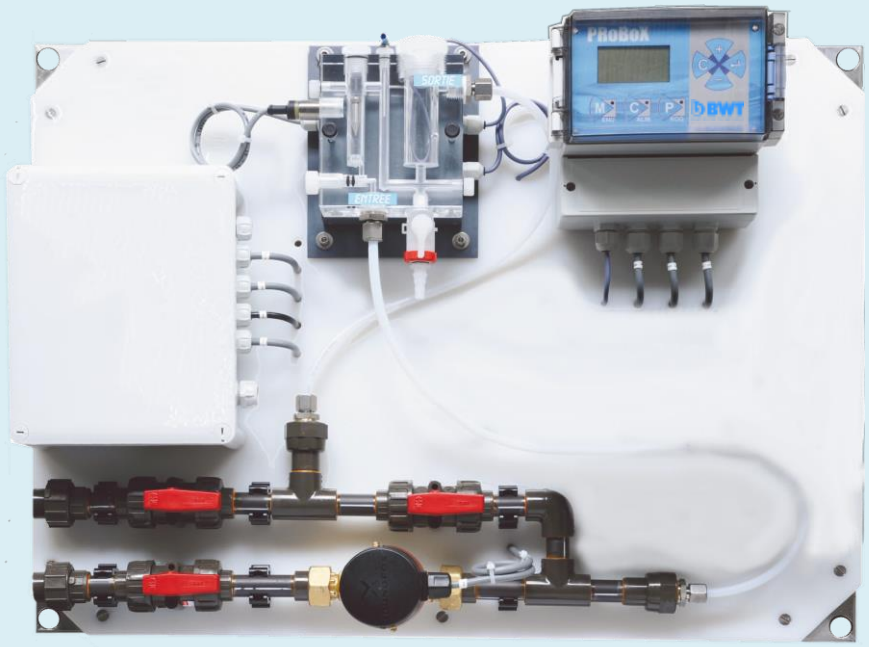


PERMO ECOBOX Version 2

CHLORINATION UNIT

For DHW CIRCUIT - Active Chlorine

VERY IMPORTANT: Read this manual carefully before connecting the unit to the mains supply, filling it with water or operating it. Failure to comply with these instructions will invalidate the BWT PERMO warranty.

www.bwtpermo.fr

For You and Planet Blue.

BWT BEST WATER TECHNOLOGY

afaq ISO 9001 Qualité AFNOR CERTIFICATION

IMPORTANT: Hydraulic and electrical connections must comply with good professional practice and standards applicable where the chlorination kit is to be installed. It is especially important to fit efficient water-hammer arresters if the water input and output piping is fitted with devices likely to generate water-hammer effects (for example, solenoid valves).

In addition, as with any electrical equipment, the **PERMO ECOBOX Version 2** electronics are subject to electrical or magnetic interference. The **PERMO ECOBOX Version 2** is fitted with a series of filters to eliminate the most common sources of interference. However, when the unit is close to power switches, transformers or any other source of interference, shielded cables should be used for connections, and a suitable interference suppressor fitted.

CONTENTS

1- PACKING LIST

The **PERMO ECOBOX Version 2** chlorination kit is presented assembled on a wall panel, with the following devices:

The P0012302 kit is delivered on a panel

- An analysis chamber fitted with a chlorine measurement electrode.
- A specific **PERMO ECOBOX Version 2** analyser/regulator
- A connection unit to control the entire installation.
- A circulation pump.

It is important to store the equipment after receipt in a clean dry room at an ambient temperature between +3 and +35°C or risk damage to some kit components.

Non-compliance with these conditions can void the guarantee on the damaged components.

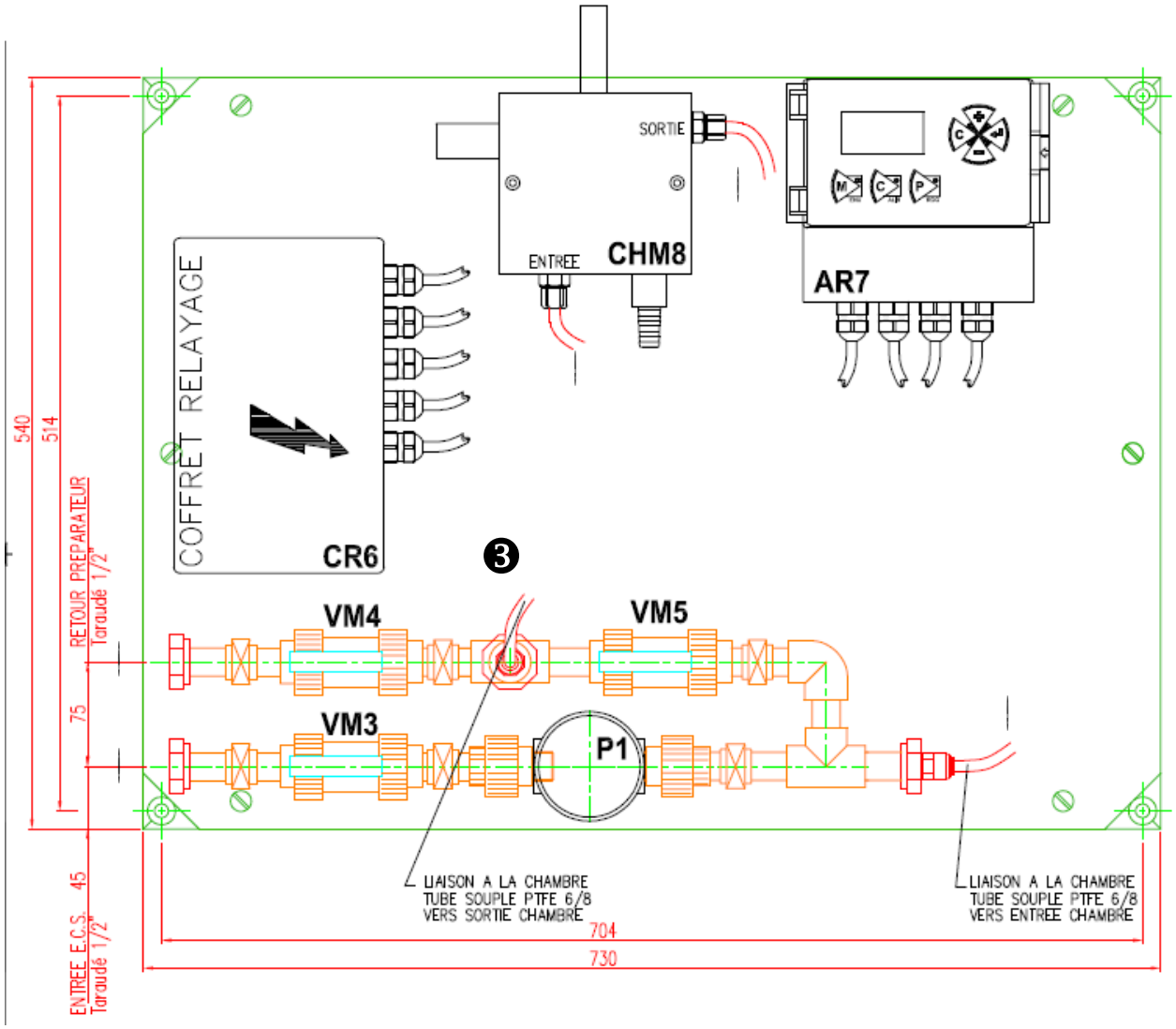
2- TECHNICAL DESCRIPTION

The **PERMO ECOBOX Version 2** chlorination kit enables the injection of chlorine into a domestic hot water supply. An analyser/regulator system + dosing pump manages the controlled injection of chlorine into the pipes, depending on a value set by the user. A timer is also provided to programme regular injections while maintaining regulation.

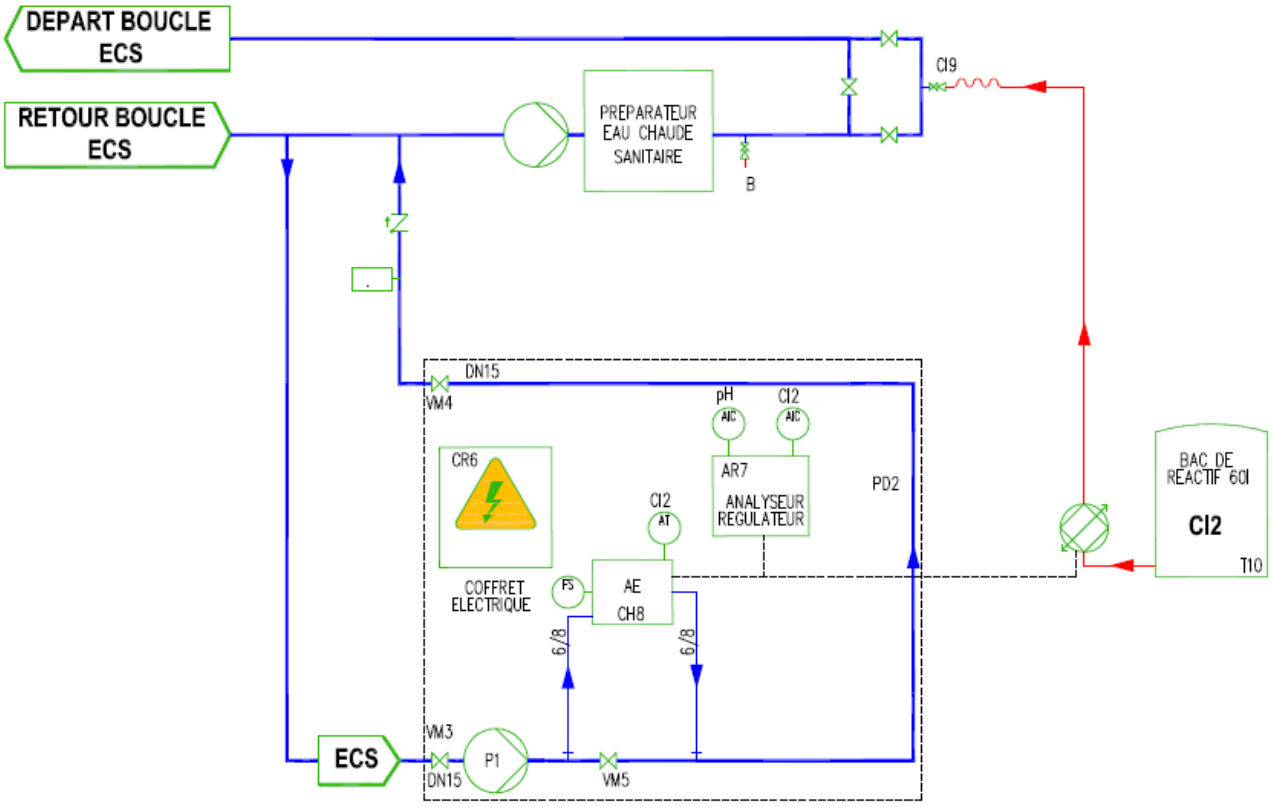
It is preferable to use this chlorination kit using intermittent injections (e.g. 3 days per month). This avoids micro-organisms from becoming resistant to a lower dosage, and limits the corrosion of pipes through a restricted contact time, according to the DGS circular of 22/04/2002.

The **PERMO ECOBOX VERSION 2** is the control unit housing the timer, the regulation and the external dialogue. **SYSCOM** software (available on option) can monitor the system remotely using a computer.

3- GENERAL INSTALLATION AND DIMENSIONS DIAGRAM



1	Hot water circuit inlet - Tapped ½"	DN15 PVCC glued
2	Hot water outlet following analysis - Tapped ½"	DN15 PVCC glued
3 &4	Measurement chamber connection	Tubing 6/8



4- TECHNICAL OPERATING CONDITIONS

Supply voltage	Single phase 230 V 50 Hz
Electricity consumption	30 W
Minimum flow rate of DHW operation	30 l/h
Minimum operating pressure	1 bar
Maximum usage pressure	< 6 bar
Measurement range	0 mg/l< C < 10 mg/l
Minimum water temperature	1°C
Maximum water temperature	70°C
Minimum room temperature	Above freezing
Maximum room temperature	35°C

5- ASSEMBLY - CONNECTIONS

5.1. Installation

The **PERMO ECOBOX VERSION 2** chlorination kit must be installed in a clean, dry, well-ventilated accessible room. This room must be frost free and the atmosphere must not contain chemical vapours that could hinder its operation.

Before installation the installer must check that the dimensional conditions, the technical characteristics and operating conditions have been met (the installation of a pressure regulator is recommended).

The wall on which the **PERMO ECOBOX Version 2** kit is to be attached should be perfectly vertical and capable of bearing the weight of the kit (28 kg - use a suitable attachment system for the wall material). Allow sufficient height under the ceiling for maintenance operations (minimum 30 cm).

The dosing pump should be attached to the ground or to a ground support (not supplied) near the storage tank for the solution to be injected. This pump MUST be positioned on the tank (aspiration at the bottom of the tank).

The can containing the sodium hypochlorite solution (**BWT DW-3002** type) should be accessible to enable the introduction and removal of the solution at the end of each processing period.

5.2. Operating principle:

Analysis:

The water taken from the circuit return is introduced into the circulation chamber for analysis, and once again directed to the DHW supply. The measurement is taken by a chlorine electrode capable of instantaneously measuring out the active chlorine (HCIO). The chlorine content is directly displayed in mg/l on the **PERMO ECOBOX Version 2** regulator.
This chlorine measurement is more accurate and more selective than a Redox potential measurement. This therefore limits the risk of corrosion arising from any excessive oxidiser.

PERMO PROBOX-Version 2:

The **PERMO ECOBOX Version 2** will compare the analysis made with a recommended value. If the amount of chlorine contained in the DHW circuit is too low, the device makes a dosage pump inject the sodium hypochlorite solution. A proportional regulation acts on the introduction of the solution until the active chlorine value has been reached.
The **PERMO ECOBOX Version 2** is also fitted with an internal timer which controls the operation of the chlorination system during processing periods, and stops any filmogen pump during the same period.
Finally, the **PERMO ECOBOX Version 2** is provided to perform various additional functions. The device can send data to a computer via the **SYSCOM** monitoring software (available on option).

The dosage pump and the disinfectant solution:

If the recommendation given on the **PERMO ECOBOX VERSION 2** regulator is not attained, the dosage pump will add a certain quantity of chlorine into the domestic hot water supply, via an injection tube.
The dosage pump rate is automatically regulated by the **PERMO ECOBOX Version 2.** The closer we get to the recommended value, the less frequent are the injections. This proportional operating principle avoids the excessive dosage of the disinfectant solution.

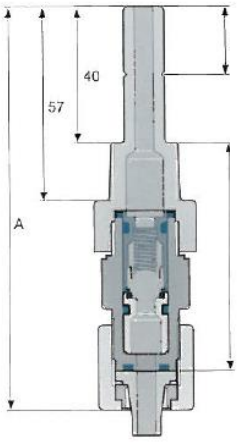
Chlorine is directly taken in the can. It is preferable to use sodium hypochlorite in liquid form (**BWT DW-3002**).
The solution must be renewed at the end of each processing period.

WARNING: Please follow the safety rules shown on the cans when handling chemical products. Users should familiarise themselves with the risks and the prevention, protection and emergency procedures.

5.3. Hydraulic connections

Injection:

The dosage pump is installed on the **PERMO ECOBOX Version 2** kit.
To correctly carry out an injection in the DHW supply, the injection tube (supplied) must be fitted to the water supply to be treated (circuit outlet).

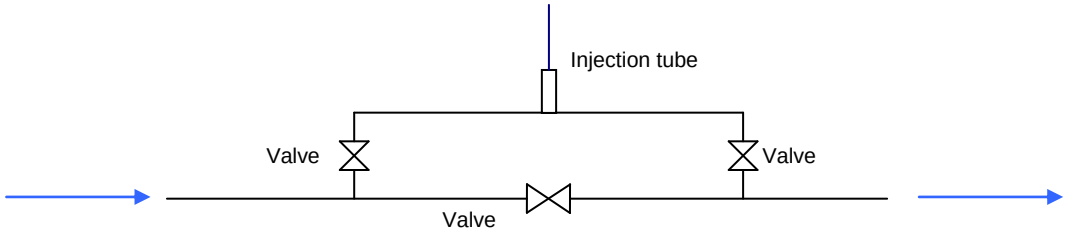


A ½'' M tapping must be performed on the pipe to be treated.

The injection tube should preferably be assembled on the generator above the piping, using the instruction given below.

In order to perform correct maintenance on the injection tube, it is strongly advised that it should not be fitted directly to the domestic hot water supply.

We recommend the following assembly:



Install the injection tube parallel in relation to the main network (as detailed on the above diagram) and fit the isolating valves upstream and downstream.

During treatment, the upstream and downstream isolation valves will be open. The valve positioned on the main pipe will be slightly closed to create enough load loss so that the water can circulate everywhere.

Note: the end of the injection tube will be cut to size so as to inject in the axis of the vein.

Sample:

Connect the PVCC piping of the kit (location ❶ on the installation diagram on page 6) to connect the DHW supply sample to be analysed. Fit an adapted isolation valve (temperature, pressure, etc.) to assist with system maintenance.

Note: This tapping should be performed UPSTREAM of the DHW supply circulating pump

DHW kit outlet:

Connect the PVCC piping of the kit (location ❷ on the installation diagram on page 6) to connect the return to the DHW circuit.

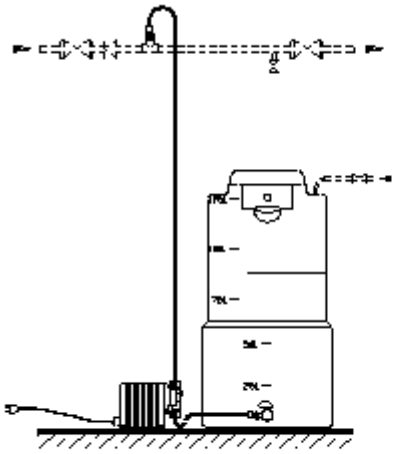
IMPORTANT

The 2 tappings ❶ and ❷ should be performed UPSTREAM of the DHW circuit recirculating pump.

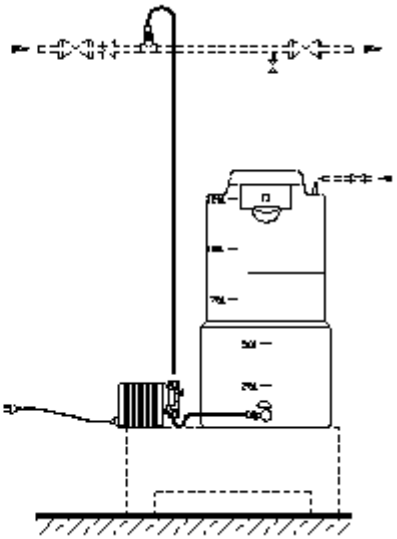
WARNING: It is essential to use material capable of withstanding the DHW supply temperature, such as PVCC (the material used in the kit).

Dosing pump:

It is essential to fit the dosing pump at the bottom of the storage tank of the injection solution. This assembly should be made using the supplied connector.



If necessary, the fitter should install a support under the dosing pump. This is especially important if the ground may become wet.



Example of assembly with retention (optional)

See specific notice on the dosing pump to view the technical information. The installed pump is BWT DDA7.5 C type.

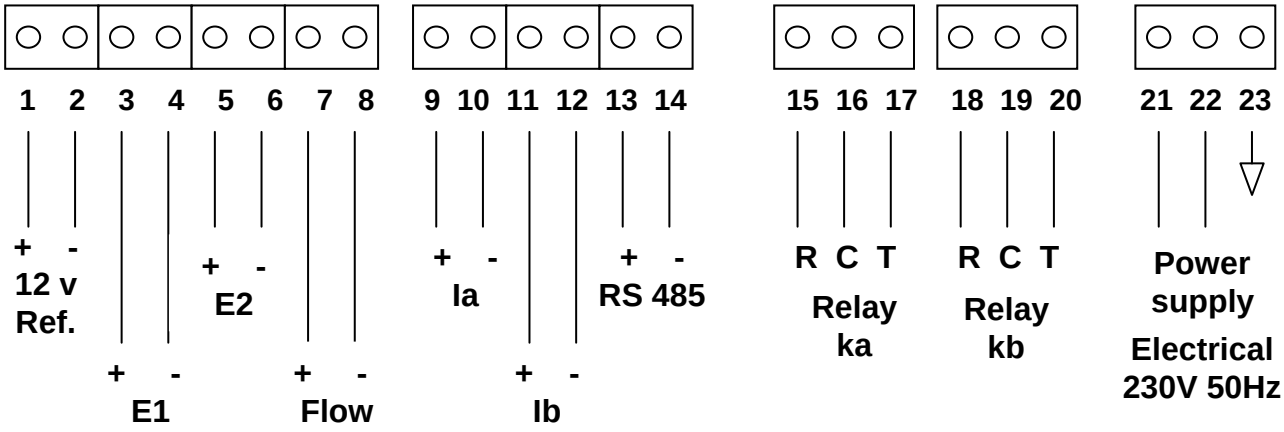
5.4. Electrical connections:

WARNING: Before making the connections and for all actions performed on the kit, cut and/or check the electricity supply.

REMARK: It is the installer's responsibility to check that the cables used comply with the standard applicable in the room where the device is installed and to replace them if necessary.

The electrical connections to the **PERMO ECOBOX Version 2** should be made using a flexible cable with a cross-section of 0.5 or 0.75 mm2.
Please read the following table carefully. It details the type of cables to use.

5.5. PERMO ECOBOX Version 2 connection unit:



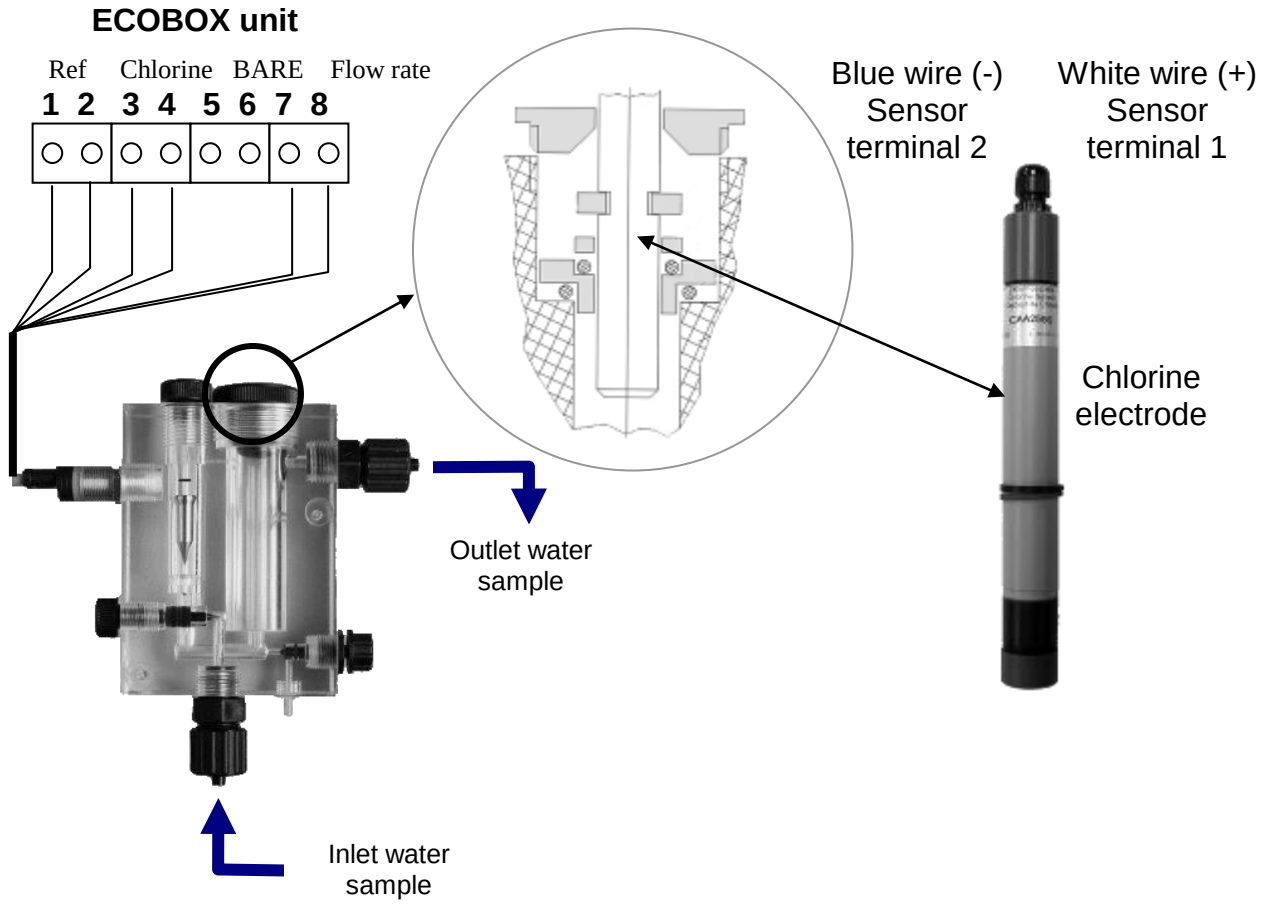
Terminal no.	*Type of cable*	*Description*
1 and 2	2 x 0.5 or 0.75 mm^2	Sensor reference 1: Red 2: Brown
3 and 4	2 x 0.5 or 0.75 mm^2	4/20 mA signal entry of the chlorine sensor 3: white (E1 +) 4: black (E1 -)
5 and 6		Not used
7 and 8	2 x 0.5 or 0.75 mm^2	Flow rate detector 8: green (Flow rate -)
9 and 10		4-20 mA output: regulation of the dosing pump 9: Ia + 10: Ia-
11 and 12	2 x 0.5 or 0.75 mm^2	0/20 or 4/20 mA output: Signal report. 11: Ib + 12: Ib -
13 and 14	2 x 0.5 or 0.75 mm²	**SYSCOM** Supervision RS485 connection (optional) 13: RS485 (+) 14: RS485 (-)
15, 16 & 17		Not used
18, 19 & 20	3 x 0.5 or 0.75 mm^2	Alarm dry contact "injection too long" 18: R: Contact normally open. 19: C: Common. 20: T: Contact normally closed. Kb relay
21, 22 & 23	3 x 0.5 or 0.75 mm^2	**PERMO ECOBOX** power supply. 230V 50 Hz 21: Phase 22: Neutral 23: Earth

5.6. Connection of the mono-parameter circulation chamber:

The circulation chamber is fitted with an electronic amplification module to manage the chlorine electrode signal and to send it under the best conditions to the **PERMO ECOBOX Version 2** for exploitation.

The connection of the circulation chamber to the **PERMO ECOBOX Version 2** is done at the factory using the above diagram. The connection should be checked at the time of entry into service.

Type of measure	1	2	3	4	5	6	7	8
Chlorine	red	brown	white	black	BARE	BARE	bare	Green



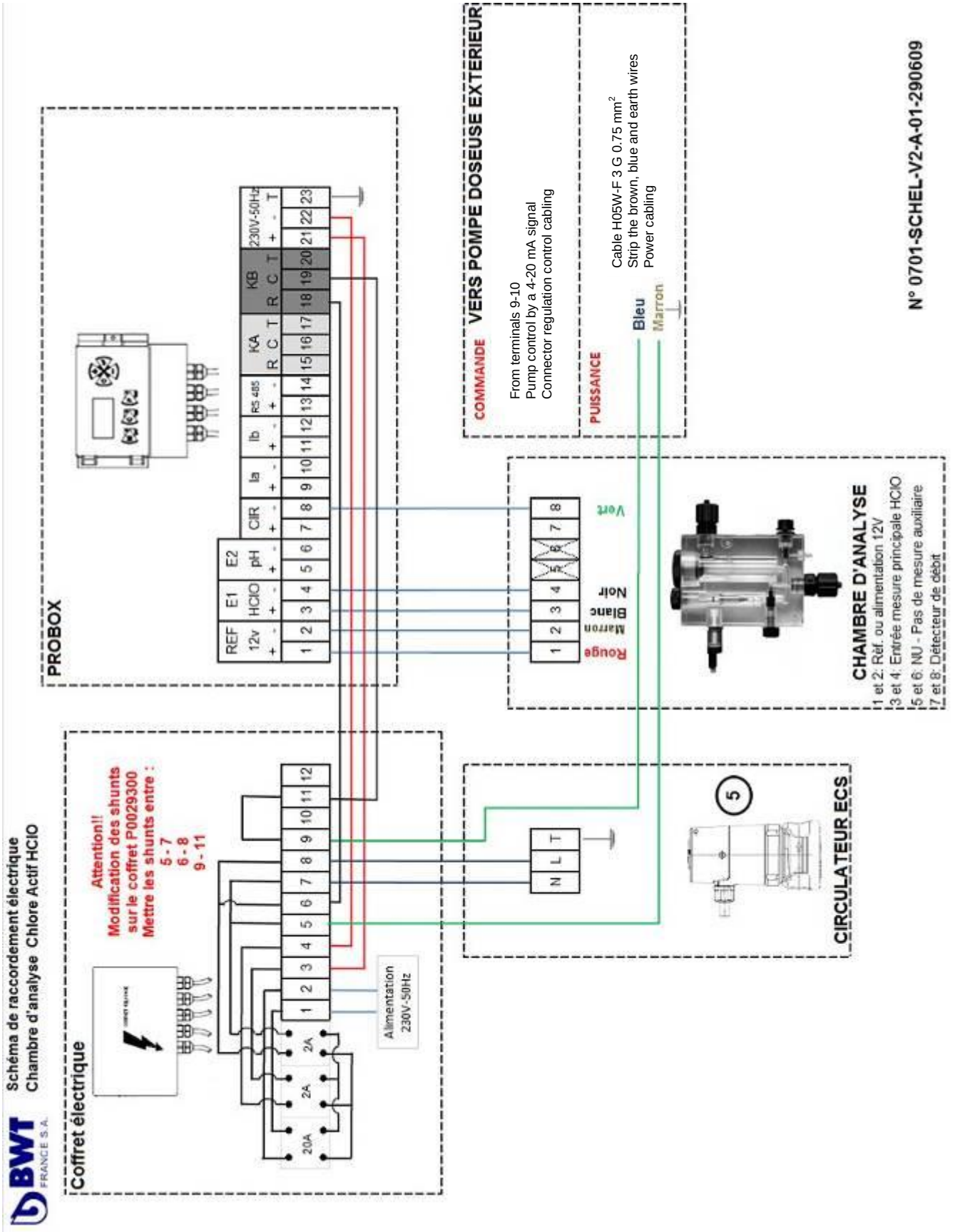
The screw terminal (2 terminals) following the above diagram and accessible by removing the upper part of the chlorine electrode (bayonet system).

- Connected the white wire to terminal no. 1

- Connect the blue wire to terminal no. 2

5.7. General electric connection diagram for the PERMO ECOBOX Version 2:

Mono-parameter



5.8. 0/4…20mA analogue output:

An analogue output (copying the **PERMO ECOBOX Version 2** signal) is available directly on the regulator terminal on terminals 11 & 12.
This analogue output, referenced **"Ib"** is fully adjustable. It can be defined for data transmission.

The delivery of analogue output current to terminals 11 & 12 can be defined by the user as:

- ✓ 0 to 20 mA
- ✓ 4 to 20 mA
- ✓ 20 to 0 mA
- ✓ 20 to 4 mA.

WARNING: The maximum carrying capacity is 500 ohms.
Respect the polarities, terminal 11 (+) and terminal 12 (-).

5.9. RS232 output:

An RS232 output is available for a direct connection with a computer using **SYSCOM** data processing software (available on option).
The length of the cable between the **PERMO ECOBOX Version 2** and the computer is a maximum of twenty metres. As standard, a five metre cable with connectors is supplied with the **SYSCOM** option.

5.10. RS485 Bus Output:

This RS485 computer bus output enables the parallel connection of up to 32 **PERMO ECOBOX Version 2** (maximum loop length of 1000 metres).
An RS485/RS232 module installed between the computer and the loop sends information to a computer with **SYSCOM** data processing software (available on option).

WARNING: PERMO ECOBOX Version 2 inputs are not thermally isolated! This function is performed at measurement chamber level.

The use of **BWT PERMO** measurement chambers is essential. No responsibility shall be accepted in the event of failure to respect this clause.

The electricity supply of the isolators and measurement converters included in the measurement chambers is performed by the **Ref.** output, which delivers a **direct voltage of 12v**.

6- CONNECTION TO THE MAINS WATER SUPPLY:

Before proceeding with connection to the mains water supply:

- Please read all of this document
- Familiarise yourself with the technical user recommendations
- Strictly adhere to the instructions for hydraulic and electrical connections

- When connecting to the mains water supply, open the water supply gradually, respecting the acceptable pressure limits (see technical operating conditions).
Check there is no leak in the installation.

6.1. Safety recommendations:

The use of a water processing unit requires handling materials and products which present various risks.

Some of these risks are well known and inherent to all industrial installations, such as electrical hazards.

Others are more specific, such as the chemical products used.

It shall be the operator's responsibility to notify the relevant people through the use of safety information sheets, and the provision of preventive, protective and emergency measures.

7- COMMISSIONING:

7.1. Circulation chamber:

A pressure greater than 6 bar may cause leaks, and possibly the destruction of the circulation chamber and the chlorine electrode.

An excessive temperature (above 70°C) may cause the destruction of the selective membrane fitted on the chlorine electrode, as well as the analysis chamber and the PVCC piping.

An excessive flow rate in the circulation chamber may damage it. The use and installation of a water reducer is recommended to protect the installation properly.

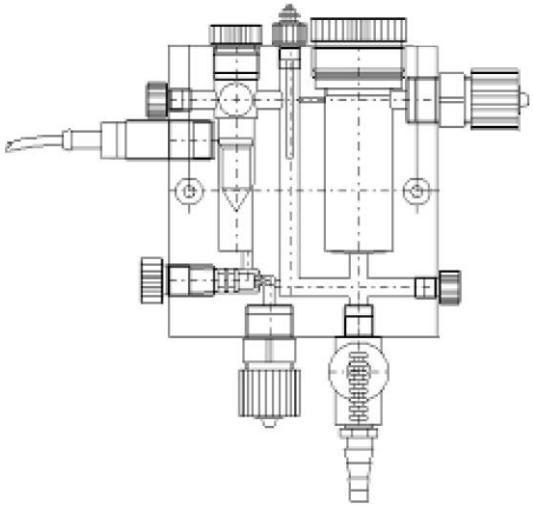
To adjust the flow rate on the circulation chamber, take the following steps:

By moving the water tap in the circulation chamber gently, leave the water to slowly rise until it pours towards the drain.

Gently open the tap so that the blue flowmeter drops as far as it will go. Then close the tap gently so that the flowmeter climbs around five millimetres (flow rate adjusted to around 30 litres per hour).

Measurement chambers are fitted as standard with an earthing lug. This element should not be connected to the sensor types used on the PROBOX DHW HV

Mono-parameter chamber



7.2. Installation of the chlorine measurement electrode:

Disassembly/Assembly/Installation

Before assembling the sensor in the measurement chamber, close the stop valves upstream and downstream of the sensor. Switch off the system.
Take suitable protective measures while handling chlorinated water solutions.
Release the cover located at the end of the sensor. The golden electrodes will then be visible and must not be impacted.

Filling the tank with electrolyte.

Release the ring located at the end of the sensor. Open the electrolyte bottle, place the nozzle on the top of the bottle and expel the excess air. Then press on the electrolyte bottle and expel slowly, avoiding creating air pockets in the tank. Gradually withdraw the bottle. Screw the ring up to the O-ring and tighten.

Attention: The tank must be filled without creating air pockets.

Calibration

Zero point calibration of the cell is not usually necessary. Calibrate the gradient using a suitable chlorine measurement device (DPD1) adjusted to the regulator/measurement device, in accordance with instructions, taking into account the pH value.

Zero point calibration (if necessary)

Zero point calibration is necessary when the chlorine measurement is low. In principle, the cell has a very stable "zero" in the absence of chlorine. However, to guarantee perfect zero including the measurement chain diversions, perform checks and, if necessary, calibration.

Pass fully dechlorinated water in the measurement chamber, or circulate the sample water through an active carbon filter.
Wait for the measure to be fully stable, and check the zero calibration on the measurement device.
Repeat the operation regularly (at least once a month).

Sensor gradient calibration.

Gradient calibration is compulsory after the initial commissioning (about 2H), and should be performed regularly (once a month) for normal chlorination operation. If chlorine dioxide is present, calibration should take this into account. The action of the chlorine dioxide is four times greater than the measured chlorine.

Circulate the chlorinated water in the chamber, wait for the value reading on the regulation device to become stable.
The chlorine value should represent at least 10% of the measurement scale.
Perform a chlorine measurement using the DPD no. 1 method.
Perform a counter measurement to confirm this calibration value.
Enter this value in the regulation device for calibration.

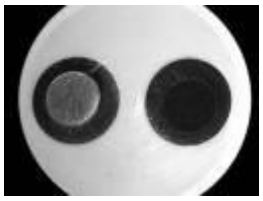
Attention: to perform correct calibration, the sensor must be used in the measurement chamber, under nominal pressure with the recommended flow rate (see technical specifications).

Electrolyte change period

The electrolyte should be changed every six months. (This period may vary depending on the quality of the water)

Remove the cell from the measurement chamber
Disconnect the power supply wires from the measurement loop.
Carefully unscrew the tank ring.
Empty the electrolyte contained in the tank
Carefully refill with new electrolyte, without creating air pockets
Screw the tank ring and tighten on the O-ring
Carry out zero and gradient calibration as detailed above.

Sensor regeneration period

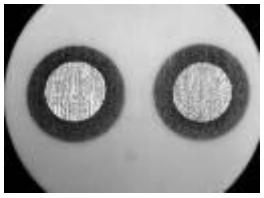


Electrodes oxidised after four months of operation

To ensure the proper operation of the sensor, and above all to guarantee sufficient sensitivity, it is recommended to clean the internal measurement electrodes located at the end of the sensor using a light abrasive (Type S3) supplied with the sensor.

In the event that calibration is impossible owing to the reduced sensitivity of the sensor, proceed as follows:

Remove the cell from the measurement chamber
Clean the electrodes with clear water and dry them
Using a special abrasive, gently rub the electrodes on the abrasive up and down.
Refit the sensor with new electrolyte.
Perform zero and gradient calibration as detailed in the above paragraphs.



Electrodes cleaned by abrasion.

Restart calibration at regular intervals. The calibration intervals will depend on the use of the sensor and the quality of the water.

Maintenance

The sensitive head of the electrode must always be kept moist.
P0060056 electrodes are "maintenance-free". However, using cleaning solutions, an electrode can be regenerated. If this regeneration is not conclusive, the electrode should be replaced.

As standard, electrodes are delivered with a cap filled with KCL solution for storage. This cap should always be kept damp.

PERMO ECOBOX Version 2 calibration

With the device switched on, go to **"USER MENU"** and go down to the **"Calibrations"** line.
Perform **"zero"** calibration, soak the chlorine electrode in a chlorine-free solution, wait a few minutes and confirm the **"zero".**
Then soak the chlorine electrode in the known chlorine solution. Position the cursor on **"gradient"** and confirm. Wait a few minutes so that the value stabilises and confirm again.
Enter the known value of your solution and confirm.

Calibration has been done (wait measurement stability).

7.3 PERMO ECOBOX Version 2 regulator programming:

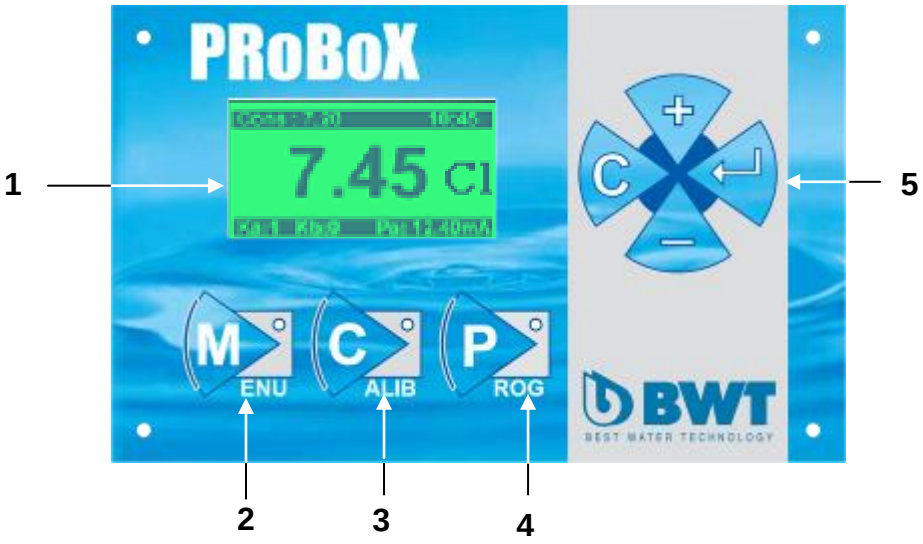
PERMO ECOBOX Version 2 regulators have a 7-key keypad and a backlit LCD screen to establish a dialogue between the user and the machine.

This dialogue is established through drop-down menus for programming with direct access keys.

REMARK: The programming can only be done if the regulator is not operational (green led button P ROG off).

ATTENTION: Do not forget to confirm the regulator operation by pressing the key P ROG when the programming is finished (Green led button P ROG lit).

Control and display keypad:



Key identification:

1 - Backlit **LCD display**

2 - "Menu" key

Access to the various programming menus
The inlaid red LED comes on in programming mode

3 - "Calibration" key

Enables a quick calibration of the setting displayed in bold characters on the LCD graphic screen.
The inlaid yellow LED comes on during calibration phases.

4 - "Programme" key

Enables the regulator parameters to be changed when the green LED is off. Also flashes an inlaid green LED, meaning that the regulation process is suspended or, if not flashing, that the regulator is in operation.

5 - Navigation keys

Enables the correction of parameters during programming
Enables going back through programme steps
Enables the extraction of programming menus

Enables parameters and numerical data to be confirmed

Enables the positive or negative modification of data.

When the **PERMO ECOBOX Version 2** regulator is out of service (green LED goes out), enables the display contrast to be modified.

The **PERMO ECOBOX Version 2** is a regulator which enables the measurement of free chlorine content to be made, with a numerical display of the measured value, as well as the management of the chlorine injection with an electronic 4/20 mA signal dosing pump.

The programming and the programmed parameters are saved in a non-volatile memory for a non-powered period of around 10 years.

REMARK: When being switched on for the initial commissioning, the parameters of the **PERMO ECOBOX Version 2** regulator will be the factory settings.
Merely change these parameters if they are not suitable for your purposes.

Programming can only be done if the regulator is not operational (Green Led button 

off).

Standard configuration or factory settings:

- Text in French,
- Relay status display on lower line
- non-programmed technical alerts.
- Proportional regulation mode
- Inactive **"Hold"** function
- Proportional band value = 10
- Communication in **RS485** mode
- Unit identification number = 0

Programming procedure:

The **PERMO ECOBOX Version 2** has a three-level drop-down menu programming system:

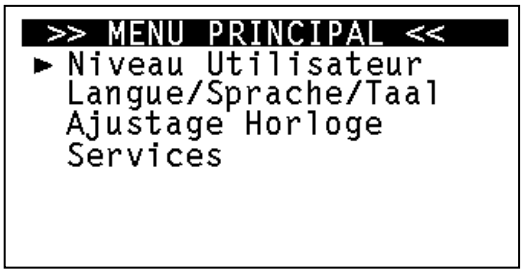
- ✓ **Main level**
- ✓ **User level**
- ✓ **Specialist level**

Each level grants access to more fundamental functions involving a solid knowledge of the required process. The programming of the **PERMO ECOBOX Version 2** will be performed at User level.

Press the key 

the green LED goes out, then press key 

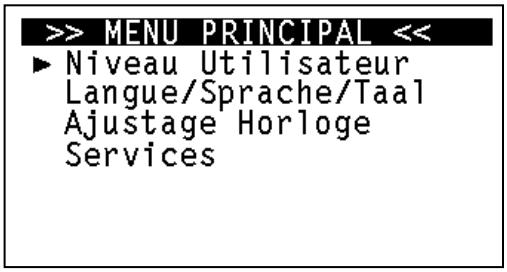
the inlaid red LED in the key comes on. The following screen appears.



With keys  select the menu to modify and confirm with key 

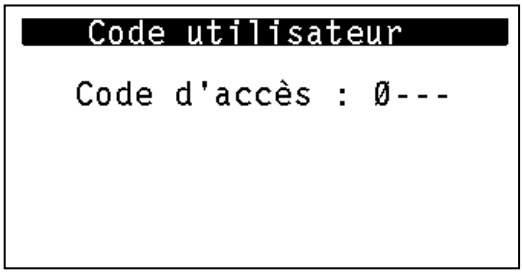
User Level:

Select the User menu and press key .



User code:

WARNING: The **"User"** menu can be protected by an access code. Without the code, no modification of the **PERMO ECOBOX Version 2** can be executed. By default, no code is entered **"0000"**.



To enter an access code, position the selection cursor on the **"User code"** line using the keys and confirm .

To enter the access code, using the keys modify the value and confirm with the key . In the event of an error, use the key to return to the previous numerical value.

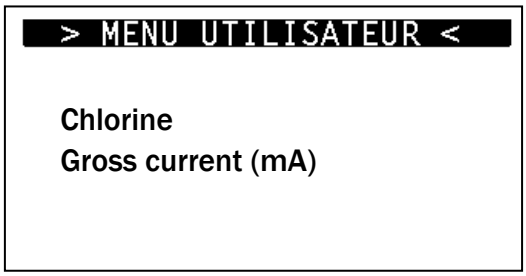
If no code is programmed, press the key several times to exit. The following menu appears:

REMARK: Code protection with the user menu also blocks the specialist level by knock-on effect. The code **"0000"** is the cancellation code.

Calibrations:

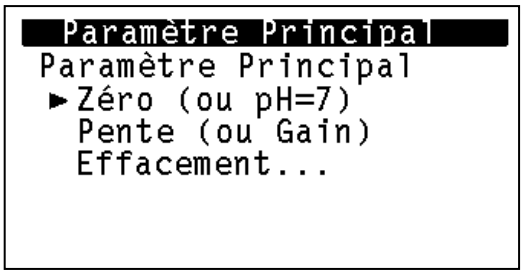
ATTENTION: An accurate calibration is done at the factory. It is recommended that you do not change the preset calibration. The calibration procedure automatically activates the opening solenoid valves for the analysis water.

Position the selection cursor on the **"Calibrations"** line with keys and confirm .



Select Chlorine with keys and confirm with key .

It is not possible to select the **"Gross current (mA)"** menu.

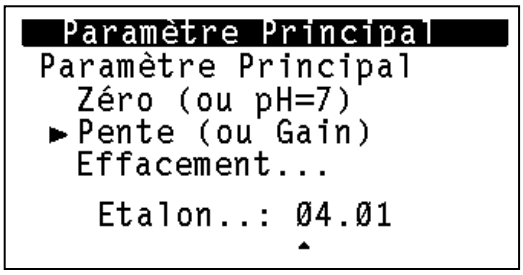


Three options are available:

- **Zero calibration**
- **Gradient or gain of the measurement chain**
- **Delete previous values with reset to factory standard values.**

Soak the measurement electrode in a chlorine-free solution, and after a few minutes confirm **"Zero"** calibration

Then proceed with adjusting the gain or the **"Gradient"**. Select the **"Gradient"** line with keys and confirm . Soak the chlorine measurement electrode in a reference solution (presence of chlorine whose threshold is known). Wait a few minutes, then enter the known value with keys then confirm the new value with key .

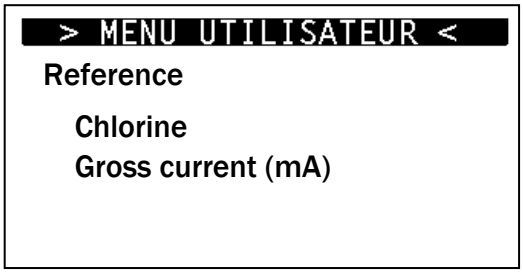


If the gradient or gain calibration procedure is validated, the **PERMO ECOBOX Version 2** performs the calculation of the new gradient based on the reference brought on the electrode.

ATTENTION: The calibration of the gradient or gain of the measurement chain should not be performed with values close to zero. Otherwise the calculation will not be performed correctly.

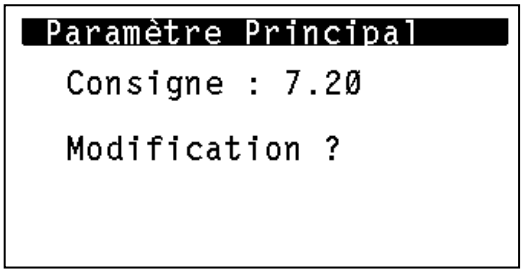
REMARK: In the event of any doubt over the quality of the calibration procedures, or in the event of any change to the elements constituting the measurement electrode, it is recommended to delete all old values by confirming the **"delete"** function.

Reference:



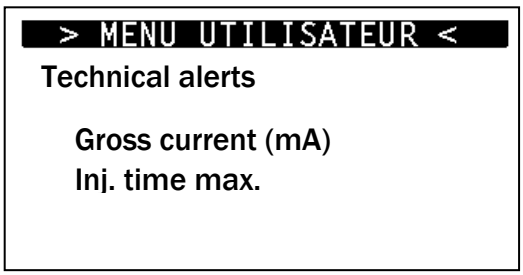
It is not possible to select the **"Gross current (mA)"** menu.

Proceed with the adjustment of the **"Reference"** by selecting only the Chlorine line with keys then confirm . To view the value, press the button and modify with keys otherwise press to exit.



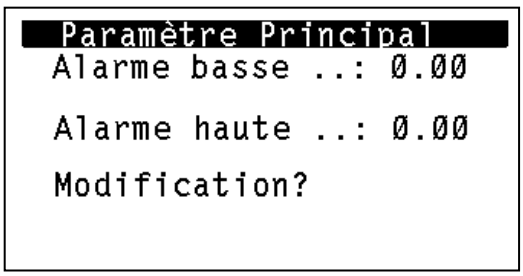
Technical alerts:

A technical alert is defined for chlorine in minimum and maximum physical values.



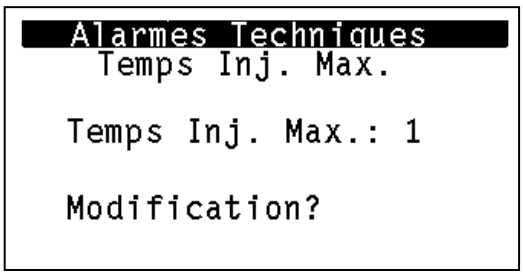
It is not possible to select the **"Gross current (mA)"** menu.

Proceed with **"Technical Alerts"** adjustment. With keys mo cursor to **"Chlorine"** and press key .



Press key to select alert ad change the value by pressing keys , confirm with key

Then adjust the maximum injection time. Select the line with then confirm with key .



This alert is essential to avoid overdosing.

This alert relates to the maximum continuous or partial operating time for the treatment dosing pump. This time is calculated while dosing orders are in effect. As soon as pumping stops and the reference point is reached, the counter automatically resets. The time is given in hours (minimum 1 hour and maximum 24 hours).

ATTENTION: In the event of triggering the **"injection too long"** alert, only a user action can reset the counter to zero.

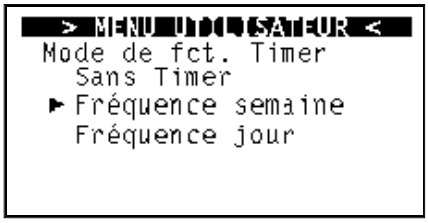
Proceed with adjusting **"Injection time"**. Select the line with keys and Press key to modify and on keys to change the value.

Timer programming:

This programming defines the regulator operating times. In TIMER mode, the regulation is automatically shut-off during operating ranges.

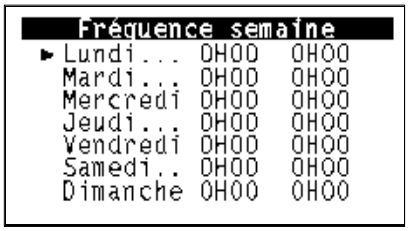
There are three operating modes available.

- No Timer, or continuous operation mode
- Week mode
- Day mode

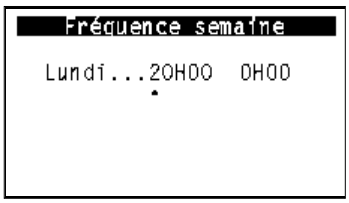


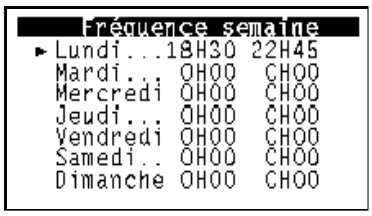
ATTENTION: In the event of any modification to the Timer operating mode, (only possible in the specialist menu), all cycles are cancelled. Programming must be done to complete the operating time.

To select the operating mode, move the cursor using keys and , then press key to select.

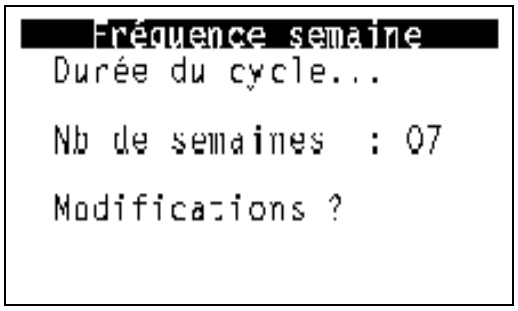


Press keys and select the day to programme, and with key Confirm. Change the start and stop times with keys for each day of the week. It is only possible to perform one programme per day.





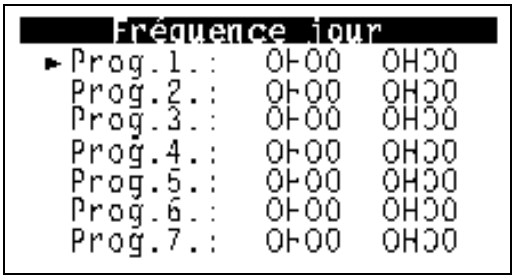
Once the week frequency has been programmed, when confirming with key , the following screen appears:



Set the duration of the dosage cycle in weeks. Press key change the value with keys and confirm .

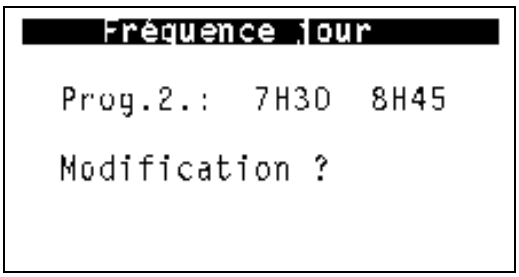
If no week number is programmed (equal to zero) the programmed cycle will be renewed every week (e.g. time programmed for Tuesday and Thursday each week of the cycle duration = 0 weeks)

The following window enables you to programme seven treatment times, identified by programmes numbered 1 to 7, representing "start/stop" per day.

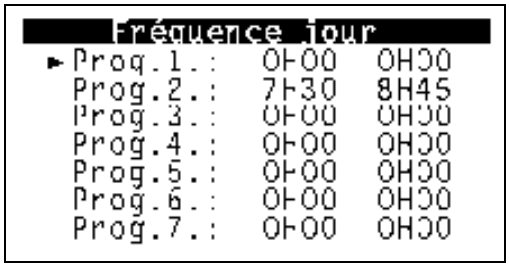


ATTENTION: In the event of any modification to the Timer operating mode, (only possible in the specialist menu), all cycles are cancelled. Programming must be done to complete the operating time.

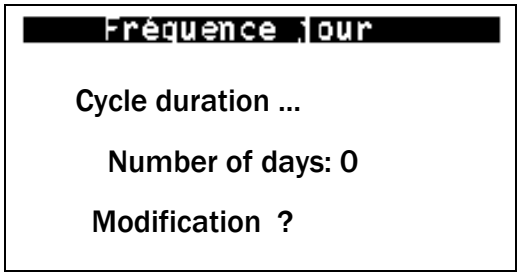
Press keys and select the programme to modify, and use key to confirm. Change the start and stop times with keys for each programme.



After modification and confirmation ...



Once the day frequency is programmed, when you confirm using key  , the following screen appears:

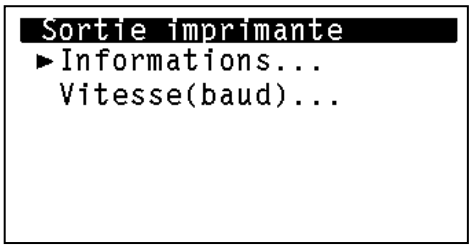


Programme the dosage cycle duration in days. Press key  , modify the value with keys   and confirm  .

If no number of days is set (equal to zero), the programmed cycle will renew every day (e.g. time programmed 10 am to 3 pm = cycle every day within the same times).

Printer output:

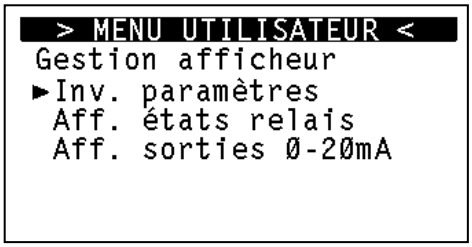
The printer output is not available and cannot be selected.



Display management:

The LCD display can be set to view different parameters...

- Reversal of the main parameter/ancillary parameter display
- **Ka** and **Kb** relay status display
- **Ia** and **Ib** 0/4...20mA analogue output display



The reversal of the display parameters will reverse the main chlorine value display through displaying the 4-20 mA signal, located in the lower right corner of the display. The chlorine value will replace the reverse display of the 4-20 mA signal.

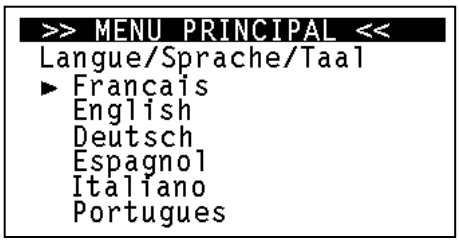
The relay status display enables the **Ka & Kb** output relay status to be viewed in the lower left corner (0 = relays off & 1 = relays on, reverser contact).

The 0-20 mA outputs display enables the **Ia & Ib** analogue output status to be displayed in the lower left corner instead of the **Ka & Kb** display (0-20 mA, respect positive and negative polarities).

REMARK: The display of the relay outputs and analogue outputs appears in negative video on the lower display line.

Langue/ Language/ Sprache/ Idioma/ Lingua/ Taal

Changing the text language for the **PERMO ECOBOX Version 2** (6 different languages are available).

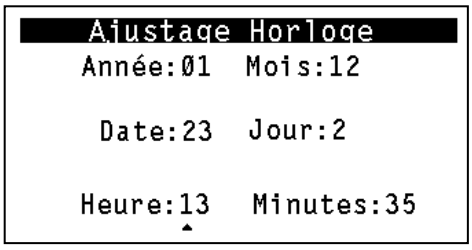


To change, press key  change the value with keys   and confirm  .

<u>Clock adjustment:</u>

Update and change time of the internal real time clock. This clock is protected by a backup battery.

REMARK: When adjusting the clock, the number of the day of the week must be specified! (E.g. Tuesday = 2nd day of the week).



To change, press key  change the value with keys   and confirm  .

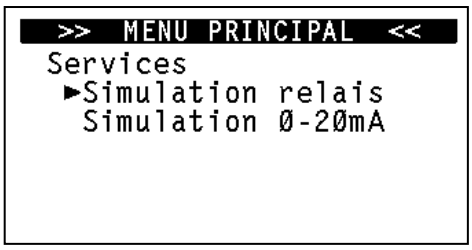
REMARK: If the numerical value is confirmed, it will no longer be possible to use the **"clear"** key to change the parameter. If this happens, recall the function and change it!

Services:

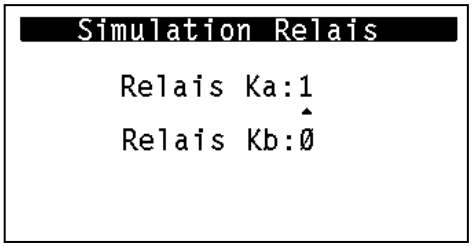
This function enables voluntary controls to be carried out on the **PERMO ECOBOX Version 2** regulator output instruments.

So **Ka and Kb** relays can be used to check whether the control instruments are operating correctly.

Similarly for **Ia and Ib** outputs, a simulation of output currents at the desired value will enable analogue transfers to be checked.



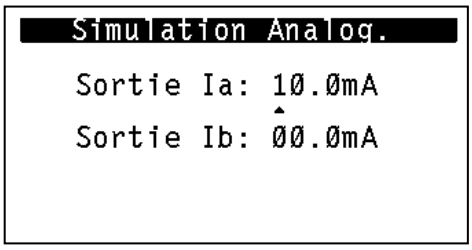
To select the function, press key  .



With keys   change the relay status and using key  change the relay and change its status with keys   . The two relays cannot be simulated at the same time (1 = relay activated & 0 = relay not being used).

REMARK: Once out of the **"Simulation"** function, the changed relays automatically return to the initial value.

For analogue outputs:



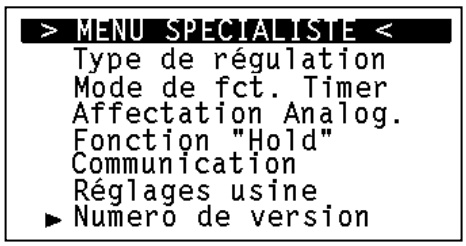
To select the function, press key .

With keys modify the output values and using key change the output and modify the values with keys .

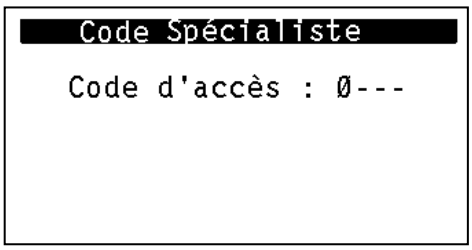
REMARK: Once out of the **"Simulation"** function, the set outputs automatically return to the initial value.

PERMO ECOBOX Version 2 SPECIALIST menu:

Specialist code:



If an access code has been set...



WARNING: A 4 figure code may be specified to protect access to the specialist menu. Remember this code or write it down in a safe place.

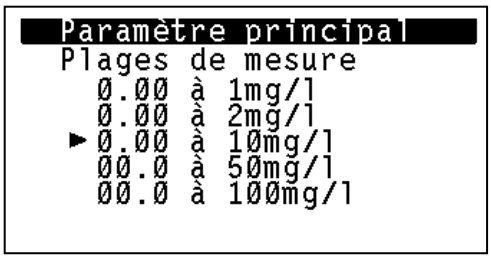
To change, press key change the value with keys and confirm .

Selection of parameters:

This function enables you to define the physical parameters of the **PERMO ECOBOX Version 2** as a main parameter.

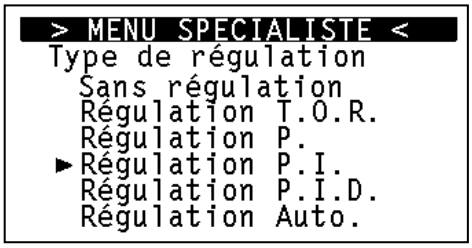
REMARK: The main parameter is the value that will be directly displayed on the screen and corresponds to the Active chlorine measurement.

This function also enables the measurement scale for each physical parameter to be measured in the measure where this is not defined by default.



Type of regulation: CASE OF A REGULATED 4-20mA PUMP

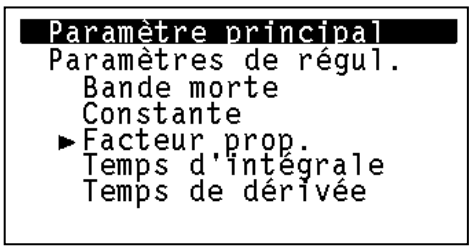
Each physical parameter has a **"regulation"** function. The regulation function is performed under the following programmable conditions:



- ✓ **No regulation**
- ✓ **All or Nothing (AON) regulation or threshold regulation**
- ✓ **Proportional Regulation (P)**
- ✓ **Proportional Regulation with Integral calculation (PI)**
- ✓ **Proportional Regulation with Integral and diversion calculations (PID)**
- ✓ **Auto-adaptive regulation**

REMARK: If the ancillary parameter is the **"gross current in mA"**, the regulation function is impossible for this parameter. The type of regulation is therefore without regulation.

Based on the type of regulation, influencing factors modifying the response of the regulator are defined as follows:

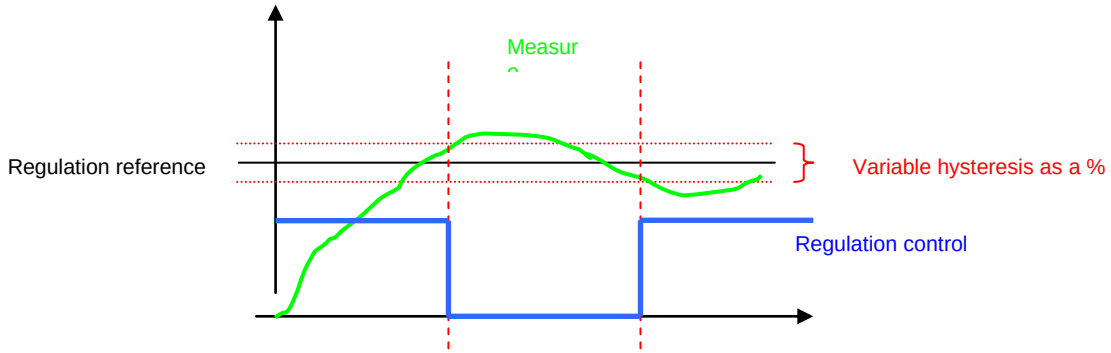


- ✓ **Constant positive regulation**
- ✓ **Hysteresis** (only for AON regulation)
- ✓ **Proportional band**
- ✓ **Kill band**
- ✓ **Integral time**
- ✓ **Diversion time**

Definition of influencing factors:

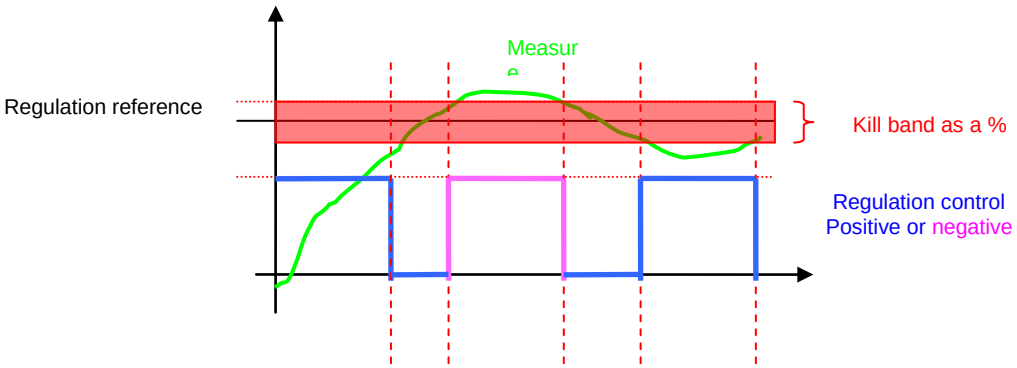
Hysteresis: (Only in AON function)

This is the low and high variable proportion around the reference point for which the AON regulator will engage or trigger the dosage instruments.



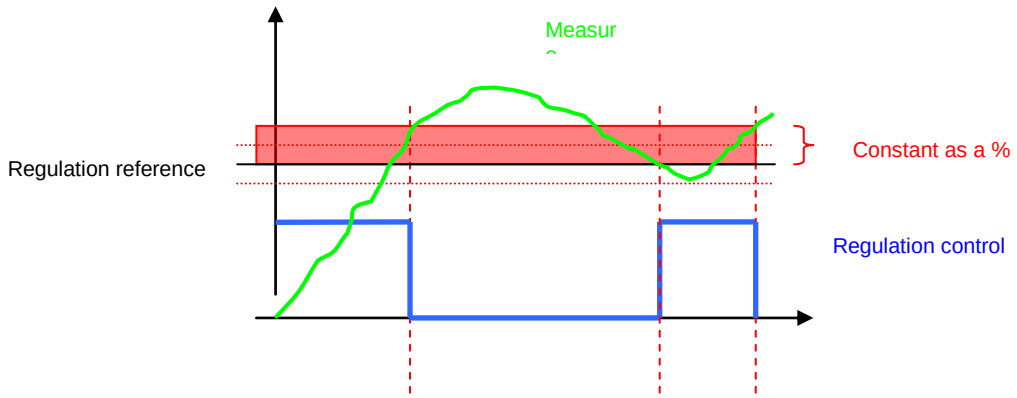
Kill band:

This is the proportion around the reference point for which no regulation order will be sent to the dosage instruments.



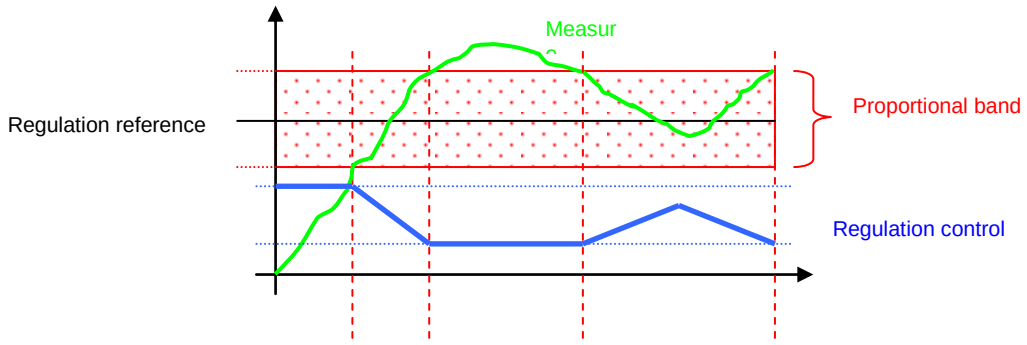
Constant:

This is a fixed positive value added to the regulation calculation



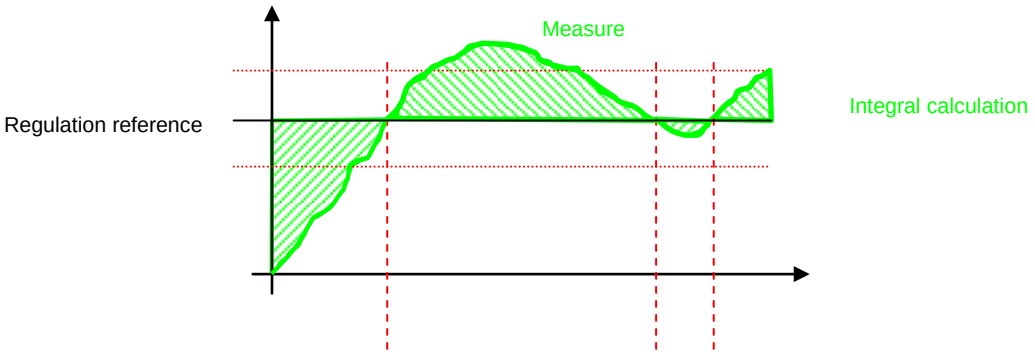
Proportional band:

This is the area around the reference point for which the regulation control is linear.



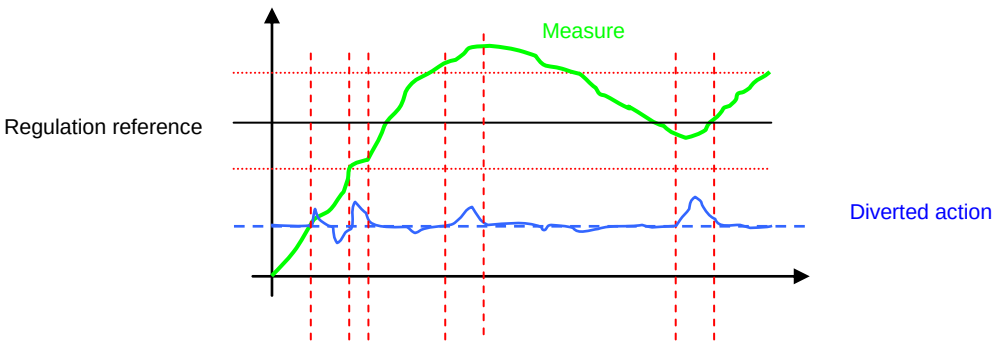
Integral:

This is the calculation of the average value of the positive or negative differences affected by the integration time.



Diverted:

This is the calculation with a sudden positive or negative variation in the measurement affected by the diversion time.



Allocation of relays:

The **Ka and Kb** relay functions are imposed.

- **Ka**: Not used
- **Kb**: Technical alert "injection too long"

Allocation of analogue paths:

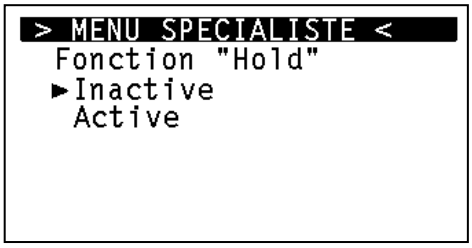
The **Ia and Ib** analogue paths are imposed! However, it is possible to change this allocation with traditional functions.

- **Ia**: Positive dosing pump regulation output
- **Ib**: Main value data transfer (e.g. Chlorine)

"Hold" function:

This function enables the **PERMO ECOBOX Version 2** regulator, while stopped (green LED off) to either keep or discard regulation calculations.
During a quick stop, the regulation algorithms are kept and the regulation process maintains full accuracy.

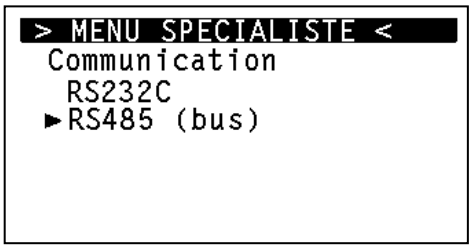
The function can be **"Active" or "Idle".**



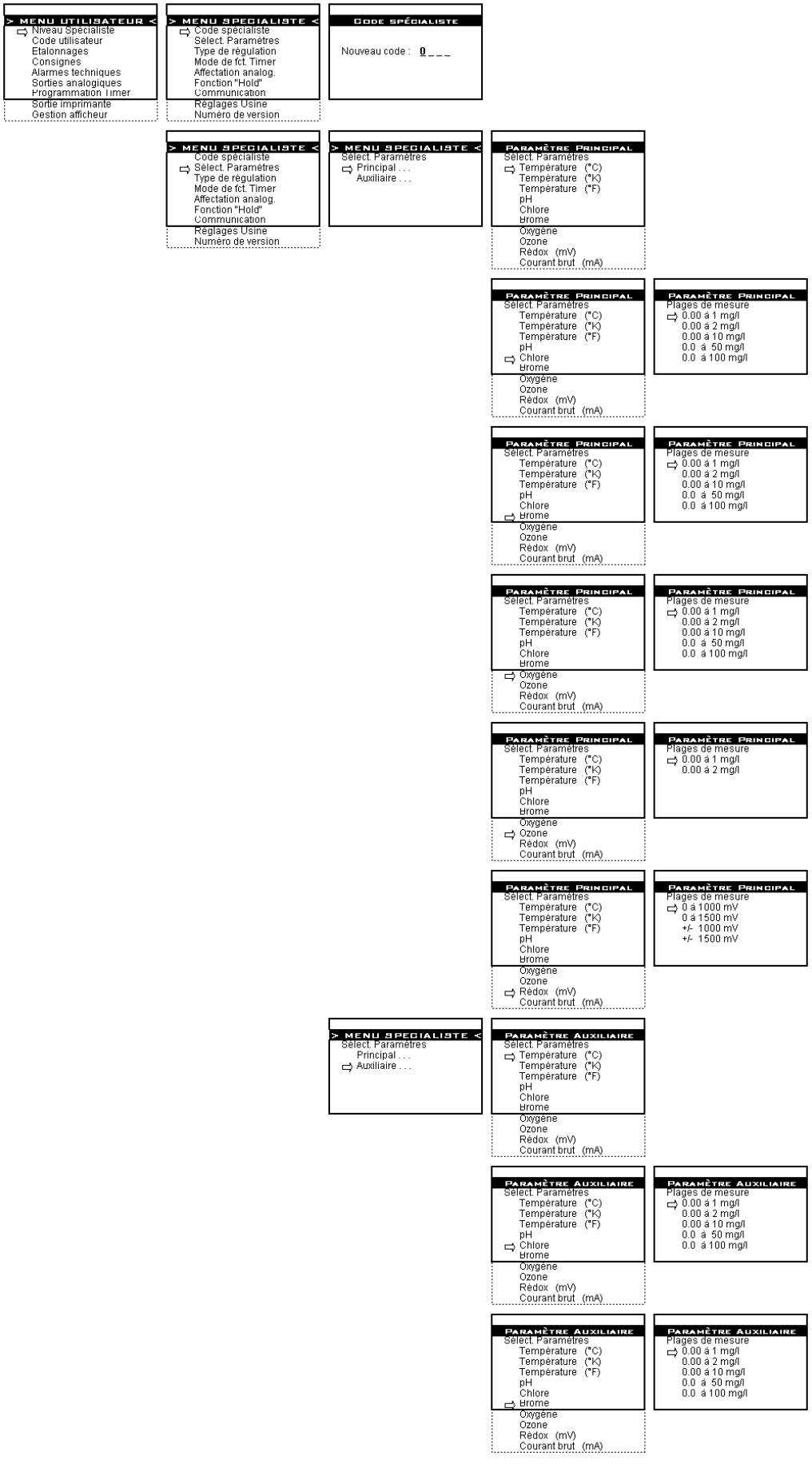
Communication:

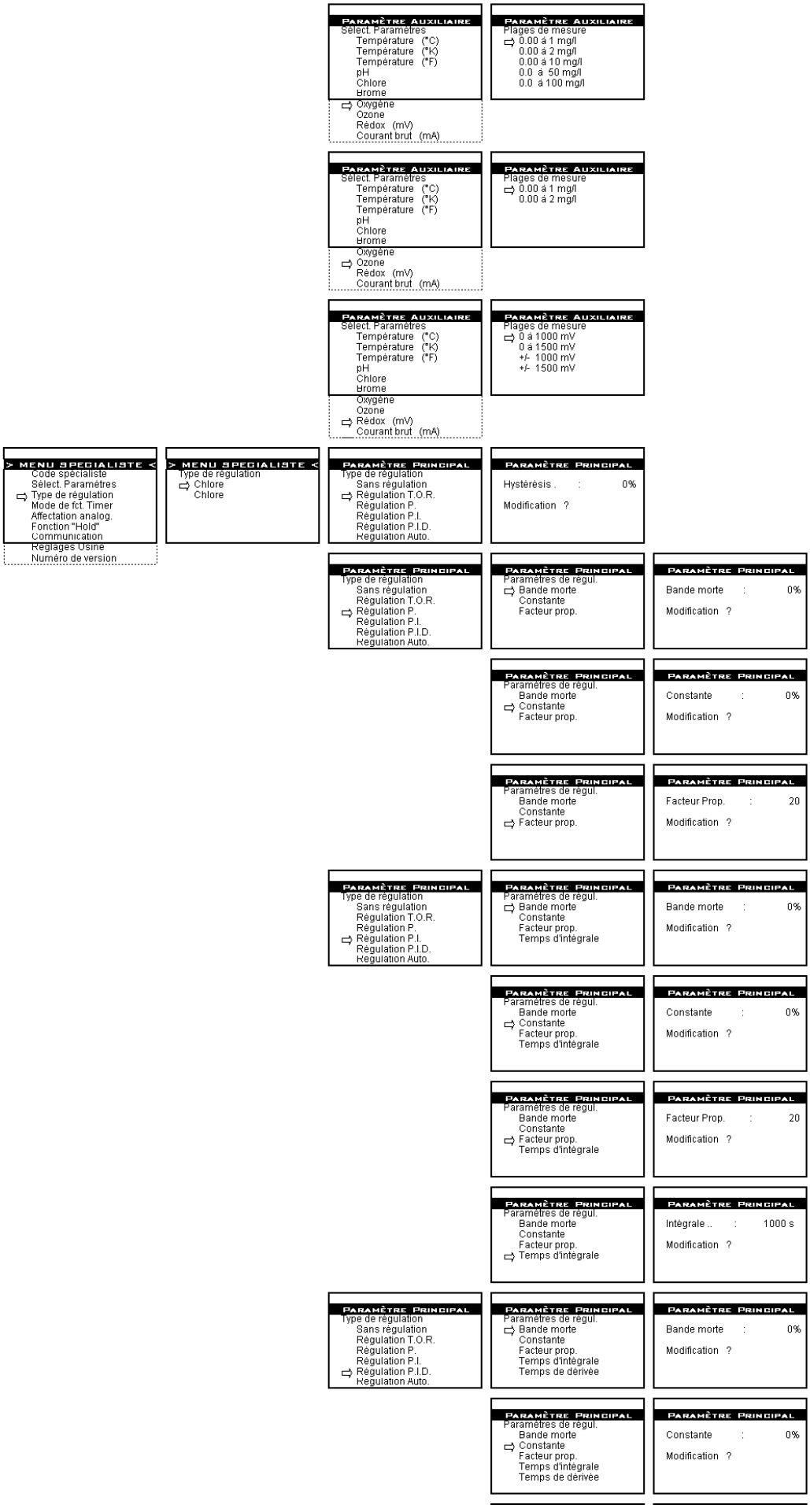
This function enables the **PERMO ECOBOX Version 2** regulator to be identified for **RS232C** output or **RS485** bus usage with **SYSCOM** software (available on option)

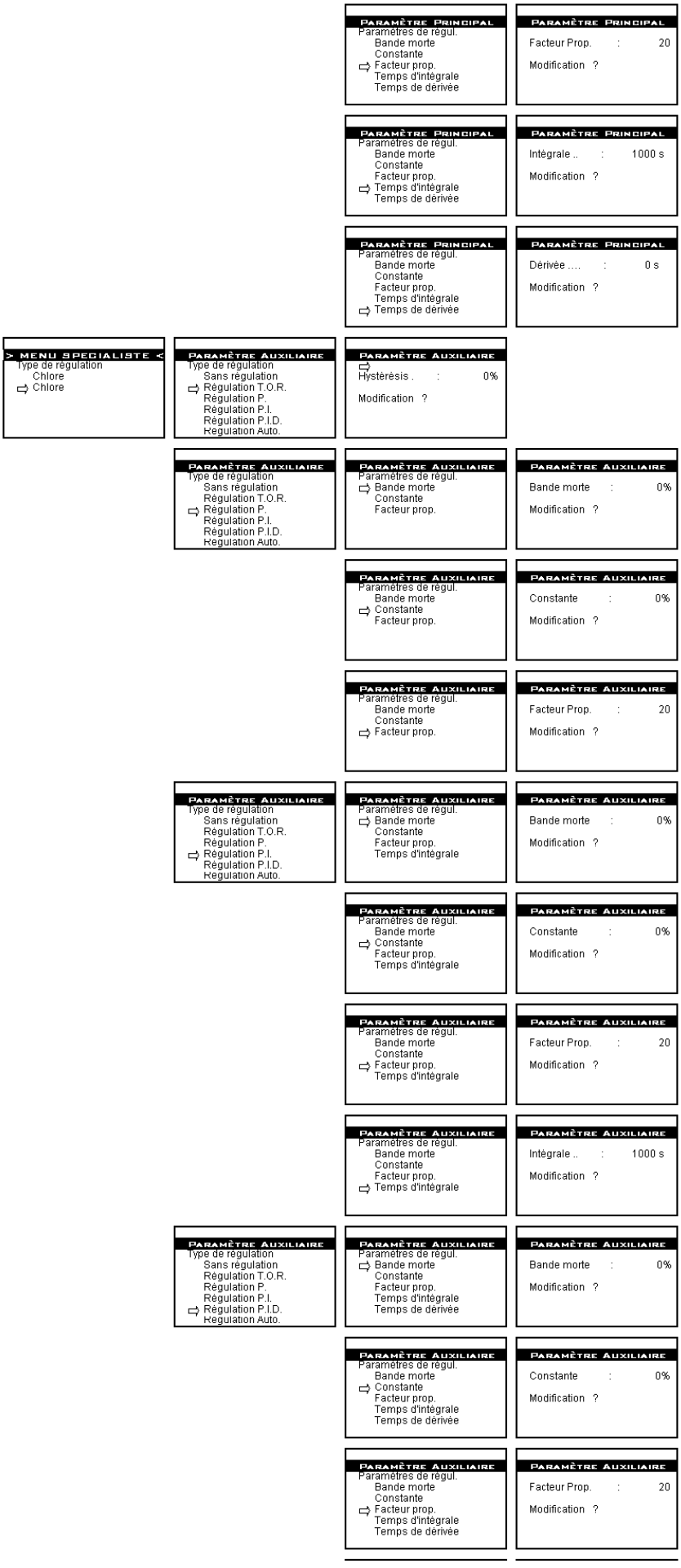
ATTENTION: When using an **RS232C** type connection, it is not possible to use the **SYSCOM** software in **RS485** bus mode.
The communication will be done only on an **RS232** connection with a single **PERMO ECOBOX Version 2** regulator unit.

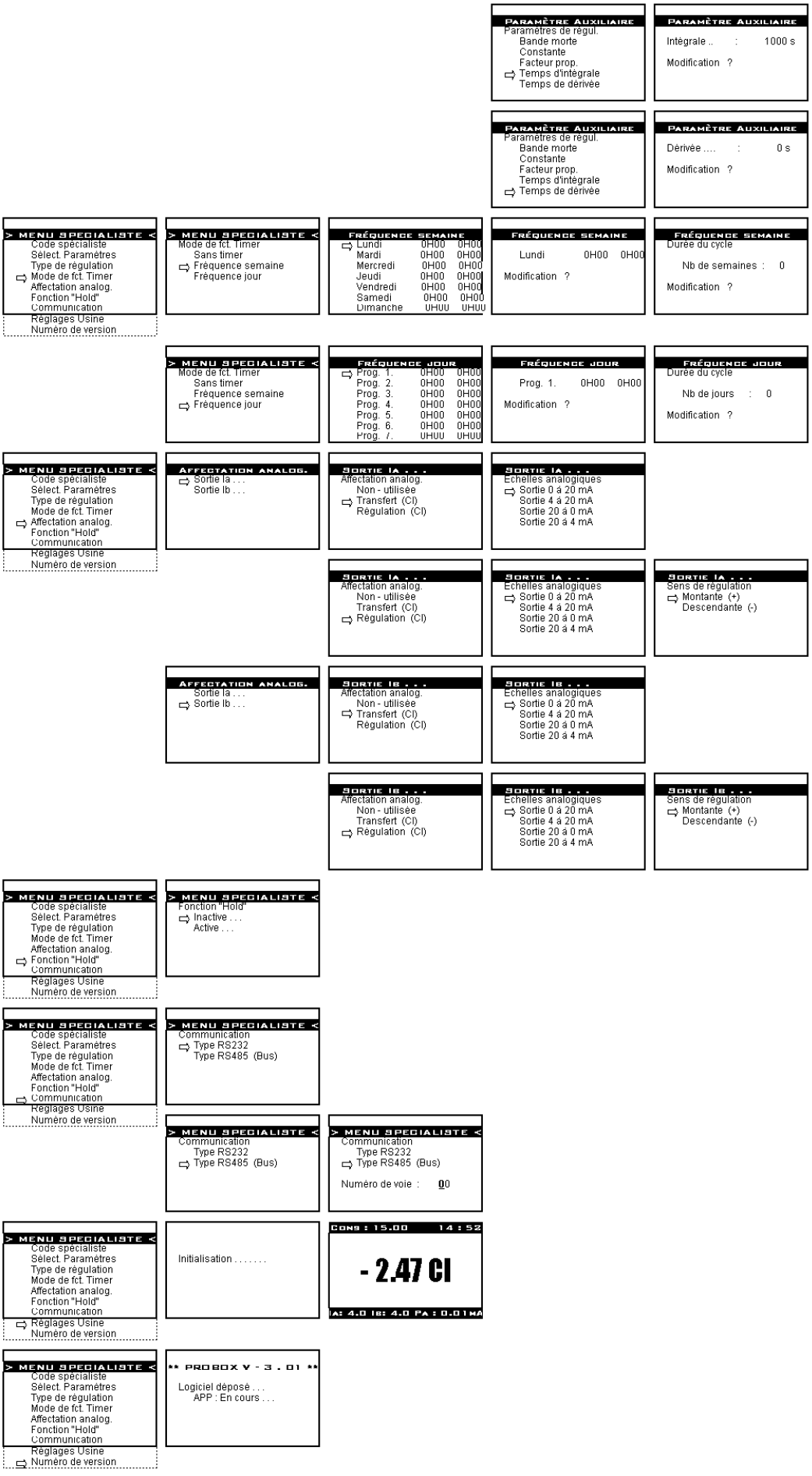


SEQUENTIAL PROGRAMMING FUNCTIONS
SPECIALIST MENU




> MENU SPECIALISTE <
Code specialiste
Sélect. Paramètres
⇨ Type de régulation
Mode de fct. Timer
Affectation analog.
Fonction "Hold"
Communication
Réglages Usine
Numéro de version
> MENU SPECIALISTE <
Type de régulation
⇨ Chlore
Chlore
PARAMÈTRE PRINCIPAL
Type de régulation
Sans régulation
⇨ Régulation T.O.R.
Régulation P.
Régulation P.I.
Régulation P.I.D.
Régulation Auto.
PARAMÈTRE PRINCIPAL
Hystérésis . : 0%
Modification ?
PARAMÈTRE PRINCIPAL
Type de régulation
Sans régulation
Régulation T.O.R.
⇨ Régulation P.
Régulation P.I.
Régulation P.I.D.
Régulation Auto.
PARAMÈTRE PRINCIPAL
Paramètres de régul.
⇨ Bande morte
Constante
Facteur prop.
PARAMÈTRE PRINCIPAL
Bande morte : 0%
Modification ?
PARAMÈTRE PRINCIPAL
Paramètres de régul.
Bande morte
⇨ Constante
Facteur prop.
PARAMÈTRE PRINCIPAL
Constante : 0%
Modification ?
PARAMÈTRE PRINCIPAL
Paramètres de régul.
Bande morte
Constante
⇨ Facteur prop.
PARAMÈTRE PRINCIPAL
Facteur Prop. : 20
Modification ?
PARAMÈTRE PRINCIPAL
Type de régulation
Sans régulation
Régulation T.O.R.
Régulation P.
⇨ Régulation P.I.
Régulation P.I.D.
Régulation Auto.
PARAMÈTRE PRINCIPAL
Paramètres de régul.
⇨ Bande morte
Constante
Facteur prop.
Temps d'intégrale
PARAMÈTRE PRINCIPAL
Bande morte : 0%
Modification ?
PARAMÈTRE PRINCIPAL
Paramètres de régul.
Bande morte
⇨ Constante
Facteur prop.
Temps d'intégrale
PARAMÈTRE PRINCIPAL
Constante : 0%
Modification ?
PARAMÈTRE PRINCIPAL
Paramètres de régul.
Bande morte
Constante
⇨ Facteur prop.
Temps d'intégrale
PARAMÈTRE PRINCIPAL
Facteur Prop. : 20
Modification ?
PARAMÈTRE PRINCIPAL
Paramètres de régul.
Bande morte
Constante
Facteur prop.
⇨ Temps d'intégrale
PARAMÈTRE PRINCIPAL
Intégrale .. : 1000 s
Modification ?
PARAMÈTRE PRINCIPAL
Type de régulation
Sans régulation
Régulation T.O.R.
Régulation P.
Régulation P.I.
⇨ Régulation P.I.D.
Régulation Auto.
PARAMÈTRE PRINCIPAL
Paramètres de régul.
⇨ Bande morte
Constante
Facteur prop.
Temps d'intégrale
Temps de dérivée
PARAMÈTRE PRINCIPAL
Bande morte : 0%
Modification ?
PARAMÈTRE PRINCIPAL
Paramètres de régul.
Bande morte
⇨ Constante
Facteur prop.
Temps d'intégrale
Temps de dérivée
PARAMÈTRE PRINCIPAL
Constante : 0%
Modification ?
PARAMÈTRE AUXILIAIRE
Sélect. Paramètres
Température (°C)
Température (°K)
Température (°F)
pH
Chlore
Brome
⇨ Oxygène
Ozone
Rédox (mV)
Courant brut (mA)
PARAMÈTRE AUXILIAIRE
Plages de mesure
⇨ 0.00 à 1 mg/l
0.00 à 2 mg/l
0.00 à 10 mg/l
0.0 à 50 mg/l
0.0 à 100 mg/l
PARAMÈTRE AUXILIAIRE
Sélect. Paramètres
Température (°C)
Température (°K)
Température (°F)
pH
Chlore
Brome
Oxygène
⇨ Ozone
Rédox (mV)
Courant brut (mA)
PARAMÈTRE AUXILIAIRE
Plages de mesure
⇨ 0.00 à 1 mg/l
0.00 à 2 mg/l
PARAMÈTRE AUXILIAIRE
Sélect. Paramètres
Température (°C)
Température (°K)
Température (°F)
pH
Chlore
Brome
Oxygène
Ozone
⇨ Rédox (mV)
Courant brut (mA)
PARAMÈTRE AUXILIAIRE
Plages de mesure
⇨ 0 à 1000 mV
0 à 1500 mV
+/- 1000 mV
+/- 1500 mV


> MENU SPECIALISTE <
Type de régulation
Chlore
⇨ Chlore
PARAMÈTRE AUXILIAIRE
Type de régulation
Sans régulation
⇨ Régulation T.O.R.
Régulation P.
Régulation P.I.
Régulation P.I.D.
Régulation Auto.
PARAMÈTRE AUXILIAIRE
⇨
Hystérésis . : 0%
Modification ?
PARAMÈTRE AUXILIAIRE
Type de régulation
Sans régulation
Régulation T.O.R.
⇨ Régulation P.
Régulation P.I.
Régulation P.I.D.
Régulation Auto.
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
Bande morte
Constante
Facteur prop.
⇨
PARAMÈTRE AUXILIAIRE
Bande morte : 0%
Modification ?
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
Bande morte
⇨ Constante
Facteur prop.
PARAMÈTRE AUXILIAIRE
Constante : 0%
Modification ?
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
Bande morte
Constante
⇨ Facteur prop.
PARAMÈTRE AUXILIAIRE
Facteur Prop. : 20
Modification ?
PARAMÈTRE AUXILIAIRE
Type de régulation
Sans régulation
Régulation T.O.R.
Régulation P.
⇨ Régulation P.I.
Régulation P.I.D.
Régulation Auto.
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
Bande morte
⇨ Constante
Facteur prop.
Temps d'intégrale
PARAMÈTRE AUXILIAIRE
Bande morte : 0%
Modification ?
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
Bande morte
⇨ Constante
Facteur prop.
Temps d'intégrale
PARAMÈTRE AUXILIAIRE
Constante : 0%
Modification ?
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
Bande morte
Constante
⇨ Facteur prop.
Temps d'intégrale
PARAMÈTRE AUXILIAIRE
Facteur Prop. : 20
Modification ?
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
Bande morte
Constante
Facteur prop.
⇨ Temps d'intégrale
PARAMÈTRE AUXILIAIRE
Intégrale .. : 1000 s
Modification ?
PARAMÈTRE AUXILIAIRE
Type de régulation
Sans régulation
Régulation T.O.R.
Régulation P.
Régulation P.I.
⇨ Régulation P.I.D.
Régulation Auto.
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
⇨ Bande morte
Constante
Facteur prop.
Temps d'intégrale
Temps de dérivée
PARAMÈTRE AUXILIAIRE
Bande morte : 0%
Modification ?
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
Bande morte
⇨ Constante
Facteur prop.
Temps d'intégrale
Temps de dérivée
PARAMÈTRE AUXILIAIRE
Constante : 0%
Modification ?
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
Bande morte
Constante
⇨ Facteur prop.
Temps d'intégrale
Temps de dérivée
PARAMÈTRE AUXILIAIRE
Facteur Prop. : 20
Modification ?
PARAMÈTRE PRINCIPAL
Paramètres de régul.
Bande morte
Constante
⇨ Facteur prop.
Temps d'intégrale
Temps de dérivée
PARAMÈTRE PRINCIPAL
Facteur Prop. : 20
Modification ?
PARAMÈTRE PRINCIPAL
Paramètres de régul.
Bande morte
Constante
Facteur prop.
⇨ Temps d'intégrale
Temps de dérivée
PARAMÈTRE PRINCIPAL
Intégrale .. : 1000 s
Modification ?
PARAMÈTRE PRINCIPAL
Paramètres de régul.
Bande morte
Constante
Facteur prop.
Temps d'intégrale
⇨ Temps de dérivée
PARAMÈTRE PRINCIPAL
Dérivée .... : 0 s
Modification ?

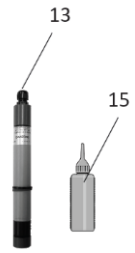

> MENU SPECIALISTE <
Code spécialiste
Sélect. Paramètres
Type de régulation
Mode de fct. Timer
Affectation analog.
Fonction "Hold"
Communication
Réglages Usine
Numéro de version
Mode de fct. Timer
Sans timer
Fréquence semaine
Fréquence jour
FRÉQUENCE SEMAINE
Lundi 0H00 0H00
Mardi 0H00 0H00
Mercredi 0H00 0H00
Jeudi 0H00 0H00
Vendredi 0H00 0H00
Samedi 0H00 0H00
Dimanche 0H00 0H00
Modification ?
Durée du cycle
Nb de semaines : 0
FRÉQUENCE JOUR
Prog. 1. 0H00 0H00
Prog. 2. 0H00 0H00
Prog. 3. 0H00 0H00
Prog. 4. 0H00 0H00
Prog. 5. 0H00 0H00
Prog. 6. 0H00 0H00
Prog. 7. 0H00 0H00
Nb de jours : 0
AFFECTATION ANALOG.
Sortie Ia . . .
Sortie Ib . . .
SORTIE Ia . . .
Affectation analog.
Non - utilisée
Transfert (CI)
Régulation (CI)
Echelles analogiques
Sortie 0 à 20 mA
Sortie 4 à 20 mA
Sortie 20 à 0 mA
Sortie 20 à 4 mA
Sens de régulation
Montante (+)
Descendante (-)
SORTIE Ib . . .
Fonction "Hold"
Inactive . . .
Active . . .
Communication
Type RS232
Type RS485 (Bus)
Numéro de voie : 00
Initialisation . . . . . .
CONS : 15.00 14 : 52
- 2.47 CI
IA: 4.0 IB: 4.0 PA : 0.01MA
** PROBOX V - 3 . 01 **
Logiciel déposé . . .
APP : En cours . . .
PARAMÈTRE AUXILIAIRE
Paramètres de régul.
Bande morte
Constante
Facteur prop.
Temps d'intégrale
Temps de dérivée
Intégrale .. : 1000 s
Modification ?
Dérivée .... : 0 s

8- MAINTENANCE AND OPERATION RANGE

Shaded item = Service that can be done by BWT PERMO under a contract.

Item	Action	Frequency								Comment	References of spare parts or consumables
ANALYSER and OTHER INSTRUMENTS											
1	Tightness inspection				x						
2	Sensor calibration				x					More or less significant frequency based on diversions relating to the quality of water to be treated. The electrode should be replaced if it is not possible to perform calibration.	
3	Refill with electrolyte and sand the electrode				x						Electrode type function code **(15)**
4	Checking operating parameters					x					
5	Check on the circulator rotation and electrical equipment connections						x				
6	Replacing electrode joints and membrane						x			More or less significant frequency based on diversions relating to the quality of water to be treated.	P0042324 (joints) Membrane code based on the type of electrode installed
7	Electrode replacement							x			**(13)** code based on devices

PERMO ECOBOX ECS version 2



Sensor and electrolyte

Item	Action	Frequency									Comment	References of spare parts or consumables
		J	**H**	**M**	**T**	**S**	**A**	**2A**	**3A**	**4A**		
DOSING PUMP												
1	Product refill in dosing tank		x								Based on consumption	
2	Analysis of target or influencing values / dosage adjustment		x								Based on the process or the criticality of installations downstream.	
3	Tightness inspection				x							
4	Check on pump operation, dependency (as with a pulse counter)				x							
5	Programming check					x						
6	Replacing the inlet valves and discharge valves - cleaning the injection tube						x				The frequency can be shortened according to the concentration of the product dosed out.	Based on the type of dosing pump
7	Check on circulator rotation						x					
8	Cleaning of reagent tank						x					
9	Replacing the dosage membrane						x				The frequency can be shortened according to the concentration of the product dosed out.	
10	Replacing the injection tube							x			The frequency can be shortened according to the concentration of the product dosed out.	
11	Replacing the valve at the bottom of the inlet device on the dosing pump							x			The frequency can be shortened according to the concentration of the product dosed out.	
12	Replacing upstream and downstream dosing pump tubes							x			The frequency can be shortened according to the concentration of the product dosed out.	P0028212 (metre)

Attention: the Individual Protective Equipment port is necessary for all maintenance operations on dosing pumps

pump used in the PERMO ECOBOX Version 2
Not mounted on the panel

J	H	M	T	S	A	2A	3A	4A
Daily	Weekly	Monthly	Quarterly	Half-yearly	Yearly	Every 2 years	Every 3 years	Every 4 years

9- STATEMENT OF PARAMETERS DURING TREATMENT

Preparation of chlorinated solution

_____ Litre of sodium hypochlorite sol at _____°
In _____ litres of DHW make-up water.

Initial chlorine content in water supply: _____ mg/l

Chosen operating mode:

Injection flow rate of the dosing pump: l/h

Adjusting the dosing pump:

Commissioning date

PERMO ECOBOX Version 2 reference value: mg/l

Low alert value: _____ mg/l

High Alert Value: mg/l

Period before alert (Injection time too long): _____/_____ Hours/minutes

TIMER adjustment:

Week frequency

	Start	Stop
Monday:	__/____	-____/__
Tuesday:	__/____	-____/__
Wednesday:	__/____	-____/__
Thursday:	__/____	-____/__
Friday:	__/____	-____/__
Saturday:	__/____	-____/__
Sunday:	__/____	-____/__

Week interval:_____

u

Day frequency

	Start	Stop
Prog 1:	/	- /
Prog 2:	__/____	-____/__
Prog 3:	__/____	-____/__
Prog 4:	__/____	-____/__
Prog 5:	__/____	-____/__
Prog 6:	__/____	-____/__
Prog 7:	__/____	-____/__

Day interval: _____

10-OPERATION

Example monitoring sheet to be implemented:

Even page

Date	Measured chlorine value	Chlorine value on PROBOX DHW	pH value	DHW circuit temperature	Sodium hypochlorite tank level	Comment number

Odd page

Comment number:

Preparation of the sodium hypochlorite solution for the dosing tank:

This solution should be prepared at the last moment and not stored for more than a period of time corresponding to a treatment period.
The **BWT DW-3002** presents sufficient stability. The solution can be pure or diluted, depending on the cycle and the installation itself.

Other:

The rest of the equipment installed should be maintained periodically, according to its specific maintenance instructions.

11-OPERATING BREAKDOWN DIAGNOSTICS AND REMEDIES

Failures	Causes	Remedies
The dosing instrument does not work	Internal protection fuse destroyed.	Incorrect regulation reference Defective dosing instrument
The measure is not stable	Poor circulation of water in the measurement cell.	Check the flow rate in the measurement chamber using a flowmeter. Check the thermal insulation of the dosing instrument in relation to the electronics box.
The chlorine value displayed is incorrect	Check using a chemical reagent, then calibrate is necessary.	If it is not possible to calibrate, replace the selective chlorine membrane.
Water pours at the join of the measurement chamber window. The window is distorted.	The pressure in the chamber is too high.	Increase load loss between taking a sample and the chamber by modifying the 4/6 pipe length. Restrict the sampling valve by respecting the flow rate of 30 l/h min.
The screen does not come on after starting. No light on.	Defective primary power supply	Check the fuse on the primary power supply. Check the power cable.
When switching on, the sensors fail to register anything or the values indicated are wrong.	Power fault in the measurement chamber reference.	Connect the red and brown wire(s) to the +12v reference terminal.
The sensor constantly indicates a maximum value.	Short circuit current loop.	Check the connections using these instructions and identify the measurement loop.
Permanent instability of the measurement sensor.	Poor hydraulic power in the measurement chamber or internal overpressure.	Check the hydraulic power of the measurement chamber and correct.
Impossible to calibrate the sensor.	Poor electrode or defective membrane.	Change the electrode and/or the membrane.
Impossible to set up the device.	Wrong access code	Apply the unblocking request procedure.
Disrupted or unstable regulation.	Set-up error	Check the programming parameters. Study the behaviour of the site and adapt the regulation parameters.

12- CHLORINE MEASUREMENT PRINCIPLE

Traditional products (without chlorine stabiliser)

Chlorine's disinfection effect in water is down to the presence of Hypochlorous Acid (HCLO-). Depending on the pH and the temperature, this acid separates hypochlorite ions (CLO-) and hydrogen ions (H+).

The hypochlorous acid is the active form of chlorine (commonly known as "Active Chlorine") and it prefers a low pH.

pH	% chlore libre / chlore actif	0,5	0,6	0,7	0,8	0,9	1	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8	1,9	2,0	2,2	2,4	2,6	2,8	3,0	3,5	4,0
6,8	83,5	0,42	0,50	0,58	0,67	0,75	0,84	0,92	1,00	1,09	1,17	1,25	1,34	1,42	1,50	1,59	1,67	1,84	2,00	2,17	2,34	2,51	2,92	3,34
6,9	80,1	0,40	0,48	0,56	0,64	0,72	0,80	0,88	0,96	1,04	1,12	1,20	1,28	1,36	1,44	1,52	1,60	1,76	1,92	2,08	2,24	2,40	2,80	3,21
7,0	76,2	0,38	0,46	0,53	0,61	0,69	0,76	0,84	0,91	0,99	1,07	1,14	1,22	1,30	1,37	1,45	1,52	1,68	1,83	1,98	2,13	2,29	2,67	3,05
7,1	71,8	0,36	0,43	0,50	0,57	0,65	0,72	0,79	0,86	0,93	1,01	1,08	1,15	1,22	1,29	1,36	1,44	1,58	1,72	1,87	2,01	2,15	2,51	2,87
7,2	66,9	0,33	0,40	0,47	0,54	0,60	0,67	0,74	0,80	0,87	0,94	1,00	1,07	1,14	1,20	1,27	1,34	1,47	1,61	1,74	1,87	2,01	2,34	2,68
7,3	61,6	0,31	0,37	0,43	0,49	0,55	0,62	0,68	0,74	0,80	0,86	0,92	0,98	1,05	1,11	1,17	1,23	1,36	1,48	1,60	1,73	1,85	2,16	2,46
7,4	56,0	0,28	0,34	0,39	0,45	0,50	0,56	0,62	0,67	0,73	0,78	0,84	0,90	0,95	1,01	1,06	1,12	1,23	1,35	1,46	1,57	1,68	1,96	2,24
7,5	50,3	0,25	0,30	0,35	0,40	0,45	0,50	0,55	0,60	0,65	0,70	0,75	0,81	0,86	0,91	0,96	1,01	1,11	1,21	1,31	1,41	1,51	1,76	2,01
7,6	44,6	0,22	0,27	0,31	0,36	0,40	0,45	0,49	0,54	0,58	0,62	0,67	0,71	0,76	0,80	0,85	0,89	0,98	1,07	1,16	1,25	1,34	1,56	1,78
7,7	39,0	0,19	0,23	0,27	0,31	0,35	0,39	0,43	0,47	0,51	0,55	0,58	0,62	0,66	0,70	0,74	0,78	0,86	0,94	1,01	1,09	1,17	1,36	1,56
7,8	33,7	0,17	0,20	0,24	0,27	0,30	0,34	0,37	0,40	0,44	0,47	0,51	0,54	0,57	0,61	0,64	0,67	0,74	0,81	0,88	0,94	1,01	1,18	1,35
7,9	28,7	0,14	0,17	0,20	0,23	0,26	0,29	0,32	0,34	0,37	0,40	0,43	0,46	0,49	0,52	0,55	0,57	0,63	0,69	0,75	0,80	0,86	1,01	1,15
8,0	24,3	0,12	0,15	0,17	0,19	0,22	0,24	0,27	0,29	0,32	0,34	0,36	0,39	0,41	0,44	0,46	0,49	0,53	0,58	0,63	0,68	0,73	0,85	0,97

Exemple : à pH 7,3 pour 1,6 mg/l de chlore libre, dans une eau à 25° C, il y a 0,98 mg/l de chlore actif.

REPLACEMENT PARTS

Reference	name	device
P0029320	Special hot water active chlorine electrode	Chlorine sensor
P0029030	PROBOX DHW HT kit	Control unit
P0906243	BWT DDA7.5C dosing pump	Dosing pump
P0940603	PVDF ½" injection tube	Dosing pump accessory
P0028212	PTFE 4/6 tube	Dosing pump accessory
P0049434	PVCC ball valve	Valve
P0029350	DHW circulator	Circulation pump

LIST OF CONSUMABLES

Reference	Consumables	Minimal quantity for one year
P0029320	Active chlorine electrode	/
*P0060150	Electrolyte for Active Chlorine sensor	1
* P0026121	Dosage membrane for dosing pump	1
*P0940603	PVDF ½" injection tube	/
* P0026116	Valve inlet	1
*P0026118	Valve discharge	1

* parts recommended to keep in stock.

For further information, please contact your regional branch on 0 825 00 07 26 *(€0.15 incl. tax / mn)*

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