MP222

PH CONTROLLER
WITH BUILT-IN CHEMICAL FEED PUMP

INSTRUCTION MANUAL

WARNING: this manual contains important information about the installation and the operation of the instrument. These instructions must be followed at all times in order to prevent damage to persons and property**.**

CE

GENERAL SECURITY INFORMATION

DANGER!

In the event of an emergency will be necessary to turn off the power and disconnect the pump immediately.

In case of aggressive chemical products manipulation, it is needed to follow the Regulation and Terms of Use strictly, as well as the recommendations of the manufacturer.

If the equipment is installed outside European Community, please follow the local Regulation and Terms of Security

The manufacturer cannot be held responsible for any damage to persons or property in case of a wrong installation or use of the equipment.

WARNING!

The equipment should be installed in an easily accessible place. Do not block the place where the equipment is installed.

It is advisable to install an interlock device to block automatically the equipment in case of no-flow.

Qualified staff must carry out the assistance and maintenance of the equipment.

The fittings of the tubes must be disconnected before any manipulation.

It is advisable to empty and to wash the tubes that are in contact with aggressive chemical products. Safety systems must be used for this purpose.

Pay special attention to the chemical characteristics of the product to be dosed.

TABLE OF CONTENTS

Chapter 1: Introduction 2
Technical features 2
Technical specifications 3

Chapter 2: Installation 4
Installation instructions 4

Chapter 3: Programming 7
Process control 7
User interface 8
Priming 9
Working modes 9
Status menus 9
Programming menus 11

WARNING: it is completely prohibited the use of this equipment with radioactive products.

CAUTION: it is needed to follow the rules of the manufacturer for handling any chemical product such as: glasses with flexible support, chemical coat, chemical goggles, etc. Direct contact with chemical products must be avoided at all times.

1

INTRODUCTION

The MP222 is an electronic system to control pH. It is based in the latest technology microprocessors with an advanced user display, which offer high performance and reliability.

The equipment is based on a high-performance peristaltic pump specifically designed to work with pH chemical products. Once the set point is properly configured, the system is able to start the pump to correct the detected deviations. The amount of product pumped is proportional to the deviation from the configured set point. The pump can be configured to work by time or by flow.

There are several password protected programming menus to change the behavior of the system. It is possible to control the type of product to feed: acid or base. You can also configure the maximum flow of the pump.

The equipment also has a “Standby Mode” associated with a voltage-free input. It is possible to specify the amount of time that the equipment will remain in this mode, during which product dosages will be blocked.

The equipment has 1 input of product level which allow blocking the pump when there is no product.

It is possible to set a maximum dosage time for each pump. An alarm will be generated after this time and optionally the pump will be stopped.

TECHNICAL FEATURES

MC222 is specifically designed for pH control in a simple and economic way. Some of its highlights are:

- Electronic system based in a high reliability microprocessor.
- LCD display for a fast and intuitive visualization of all the parameters of the system.
- Wide measurement range.
- High-performance and self-priming peristaltic pumps which offer the maximum compatibility with chemical products.
- Easy installation thanks to its optimized design casing.
- Simple and fast start up thanks to its menu system.

TECHNICAL SPECIFICATIONS

Power supply: 110/230 VAC ± 10% - 50/60Hz.

International Protection Rating: IP 65

Main fuse: 315mA – 250V

Pump fuse: 2A – 250 V

2

INSTALLATION

INSTALLATION INSTRUCTIONS

For a proper installation please follow the instructions below:

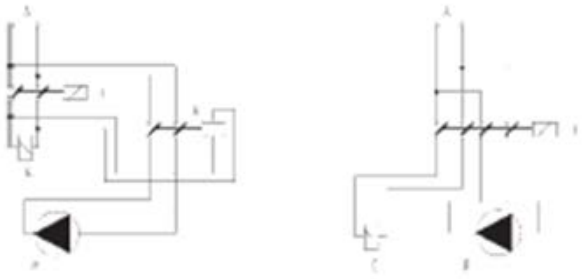
1. The equipment must be installed in a safe and accessible place.
2. It should be firmly fixed in order to keep it from moving.
3. The maximum suction height is 1.5m.
4. Suction and injection tubes must be placed in order to avoid curves that could block the flow of the products.
5. Tubes connections must be perfectly connected to the corresponding fittings.
6. Tubes must be compatible with the chemical product to be used.
7. It is important to verify the grounding connection.
8. If the grounding connection is not enough, it is needed to install a differential switch with a minimum sensitivity of 0.03A.
9. The voltage of the power supply must be within the limits of the equipment: 230VAC ± 10%.

The equipment includes an installation kit:

Probe holder
Collar fitting
BNC Coaxial connection
Buffer solution pH7
Valve 1/2"
Foot filter with ring and valve
Suction tube
Injection tube

Wall plug M 6
Screw M 6
Double faston
Probe holder

The equipment must never be connected in parallel with an inductive load (e.g. engines) to avoid possible damage to it. In order to achieve this it is needed to use a relay. Please follow next recommended schemes:



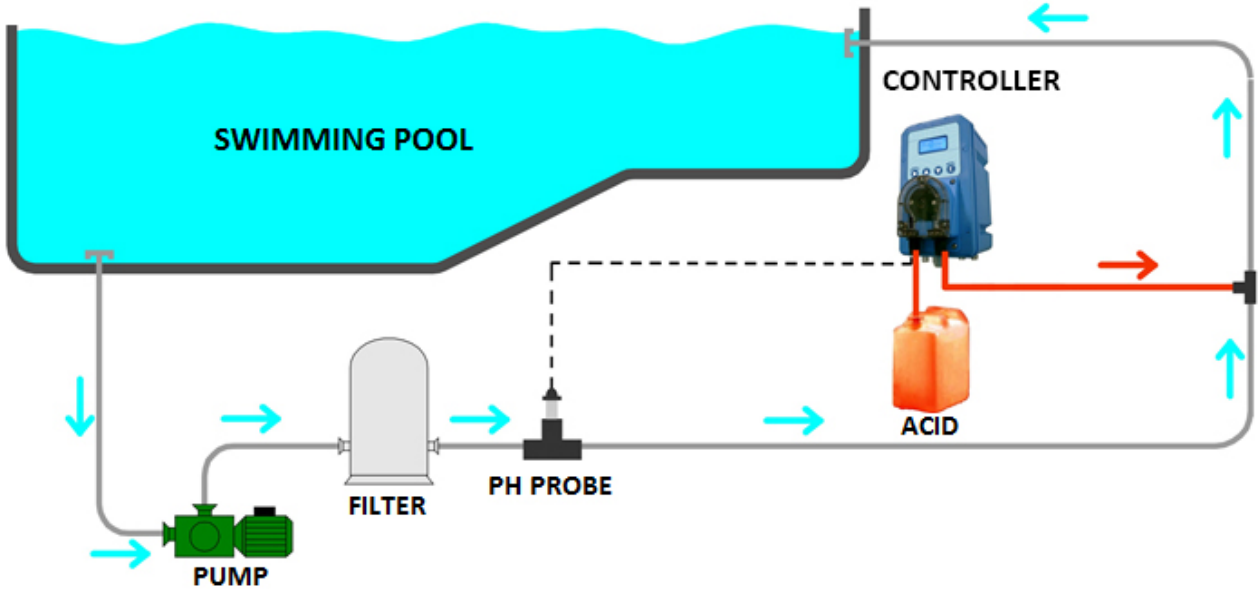
P - Dosing pump
R - Relay
I - Safety switch
E - Solenoid / Inductive load
A - Power supply

The equipment has 2 fuses inside. Please follow next steps for replacement:

1. Disconnect the equipment from the electricity network.
2. Remove the screws from the front cover of the pump.
3. Open the front cover: pull first and pull down then.
4. Replace the blown fuse for another with similar characteristics.

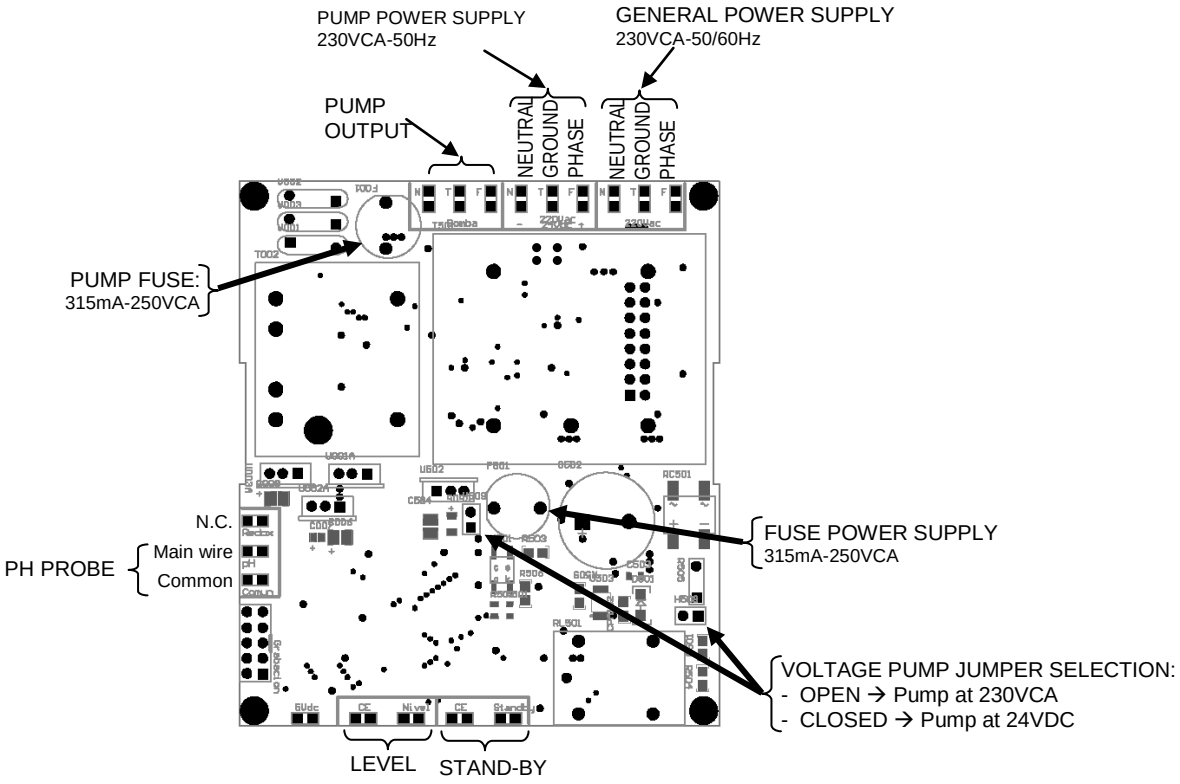
INSTALLATION DIAGRAM

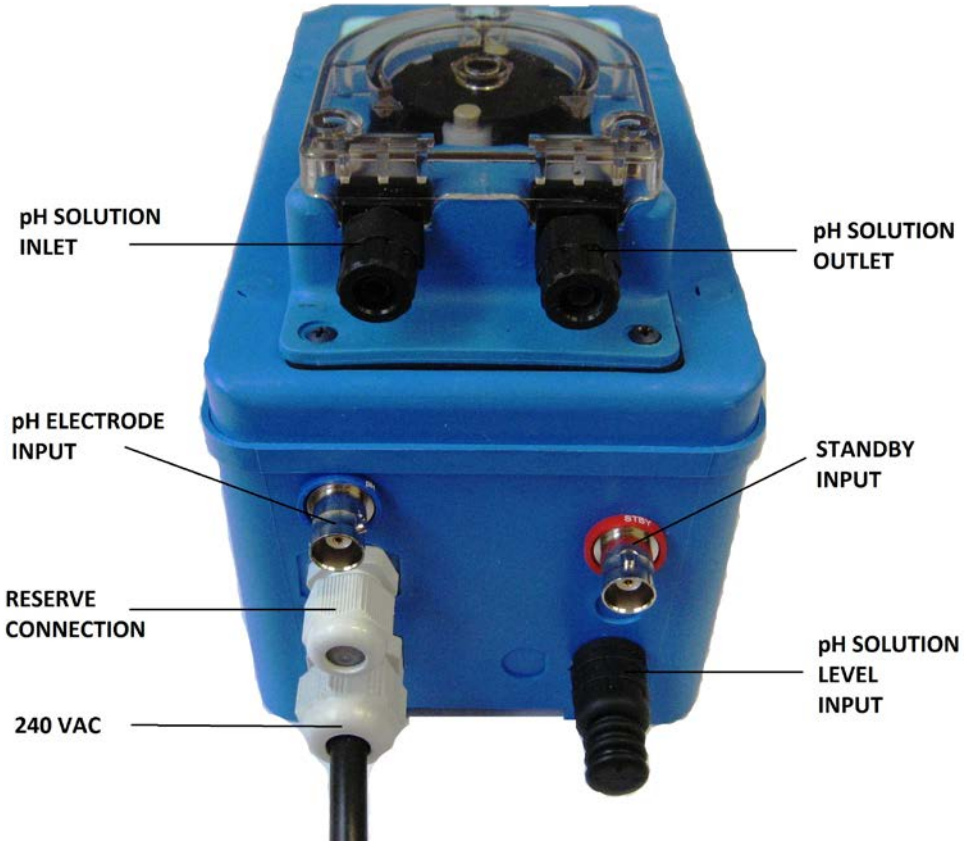
The picture below shows the recommended installation diagram for the equipment:



ELECTRIC CONNECTIONS

Scheme below shows the electric connections of the equipment:





3

PROGRAMMING

PROCESS CONTROL

This equipment has been especially designed for pH control applications. The equipment is able to start the dosing pump in order to keep the desired pH level of the installation thanks to the configured set points.

There is the possibility to establish a maximum dosing flow if the equipment has pumps with adjustable flow volume. This way the equipment can adapt to the requirements of the installation.

The possible set points to configure are:

- ***Target point*** (0%-OFF): it is the value to keep in the desired range.
- ***Maximum deviation point*** (100%-ON): when this point is reached, the associated pump will dose at its full potential.

When the level is between both points, the equipment will dose proportionally. Once the equipment reaches the target point, it will stop. If the maximum deviation point is reached, then the pump will dose at full potential. You can see in the menu the speed at which the pump is working

It is possible to configure the equipment to work in one of the next two modes:

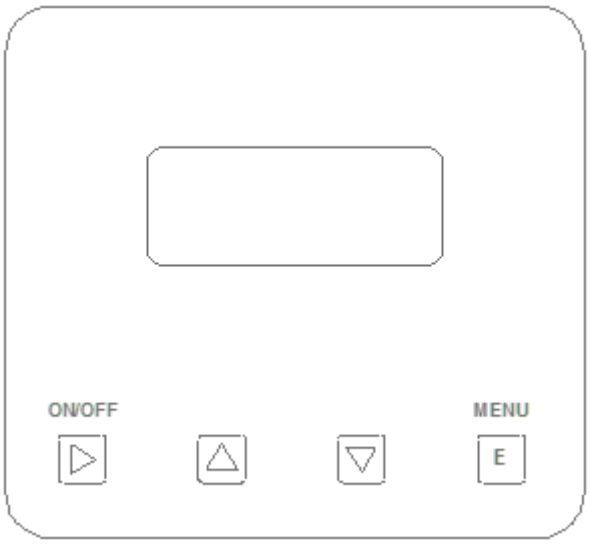
- **0%-100%** → the flow of the pump will be used to comply with the configured set points. The closer the value is from the target point the lower the flow of the pump will be. The minimum flow can't be modified but the maximum flow is configurable through the different programming menus.
- **ON-OFF** → the configured set points will be reached using a work cycle. The equipment uses a default work cycle of 100 seconds; the amount of time the pump is working will increase from 0 seconds (when the target point is reached) to 100 seconds (when the maximum deviation point is reached).

There are several additional functions to achieve the maximum adaptability to all the installations:

- ✓ **LEVEL CONTROL:** the equipment is able to detect the absence of any of the products and stop the pump to prevent its loss of prime. You can visualize this situation in the menu.
- ✓ **STAND-BY:** there is one normally open free voltage input to generate the "Stand-by" signal. This signal is able to stop the dosage of both pumps, plus a possible adjustable period of time. This signal is also attached to an initial stop time of the pumps, just after the equipment has been connected to the general power supply. Once this period of time is over, the pumps will be able to dose again. All this options are under the menu "STAND-BY/FLOW".
- ✓ **MAXIMUM DOSAGE TIME:** it is possible to establish a maximum dosage time during which the target point must be reached. If this point is not reached, an alarm situation will be generated and there is the possibility to stop the corresponding pump.

USER INTERFACE

This is the control panel of the equipment:



The interface has a high luminance display to show data clearly. There are also 4 keys to navigate through the status and programming menus:

- "►" → to scroll through menus and the different parameters of a certain programming menu. When you are visualizing the status menus, you can jump from standby mode and operating mode with a prolonged pressure of this key.
- "▲" – "▼" → allows navigating through the programming menus and modifying the selected parameter.
- "**E**" → to access the programming menus and record the different parameters.

PRIMING

The equipment offers the possibility to prime the pump. To do this, just push "▲" and "▼" keys at the same time for 3 seconds and the pump will start working. Release both buttons to stop the pump.

WORKING MODES

A welcome screen is shown when the equipment is connected to the power supply. This screen indicates the version of the microprocessor software and during this time all the outputs will remain deactivated and the keyboard disabled.

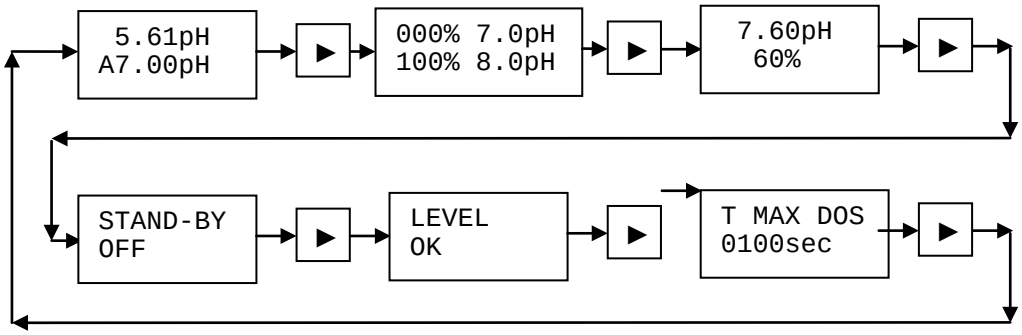
The equipment has 2 working modes:

- ***STANDBY MODE*** → the equipment is on and it is possible to visualize the status menus and the status of the different signals. It is also possible to access to the programming menus to visualize and change parameters. PH measurements can be visualized in real time on the screen. In this mode the pump is always stopped and it is possible to know if this mode is active accessing status menu 1 and see if text "OFF" is shown in the second line.
- ***OPERATING MODE*** → the equipment is fully operational and all status and programming menus can be accessed. In this mode the pump is ready to dose when necessary.

To change between both working modes it is needed to press "►" key during 3 seconds in one of the status menus. If the pump is working and the standby mode is selected, this pump will be stopped.

STATUS MENUS

Scheme below shows the structure of the status menus:



STATUS MENU 1

```
5.61pH
↑↓7.00pH
```

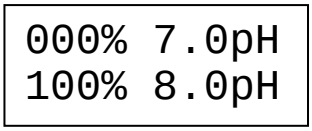
The first line shows the pH measurement. The first character of the second line shows how the pump is configured to dose:

- ↑: the pump will dose in order to increase the pH value (bases).

- ↓: the pump will dose in order to decrease the pH value (acids).

Beside arrows is shown the configured set point (target).

STATUS MENU 2

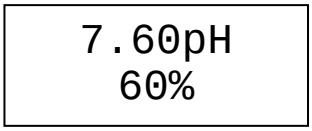


This menu shows the configuration of the set point. The first line shows the type of dosage and the set point. The type of dosage can be:

- "000%" → dosage proportional to the flow of the pump.
- "OFF" → dosage proportional to start/stop periods of time.

The second line shows the maximum deviation point.

STATUS MENU 3

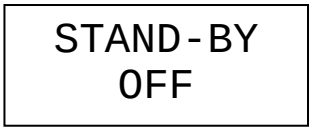


The first line shows the current pH measurement of the equipment.

The second line shows the speed at which the pump is working. This value is indicated in relation to the current pH measurement and the configuration of the set point. If the pump mustn't dose the value is "00%".

In equipments with adjustable flow pumps, a 100% value indicates that the pump is going to work at its full potential according to the programming of the menu "Flow". If the pump has a nominal flow of 5 l/h and this "Flow" menu has a configured value of 50%, the pump will dose 2.5 l/h when this status menu shows 100%.

STATUS MENU 4



This menu shows the status of the STAND-BY signal and timing:

- OFF → signal and timing are both inactive.
- ON → stand-by signal is active; close contact.
- Time → indicates the number of seconds to finish the stand-by timing.

STATUS MENU 5

The screen shows the status of the input level:

- "OK" → there is product in the drum. The contact of the probe level is open.

- "ALARM" → the contact of the probe level is closed indicating a lack of product.

STATUS MENU 6

```
T MAX DOS
 0100sec
```

This menu shows the maximum dosage time. The pump starts working when there is a deviation from the configured set point and right at that moment the countdown configured in this menu starts. If the countdown goes to 0 seconds before the set point is reached again, an alarm is generated. The text "ALARM" is shown in the second line.

Depending on the configuration, the pump will stop. If the pump is stopped, you have to reset this menu just pushing the "▲" for 3 seconds in order to start the pump again.

If the equipment is configured in "ON-OFF" (start/stop) mode, this counter will work when the pump is in the start part as well as in the stop part.

PROGRAMMING MENUS

It is possible to access to the programming menus pressing the "E" key for 3 seconds from any of the status menus. Next screen is shown:

```
PASSWORD
  0000
```

Use the keys "▲" and "▼" to modify a certain value and the key "►" to move between digits. Press the '"E" key to validate the input. If the password is correct you will access to the programming menus. If the password is not correct, next screen is shown:

```
  ERROR
PASSWORD
```

If the password is correct, the screen shows all the programming menus:

```
>1 PCON
 2 CALIB
```

The arrow symbol "**>**" indicates the selected menu. Use the "▼" and "▲" to navigate through the different options and the key "E" to enter the selected menu. This is the list of the programming menus:

1 PCON → allows configuring the set point, the maximum deviation point and the dosing mode.

2 CALIB → allows calibrating the pH probe.

3 ALARM → allows configuring the maximum dosage time and if the pump must stop.

4 PASSWORD → modifies the access password.

5 STD-BY → configures the stand-by additional time and the behavior of the external signal.

6 FLOW → if the equipment has a pump with adjustable flow rate, this menu allows to configure its maximum flow rate.

7 LANGUAGE → you can select among English, Spanish and Portuguese.

8 EXIT → to return to the status menus.

Next screen is shown when you save the configuration in the different programming menus:

```
DATOS
OK
```

PROGRAMMING MENU 1: SET POINT

```
> a- 000%
  06.00pH
```

This menu allows configuring the set points of the equipment:

- Target point → it is the desired pH value. The equipment will work in order to reach the pH value configured in this menu.
- Maximum deviation point → the equipment will work at its full capacity when this point is reached.

Here is a description of the set points:

- ***Target point:*** identified as "a"
  - *Proportional to time*: the text "OFF" is shown in the first line. The dosage is controlled according to the relation between the start time and the stop time in cycles of 100 seconds.
  - *Proportional to flow*: the text "0%" is shown in the first line. This option is only available in equipments with adjustable flow pumps. The flow of the pump will be proportional to the difference between the pH measurement and the target point.

  Select the pH value in the second line. Push the "E" key to save the current configuration and advance to the maximum deviation point screen.
- ***Maximum deviation point***: identified as "b" and "ON" or "100%" depending on the type of dosing mode (time or flow). Select in the second line the pH value at which the pump will work at its full potential.

Depending on the configured values for the target and maximum deviation points, the equipment will dose different type of products:

- Acids → target point lower than maximum deviation point.
- Bases → target point higher than maximum deviation point.

Let's see a couple an example:

DOSING PROPORTIONAL TO TIME:

- ✓ Target point = 6.00pH; 0% dose
- ✓ Maximum deviation point = 7.00pH; 100% dose

- ✓ The equipment is configured to feed an acid product, so the dosage will start when the measurement is higher than 6.00pH.
- ✓ The difference between both points is 1.00pH.
- ✓ If the measurement is 6.25pH, the difference with the target point is 0.25pH.
- ✓ Dosage rate: 0.25pH over 1.00pH → 25% for a 6.25pH measurement
- ✓ With a 25% dose the pump will be active during 25 seconds and inactive during 75 seconds.
- ✓ If the measurement goes above 7.00pH, the dose will be 100%
- ✓ If the measurement goes below 6.00pH, the dose will be 0% (pump stopped).

PROGRAMMING MENU 2: CALIBRATION

```
C>7.00pH
R 6.78pH
```

The recommended procedure to calibrate the pH probe is listed below.

✓ PH CALIBRATION:

The procedure for calibrating the pH probe must be as follows:

1. Clean the probe with plenty of water.
2. Access to the calibration menu. The default point will be shown: 7.00pH.
3. Adjust the calibrating menu value (first row) to the buffer solution value to be used.
4. Immerse the pH probe in the corresponding buffer solution.
5. Wait 10 seconds until the equipment stabilizes the measurement.
6. Move the cursor (“>”) to the second line.

WARNING
If the “OK” key is pressed while the cursor (“>”) is in the first line, the calibration process is finished and all the parameters are ignored.

7. Press the “OK” key so the equipment saves temporally the data of the first point.
8. If the previously steps have been correctly completed, the equipment will show the screen to calibrate the second point; the default value is 4.00pH.
9. Adjust the calibrating menu value (first row) to the buffer solution value to be used.
10. Immerse the pH probe in the corresponding buffer solution.
11. Wait 10 seconds until the equipment stabilizes the measurement.
12. Move the cursor (“>”) to the second line.

WARNING
If the “OK” key is pressed while the cursor (“>”) is in the first line, the calibration process is finished and all the parameters are ignored.

13. Press the “OK” key so the equipment does the calculation to perform calibration. There are 2 possibilities:

a. ***Correct calibration***: data entered and probe measurement is consistent and the equipment is able to record these values permanently.

b. ***Calibration error***: there are 2 options:
   i. The equipment detects that the probe has an excessive deviation and is not possible to calibrate it. A replacement of the probe is recommended.
   ii. Data entered is not consistent. Please repeat the entire process from step 1.

   In either case, calibration process is not performed and an error message will be shown.

14. Remove the probe from the buffer solution and connect it to the final installation.

WARNING:
- **Please follow above steps carefully. Any variation in the process may result in the equipment not working properly.**
- **Calibration process must be performed through buffer solutions in good condition; otherwise probe measurements will not be correct.**
- **The calibration procedure needs two well differentiated pH values to be successful.**

PROGRAMMING MENU 3: ALARM

```
> 010min
  DOSIF
```

In this menu it is possible to establish a maximum dosage time and the action to apply to the pump in case this time is reached. Use the arrow keys to navigate and change the parameters.

Here is a description of the parameters of this menu:

- **Maximum dosage time** → it is the maximum dosage time during which the pH target point must be reached. If this point is not reached and the equipments needs to dose, an alarm situation will be generated.
- **Pump action** → indicates the behavior of the pump when the previous time is reached. 2 possibilities:
  - **DOSIF** → the pump remains dosing if necessary.
  - **STOP** → the pump stops and remains as blocked until the situation alarm is reset (see programming menu 5: stand-by)

Push the “E” key to save the parameters.

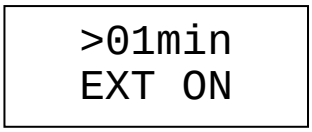
PROGRAMMING MENU 4: PASSWORD

```
PASSWORD
0000
```

This menu makes possible to change the password to access the programming menus. Use the arrow keys to go through the digits and change their values Push enter to save the desired password.

The default password is “0000”.

PROGRAMMING MENU 5: STAND-BY



This menu allows configuring the behavior of the equipment when the stand-by signal is received. This signal comes from a free voltage normally open contact: the stand-by input signal is detected as active when the contact is closed.

The dose in the equipment will be blocked while the stand-by condition is active. There are 2 possible scenarios:

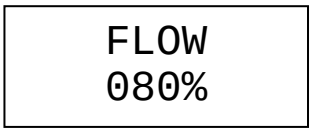
- While stand-by signal is active, i.e., the contact is closed.
- While extra timing is counting down after stand-by is deactivated.

After these conditions have gone the equipment can dose again.

There are two parameters to configure:

- **Stand-By time** → indicates the additional time for the stand-by condition. This time is taken into account in 2 situations:
    - When the equipment is connected to the power supply: the pump will be blocked during this time after the equipment is supplied with power.
    - When the stand-by signal is finished: this happens when the contact of the stand-by signals changes from closed to open. This configuration is optional and can be controlled using the next parameter of the menu.
- **To enable timing trough an external signal**
    - “EXT ON”: the timing is enabled after the stand-by deactivation: the pump remains as blocked after the configured stand-by time.
    - “EXT OFF”: the timing is disabled after the stand-by deactivation: the pump remains as blocked immediately.

PROGRAMMING MENU 6: FLOW



This menu is only useful in equipments with adjustable flow pumps. You must indicate a value from 35% to 100% in order to establish the maximum flow of the pump.

Example:

- Pump with adjustable flow and nominal flow of 5 l/h.
- Value of 80% in this menu.

The maximum flow of the pump will be 4 l/h. The pump will dose 4 l/h when the configuration is proportional to time. The pump will dose 4 l/h when the configuration is proportional to flow and the dosage is 100% and 2 l/h when the dosage is 50%.

PROGRAMMING MENU 7: LANGUAGE

You can change the language of the menus:

ING → English
ESP → Spanish
PTG → Portuguese

WARRANTY:

These instruments are warranted from all defects in materials and manufacturing for a period of two years from the date of purchase. The electrode is warranted for a period of 6 months.
If during this period, the repair or replacement of parts is required, where the damage is not due to negligence or erroneous operation by the user, please return the parts to either dealer or our office and the repair will be effected free of charge.
Note: We reserve the right to modify the design, construction and appearance of our products without advance notice.

THANK YOU FOR CHOOSING

Milwaukee Electronics Kft.
Alsó-kikötő sor 11C
6726 Szeged, Hungary
Tel: +36-62-428-050
Fax: +36-62-428-051
e-mail: sales@milwaukeeinst.com

www.milwaukeeinst.com