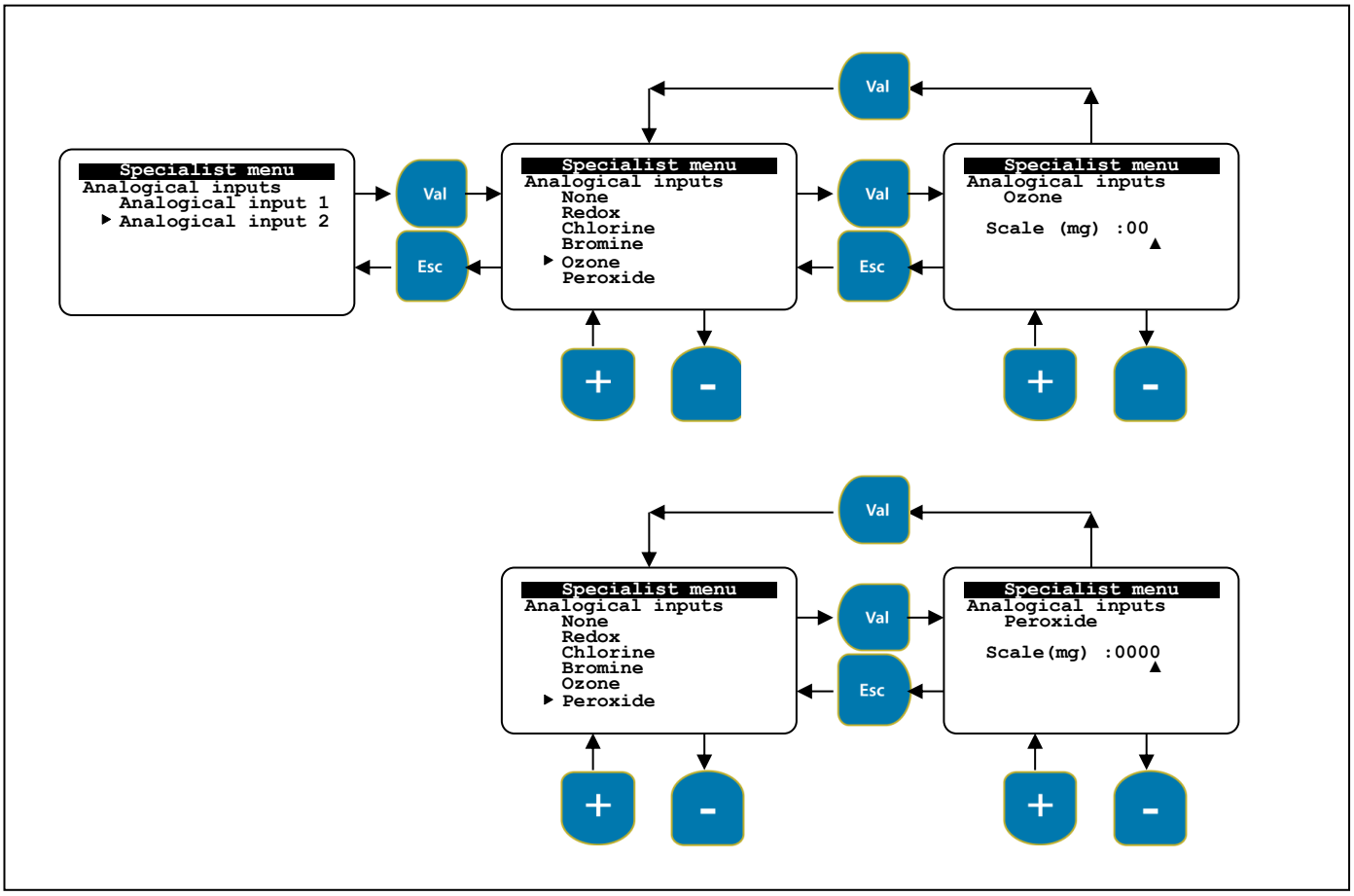
a) The active input is used when using a pH sensor and comply with the +/- polarities marked on the terminals.

b) The passive input is used when using an inductive conductivity sensor. It is essential that the polarities are inversed from what is marked on the terminals (the + becomes - and vice versa).



Positioned lower left of the electronic card


Specialist menu
Configurations
Drainage safety
Biocides
Inhibitor
Dispersant
Flow meter
Flowswitch
Analogical inputs 1&2
Analogical outputs
Auxillary relays
Recorded frequency
Val
Esc
+
-
Specialist menu
Analogical inputs
Analogical input 1
Analogical input 2
Specialist menu
Analogical inputs
None
Redox
Chlorine
Bromine
Ozone
Peroxide
Specialist menu
Analogical inputs
Redox
Scale(mV) :0000
Specialist menu
Analogical inputs
Chlorine
Scale (mg) : 00
Specialist menu
Analogical inputs
Bromine
Scale (mg) :00



Defining the auxiliary input:

Two 0/4…20mA inputs are available on the **"Diomède"** and can be configured to measure different values. These values are:

- Input 1 "AN1"
  - Inductive conductivity or inductivity (reminder: passive input, strap SV2),
  - pH (reminder: active input, strap SV2),

- Input 2 "AN2"
  - Redox or ORP potential,
  - Active, free or total chlorine measurements,
  - Bromine measurements,
  - Ozone measurements,
  - Hydrogen peroxide measurements.

Under certain circumstances, these parameters may be required to control cooling tower operation.

IMPORTANT

All the sensors used to measure these parameters must be 4/20 mA two wire compatible.
They must be defined by the nature and the measurement scale used.

The measurement scales must be defined based on the selected sensor for the different sensors that can be used.

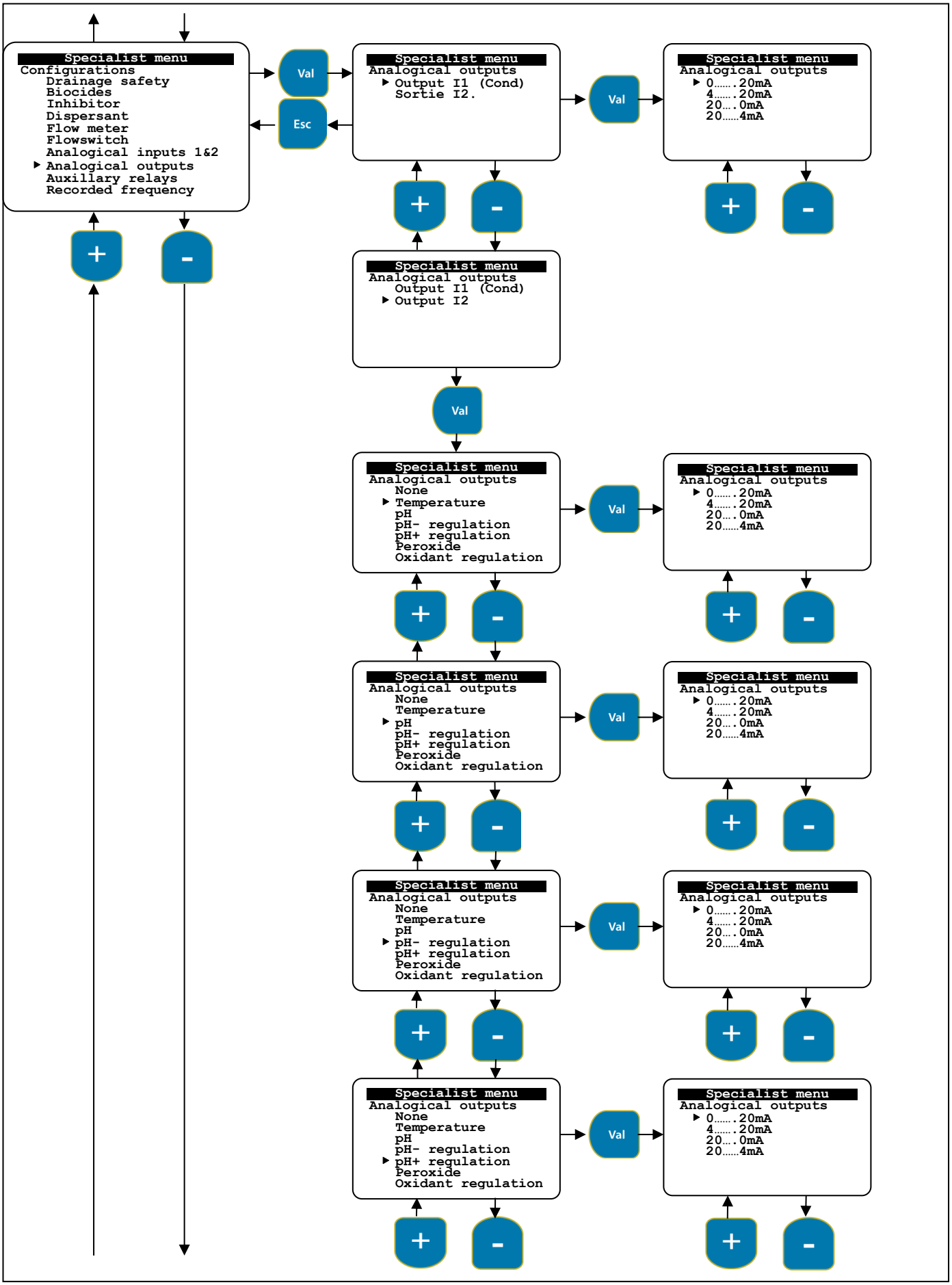
The maximum scales are:

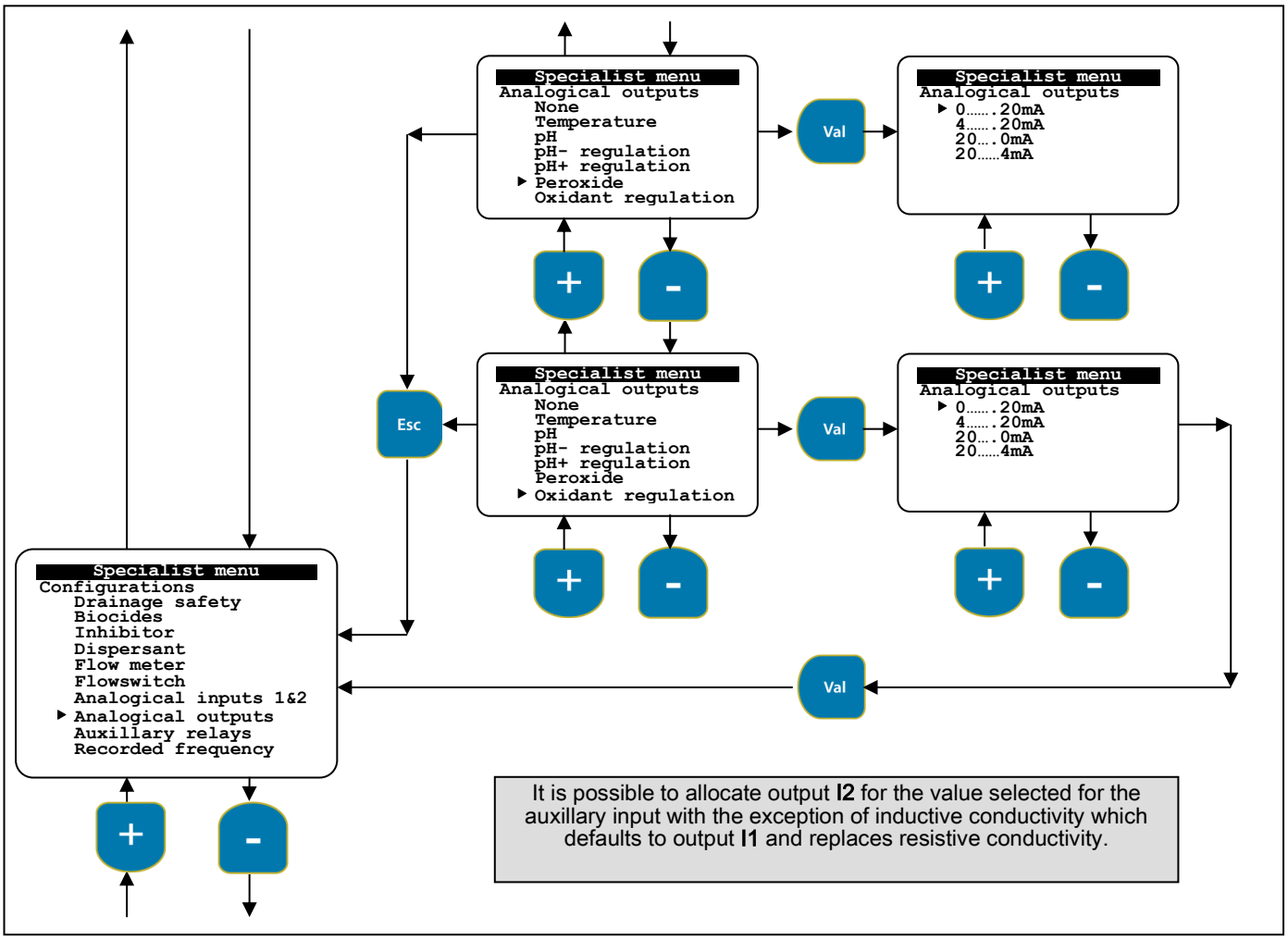
Parameter	Description of maximum sensor scales for 4/20mA	Range
Conductivity	Inductive conductivity sensor	0 to 1000mS
pH	pH sensor (fixed scale)	0 to 14pH
Redox	Redox (ORP) sensor	0 - 1,500mV
Chlorine	Chlorine sensor	0 - 20mg/l
Bromine	Bromine sensor	0 - 20mg/l
Ozone	Ozone sensor	0 - 20mg/l
Peroxide	Hydrogen peroxide sensor	0 - 2,000mg/l

0/4…20mA input characteristics:

Parameter	Description of the auxiliary input:	Range
Auxiliary	Analogical input for 2 wire technology sensor	0 - 20mA
Power supply	Self-powered loop	24V +/- 1V DC
Current	Maximum current created in short circuit	50mA
Input resistance	Charge resistance	485Ω
Insulation	Complete insulation between input and other circuits	> 10^9Ω

Control


Specialist menu
Configurations
Drainage safety
Biocides
Inhibitor
Dispersant
Flow meter
Flowswitch
Analogical inputs 1&2
Analogical outputs
Auxillary relays
Recorded frequency
Val
Esc
Specialist menu
Analogical outputs
Output I1 (Cond)
Sortie I2.
Specialist menu
Analogical outputs
0.....20mA
4.....20mA
20....0mA
20.....4mA
+
-
Specialist menu
Analogical outputs
Output I1 (Cond)
Output I2
Specialist menu
Analogical outputs
None
Temperature
pH
pH- regulation
pH+ regulation
Peroxide
Oxidant regulation



0/4…20mA analogical outputs:

2 analogical outputs are available on the **"Diomède"**.

Output **I1** is fixed and emits the **conductivity** to communicate it to a recorder or centralised control room.

The output scale is directly related to the programming made in the **Technician** menu for the analogical outputs.

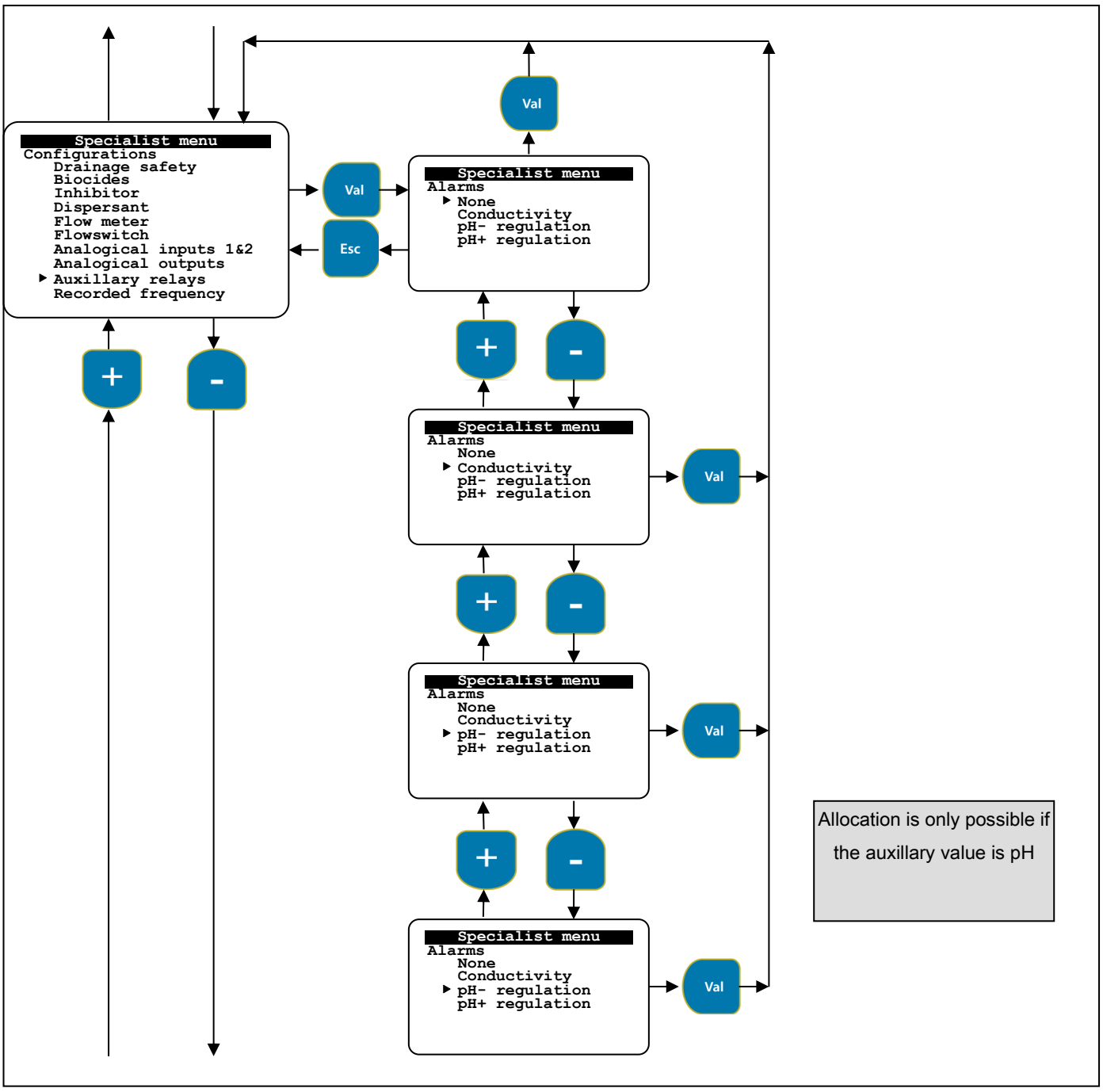
Output I2 can be programmed and can be allocated to the following parameters:

- No output
- Temperature output (0/4…20mA)
- Value of **auxiliary** output

The 2 analogical outputs can be programmed for a transfer in mode:

- 0…20mA
- 4…20mA
- 20…0mA
- 20…4mA

8.13. Defining the dry contact 'alarms' output relay output:



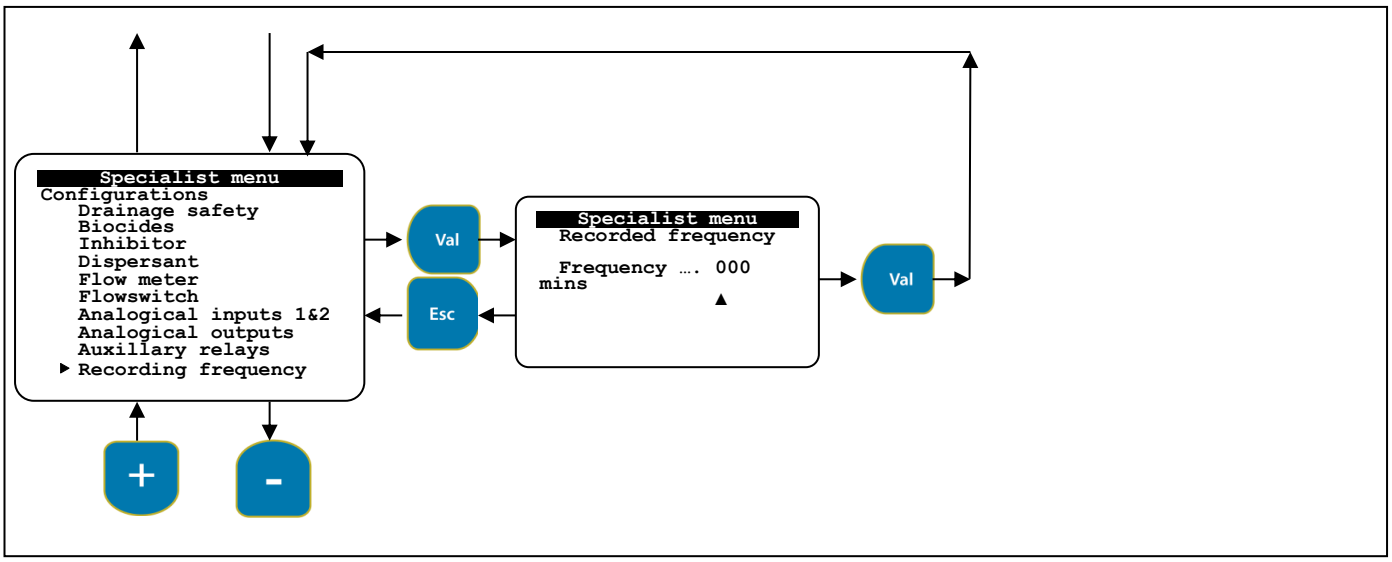
Defining the alarm relay:

The relay alarm can be disabled, allocated to the conductivity alarm function or, when the auxiliary parameter is pH, to the upward or downward adjustment of the pH.

IMPORTANT

If you use the alarm relay to adjust the pH, the alarms can not be transmitted.

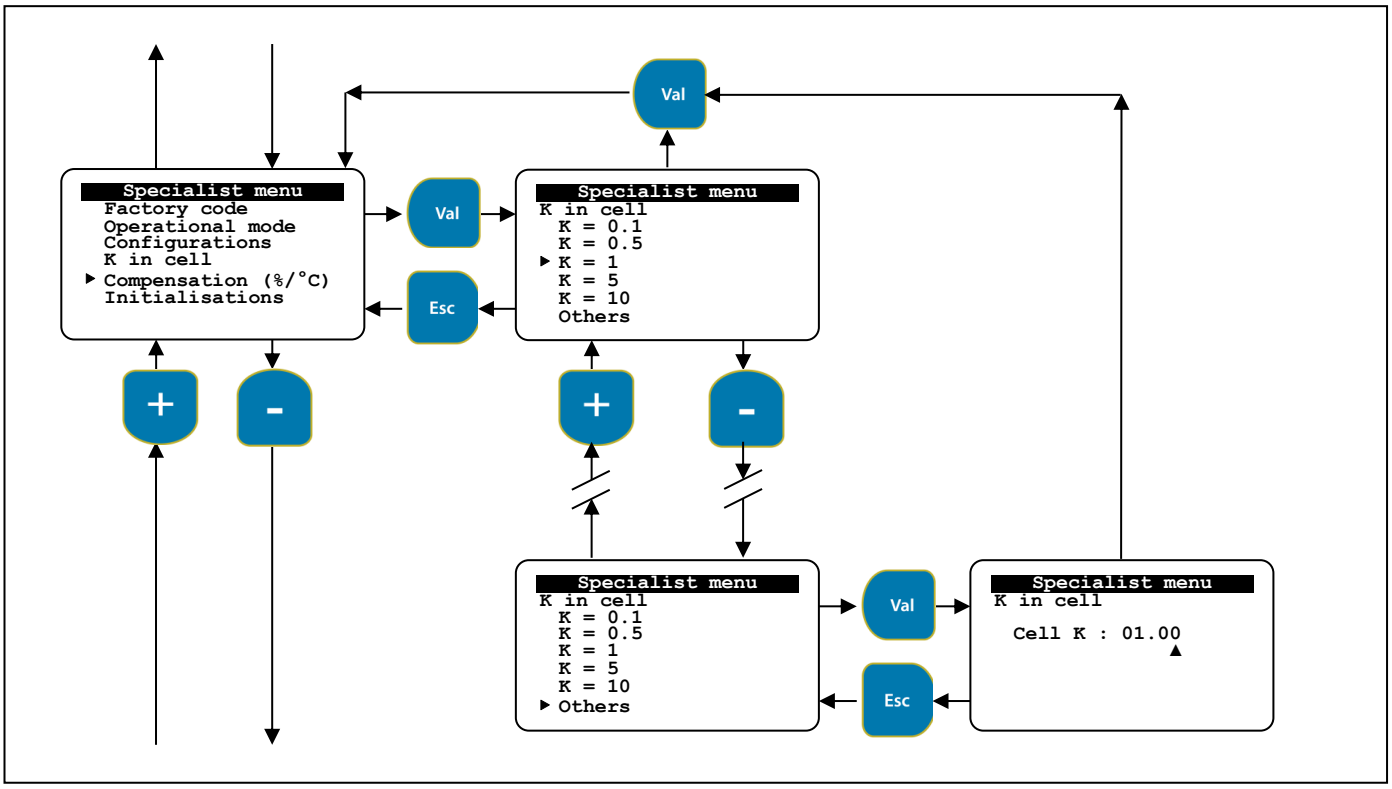
8.14. Defining the recording frequency:



Defining the recording frequency:

The recording frequency is used to set the frequency with which parameters are recorded. The unit is minutes with a maximum value of 240 minutes.

8.15. Programming the theoretical conductivity cell K.



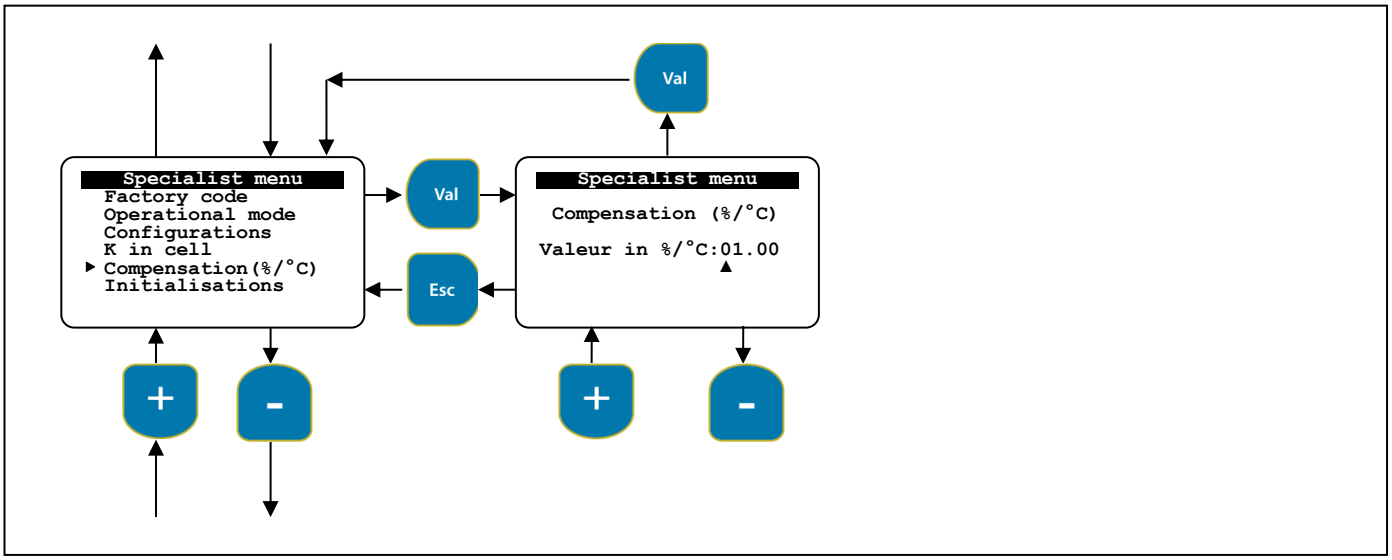
K (the cell coefficient) must be provided to the **"Diomède"** before use.

Standard K coefficients are available to make programming easier. When a cell is used with a different K coefficient, use the Others function and enter the cell's K value.

IMPORTANT

Make sure the cell's K coefficient is correct before starting to programme.

8.16. Conductivity cell thermal compensation:



The default value for the conductivity sensor's thermal compensation is 1.9%/°C.

To use a different thermal compensation value for the conductivity sensor, enter the required coefficient and confirm.

If you do not want to use a thermal compensation, enter 0.

If the temperature coefficient is different and known, enter it and confirm.

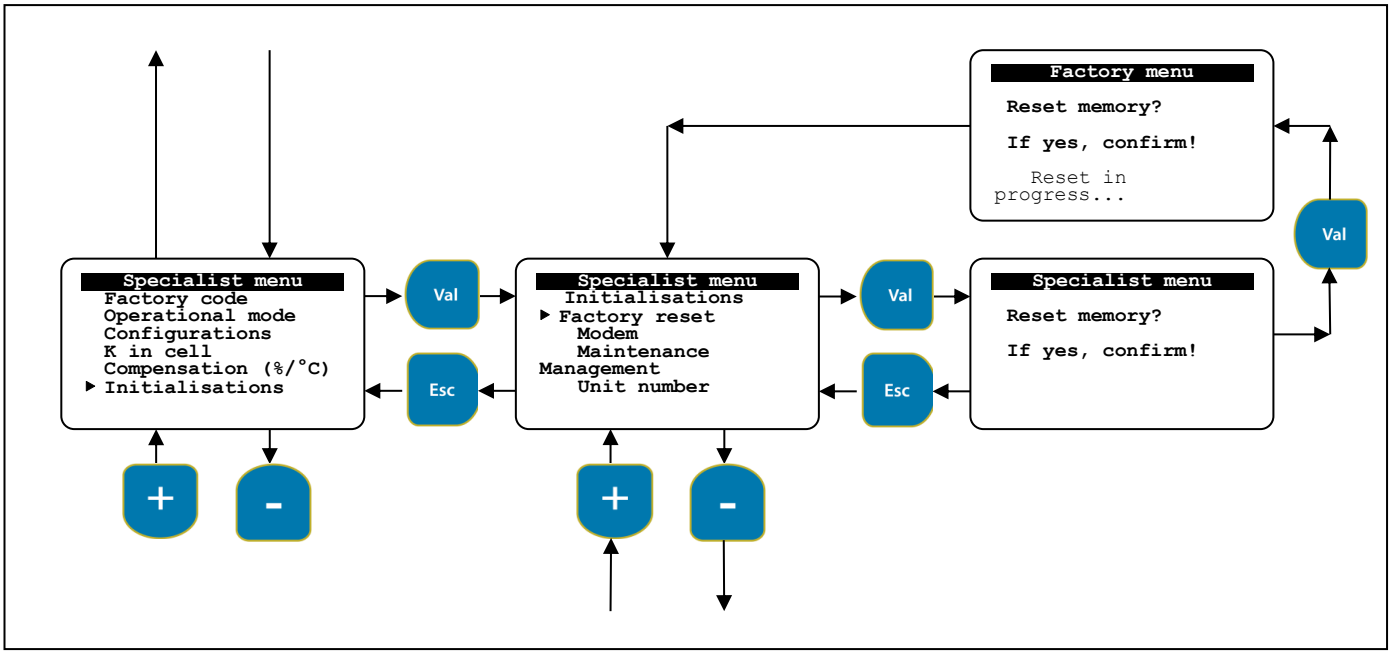
INFORMATION

The thermal compensation coefficient (α = 1.9%/°C for water) does not usually have to be changed. Should a change be required and if α is known, then enter the new coefficient. The conductivity sensor should then be calibrated.

8.17. "Diomède" initialisation:

IMPORTANT

Initialisation procedures must be used with prudence!
They change the way the "Diomède" behaves and can lead to serious anomalies!
Factory Reset re-initialises "Diomède" to the standard factory settings.



8.18. Factory reset:

The effect of this procedure is to restore the default parameters with which the **"Diomède"** was delivered.

IMPORTANT

All current configurations, calibrations, settings, etc. will be lost!

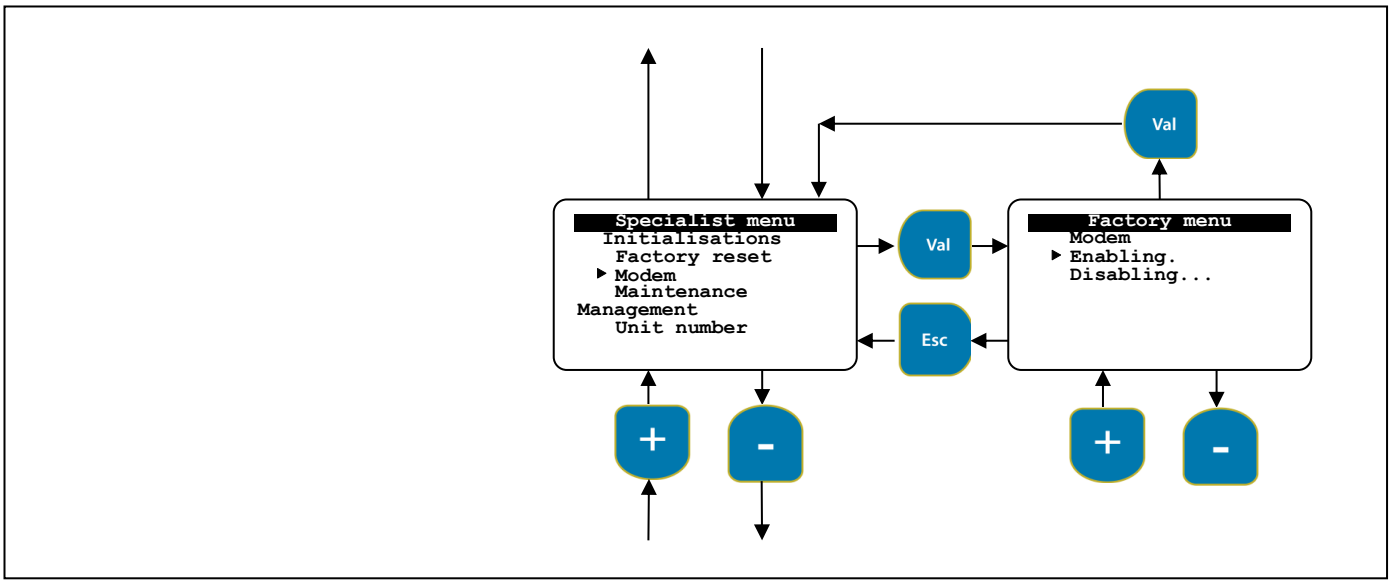
The main initialisation conditions are as follows:

Parameter	Description of initialisation (Factory reset)	Value
Mode	Operating mode	Conductivity
Auxiliary	Auxiliary parameter	None.
Language	Basic language	French
Codes	Technician and factory access codes	0000
Displays	LCD parameter display	None.
Cell K	Resistive cell constant	1.00
µS setting	Conductivity setting	1500µS

Flow meter	Flow meter Calibration value in l/impulsion	Disabled 100l/imp.
Biocides	Biocide 1 & 2 status	Disabled
Seasons	Seasonal operational mode Summer reference month Winter reference month	Automatic April October
Timers	4x8 internal timers Days active Number of weeks in the cycle	00 None 1
Inhibitor	Inhibitor mode	Continuous
Dispersant	Dispersant mode	Continuous
Calibrations	Theoretical calibration gains or slopes	1.00
Analogical outputs	Configuration of analogical output I1 I1 transfer mode Configuration of analogical output I2 I2 transfer mode	Conductivity 0…20mA None. 0…20mA
Number	Unit number	00

8.19. Modem enabling or disabling:

This function allows the modem to be enabled or disabled.

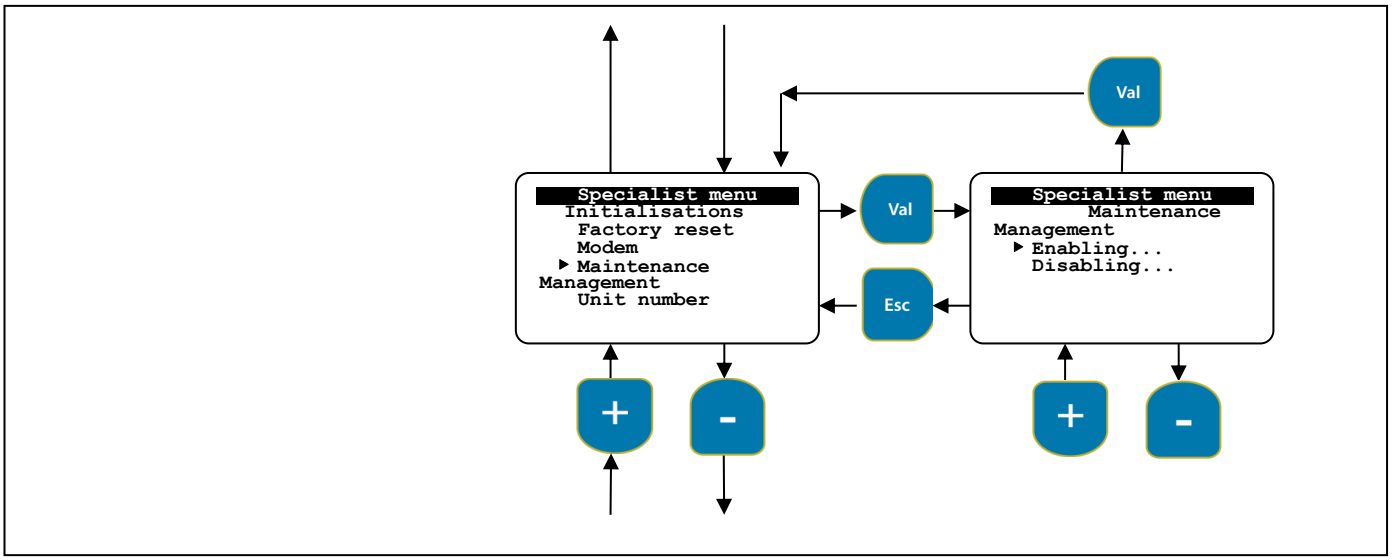


INFORMATION

Note: option not available. To activate the modem, the "Diomède" has to have an appropriate modem socket that complies with the local telephone network standard.

8.20. Enabling maintenance management:

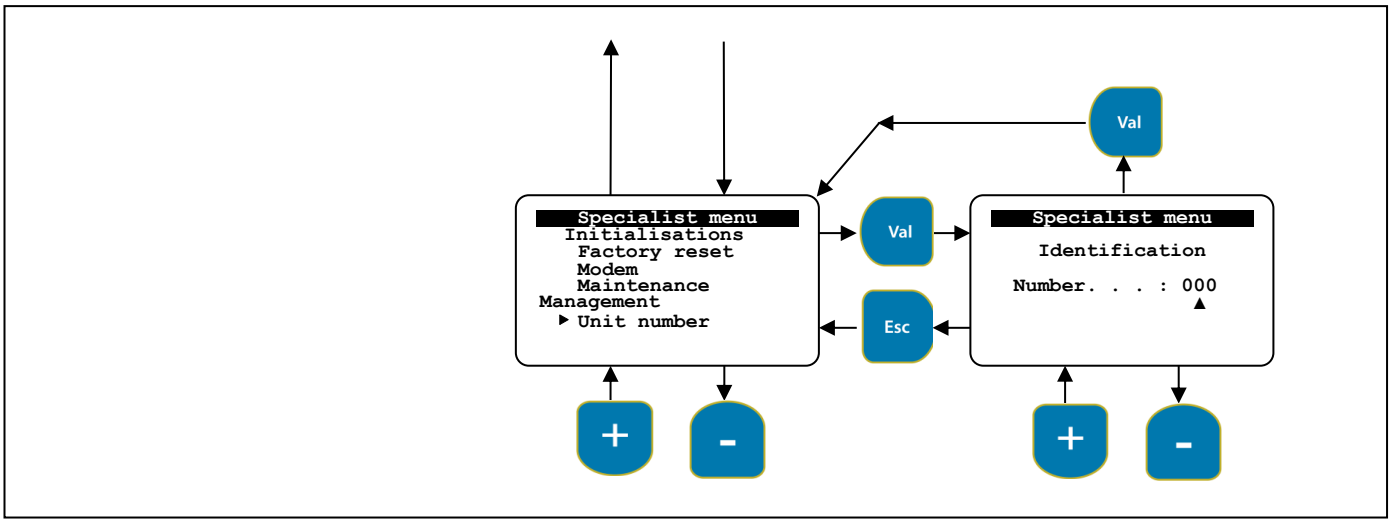
This function enables access to tests for different parts of the **"Diomède"** from the User menu.



8.21. Unit number:

Identifies the **"Diomède"** when it is connected to a network containing other equipment.

The interface programme needs to identify the device it is communicating with when using a RS485 or Modem connection. This number is allows the **"Diomède"** to be recognised on the communication line or bus.



IMPORTANT

If the identification number is zero, recognition does not occur.

9. BREAKDOWN SERVICE

IMPORTANT

Stop the "Diomède" completely (press the M/A key) and secure the installation against a manual start before looking for any error!

The troubleshooting table is on the final pages.

Eliminate the cause of the error so that the **"Diomède"** can operate again.

Check that all the elements have started to operate again.

In the event of M/A (green light unlit) the **"Diomède"** responds as follows:

- It interrupts all injection processes,
- It closes the deconcentration valve,
- It switches the pH regulation output (when used) to off
- It maintains the corresponding analogical outputs
- It allow external communication (Modem, RS485,...)
- It allows access to the programming menu
- It continues to collect data (Conductivity and others...)
- It stops managing technical alarms.

10. MAINTENANCE

WARNING

- *Isolate the equipment or installation from mains electricity before any maintenance intervention!*
- *The "Diomède" does not have a power supply circuit breaker. The electrical power supply must be stopped at the main external switch or fuse board!*
- *Otherwise, standard safety instructions apply.*
- *Replace fuses with the original fuses.*
- *Only use fuses supplied by the manufacturer.*

Changing fuses on the **"Diomède"**:

- Take the above safety measures before changing the fuses in the equipment.
- The fuses are protected by plastic safety covers.
- Open the equipment and move it to a 'parking' position.
- Identify the fuse to be changed and remove the protective cover by holding by its two ends.
- Remove the fuse and replace it with an identical new fuse.
- Close the cover of the fuse door.

11. WASTE DISPOSAL

Eliminate **"Diomède"** waste in accordance with applicable standards in your region.

RECYCLING

Comply with applicable requirements in your region.
(You will find the material characteristics in the Technical characteristics of material' section)

12. TECHNICAL CHARACTERISTICS

Temperature constraints:

Acceptable ambient temperature	0°C to 40°C
Acceptable storage temperature	-10°C to 50°C

Material and chemical resistance:

Case and frame	ABS
Façade	Plexiglas
Keypad	Film polyester PET
Seal	CR rubber foam
Chemical resistance	Normal atmosphere in technical premises
Protection type	IP54

Dimensions and weight: (L x H x D)

250 x 215 x 130 mm	Wall mounted
Weight without packaging	About 1.6Kg

Electrical specifications: 230V version

Nominal voltages	230V AC (190-250V AC) , 50/60Hz
Maximum current (Unit only, without external devices)	45mA at 230V AC
Fuses	TR5 - 100mA, 250V, 5x20 delayed action
Maximum current for external devices:	2A at 230V AC
Fuses for external devices	
Solenoid valve	TR5 3.5 A, 250V delayed action
Pump 1 Biocide A	TR5 2A, 250V delayed action
Pump 2 Biocide B	TR5 2A, 250V delayed action
Pump 3 Inhibitor	TR5 2A, 250V delayed action
Pump 4 Dispersant	TR5 2A, 250V delayed action

13. ANALYTICAL SPECIFICATIONS:

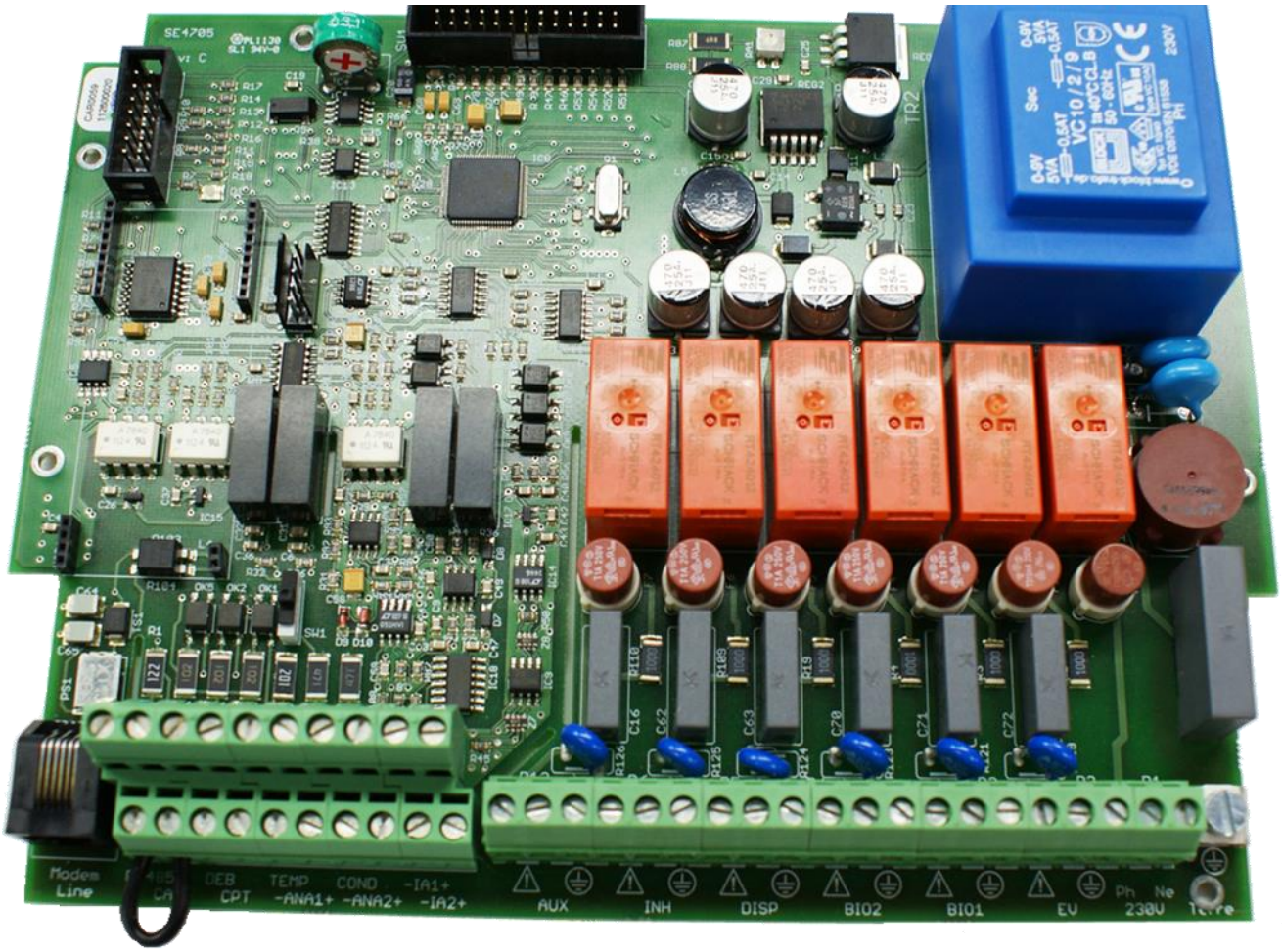
Resistive conductivity input	All sensors	K=0.01 to 10
Temperature input in 4/20 mA	Temperature range	0°C to 100°C
	Accuracy	+/- 0.5°C
	Resolution	0.1°C
Auxiliary 0…20mA input	All 2-wire sensors	0…20mA
	Loop power supply	24V +/- 1V
	Maximum current	50mA
	Charge resistance	485Ω
	Isolation voltage	500V
	Galvanic insulation	$10^9\Omega$
Digital inputs	Common reference potential but with galvanic separation from other inputs/outputs	
	Isolation voltage	500V
	Perturbation	0 to 10Hz
Standard signal outputs	Galvanic separation from other inputs/outputs	
	Isolation voltage	500V
Output range	0/4…20mA	
	Charge resistance	500Ω max.
	Accuracy	0.5% of the output range
		Sortie
Power relay outputs	Direct output	230V AC
	Fuses	
	Contact life	> 20 x 10^6 actions
RS232C standard outputs	Printer output Not insulated, differential	RS232C standard
	PC input/output Not insulated, differential	RS232C standard
Transmission speed	1200 Baud (fixed)	
RS485 standard output	Half duplex mode 2 wires, differential mode	RS485 standard
Transmission speed	1200 Baud (fixed)	
MODEM input/output	Standard MODEM socket impalement specification. CCITT or others	Depending on

Protection against accidental contact with humidity:

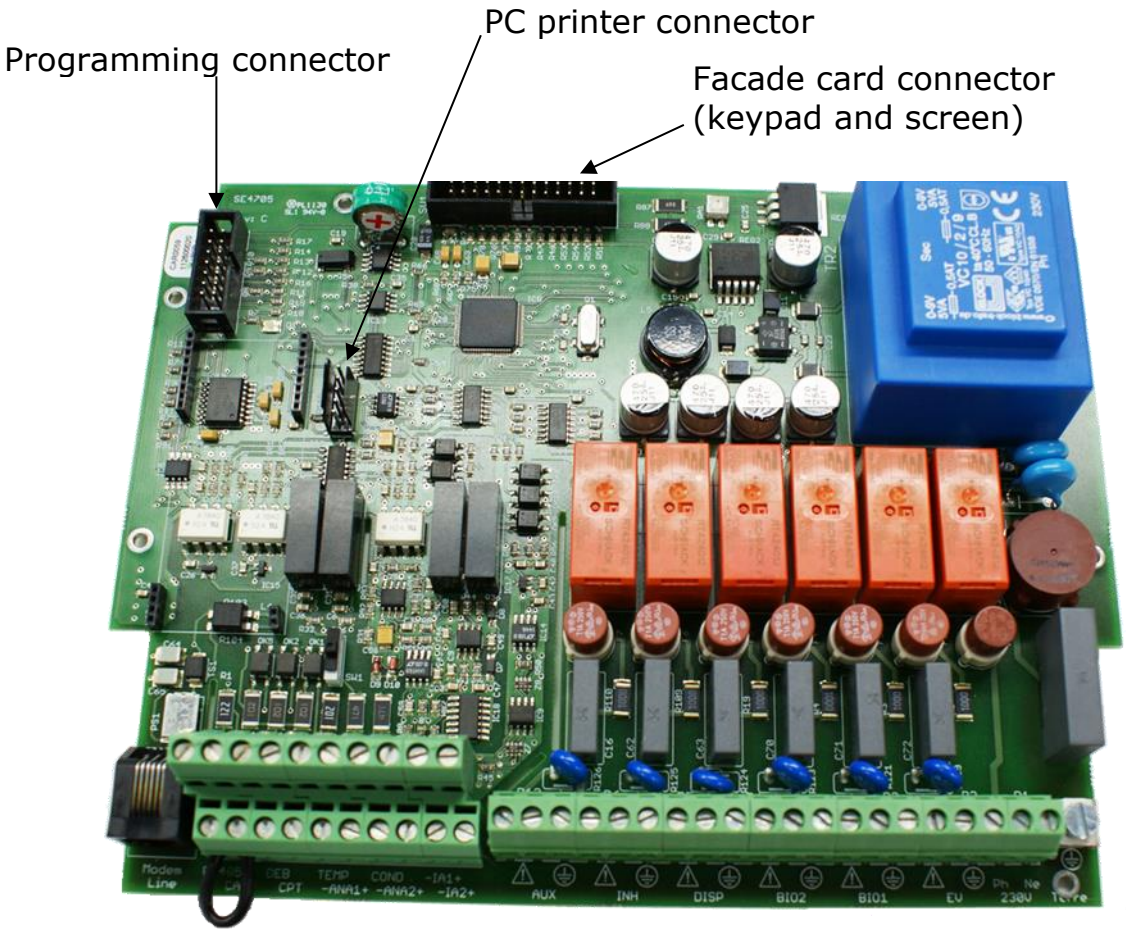
Closed device with	Protection level	IP54 in accordance DIN VDE 0470
External seal with	Protection level	IP54 in accordance DIN VDE 0470
Alternating humid atmosphere DIN 50016		in accordance with FW

14. ELECTRICAL CONNECTIONS

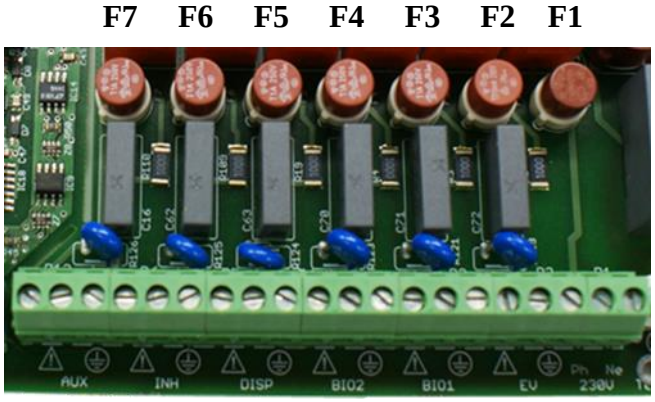
14.1. Location of the "Diomède" internal terminals



14.2. Location of connectors



14.3. Fuses



Connection terminal

F1 = 230 volts power supply

F2 = 230V deconcentration solenoid valve power supply

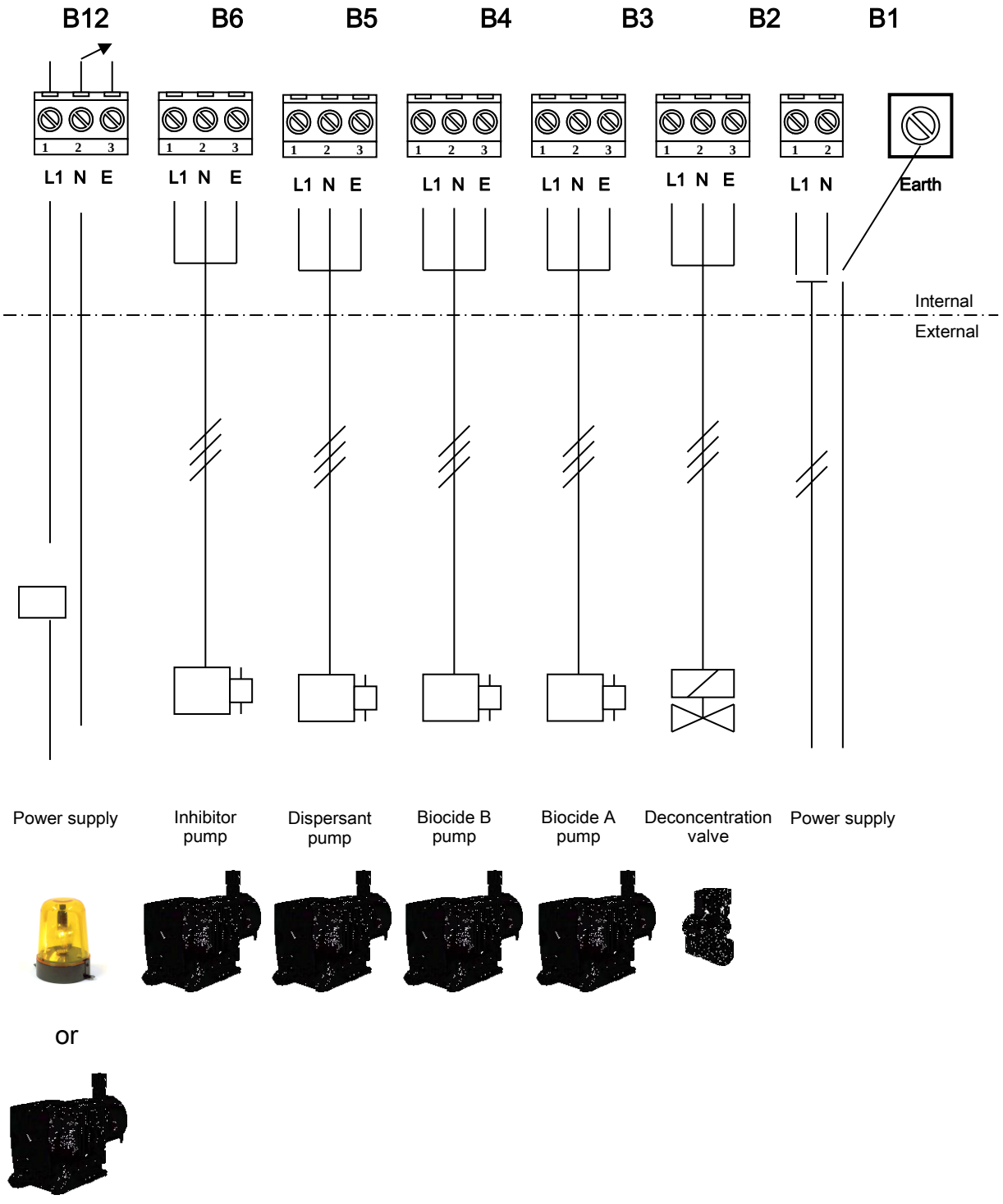
F3 = 230 volts Biocide 1 power supply

F4 = 230 volts Biocide 2 power supply

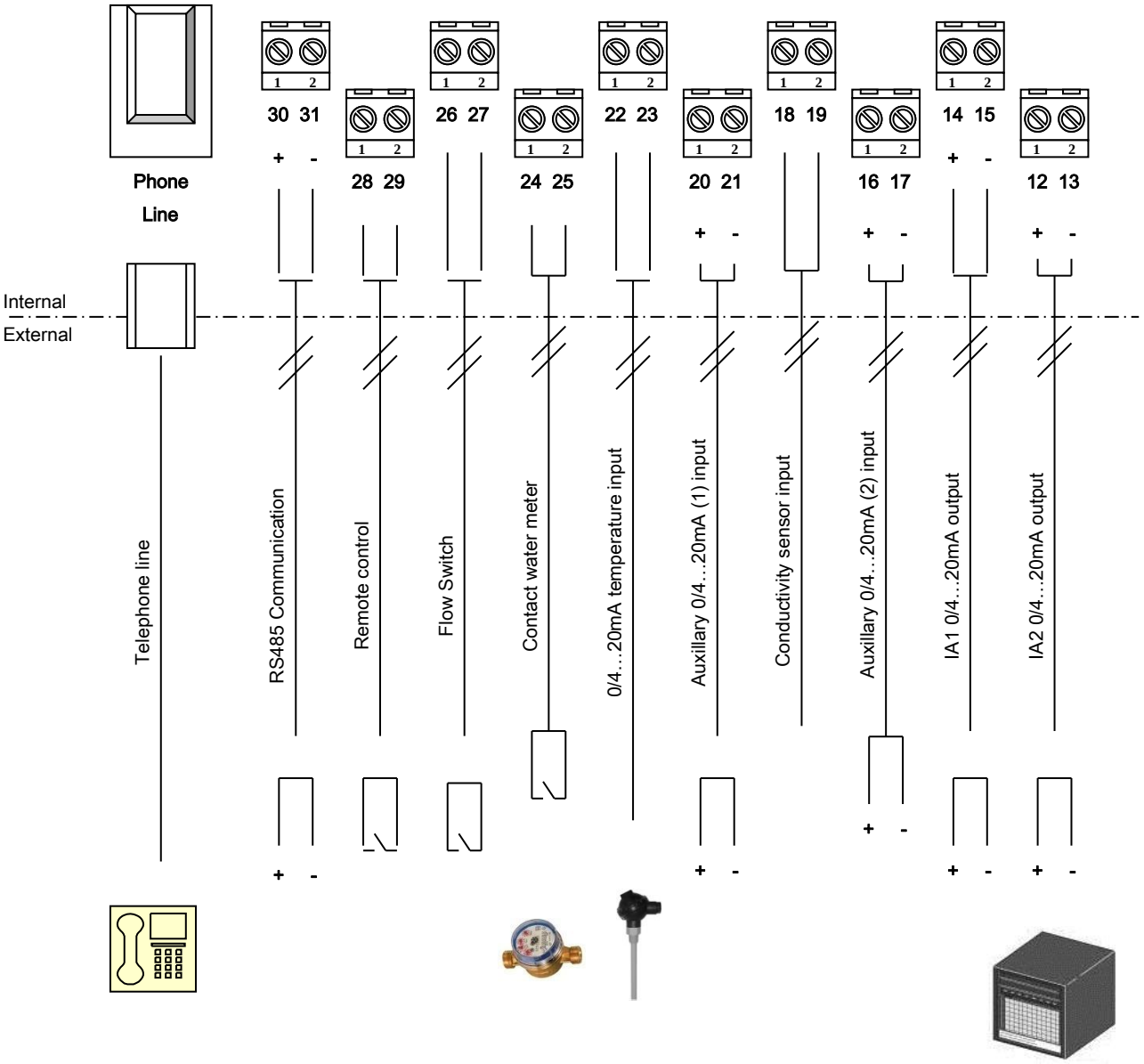
F5 = 230 volts Dispersant power supply

F6 = 230 volts Inhibitor power supply

14.4. Diagram of 'high level inputs/outputs' connections



14.5. Diagram of 'low level inputs/outputs' connections



Notes

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