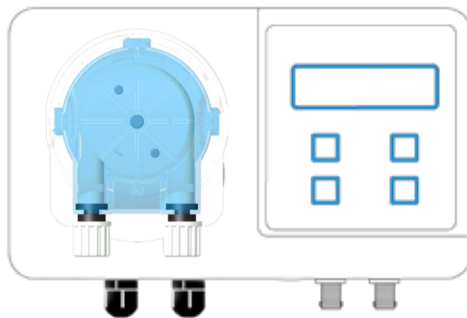# innowater

pH-Redox controller

User manual

WARNINGS

The Innowater pH-Redox controller allows you to continuously monitor the pH value and the redox potential (ORP) of the pool water through two sensors installed in its filtration circuit. These readings are available to control the various outputs of the controller which are used to activate a salt chlorinator and acid or hypochlorite dosing pumps to maintain the pH and redox values within a determined range automatically. However, both pH and redox probes are subject to damage, their performance deteriorates over time being a delicate component that can be easily destroyed. However, like any other device, the electronic system may fail and give incorrect reading of the parameters. Therefore, you must periodically carry out a MANUAL COM-PROBACION of pH and redox potential using approved means to ensure that the values are within the regulatory limits.

INNOWATER TRATAMIENTOS INTERGRALES DEL AGUA S.L. declines any responsibility for possible material damages and/or personal causes due to the excessive or insufficient use of acid, chlorine or other chemical substances or residues in its handling or processing.

ATTENTION! The acid is corrosive and can seriously damage eyes and skin. Oxidants (hypochlorite) are harmful and can seriously damage the eyes, skin and respiratory tract. When reacting with other compounds they can produce very dangerous poisonous gases. Use appropriate personal protective equipment when handling chemical containers or dispensing equipment.

The device must be electrically connected to a suitable ground and protected by a differential current circuit braker of 30 mA.
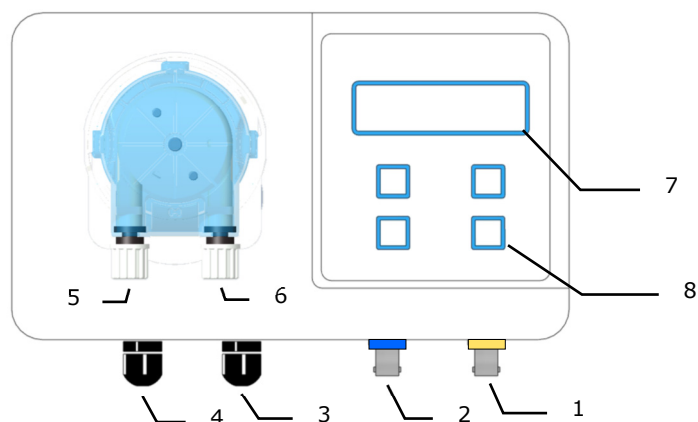
Never open the device under power. Danger due to voltage 230 VAC.

All manipulations inside the equipment must be carried out by a qualified professional.

Never connect the relay output to a voltage higher than 230 VAC or circulate an electric current higher than 2 A through it.

1. DESCRIPTION

1. pH probe input

2. Redox probe input

3. Relay output for redox function

4. Power input cable 230 VAC

5. Built-in pH pump acid suction fitting

6. Built-in pH pump acid injection fitting

7. LCD screen

8. Keypad

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Performance

The Innowater pH-Redox Controller provides continuous readings of the pH and redox potential values of the pool water through two probes installed in the filtration circuit.

Reading the pH probe allows automatic control of acid injection to maintain the pool's pH within a set range. To do this, the equipment has a built-in peristaltic pump and two radio control outputs that allow controlling Innowater wireless pumps.

Reading the redox probe allows you to control a salt chlorinator or hypochlorite pump to maintain the chlorine level within a set limit. This can be done via wired control, using the Redox Relay Output, or using the Radio Redox Outputs to remotely control an Innowater salt chlorinator or an Innowater wireless hypochlorite pump.

Control outputs

The pH and redox functions have 3 control outputs each that are programmed independently and can be used simultaneously. The Radio Outputs require that the radio function be activated (**see 3.5 Radio channel**). When this function is activated, the device periodically issues control commands to the different wireless devices.

pH Function

1. pH built-in pump.
The built-in peristaltic pump allows acid to be injected based on the pH reading and set points set by the user (see **3.1.1**). The pump works at constant speed during a variable duty cycle of period 100 s. You can visualize the duty cycle course by accessing the pump status menu (**3.1.1**). To activate the pump manually (priming), press the **OK** key for 2 seconds from the pump status screen. See section 3.1.1 to configure the output and view its status.

2. pH Radio 1 output (in option).
Allows remote control of an Innowater wireless variable speed pump. To manually activate the pump (prime), press the black button on its bottom. See section **3.1.2** to configure the output and check its status.

3. pH Radio 2 output (in option)
Allows remote control of an Innowater wireless constant speed or pulse pump. To manually activate the pump (prime) press the up arrow from the main screen for two seconds. Innowater peristaltic also feature a primming button on its bottom. See section **3.1.3** to configure the output and view its status.

Redox Function

1 Relay redox output

It provides a voltage-free contact for wired control of a salt chlorinator or hypochlorite dosing pump. It can be programmed in **ON/OFF** mode or in **proportional** mode with a variable duty cycle of 100-second period **(PWM).** See section **3.2.1** to configure the output and check its status. See chapter **2 INSTALLATION AND COMMISSIONING**, section **2.7 Redox Relay output** for wiring the output.

Maximum allowable voltage	230 VAC
Maximum allowable current	2 A
Do not connect inductive loads	

⚠️ **When you use this output to control a salt chlorinator, it MUST be configured in ON/OFF mode.**

2. Redox Radio 1 output (in option).

Allows remote control of an Innowater SMCI salt chlorinator or an Innowater wireless variable speed pump. To activate the pump manually (priming), press the black button on its bottom. See point **3.2.2** to configure the output and check its status.

3. Redox Radio 2 output (in option)

Allows remote control of an Innowater SMC chlorinator or a Innowater wireless constant speed pump. It can be configured as an ON/OFF output (SMC chlorinator) or as a proportional output with a variable duty cycle of period 100 s (hypochlorite pump). To manually activate the output, press the down arrow from the main screen for two seconds. Innowater peristaltic also feature a primming button on its bottom. See point **3.2.3** to configure the output and check its status.

⚠️ **When you use this output to control a SMC salt chlorinator, it MUST be configured in ON/OFF mode.**

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2. INSTALLATION AND COMMISSIONING

2.1 pH-Redox controller.

Mount the unit on a wall using the supplied bracket. Before attaching the bracket to the unit, use it to mark the locations of the holes you'll need to drill. Choose a location close to the injection point. You're free to choose the location.

2.2 Power supply 230 VAC

Connect the power cable to an electrical outlet connected to the filtration pump, equipped with a ground conductor and protected by a **30 mA differential current circuit breaker. The equipment should only be powered when the filtration pump is operating and water is circulating through the circuit.** If the equipment remains on without water circulation, the probe readings will be erroneous, and the excess of dosed acid or hypochlorite could accumulate and cause damage.

2.3 pH and RX probes.

Install the supplied pipe saddle clamps on the piping upstream of the chlorinator cell and as far away from it as possible. Choose a section of the circuit that won't be drained of water when the filtration pump is off, as the probes deteriorate when not submerged in water. Insert the probes into the saddle clamps as far as they will go and connect their cables to the BNC connectors on the bottom of the unit (1) and (2).

2.4 Acid injection (6).

Install the supplied injector with valve fitting in the circulation pipeline just before the returns to the pool. If a salt chlorinator is present, the acid injection must be after the cell; otherwise, the acid could damage the electrodes. The injection tube must be the **rigid, opaque PE tubing** supplied with the unit. Connect one end to the injector installed in the pipeline and the other to the injection fitting of the integrated pump (6).

2.5 Acid tank.

We strongly recommend not to place the acid tank in the same room than the water treatment equipment. The fumes emanating from it will quickly deteriorate any metal or electronic equipment.

2.6 Acid suction (5).

The suction tube is the **flexible, transparent PVC** one supplied with the equipment. Connect one end to the suction ballast filter and the other to the suction fitting on the integrated pump (5). Immerse the suction filter in the acid tank and ensure that it rests upright and stable on the bottom. Close the tank as best as possible to prevent evaporation gases from escaping. For pump priming, see page 4, **pH Function - 1. pH built-in pump**

2.7 Redox Relay Output (3).

Connect the relay output cable to the external control input of a salt chlorinator or use it to operate a hypochlorite dosing pump. See section **3.2.1** to configure the output and view its status. If you need to control charges exceeding 1 A with the Relay Output, install an additional relay of sufficient capacity and operate it via the Relay Output. Do not connect inductive charges or exceed the following values:

Maximum allowable voltage	230 VAC
Maximum allowable current	2 A

When you use this output to control a salt chlorinator, it **MUST** be configured in **ON/OFF mode.** See section 3.2.1 ON/OFF Mode.

2.8 Radio outputs (in option)

Innowater radio-controlled devices do not require a wired connection. As soon as the radio function is activated on the Innowater pH-Redox Controller and the Innowater wireless device is switched on, communication between the two will be established. Refer to section 3.5 Radio Channel to activate the radio function and select the channel. Refer to sections **3.1.2, 3.1.3, 3.2.2, and 3.2.3** to configure the radio outputs and view their status.

2.9 Innowater peristaltic Wireless pump (in option)

To associate an Innowater wireless pump to the pH or RX Radio Outputs, see point **3.5 Radio Channel.**

Once the pump, the corrective product tank (acid or hypochlorite) and the suction and injection tubing have been installed, proceed to prime the pump.

To prime an Innowater wireless peristaltic pump, press the priming button on the bottom of the pump.

To prime an Innowater wireless pulse pump proceed as follows:

1. Prepare a tubing and container to collect the product through the priming valve.
2. Connect the pump to an electrical outlet/mains and verify that its LED flashes. If the pump is linked to the Radio pH output, it will flash once every second. If it is linked to the Radio RX output, it will flash twice every second.
3. Open the pump priming valve.
4. From the main screen in the pH-Redox Controller press and hold the up arrow for 2 seconds to activate the pH pump or the down arrow to activate the RX pump.

```
pH  7.21      40%          ⬆ (2 s)      PH PUMP PRIMING
RX 650mV      90%                        Key = exit

                           ⬇ (2 s)      RX PUMP PRIMING
                                         Key = exit
```
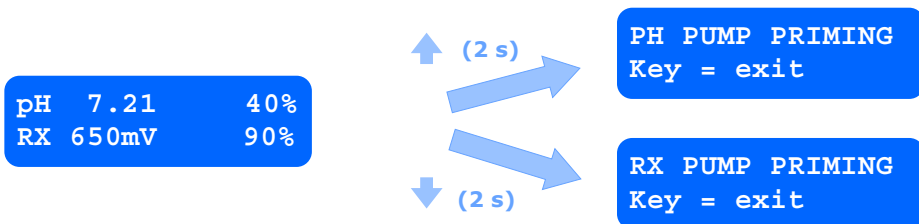
5. Wait for the product to come out of the priming tubing.

6. When you are sure the pump is completely filled with product, close the priming valve. The pump will begin injecting fluid through its injection tube.

7. Exit forced pulsed mode

⚠️ If the product tank is too far below the pump, the pump may not be able to draw in the acid. In this case, use a syringe to draw in the priming line until the acid flows out. **In general, we recommend to always use this method.**

2.10 Commissioning.

Once all components are installed (pH probe, redox probe, injection/suction tubes, control outputs), prime the dosing pumps. See paragraph **1 "Built-in pH Pump"** on page 4 and point **2.9** of this chapter. Prime the dosing pumps until the product to be injected reaches the injection point.

Next, proceed to establish the setpoints and calibrate the pH and redox probes. pH and redox probes require calibration before initial use and periodic recalibration thereafter. This is necessary because the sensitivity and response of each probe are not exactly the same and because they inevitably vary over time.

Calibrating the pH probe involves recording its response by inserting it into two solutions of known pH to calculate the pH of any other solution—in our case, the pH of the pool water. This is done using the two calibration solutions supplied, pH4 and pH7. See chapters **3.1.4 y 3.1.5.**

A single buffer solution (usually 465 mV) is used for calibration of the redox probe. Sea chapter **3.2.4.**

Once the probes are calibrated, the device can continuously read the correct pH and redox values and act on the control outputs according to its programming.

3. CONTROL INTERFACE AND SETTINGS

Switching ON—OFF.

```
         OFF
```

OK / OFF

➡

```
pH     7.40     20%
RX    650 mV 100%
```

To switch on the equipment press the key **ON/OFF (MENU)** during two seconds. The main screen on the right will be displayed on the screen.

To turn off the device, make sure you are on the main or secondary screen and press **ON/OFF** again for two seconds.

Main screen

1   2

```
pH     7.40     20%
RX     650 mV 100%
```

3   4
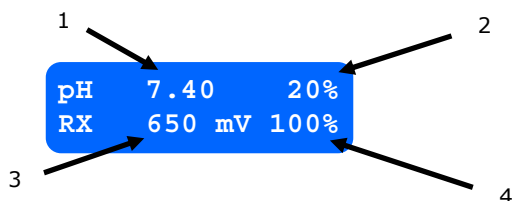
The main screen displays at all times:

(1) Reading of the pH value.

(2) The dosing percentage corresponding to the pH output selected in the menu *7 Screen info*. See **3.7.**

(3) Reading the redox potential in mV.

(4) The dosing percentage corresponding to the redox output selected in the menu *7 Screen info*. See **3.7.**

When the equipment is powered up to the mains, if the initial delay is activated (**see 6.3** page 26) and the programmed time has not yet elapsed, the following screen will be displayed:

```
pH  7.05   DELAY
RX 680 mV 25 min
```

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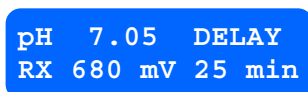
Access to the settings menus

```
pH    7.40    20%
RX    650 mV 100%
```
MENU →
```
MAIN MENU
1 pH Function
```

To access the different menus, press the **MENU** key and then scroll through them using the arrows. To enter a menu, press **OK.** Press **MENU** once or several times to return to the main screen.

3.1 pH FUNCTIONS

All functions and settings related to pH measurement are found within the **MAIN MENU 1 - pH Function** and its various submenus:

```
MAIN MENU
2 RX Function
```

3.1.1 Built-in pH pump

```
MAIN MENU
1 pH Function
```
OK →
```
pH Function
1 Built-in pump.
```

Pump settings

```
pH Function
1 Built-in pump
```
OK →
```
1 Built-in pump
1 Settings
```

↓ **OK**

```
pH Built-in pump
ON            pH-
```

⬆ ⬇ **MENU**

```
Built-in pump
OFF           pH+
```
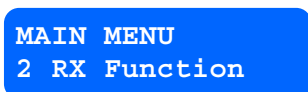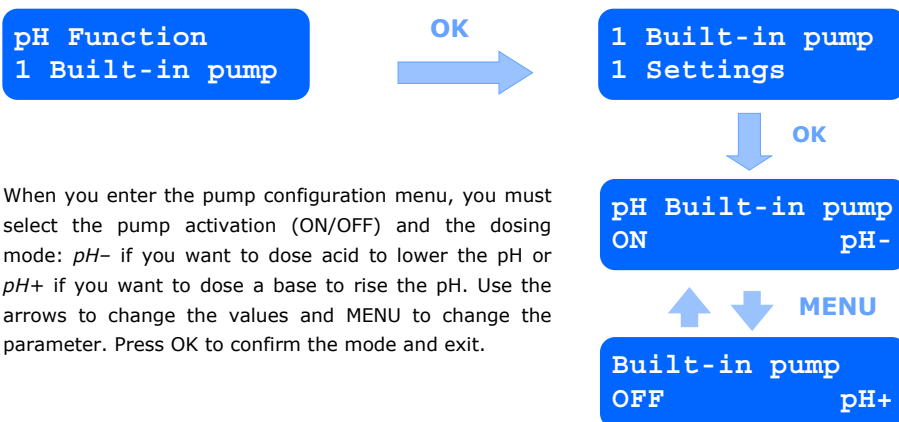
When you enter the pump configuration menu, you must select the pump activation (ON/OFF) and the dosing mode: *pH–* if you want to dose acid to lower the pH or *pH+* if you want to dose a base to rise the pH. Use the arrows to change the values and MENU to change the parameter. Press OK to confirm the mode and exit.

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Disabled pump

```
Built-in pump
OFF        pH-/pH+
```
OK

Choose this mode if you're not going to use the pump or want to turn it off. Pressing OK will select the mode and return you to the previous menu.

Activated pump: pH- setpoints

```
Built-in pump
ON              pH-
```
OK

```
pH =   7.0     10%
pH >   9.0     90%
```
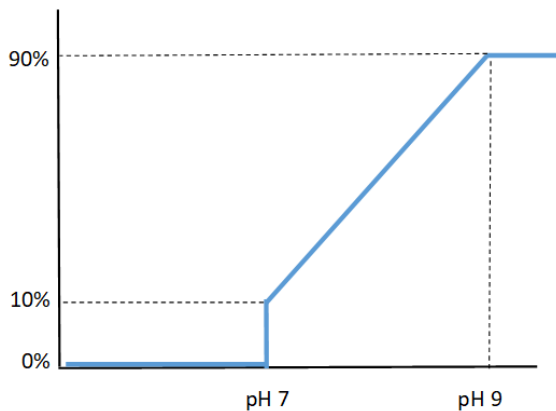

The pump dosing is calculated by selecting two setpoints, as shown in the screen on the right. The dosing calculation (blue line) is as follows:

- When the pH reading is below the lower set point (pH 7.0 in the figure) the pump will not dose acid (0%).
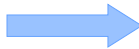
- When the pH reading is between both points, the pump will dose according to the straight line defined by both points. For example, in the figure, if the pH is 8, the pump will dose at 50%.

- When the pH reading is above the upper set point (pH 9 in the figure), the pump will maintain the dosing percentage defined for that point. In the figure, it's 90%.

You can set both points and choose the dosage percentage for each. To do this, use the **MENU** key to position the cursor on the parameter you wish to modify and use the arrows to change the value. Press **OK** to save the data and exit the submenu.

By setting the setpoints, you simultaneously define the required dosing volume and the re-

sponse delay after dosing, both of which depend on the size of your pool. For example, if your pool has a large volume, you should set high dosing percentages. You can take the response time of your pool's pH measurement into account when setting the setpoint A, cutting off the dosing before reaching the desired pH value. For example, to achieve a pH of 7.0 and avoid overdosing, set the dosing cutoff to a slightly higher value:

<p align="center">**A: pH 7,2   0%**</p>

Since each pool requires more or less acid and is more or less reactive to dosing, at least at first, you may need to correct the set points several times.

Activated pump: pH- setpoints

```
Built-in pump
ON               pH+
```
OK →
```
pH  =   5.0      90%
pH  =   7.0      10%
```

When you chose pH+ mode, the dosing calculation is the reverse of the pH− calculation:

- When the pH reading is below the lower set point (pH 5.0 in the figure) the pump will maintain the dosing percentage defined for that point (90% in the figure).

- When the pH reading is between both points, the pump will dose according to the straight line defined by both points. For example, in the figure, if the pH is 6, the pump will dose at 50%.

- When the pH reading is above the upper set point (pH 7.00 in the figure), the pump will not dose acid (0%).

The dosing percentage will be implemented with variable pump working cycle of period 100 s. For every 100 s period, the pump will turn during a number of seconds equal to the calculated dosing percentage. For example, if the calculated dosing is 20%, the pump will turn during the first 20 s and will halt during the remaining 80 s. Yu can visualize the curse of the working cycle in the pH Buil-in pump status screen (see next section).

Status of the pH built in pump

```
pH Function
1 Built-in pump
```
OK →
```
pH Built-in pump
1 Configuration
```

↓ **x1**

```
pH 7.40 Dos   30%
Pump deactivated
```
← **OK**
```
pH Built-in pump
2 Pump Status
```

```
pH 7.40 Dos   30%
CT   50 Pump OFF
```
← **OK**

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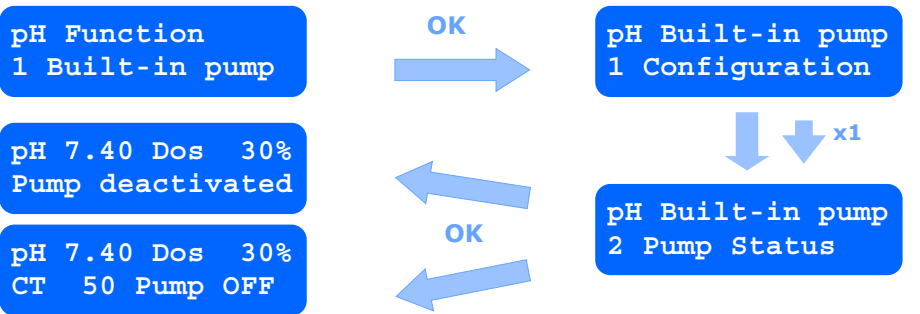
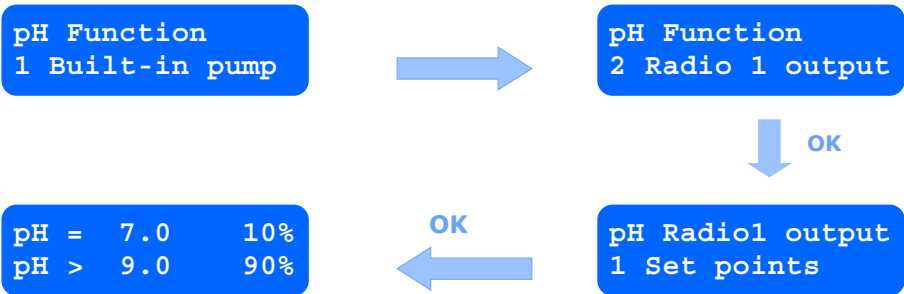This screen shows the pH reading and the calculated dosing percentage. If the pump has been activated, the curse of the working cycle (CT) and the pump status (ON/OFF) will be displayed. If the pump has been deactivated, the screen will display *Pump deactivated*. Note that in some cases (Start delay active, dosing alarm triggered) the pump will remain halted even if the calculated dosing is not 0%.

3.1.2 pH Output radio 1 (in option)

pH Radio 1 output allows you to control an Innowater wireless variable speed acid pump.

```
pH Function
1 Built-in pump
```
→

```
pH Function
2 Radio 1 output
```

OK ↓

```
pH Radio1 output
1 Set points
```

OK ←

```
pH =   7.0     10%
pH >   9.0     90%
```

Setpoints

The operation of the setpoints is the same than for the integrated pump output (see point **3.1.1**). In this case, a command with linear control information (0—100%) is transmitted continuously via radio.

Output status

```
pH Function
2 Radio1 output
```
OK →

```
pH Radio1 output
1 Set points
```

↓ ↓ X1

```
pH Radio1 output
2 Output status
```

OK ←

```
pH 7.40 Dos   30%
Sending...    30%
```
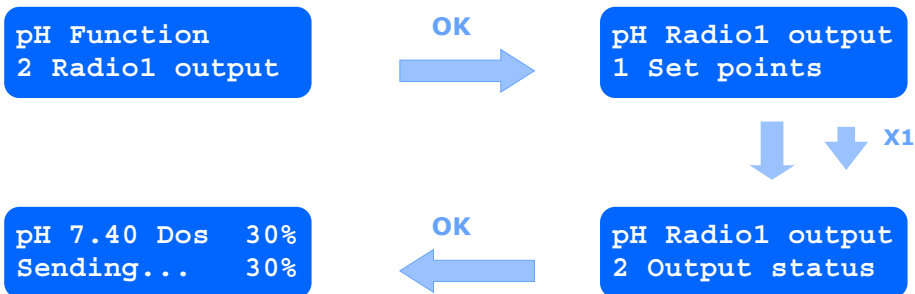
This screen displays the current pH Reading value, the calculated dosing percentage, and the control command being transmitted. Note that in some cases (start delay active, dosing alarm triggered), the transmitted command will be 0% even if the calculated dosing is not 0%.

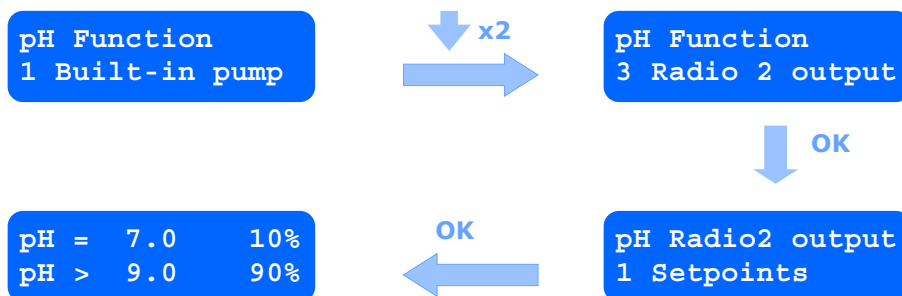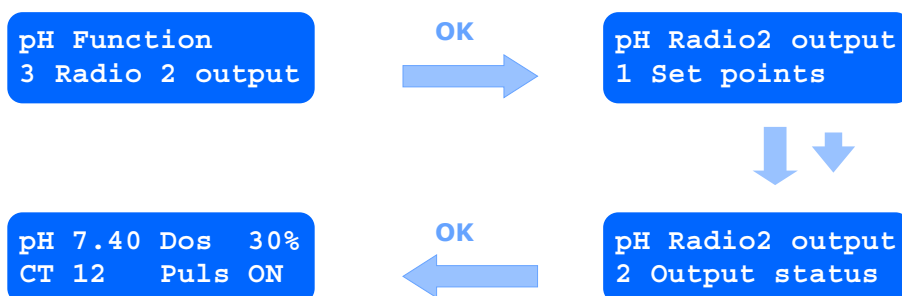innowater

3.1.3 pH Output Radio 2 (ON/OFF) (in option)

Radio Output 2 allows you to control an Innowater wireless constant speed or pulse pump.

Setpoints

```
pH Function
1 Built-in pump
```
→ x2 →
```
pH Function
3 Radio 2 output
```

↓ OK

```
pH =   7.0    10%
pH >   9.0    90%
```
← OK
```
pH Radio2 output
1 Setpoints
```

The operation of the setpoints is analogous to that of the Built in Pump Output pH (See point **3.1.1**). In this case, a command with binary control information (ON/OFF) is transmitted continuously via radio. The calculated dosing percentage will be implemented through 100-s work cycles. During each cycle, the transmitted command will be ON for a number of seconds equal to the dosing percentage. For example, if the calculated dosing is 20%, the command will be ON for the first 20 seconds of the cycle and OFF for the remaining 80 seconds. You can monitor its operation on the status display for this output (see the next point).

Output status

```
pH Function
3 Radio 2 output
```
→ OK →
```
pH Radio2 output
1 Set points
```

↓ ↓

```
pH 7.40 Dos  30%
CT 12    Puls ON
```
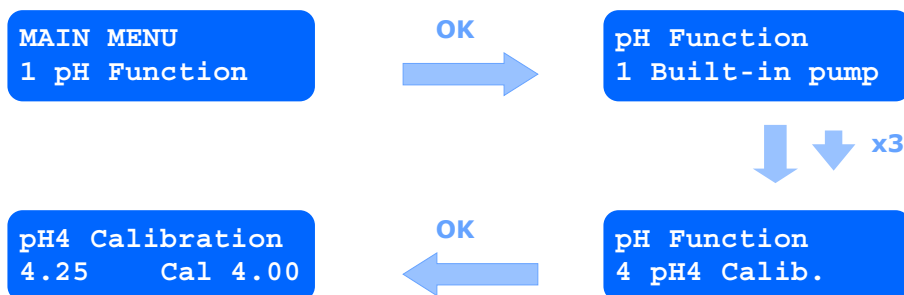← OK
```
pH Radio2 output
2 Output status
```

This screen displays the current pH value, the calculated dosage percentage, the duration of the work cycle (TC), and the command being transmitted (Puls). Note that if there is a cause (delay activated, dosing time exceeded), the transmitted command will be Puls OFF even if the calculated dosing is not 0%.

3.1.4 Calibration probe pH4

```
MAIN MENU
1 pH Function
```
OK →
```
pH Function
1 Built-in pump
```

↓ **x3**

```
pH4 Calibration
4.25    Cal 4.00
```
← **OK**
```
pH Function
4 pH4 Calib.
```

When you enter the *4 Cal pH 4* submenu and press **OK,** you'll see the screen in the lower left corner of the figure. The value on the left shows the current pH probe reading. The value to the right of Cal indicates the pH of the calibration solution used. You can adjust this value using the arrows to suit the temperature and the solution used.

Insert the probe into the pH4 calibration solution, move it lightly and wait for a stable reading to be reached.

Once the reading has stabilized, press the **OK** key to save the calibration or press **MENU** to exit without saving. Pressing **OK** will momentarily display one of the following two screens:

```
Calibration pH4
      OK
```

```
Calibration pH4
     ERROR
```
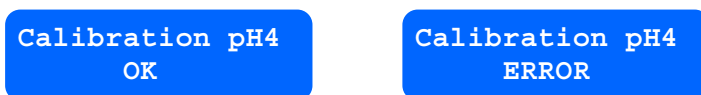
The display on the left indicates that the values entered are consistent with the solution used and that the calibration has been saved.

The display on the right indicates that the probe response is too far from the entered solution value and that the calibration has not been saved.

3.1.5 Calibration probe pH7

```
MAIN MENU
1 Ph Function
```
OK →
```
pH Function
1 Built-in pump
```

↓ **x4**

```
pH7 Calibration
7.24    Cal 7.00
```
← **OK**
```
pH Function
5 pH7 calib.
```

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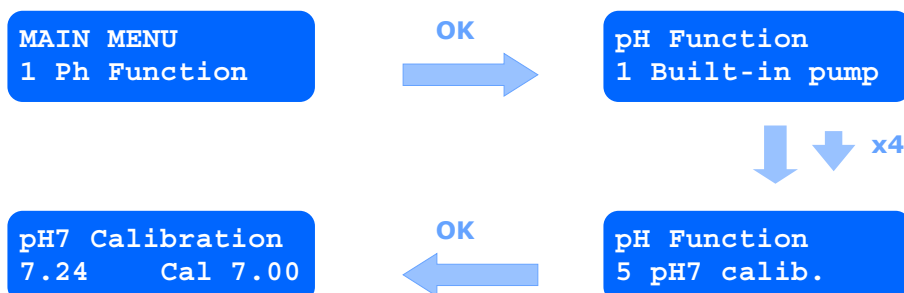
Remove the probe from the pH4 buffer solution, rinse its bottom with clean water, and gently shake it to remove excess water (do not rub the probe with a cloth or paper towel). Next, go to *Menu 5 Cal pH7* and repeat the above process with the pH7 buffer solution.

3.1.6 Factory calibration

```
MAIN MENU
1 pH Function
```
OK →
```
pH Function
1 Built-in pump
```

↓ **x5**

```
Factory cal.?
yes:OK    no:MENU
```
← **OK**
```
pH Function
6 Factory Calib.
```

Use this function to reset the factory calibration, which corresponds to the theoretical response of a new probe. This function can be 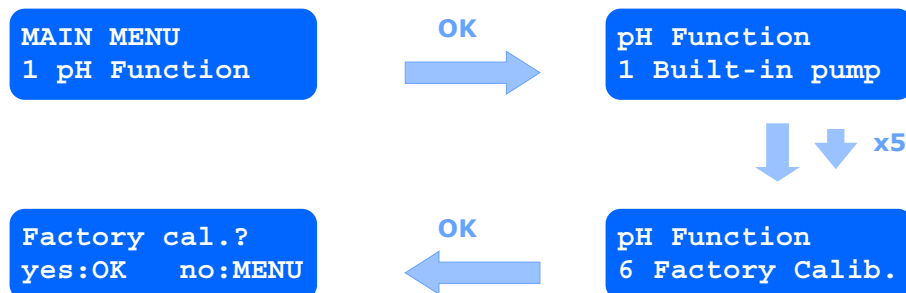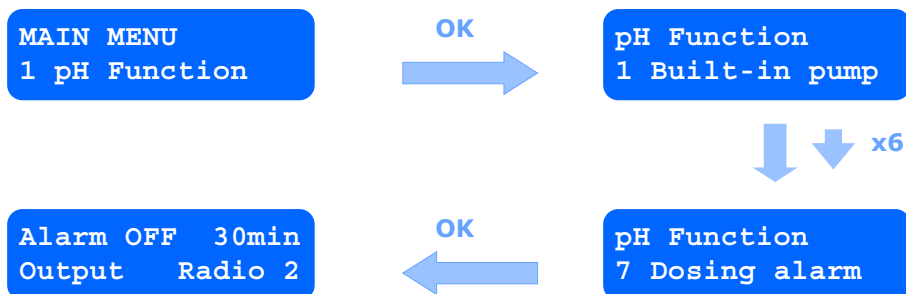useful in some situations, for diagnostic purposes or if calibration solutions are unavailable. Press **OK** to restore the factory calibration or **MENU** to exit.

3.1.7 pH Dosing Alarm

```
MAIN MENU
1 pH Function
```
OK →
```
pH Function
1 Built-in pump
```

↓ **x6**

```
Alarm OFF   30min
Output    Radio 2
```
← **OK**
```
pH Function
7 Dosing alarm
```

The pH dosing time alarm triggers an alarm that halts dosing if the time elapsed without reaching the programmed set point exceeds a certain limit. This can be useful for preventing overdosing, signalling a lack of product in the tank, or detecting potential problems with the probe or injection system.

Place the cursor (**MENU** key) under the word OFF and use the arrows to activate (***ON***) or deactivate (***OFF***) the alarm.
Place the cursor below the time displayed and use the arrows to set the maximum dosing time in minutes.
Place the cursor right to the word *Output* and use the arrows to select the pH Output whose dosing time you want to monitor. Press **OK** to save and exit.

If the pH alarm has been enabled and the maximum dosing time is reached for the pH output selected, the dosing **will be halted in all pH outputs** and the following screens will alternate:

```
DOSING EXCEEDED
Continue? = OK
```

⟷

```
pH Radio 2
RX Relay ON/OFF
```

The screen on the right indicates the parameter (ph and/or RX) and the corresponding output for which the maximum dosing time has been reached.

Press **OK** to continue. The dosing time counter will reset, and dosing will resume.

3.2 REDOX FUNCTION

All functions and settings related to the redox measurement are found within the ***MAIN MENU 2 RX Function*** and its different submenus.

```
MAIN MENU
2 RX Function
```

3.2.1 RX Relay output

```
MAIN MENU
2 RX Function
```

OK →
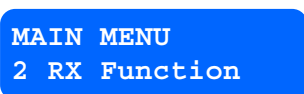
```
RX Function
1 Relay output
```

⚠️ **Do not connect the relay output to a voltage greater than 230 VAC. The electric current through the contacts must not exceed 2A.**

⚠️ **When you use this output to control a salt chlorinator it MUST be configured in ON/OFF mode. See section Mode ON /OFF**

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Relay configuration

```
RX Function
1 Relay output
```

OK ↓

```
RX Relay output
1 Relay config.
```

OK →

```
Relay output
   DISABLED
```
↑↓
```
Relay output
   ON / OFF
```
↑↓
```
Relay output
 PROPORTIONAL
```

Select the relay output mode using the arrows and press **OK** to save and enter the corresponding configuration menu or press **MENU** to exit.
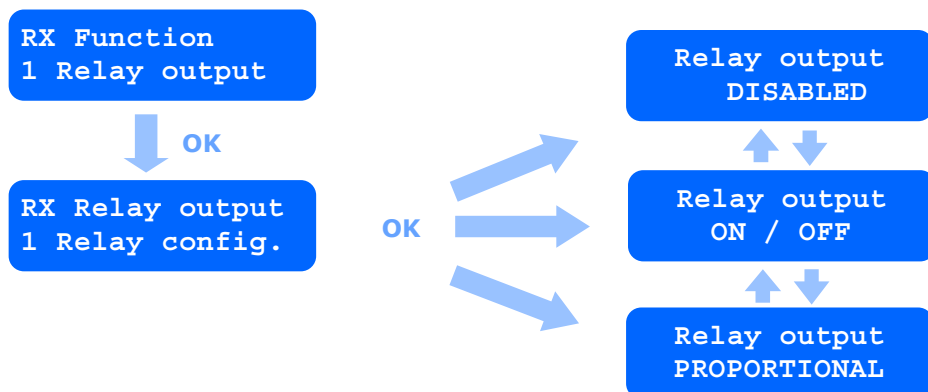
Disabled mode

```
Relay output
  DISABLED
```

Choose this mode if you are not going to use the output.

ON / OFF mode

```
Relay output
  ON / OFF
```

OK →

```
RX < 650 mV    ON
RX > 750 mV   OFF
```

In ON/OFF mode the relay output will remain ON (contact closed) whenever the RX reading is below the first set point (650 mV in the figure) and will remain OFF (contact open) whenever it is above of the second set point (750 mV in the figure). If the RX value is between both points (650—750 mV) the output will not change and will continue in its previous state (hysteresis).

Choose the set point value with the help of the arrows and change from one point to another with the **MENU** key. Click **OK** to save and exit.

**Salt chlorinator:** To control a salt chlorinator through the relay output, use ONLY the *ON/OFF Mode.* If you have an Innowater SMC chlorinator, connect the relay output cable to the external control input of the chlorinator and configure the Ext Control function (**MENU 5**) as follows:

1 External control	*ON*
2 Contact type	*open = active*
3 Production if active	*0%*

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Proportional mode

| Relay output PROPORTIONAL | **OK** → | RX < 650 mV 80% RX = 750 mV 20% |

In this mode, the dosage percentage at any given time is calculated by selecting two setpoints, as shown in the display on the right. The dosage calculation (blue line) is as follows:
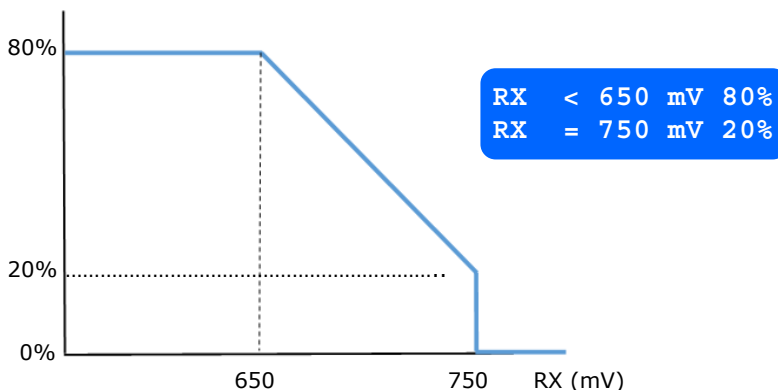
- When the RX reading is below the lower set point (650 mV in the figure), the signal sent will remain constant and equal to the percentage defined for that point. In the case of the figure, it is 80%.

- When the RX reading is between both points, the signal will reflect a percentage based on the linear function defined by both points. For example, in the figure, if the RX is at 675 mV, the signal will send 50%.

- When the RX reading is above the upper set point (750 mV in the figure), the signal sent will remain at 0%.

You can set both points and choose the dosing percentage for each. To do this, use the MENU key to position the cursor on the parameter you wish to modify and use the arrows to change the value. Press OK to save the data and exit the submenu.

The set dosing percentage values define the dosing or production volume required by your pool, which will depend on the pool's size and the capacity of the chlorinator or oxidizer pump you use. For example, for a large pool or a small chlorinator, set both dosing percentages high. You can take into account the response time of your pool's redox measurement by establishing a higher set point that cuts off dosing before reaching the desired redox value. For example, to obtain an RX = 750 mV and avoid overproduction, set the dosing cutoff to a slightly lower value:

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RX = 730   20%

The calculated dosing percentage will be implemented on the relay output by activating the contact during variable working cycles in 100-s periods. During each period, the output will remain ON (contact closed) for a number of seconds equal to the dosing percentage. For example, if the calculated dosing is 20%, the contact will remain closed for the first 20 seconds of the period and open for the remaining 80 seconds. You can monitor the curse of the period on the status screen for this output (see the next point).

Relay output status

```
RX Relay output
1 Relay config.
```

```
RX Relay output
2 Output status
```

OK

```
RX Relay output
Disabled
```

```
RX    780 mV
ON/OFF Relay:OFF
```

```
RX   720 mV    20%
CT   74 Relay OFF
```
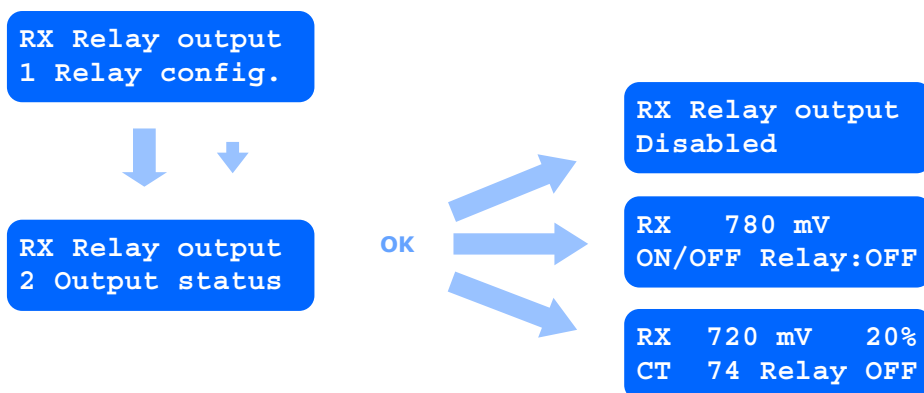
This screen provides information on the current status of the relay's redox output. Depending on the selected mode, the following information can be displayed:

- In *disabled* mode only Relay *Disabled* is displayed.

- In *ON/OFF* mode the current RX reading and relay status are displayed.

- In PROPORTIONAL mode, the current redox reading, the corresponding dosage, the course of the relay duty cycle, CT, and the current status of the relay are displayed.

Note that if there is a cause (delay activated, dosing time exceeded), the transmitted relay state will be OFF even if the calculated dosing is not 0%.

3.2.2 RX Radio 1 output (in option)

```
MAIN MENU
2 RX Function
```

```
RX Function
2 Radio 1 output
```
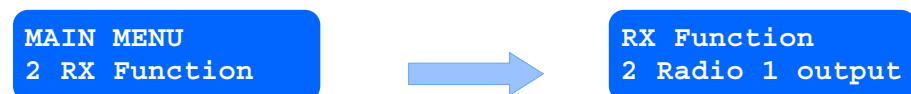
The Radio 1 output allows you to control an Innowater SMCI salt chlorinator or an Innowater variable speed pump

Set points

```
RX Function
1 Relay output
```
→

```
RX Function
2 Radio 1 output
```

OK

```
RX < 650 mV   80%
RX = 750 mV   20%
```
← **OK**

```
RX Radio1 output
1 Set points
```

The dosing percentage at any given time is calculated by selecting two set points, and the dosing calculation is analogous to that of the RX Relay Output in proportional mode (see section **3.2.1 Proportional Mode**). In this case, a command with 0-100% control information is transmitted continuously via radio.
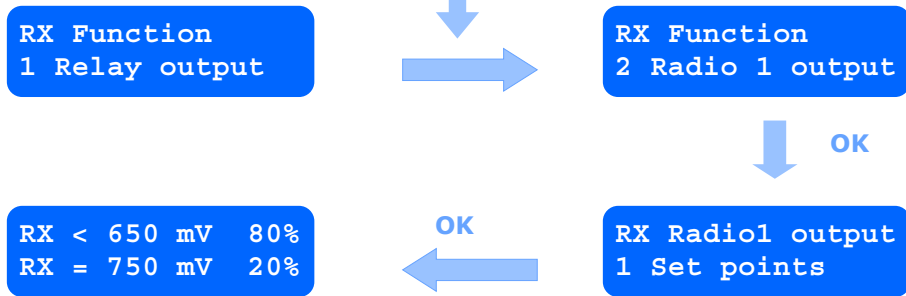
Output status

```
RX Function
2 Radio 1 output
```
OK →

```
RX Radio1 Output
1 Set points
```

```
RX  650 mV    80%
Sending...    80%
```
← **OK**

```
RX Radio1 Output
2 Output status
```
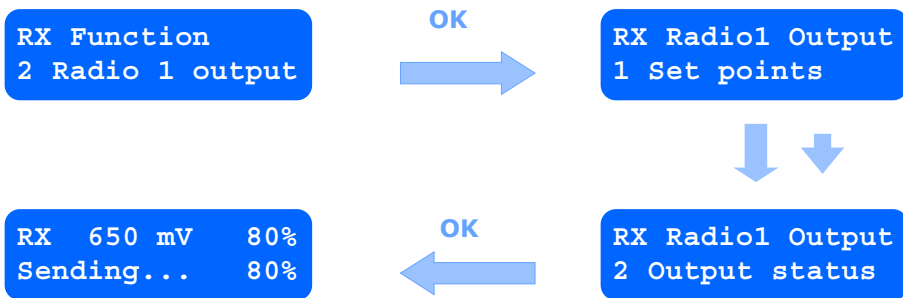
This screen displays the current redox measurement, the calculated dosing percentage, and the control command being transmitted. Note that if the is a cause (start delay active, max dosing time exceeded) the transmitted command will be 0% even if the dosing is not 0%.

3.2.3 RX Radio 2 output (ON/OFF) (in option)

```
MAIN MENU
2 RX Function
```
→

```
RX Function
3 Radio 2 output
```
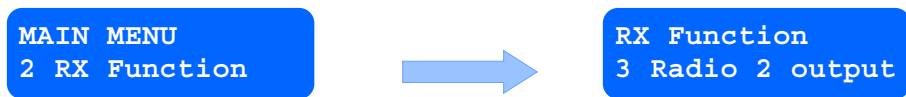
The Radio 2 RX output allows you to control an Innowater SMC salt chlorinator or an Innowater constant speed or pulse pump.

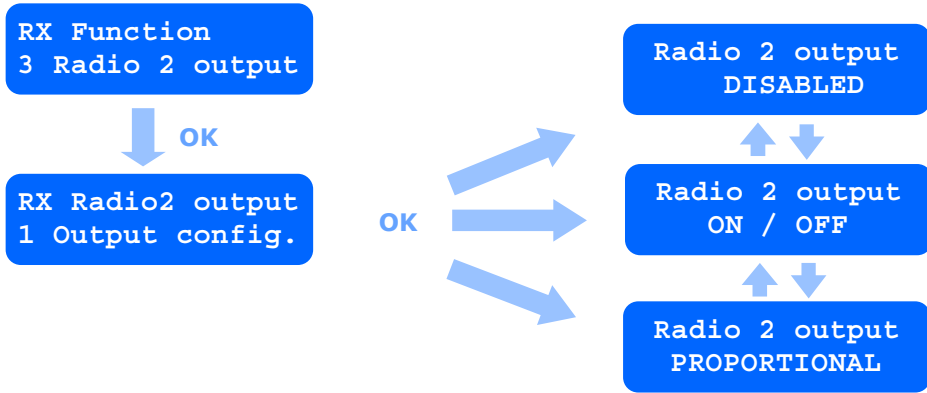⚠️ **When you use this output to control a SMC salt chlorinator it MUST be configured in ON/OFF mode. See section Mode ON /OFF**

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RX Radio 2 configuration

```
RX Function
3 Radio 2 output
```

OK

```
RX Radio2 output
1 Output config.
```

OK

```
Radio 2 output
    DISABLED
```

```
Radio 2 output
   ON / OFF
```

```
Radio 2 output
  PROPORTIONAL
```

Select the dosing mode with the arrows. Press **OK** to save and enter the corresponding configuration screen or **MENU** to exit.

Disabled mode

```
Radio 2 output
   DISABLED
```

Select this mode if you are not going to use the output. Press **OK** to save and exit the screen.

ON / OFF Mode

```
Radio 2 output
    ON / OFF
```

OK

```
RX < 650 mV    ON
RX > 750 mV   OFF
```

Use this mode to control an Innowater SMC salt chlorinator. In ON/OFF mode the radio output will send ON whenever the RX reading is below the first set point (650 mV in the figure) and will send OFF whenever it is above of the second set point (750 mV in the figure). If the RX value is between both points (650—750 mV) the output will not change and will continue in its previous state (hysteresis).

Choose the set point value with the help of the arrows and change from one point to another with the **MENU** key. Click **OK** to save and exit.

Innowater SMC salt chlorinator: To control a Innowater SMC salt chlorinator configure the RX Radio 2 output in *ON/OFF* mode and enable the RX Control Function in the chlorinator.
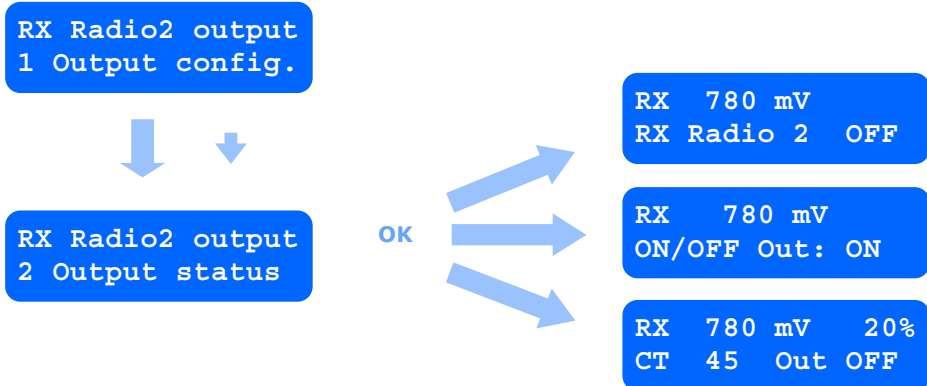
Proportional mode

```
Radio 2 output           OK          RX < 650 mV  80%
  PROPORTIONAL          ───►          RX = 750 mV  20%
```

Use this mode to control an Innowater constant speed or pulse pump. In this mode the dosing percentage at each instant is calculated from the two points in a similar way to the RX relay output (See **3.2.1 Proportional mode**). The calculated dosing will be implemented by sending continuously commands with binary control information (ON/OFF) in variable duty cycles with a period of 100 seconds. During each period, the transmitted command will be ON for a number of seconds equal to the dosing percentage. For example, if the calculated dosage is 20%, the command will be ON for the first 20 seconds of the cycle and OFF for the remaining 80 seconds. You can monitor the course of the duty cycles on the status screen (see next point).

Output status

```
RX Radio2 output                          RX   780 mV
1 Output config.                          RX Radio 2   OFF


      ▼    ▼                              RX    780 mV
                        OK                ON/OFF Out: ON
RX Radio2 output       ───►
2 Output status
                                          RX   780 mV   20%
                                          CT   45   Out OFF
```

This screen displays the current RX radio 2 output. Depending on the mode selected you will find the following readings:

- In DISABLED mode *RX Radio 2 OFF* will be displayed.

- In ON/OFF mode current RX reading and current output state will be displayed.

- In PROPORTIONAL mode current RX reading, calculated dosing, course of working period (CT) and current output state will be displayed.

Note that if there is a cause (start delay active, max. dosing time exceeded), the transmitted command will *be OFF* even if the calculated dosing is not 0%.

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3.2.4 RX Calibration

MAIN MENU 2 RX Function	**OK** →	RX Function 1 Relay output

↓ x3

RX Calibration 458 mV Cal 465	← **OK**	RX Function 4 Calibration
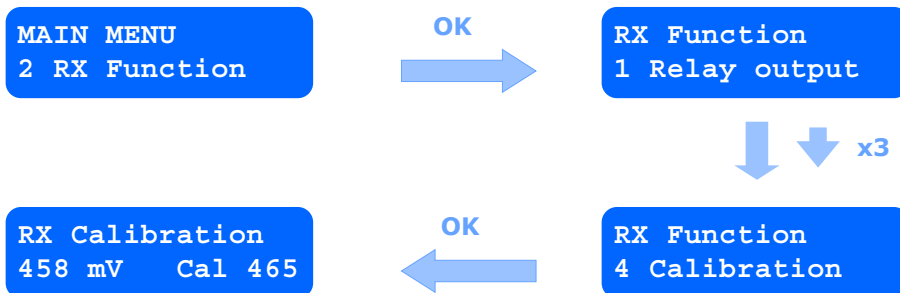
When you enter submenu *4 Calibration* by pressing OK, you will see the screen shown in the lower left corner. The value on the left shows the current redox value measured by the probe. The value to the right of Cal indicates the redox value of the calibration solution used. You can adjust this value using the arrows to suit the temperature and sample used.

Insert the probe into the 465 mV calibration solution, gently stir the solution with the probe and wait until a stable reading value is reached.

Once the reading value has stabilized, press the **OK** key to save the calibration or press **MENU** to exit without saving. Pressing **OK** will momentarily display one of the following two screens:

RX Calibration OK	RX Calibration ERROR
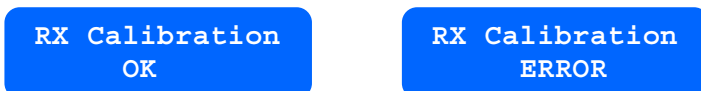
The display on the left indicates that the values entered are consistent with the solution used and that the calibration has been saved.

The display on the right indicates that the probe response is too far from the entered solution value and that the calibration has not been saved.

3.2.5 RX Factory calibration
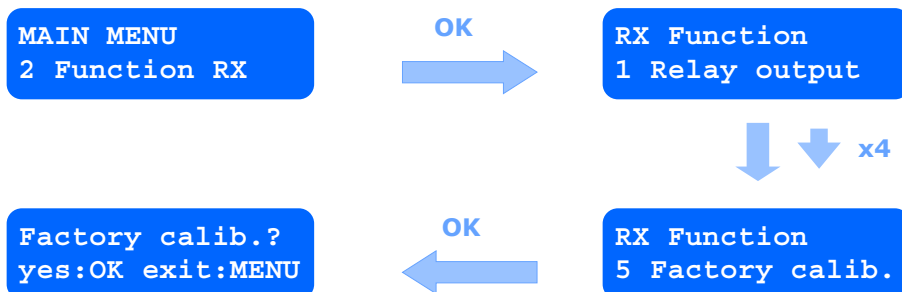
MAIN MENU 2 Function RX	**OK** →	RX Function 1 Relay output

↓ x4

Factory calib.? yes:OK exit:MENU	← **OK**	RX Function 5 Factory calib.

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Use this function to reset the factory calibration, which corresponds to the theoretical response of a new probe. This function can be useful in some situations, for diagnostic purposes or if calibration solutions are unavailable.
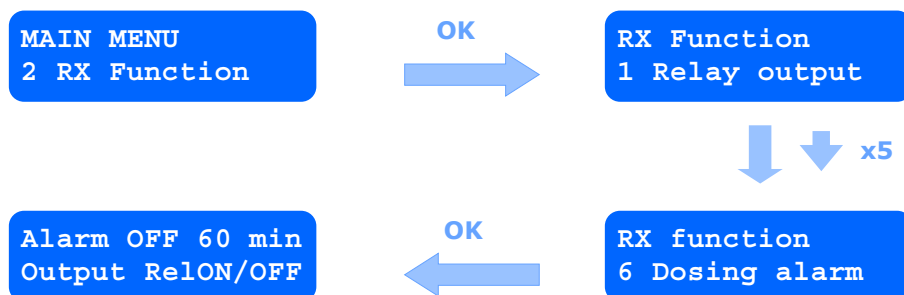
Press **OK** to restore the factory calibration or **MENU** to exit.

3.2.6 RX Dosing time alarm

```
MAIN MENU
2 RX Function
```
OK →
```
RX Function
1 Relay output
```
↓ ↓ **x5**

```
Alarm OFF 60 min
Output RelON/OFF
```
← **OK**
```
RX function
6 Dosing alarm
```

The RX dosing time alarm triggers an alarm that stops chlorine production or dosing if the time elapsed without reaching the programmed set point exceeds a certain limit. This can be useful for preventing overdosing, signalling a lack of product in the tank, or detecting potential problems with the probe or injection system.

Place the cursor (**MENU** key) under the word OFF and use the arrows to activate (**ON**) or deactivate (**OFF**) the alarm.
Place the cursor below the time displayed and use the arrows to set the maximum dosing time in minutes.
Place the cursor right to the word *Output* and use the arrows to select the pH Output whose dosing time you want to monitor.
Press **OK** to save and exit.

If the set maximum dosing time for a parameter (chlorine, pH or both) is reached, dosing will be interrupted on all outputs for that parameter and the following displays will alternate:

```
DOSING EXCEEDED
Resume? = OK
```
← →
```
pH built-in pump
RX Relay ON/OFF
```

The screen on the right indicates the parameter (ph and/or RX) and the corresponding output for which the maximum dosing time has been reached.

Press **OK** to continue. The timers will reset, and dosing will continue normally.

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3.3 LANGUAGE

```
MAIN MENU
3 Language
```
OK →
```
Choose language
English
```

Use the arrows to select the language and press **OK** to confirm or **MENU** to exit without saving.

3.4 LCD CONTRAST

```
MAIN MENU
4 LCD Contrast
```
OK →
```
LCD contrast
- ■ ■ ■ ■        +
```

Adjust the contrast using the arrows and press **OK** to confirm or **MENU** to exit without saving.

3.5 RADIO CHANNEL

```
MAIN MENU
5 Radio Channel
```
OK →
```
Channel and pump
CH1 pH pump   TX
```

This screen displays the frequency channel of the radio outputs and the transmission status. When transmission is in progress, the *TX* symbol flashes every second.

The pH-Redox Controller and the wireless devices it controls (dosing pumps, chlorinators) must be in the same channel to be able to communicate among each other. If there are multiple controllers in the same installation, each controller, along with its wireless devices, must use a different channel to make sure they receive commands from its controller only and avoid inter-reference.

To change the pH-Redox controller channel, go to menu *5 Radio Channel*, position the cursor under the channel number, select a new channel using the arrow keys (you can ignore the RX/ pH Pump indication), and press **OK**. The *TX* symbol will flash again, indicating that the controller is transmitting on the new channel.

To change the channel of an **Innowater chlorinator**, go to the chlorinator's Radio Channel menu and select the same channel as the device that will control it.

To link a **Innowater wireless pump** with the pH or RX outputs of the pH-Redox controller:

1.   Connect the pump to the mains and verify its LED flashes every second.

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2.   Activate the level sensor (or short-circuit its input connector) if you have a pulse pump or press the primming button if you have a peristaltic pump. The data LED will flash rapidly.

3.   Go to menu 5 Radio Channel and choose B*pH* to associate the pump with the pH Radio Output or *RX* to associate the pump with the RX Radio Output of the pH-Redox Controller. **Both, pH-Redox Controller and pump must be in the same channel.**

4.   Press **OK.** The pump will receive a command to set its new configuration.

5.   Release the pump's level input or primming button. If the pump has been linked to the pH Radio Output its LED will flash once every second. If the pump has been linked to the RX Radio Output, its LED will flash twice every second.

⚠️

Before pressing **OK**, make sure that **only** the pumps you want to link to a radio output are connected to mains and with the level input or primming button active. Otherwise, other pumps within range and in the same channel will inadvertently change their settings.

3.6 START DOSING DELAY

```
MAIN MENU
6 Start delay
```
OK →
```
Start delay  ON
Time     30 min
```

When the unit is connected to the mains, a certain amount of time is required for the probes to depolarize, the capacitors to charge, and the probe readings to be reliable. The start dosing delay imposes a delay after connecting the unit before dosing begins and is enabled from factory. You can enable or disable it and choose the waiting time. Position the cursor under the parameter using the **MENU** key, change the value using the arrow keys, and press **OK** to confirm.

We recommend to always program a delay time of at least 30 minutes to avoid miss dosing. When the start delay is active the main screen displays *DELAY* and the remaining time:

```
pH  7.05   DELAY
RX 584 mV 25 min
```

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3.7 MAIN SCRREN OUTPUT INFORMATION

```
MAIN MENU
7 Screen info
```
OK →
```
pH  BUILTIN PUMP
RX         RELAY
```

The main screen always displays the current pH and the calculated dosing of one of the pH out-puts and current RX and the calculated dosing of one of the RX outputs. *MENU 7 Screen info* allows you to choose which particular pH and RX outputs dosing are displayed on the main screen.

Enter *MENU 7 - Screen info* and use the **MENU** key to position the cursor on the output you want to change. Use the arrow keys to change the output and press **OK** to confirm.

Note: The dosing and current status of the different outputs of the pH-Redox Controller can be consulted at any time in the information menus for each output.

3.8 MODBUS COMMUNICATION (in option)

```
MAIN MENU
8 Modbus
```
OK →
```
Bauds:     Dir:
19.200       10
```

The RS485 port of the pH-Redox Controller provides, under the Modbus protocol, readings of the different parameters and can be also used through to modify status or configuration values. To set the baud rate and address of the pH-Redox Controller (slave), go to *Modbus menu 8*.

The pH-Redox Controller behaves as a slave in the Modbus protocol and accepts read (function 4) and write (function 6) requests of 16-bit registers. The most significant byte is sent first. If you plan to use the Modbus function, please request an updated list of the Modbus registers to Innowater.

3.9 Factory configuration

```
MAIN MENU
9 Reserved
```
OK →
```
Introduce code
    0 0 0 0
```

This menu is used for factory settings and access is restrained.

4. TECHNICAL CHARACTERISTICS

Control Unit

Weight	300 g
Dimensions	220 x 130 x 85 mm
Supply voltage	100-240 VAC, 50-60 Hz
Consumption	20 W
pH scale	0—14 pH
pH scale precision	0.01 pH
pH Calibration	Two points pH4 y pH > 7
Redox scale	0 — 1000 mV
Clorine scale precision	1 mV
Redox Calibration	1 point
Relay output without voltage	230 VAC, 1 A máx.
Probes connector	BNC
Modbus communication	modbus RTU RS485 haf duplex

Built in pump

Maximum flow rate	1,5 l/h at 1,5 bar
Regulation	duty cycle
Maximum suction height	1,5 m
Peristaltic tube material	Santoprene®
Suction tuve	PVC cristal 4x6 mm
Injection tuve	PP 4x6 mm

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