

# PLEASE READ FIRST

Congratulations on your purchase of the NFS-1 Controller. This unit is an efficient way to fully control your irrigation systems. To ensure safety, please read the manual carefully before installation and follow the instructions herein. It will provide detailed instructions that will help you to set up the unit, and to understand its full capability. Any use or application of this product, other than for its original intended purchases are prohibited. Store this manual in a secure place for future reference.

## INTRODUCTION

Aqua-X irrigation Controller is a pioneering and innovational hydroponic irrigation control system. This smartphone App based system can control up to 30 outputs (24V or 110V) and monitor the pH, EC and water temperature of nutrient. Water detectors for watering confirmation allow the system to send alerts to user when the watering schedule fails. With its incredible flexibility, everyone could easily automate their irrigation systems.

The system could control pumps by 110V Control Board and solenoid valves by 24V Control Board. When the massive control outputs, user could manage delivery schedule for multiple nutrients, multiple rooms and multiple zones.

A sensor board with EC/pH/Temp sensors is also available to allow user to monitor and log all the historical data of their nutrients. When the measured value exceeds your custom setting range, a warning message will be sent to your smartphone.

Free smartphone App allows user to monitor and control their watering schedules at their fingertips. Graphic interface makes multiple schedules easy to adjust and monitor. The innovational watering confirmation feature saves enormous loss by watering failures.

# FACTS

Here are some important things to consider when using the Aqua-X irrigation Controller

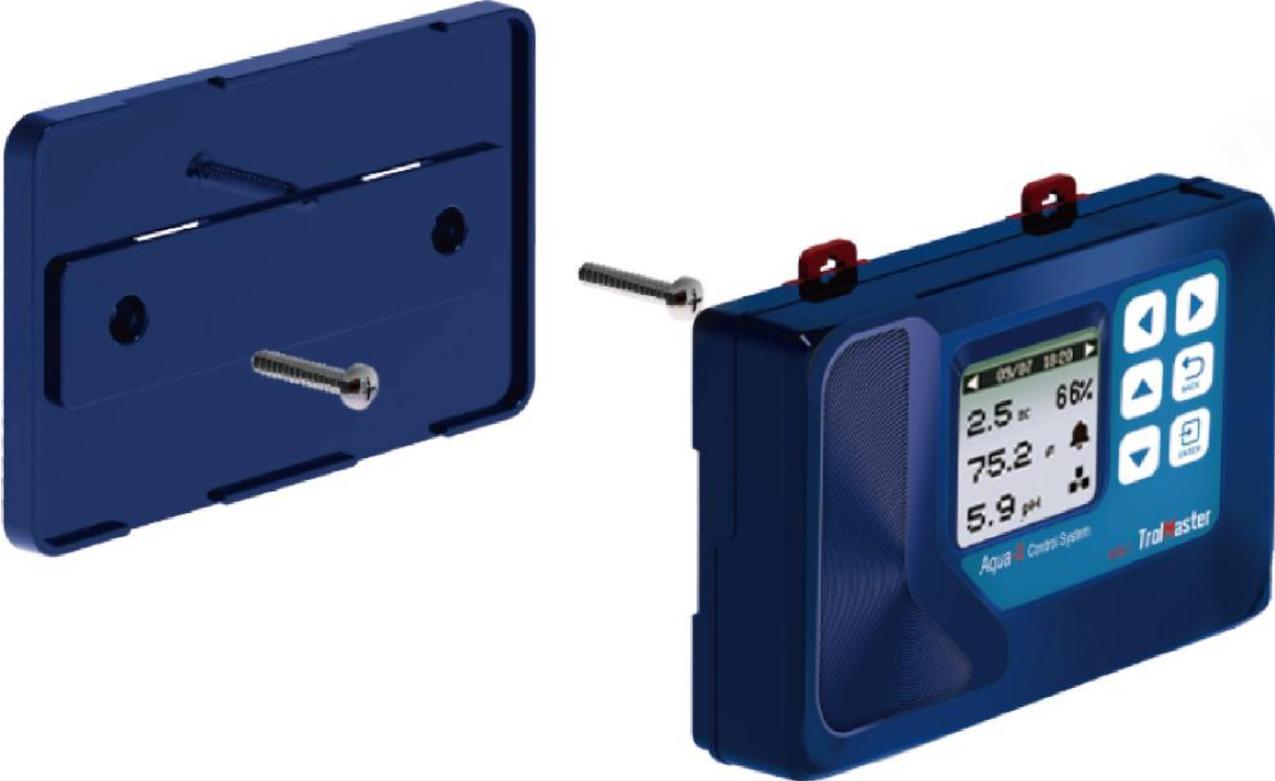
- Each set of Aqua-X Irrigation Controller can control up to 30 outputs(24V or 110V) and monitor the pH value, EC value and water temperature of nutrient
- There are two RJ12 ports for the Control Board. One is for 24V Control Board (6 individually controlled 24V outputs for solenoid valves), the other is 110V control Board ( 6 individually controlled 110V outputs for water pumps).The maximum number of connections to the Aqua-X is 5 pieces for either 24V Control Board or 110V Control Board. The Program Device Station (DSP-1 from Hydro System) is also compatible to the Aqua-X through the 110V CONTROL port. 24V Control Board ( 6 outputs each). 110V Control Board (6 outputs each) and Program Device Station (1 output each) can be used together but each Aqua-X can only control up to 30 outputs.
- The Water Detector port looks identical to the Control Board port. Make sure not to mix them up. The Water Detector port is positioned between the Sensor Board port and Micro SD slot
- pH Sensor and EC/Temp Sensor should be connected to Sensor Board ( AMP-2) and then connect the Sensor Board to the Aqua-X with a mini-DIN cable.
- A maximum distance of 1000ft / 300 meters between the NFS-1 irrigation Controller and the devices to be controlled.
- Follow all local and national electrical codes for installation requirements.

# COMPONENTS



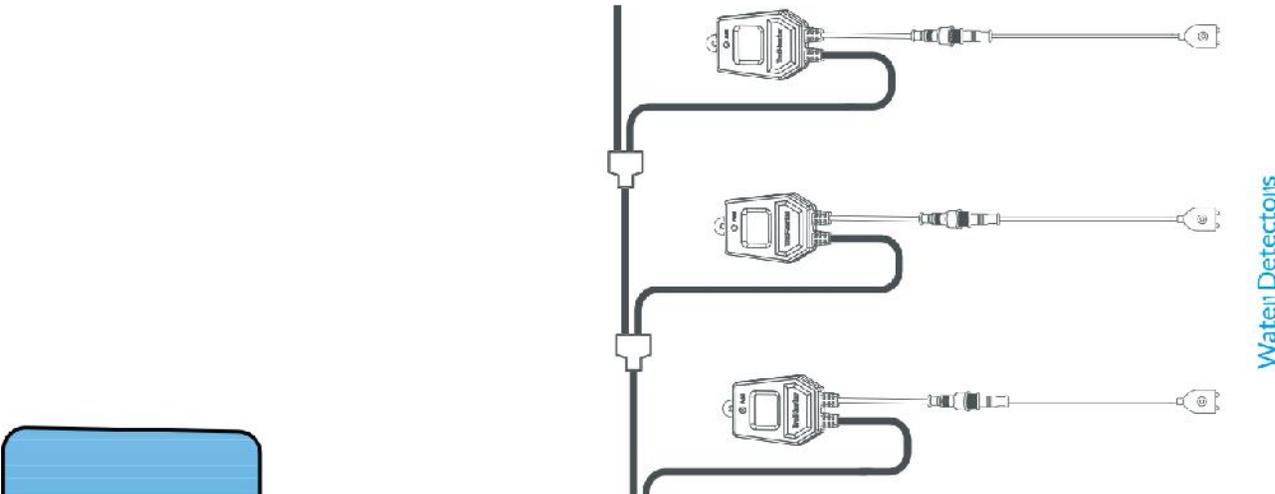
1. Aqua-X Controller (NFS-1)
2. Water Detector (WD-1)
3. Water Touch Spot
4. Back Plate (Bracket)
5. 12 V DC Power Supply

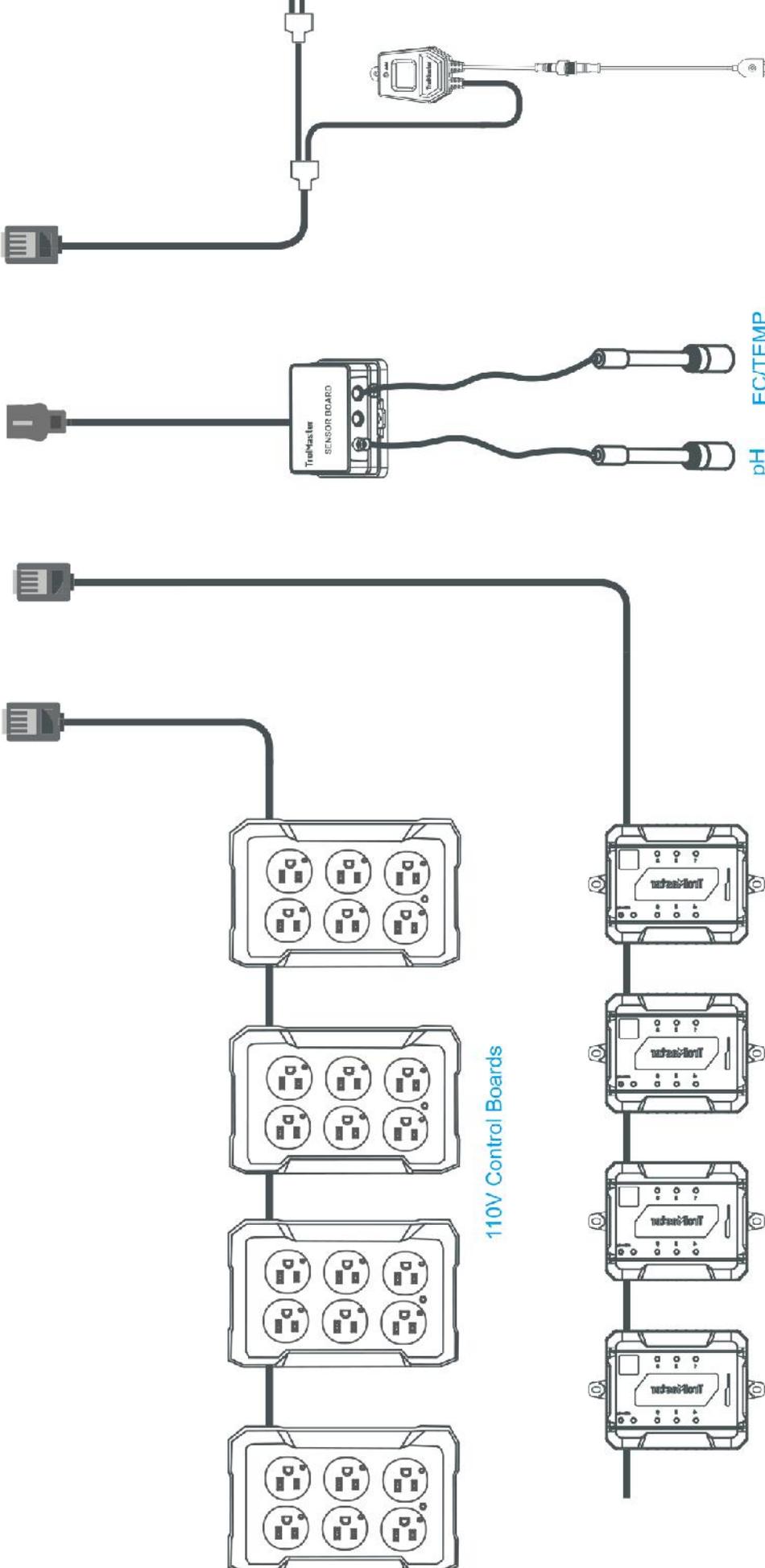
# INSTALLATION



Determine where to locate the main controller. The controller comes with a simple to use DIN type bracket. Pull the 4 tabs outward to release the bracket from the unit, mount the bracket to a wall or surface, place the unit back on the bracket and press the 4 tabs back in to lock the unit in place.

# CONNECTIONS





110V Control Boards

24V Control Boards

pH Sensor  
EC/TEMP Sensor



# CONNECTIONS CONTINUED...

## 1. Power Connection :

Connect the plug-in power supply to the power ( DC ) connector on the far left

## 2. Control Boards ( 24V or 110V ) Connection :

Connect the 24V Control Board to the Aqua-X with a RJ12 cable going from the 24V CONTROL socket to the first 24V Control Board to be connected. Plug the 24V Control Board to the wall outlet for power supply. Press "Addressing" button, the Aqua-X Controller will assign an address to the connected Control Board in sequence. Use another RJ12 cable to connect to the second 24V Control Board. Repeat this process until all 24V Control Boards ( up to 5pcs for exclusive use ) have been connected to the Aqua-X Controller.

The connection of 110V Control Boards is similar to above processes but through the 110V CONTROL port

## 3. Program Device Station Connection :

The connection of Program Device Station is similar to the 110V Control Board. The 110V Control Board and Program Device Station can be chained together with T-Splitter through the 110V CONTROL socket

## 4. Water Detectors Connection :

Connect the Water Detector to the Aqua-X with a RJ12 cable going from the Water Detector socket to the first Water Detector to be connected. Use the T-Splitter and a short RJ cable so that the first cable can continue on to be connected to the next T-Splitter (Water Detector) to be connected. Press the "Addressing " button, the controller will automatically assign an address to the Water Detector in sequence. Repeat this process until all Water Detectors ( up to 30pcs pe set) are connected to the main controller.

## 5. Sensors Connection :

Connect the Sensor Board to the Aqua-X with a round headed cable ( male-to-male). Connect the pH Sensor and EC/Temp Sensor to the corresponding

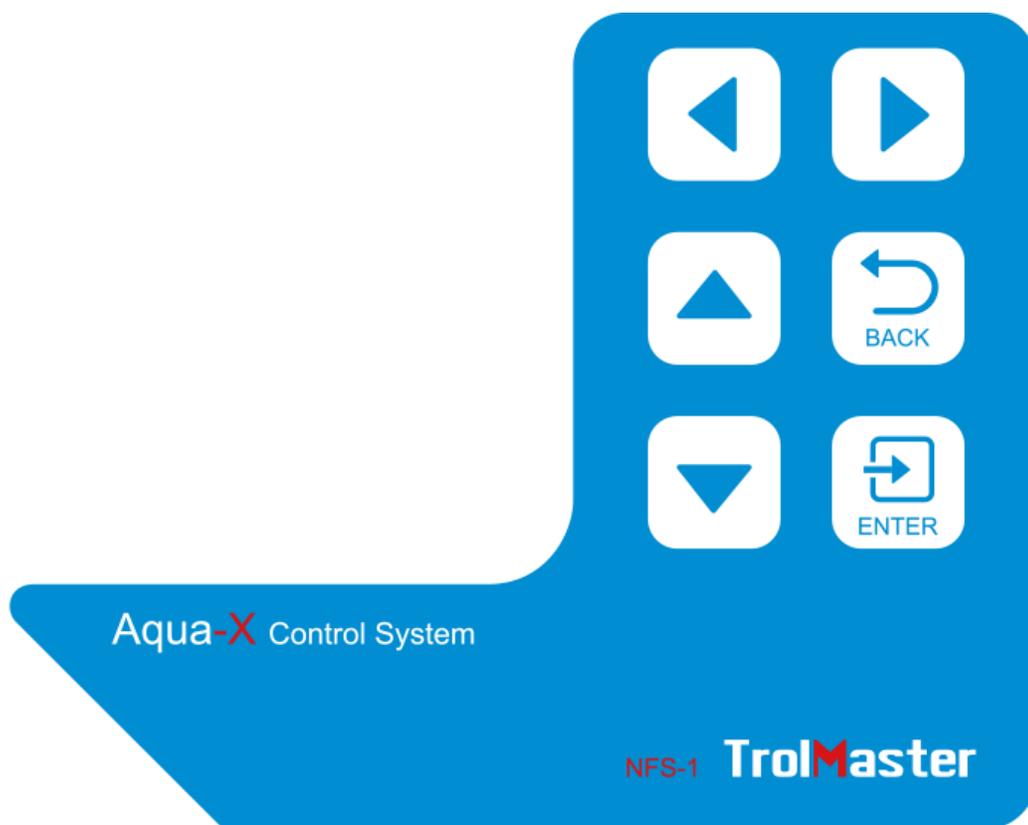
connector on the Sensor Board.

## 6. Internet Connection :

This unit has the feature of connecting the network for remote control. User can use a standard network cable for connection through the INTERNET socket.

## BUTTONS

The NFS-1 Aqua-X Controller is extremely easy to use. The backlit 128x128 LCD display will provide the user with the current conditions and access all settings. All settings are accessed by using the 6 push buttons on the front of the unit. The button functions are described below



UP



DOWN



LEFT



RIGHT



ENTER



BACK

**UP /DOWN** :The UP and DOWN buttons move the cursor up and down to select the item on the LCD display.

**LEFT /RIGHT** :The LEFT and RIGHT buttons move the cursor to previous page or next page, left item or right item.

**BACK** :The BACK button goes backwards to the previous page.

**ENTER** :The ENTER button is used to open the menu item to be changed as well as to accept and save the new setting.

Familiarize yourself with the function of the 6 buttons on the front of the NFS-1 Controller in order to be able to access settings, and to better understand how to use the NFS-1 Control Systems to its greatest potential.

## START SETTINGS

Once you have connected 24V Control Board. 110V Control Board(s), Sensor Board(s) and Water Detectors to the NFS-1 Controller, we can start using the unit

Connect the plug-in power supply to the power connector on the bottom of the NFS-1 Controller. NFS-1 Controller will turn on and boot up.

If it is the first time you have used the NFS-1 Controller, when you power on the NFS-1 Controller, the Welcome screen /page will display and remind user to press " ENTER " to set system time.



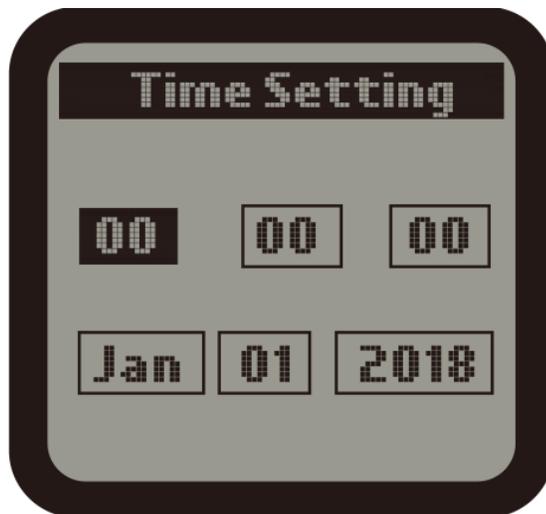
First-Use Welcome Page



Normal Start Page

**NOTE :** Press the ENTER button to set system time before use.

Time Setting : please refer to P23 for the time setting so as to change the default time into the current time before use.



Default Time



Current Time (Example)

## MAIN MENU



The main menu displays three elements

[EC Value](#) e.g.2.9

[pH Value](#) e.g.5.9

[Water Temperature Value \(°F\)](#) e.g.: 75.2°F

[Water Content Value](#) e.g.:77%

The top title bar indicates current date & time.

[Month/Day](#) e.g.:09/07

[Hour/Minute](#)e.g.:18:20

Icon Indication



Alarm Activated



Internet Connected



**NOTE :** Download the TrolMaster App from APP Store or Google Play



Alarm Message Page

Water Detector Page

Main Menu Page

1 ) On the Main Menu page, press LEFT button  to get access to Water Detector page. It shows output(s) that has (have) been associated with the connected Water Detector. Press LEFT button again, the LCD screen will show the Alarm Message page. The LCD screen will show records of all alarm messages.



Main Menu Page

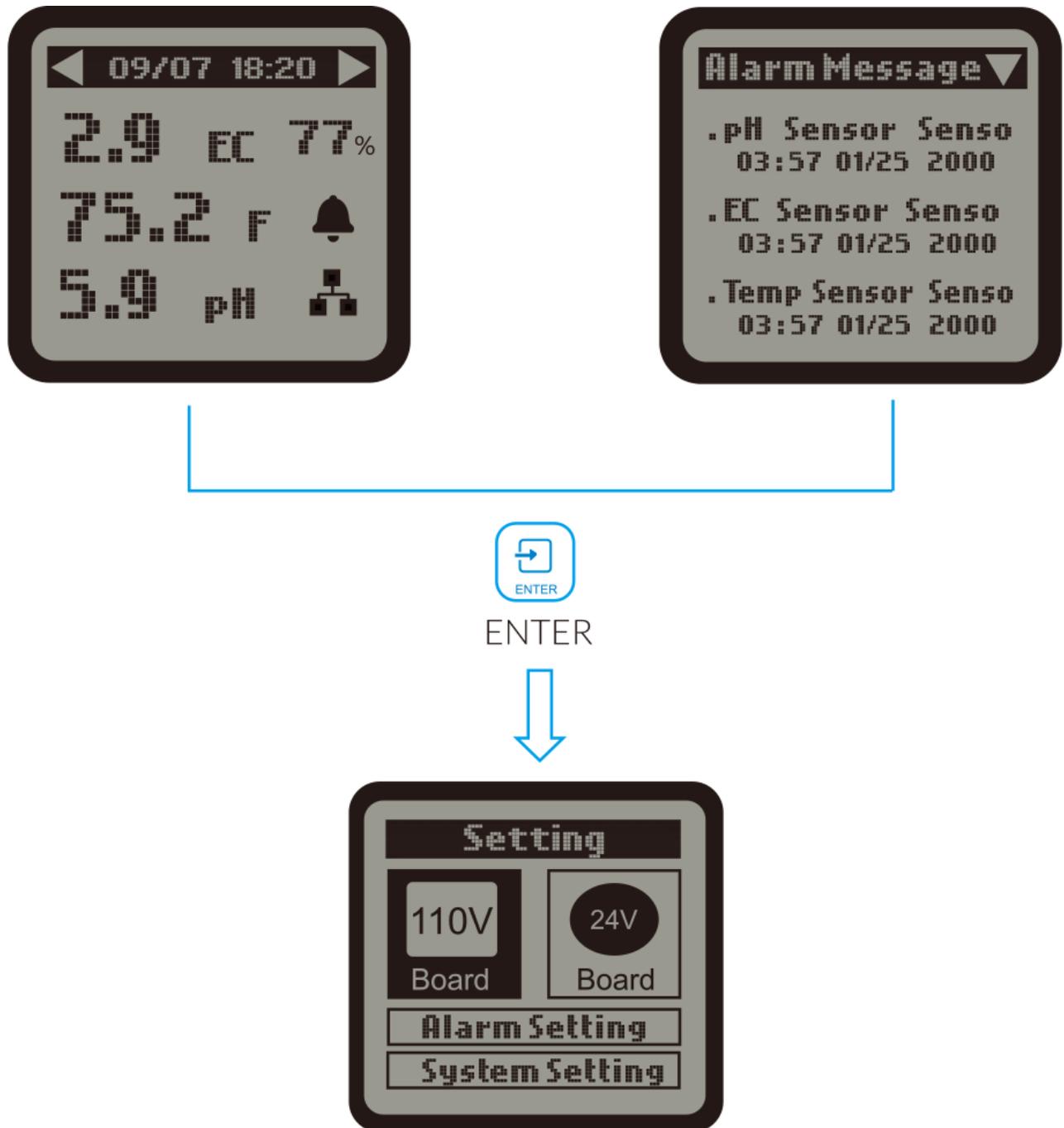
Alarm Message Page

Water Detector Page

2 ) On the Main Menu page, press RIGHT button  to get access to Alarm Message page. The LCD screen will show record of all alarm messages. Press RIGHT button again, the LCD screen will show the Water Detector page. It shows the only output ( 110V or 24V) that has been associated with the connected Water Detector.

**NOTE :** Hot-plug is not recommended for the MicroSD card on the main page.  
Damage to the files within the MicroSD card is a possible result

## SETTING PAGE



On the Main Menu page or Alarm Message page press  ENTER button to get access to the SETTING page. The LCD screen will display 4 subjects ( 110V Board. 24V Board. Alarm Setting and System Setting) as shown on above

picture. You can press the respective button (UP/DOWN/LEFT/RIGHT) to select the subject that you want to adjust the setting.

## 110V BOARD SETTING

When the RJ12 cable is not correctly connected to the corresponding 110V CONTROL port or the 110V Control Board is not connected to the power supply, the LCD screen will show "No 110V Board Online". Please make sure the RJ12 cable is correctly connected and power on the 110 Control Board. After power-on, the Addressing LED indicator will keep flashing every second. Then press the ADDRESSING button on the 110V Control Board, the LCD screen will display "110V Board A has been added". The first connected Control Board will be marked as "A", and the second one marked as "B", the third as "C", and so on.



Wrong Connection



Correct Connection

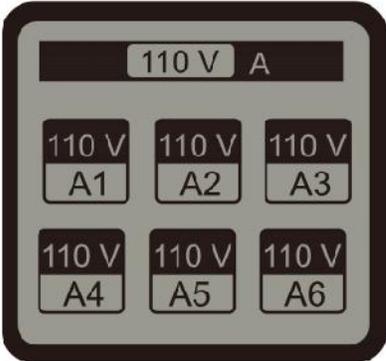
On the SETTING page, press ENTER button to enter the 110V Control Board list page. The connected Control Board(s) will be shown page to page. User can press RIGHT button to select the 110V Control Board (A.B.C...) for the setting change.

When the Control Board selected press ENTER button and the 1st output will be highlighted and blinking. Press LEFT, RIGHT, UP or DOWN button to select the

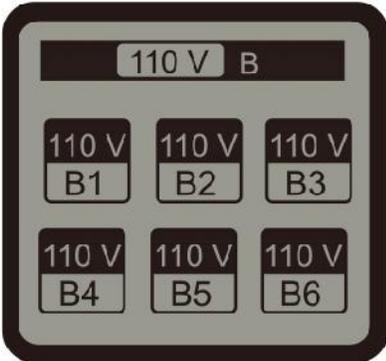
output such as 110V A1. Press ENTER button to confirm and enter the SETTING page of that output



SETTING Page



110V Control Board A



110V Control Board B



110V B Setting Page

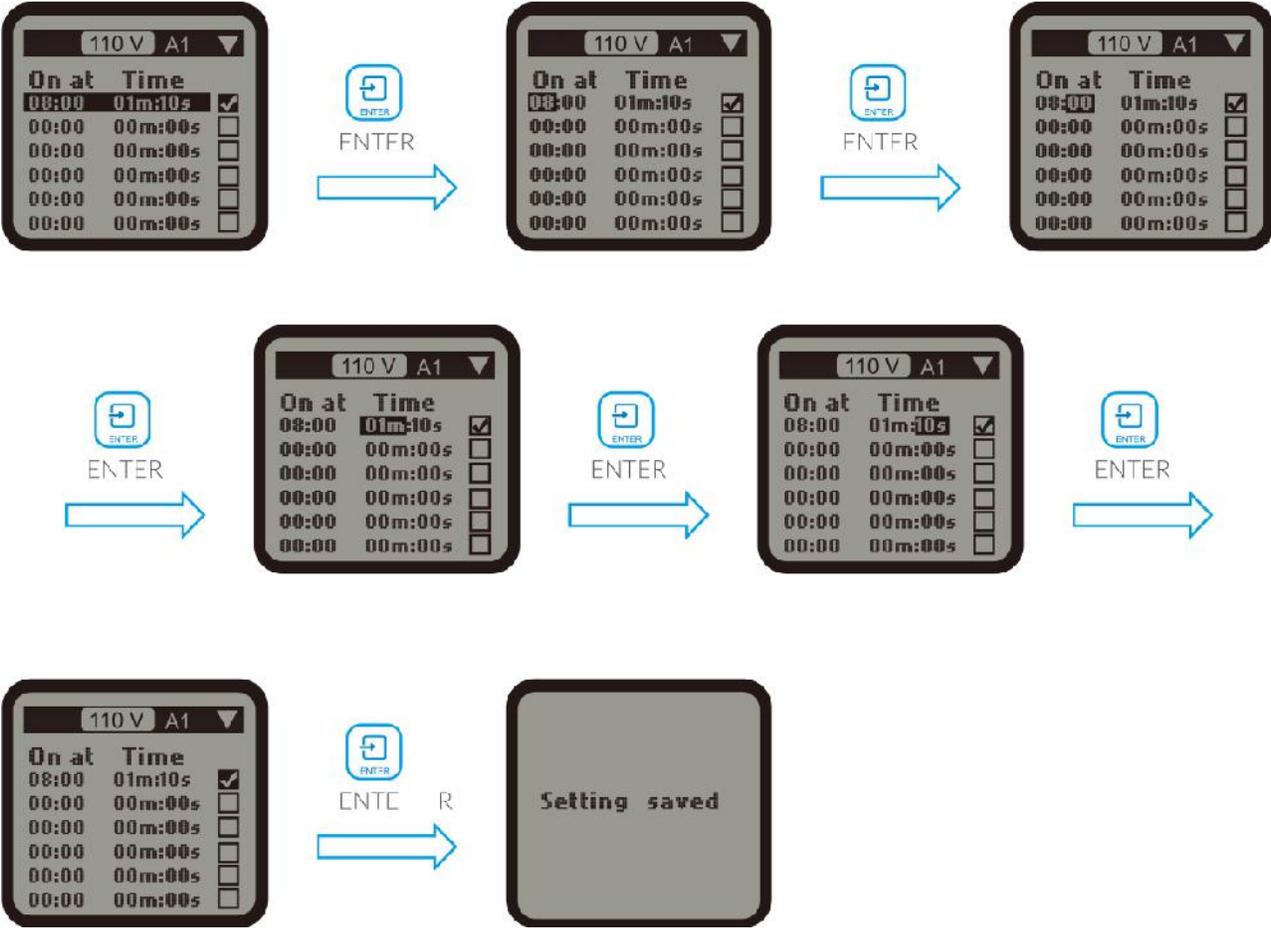
On the SETTING page of selected output such as 110V A1 press ENTER button and the tick icon on the "By schedule" will be highlighted and blinking. You can also press DOWN button to select "By recycle". Press ENTER button to confirm and save the setting.

a. By schedule.

Once the "By schedule" setting is selected, user can press ENTER button to activate the setting for the 1 line of total 12 lines of schedules. The HOUR of "On at" time will be highlighted and blinking, which means that it's ready for change. User can press UP or DOWN button to change the HOUR. Press ENTER button and the MINUTE of "On at" will be highlighted and blinking, user can press UP or DOWN button to change the minute. Press ENTER button and the MINUTE of "Time" will be highlighted and blinking, user can press UP or

DOWN button to change the minute. Press ENTER button and the SECOND will be highlighted and blinking, user can press UP or DOWN button to change the second. Press ENTER button and the tick symbol will be highlighted and blinking. Finally, press ENTER button to confirm and save the changes and the LCD screen will display " Setting saved".

Similarly, user can change the "On at" & "Time" for other schedule (up to 12 lines) as above processes.

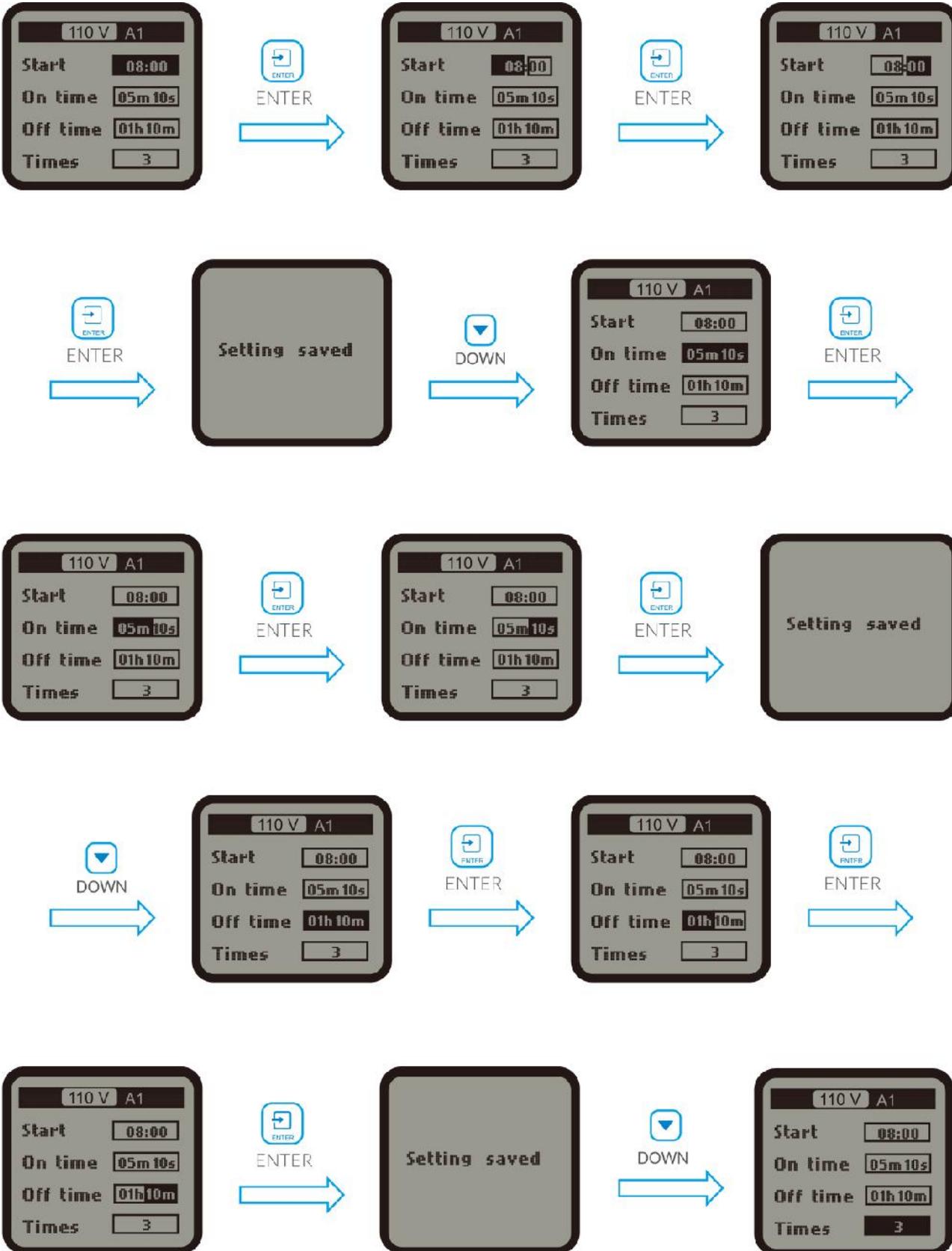


**b. By recycle:**

Once the "By recycle" setting is selected, user can press "UP" or "DOWN" button to select "Start". "On time" & "Times" for change. Press ENTER button to activate the setting. For example, when "Start" selected, press ENTER button and the HOUR will be highlighted and blinking, user can press UP or DOWN button to change the hour. Press ENTER button and the MINUTE will be highlighted and blinking, press UP or DOWN button to change the minute.

Finally, press ENTER button to confirm and save the change and the LCD screen will be display " Setting saved"

Similarly, user can change the "On time". "Off time" and "Times" accordingly.

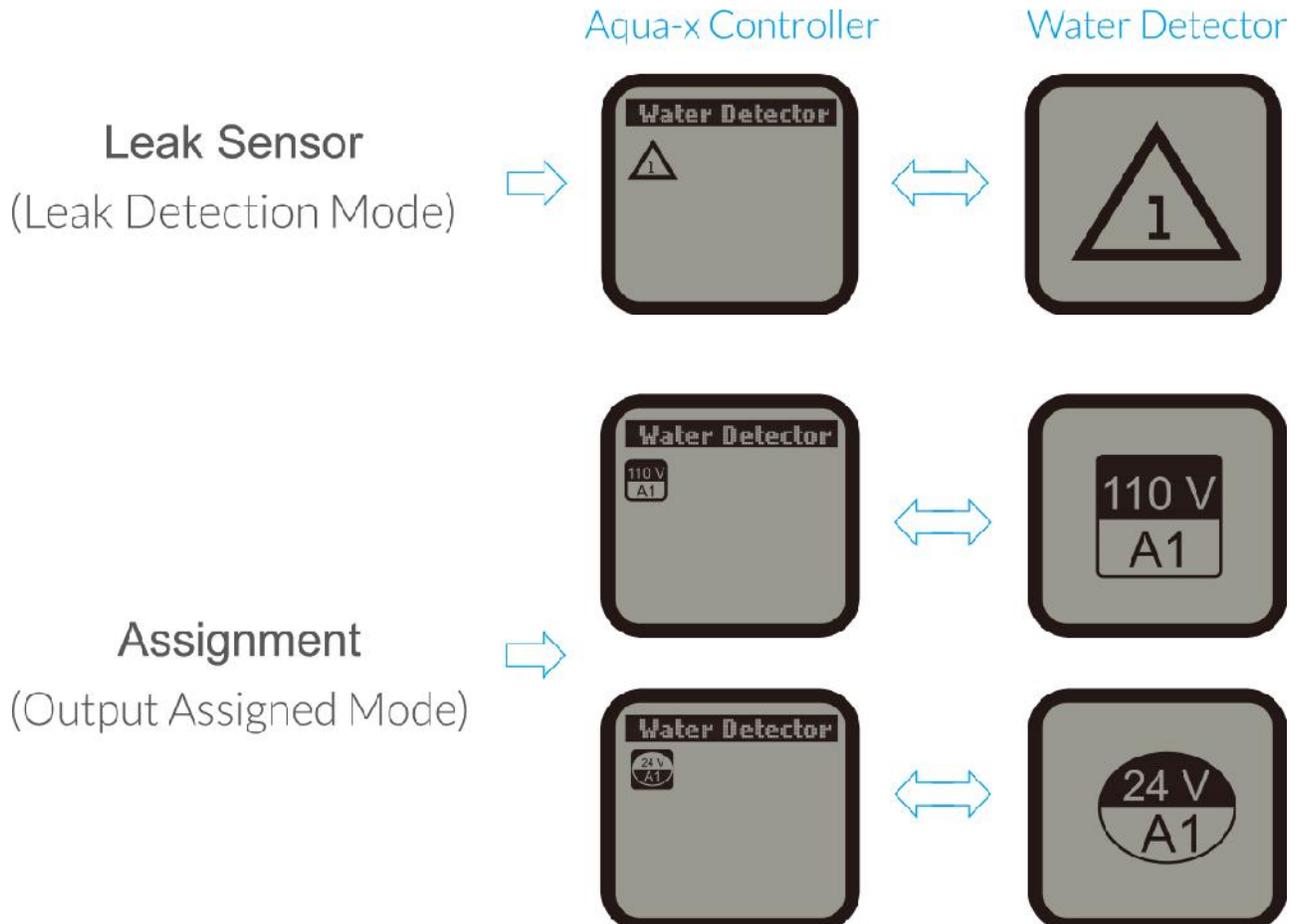




## 24V BOARD SETTING

The setting of 24V Board Setting is similar to the 110V Board Setting.

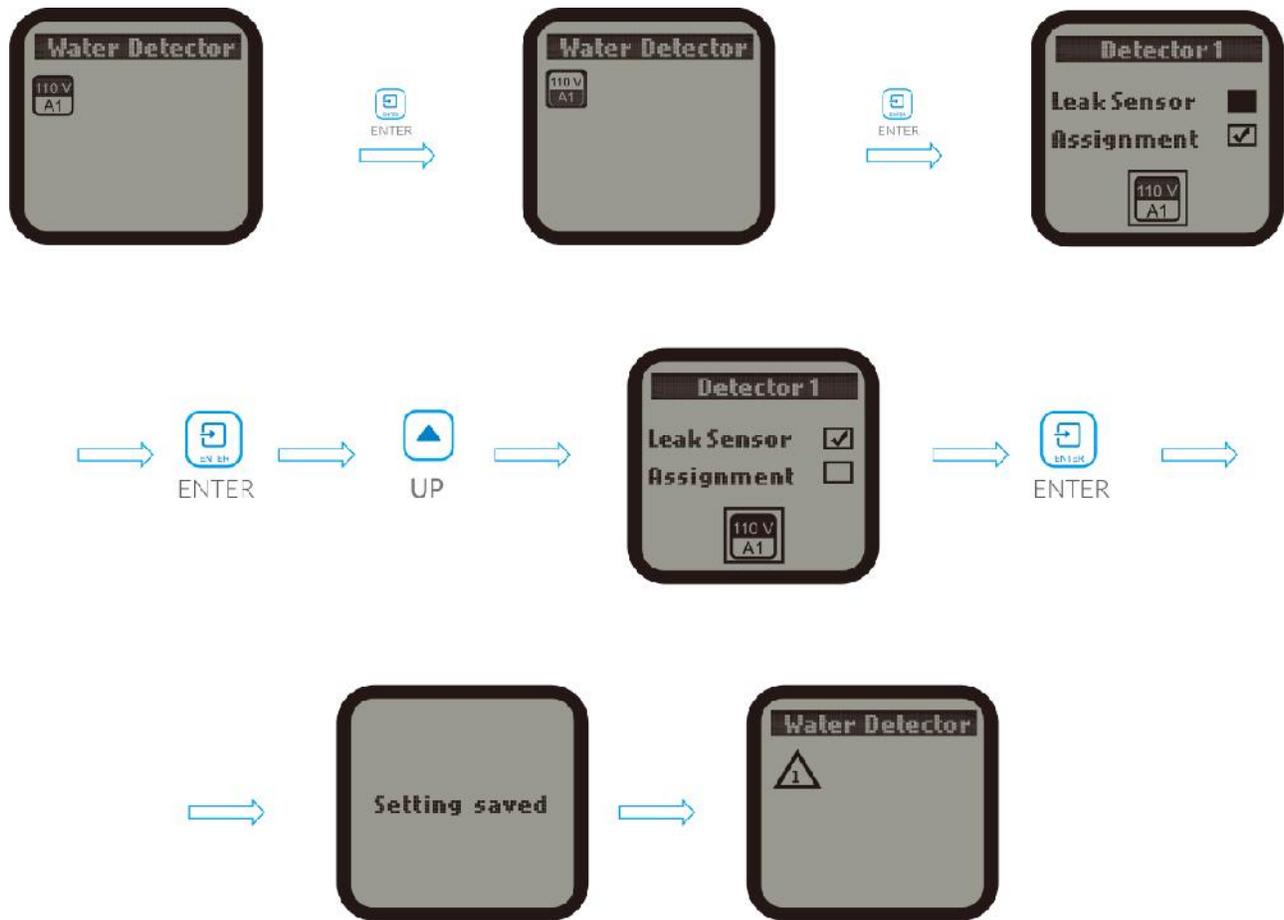
## WATER DETECTOR SETTING



### a) Leak Sensor ( Leak Detection Mode)

The default function of Water Detector ( WD-1) is to do leak detection and the symbol is a triangle shown in the Aqua-X Controller. When WD-1 detects water

leakage, it will send alarm message to your Smartphone one minute later. You can also check the alarm message in the Aqua-X Controller.

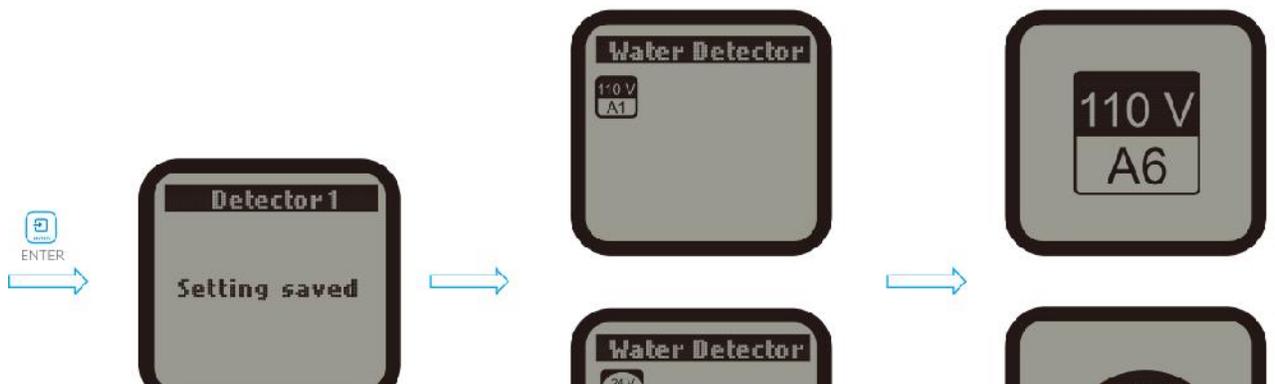
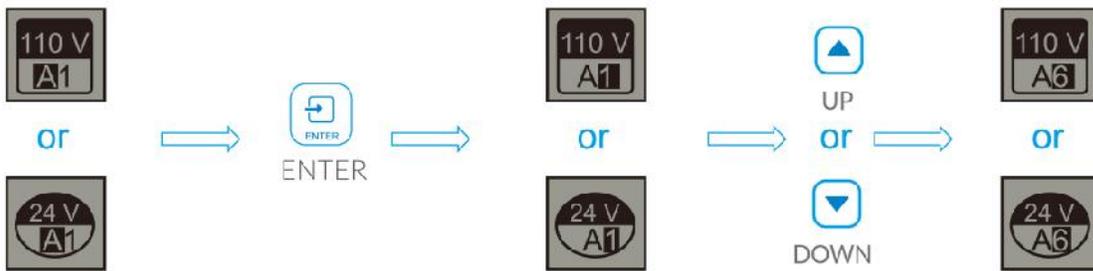
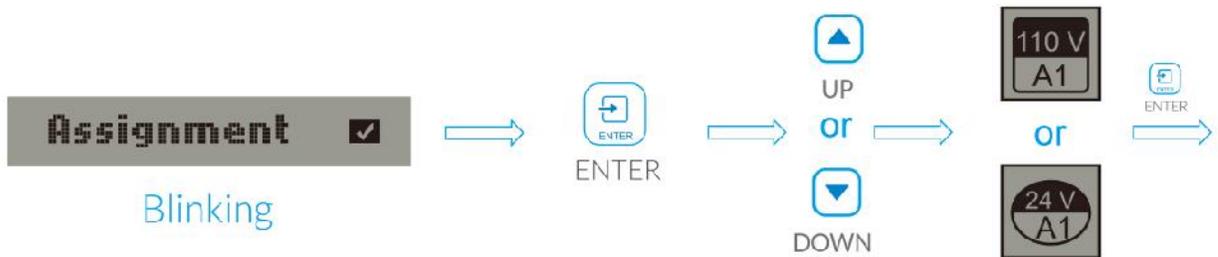
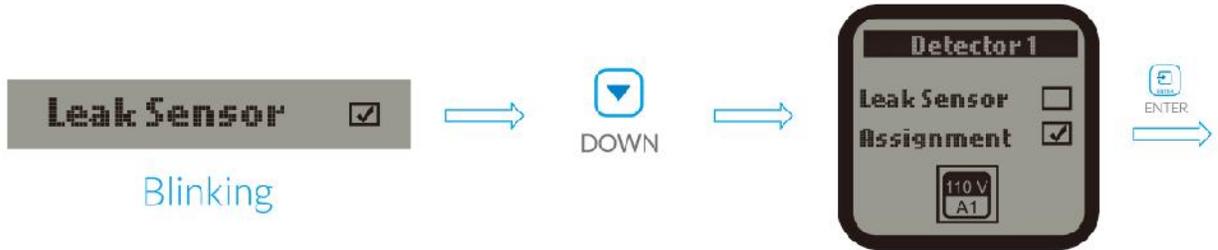


Assignment converted into Leak Sensor

If the Water Detector is NOT in original default function ( leak sensor ), you can change the Assignment into Leak Sensor as above processes.

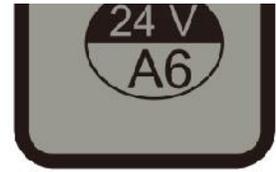
#### b) Assignment ( Output Assigned Mode )

The default mode of Water Detector is in Leak Sensor ( Leak Detection Mode). You can change the Leak Detection Mode ( Leak Sensor ) into Output assigned Mode ( Assignment ) as below processes. As one Water Detector can be assigned to only one output on any Control Board, you need to select 24V or 110V and one of six outputs to be assigned with the Water Detector. When the output has been successfully assigned, the Water Detector will send alarm message to your Smartphone one minute later when it detects no water on the reservoirs of the irrigation system.





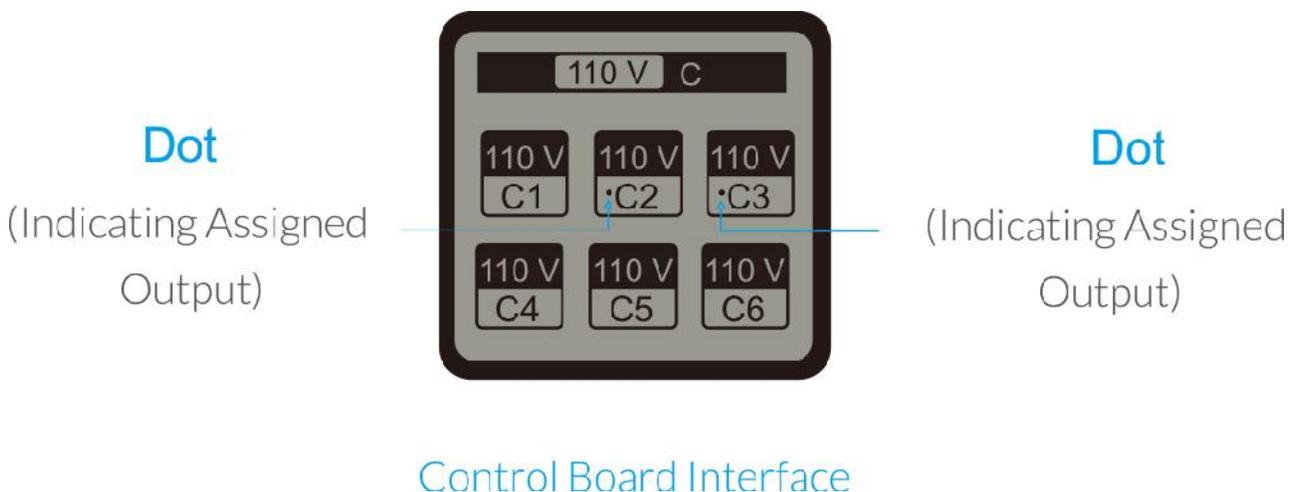
Aqua-X Controller



Water Detector

**NOTE :**

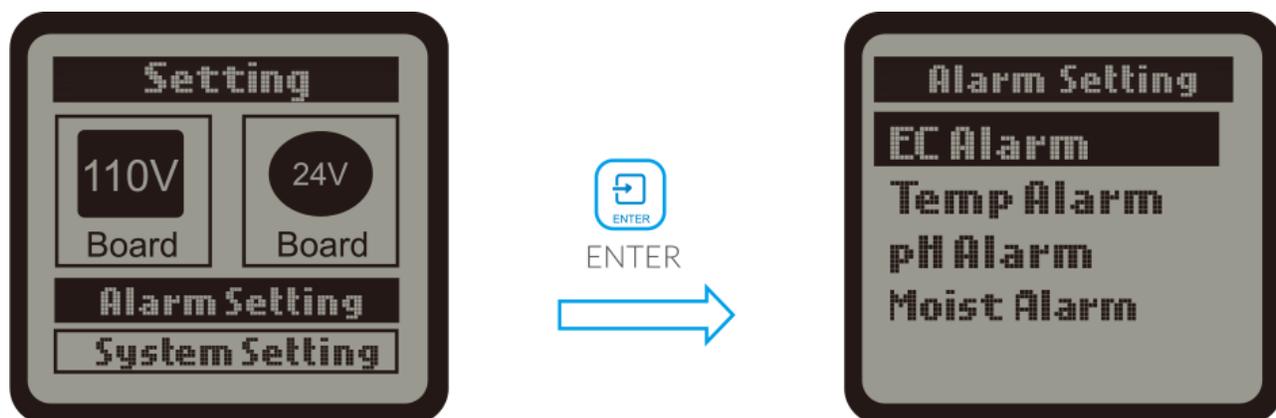
1. Each Water Detector can be assigned to a Control Board which has been successfully assigned to the Aqua-X Controller. The Water Detector can not be assigned to an unassigned Control Board.
2. One Water Detector can be assigned to only one 24V or 110V output. One Aqua-X Controller can connect up to 30pcs Water Detectors.
3. If the assigned output of that board is offline, the output symbol will blink on the LCD display of the Aqua-X Controller.
4. If the output is successfully assigned with the Water Detector and the Water Detector is connected with the Aqua-X Controller, there is a dot before the assigned output on the Control Board interface as below illustration.



## ALARM SETTING

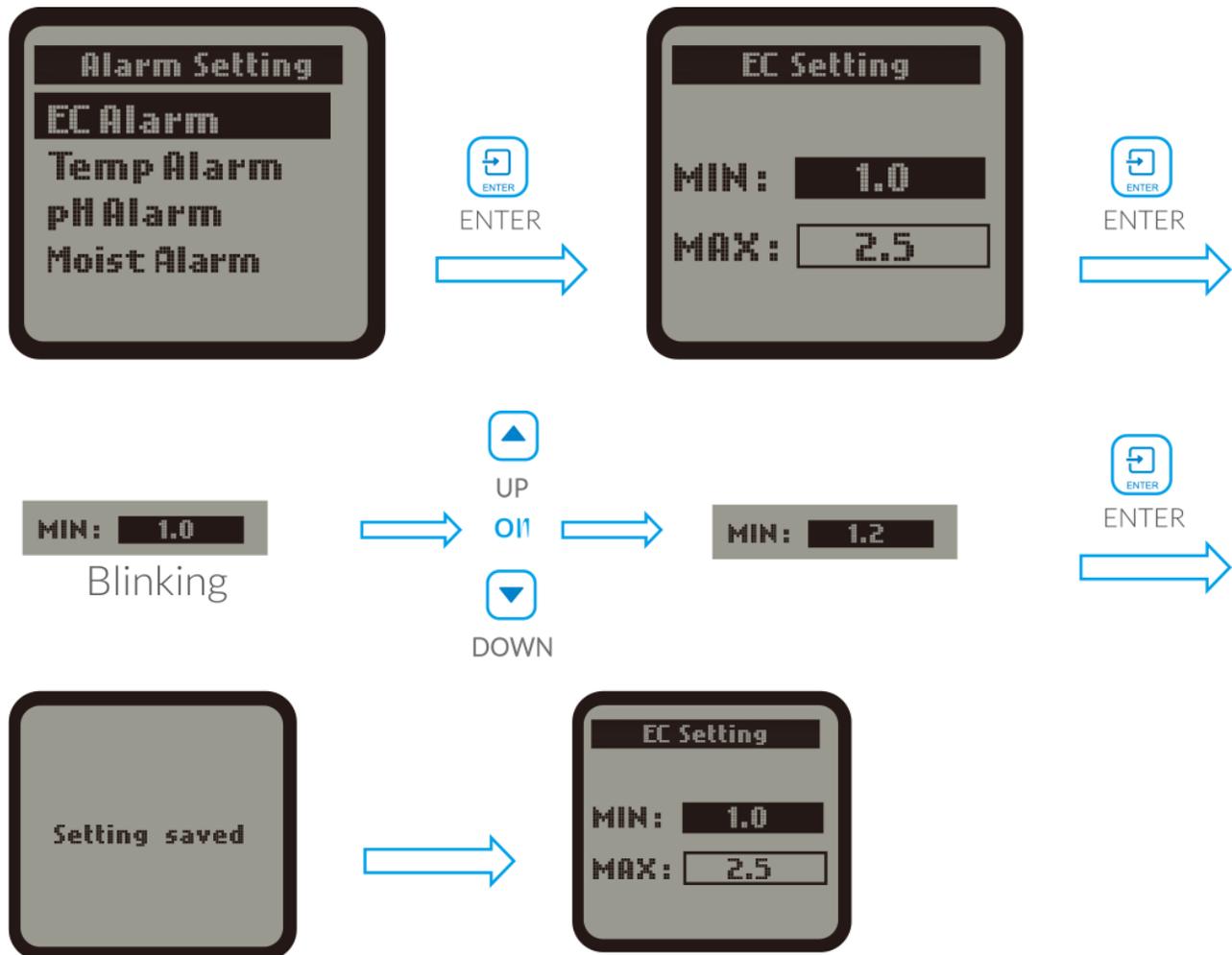
On the Setting page, press DOWN button to select the Alarm Setting, Press ENTER button and the LCD screen will display three Settings for selection EC

Alarm. Temp Alarm and pH Alarm. User can press UP button or DOWN button to select anyone of them for setting.



a. EC Alarm

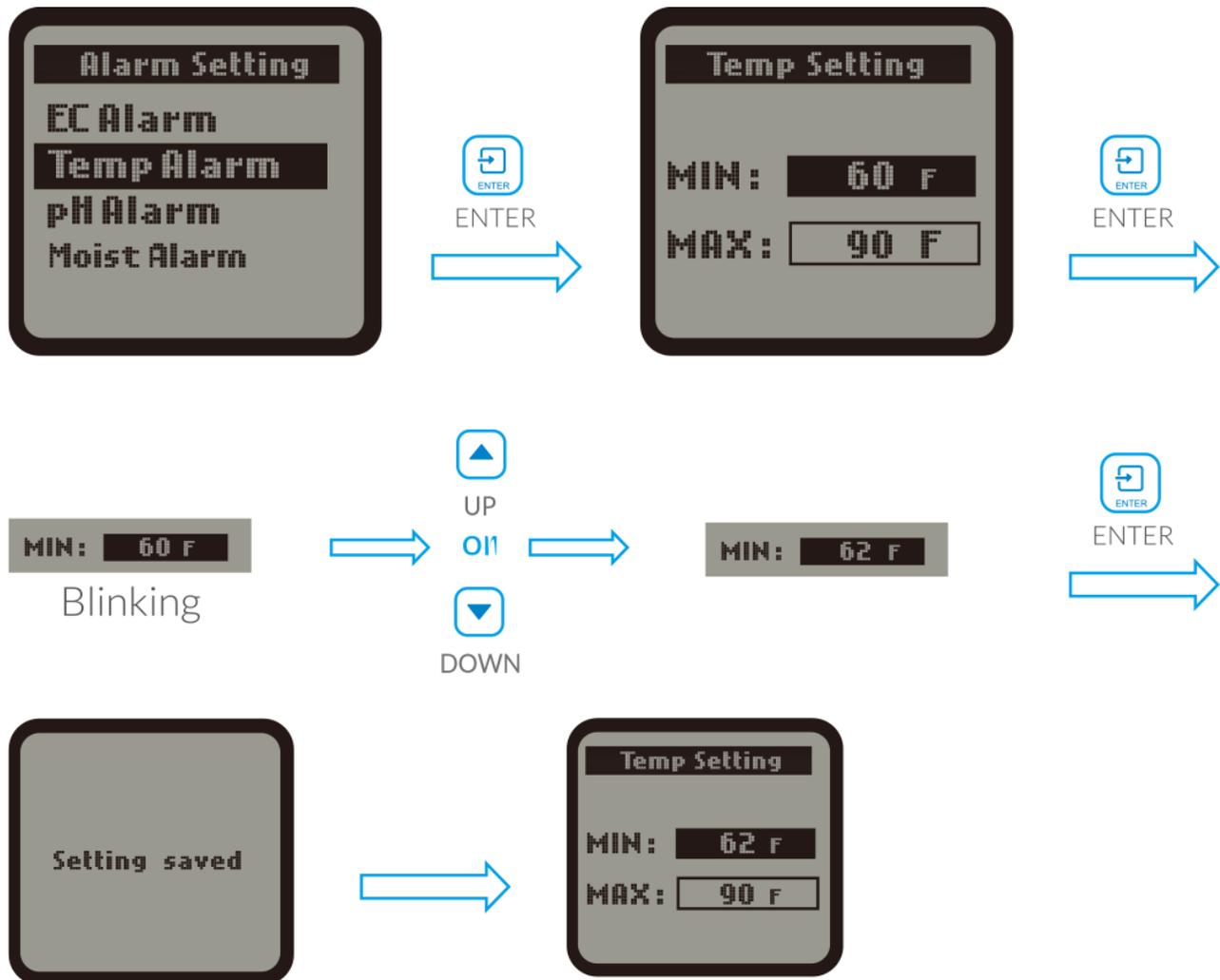
When the EC Alarm is selected, press ENTER button to enter the EC Alarm setting page. The LCD screen will display the MIN value and MAX value. Press ENTER button to activate the setting page and the MIN value will be highlighted and blinking. Press UP button or DOWN button to change the MIN value, then press the ENTER button to confirm and save the change. The LCD screen will show "Setting saved".



User can also press DOWN button to select the MAX value directly for change. If keeps unchanged for the MIN value. The setting of MAX value is similar to setting of MIN value.

#### b. Temp Alarm

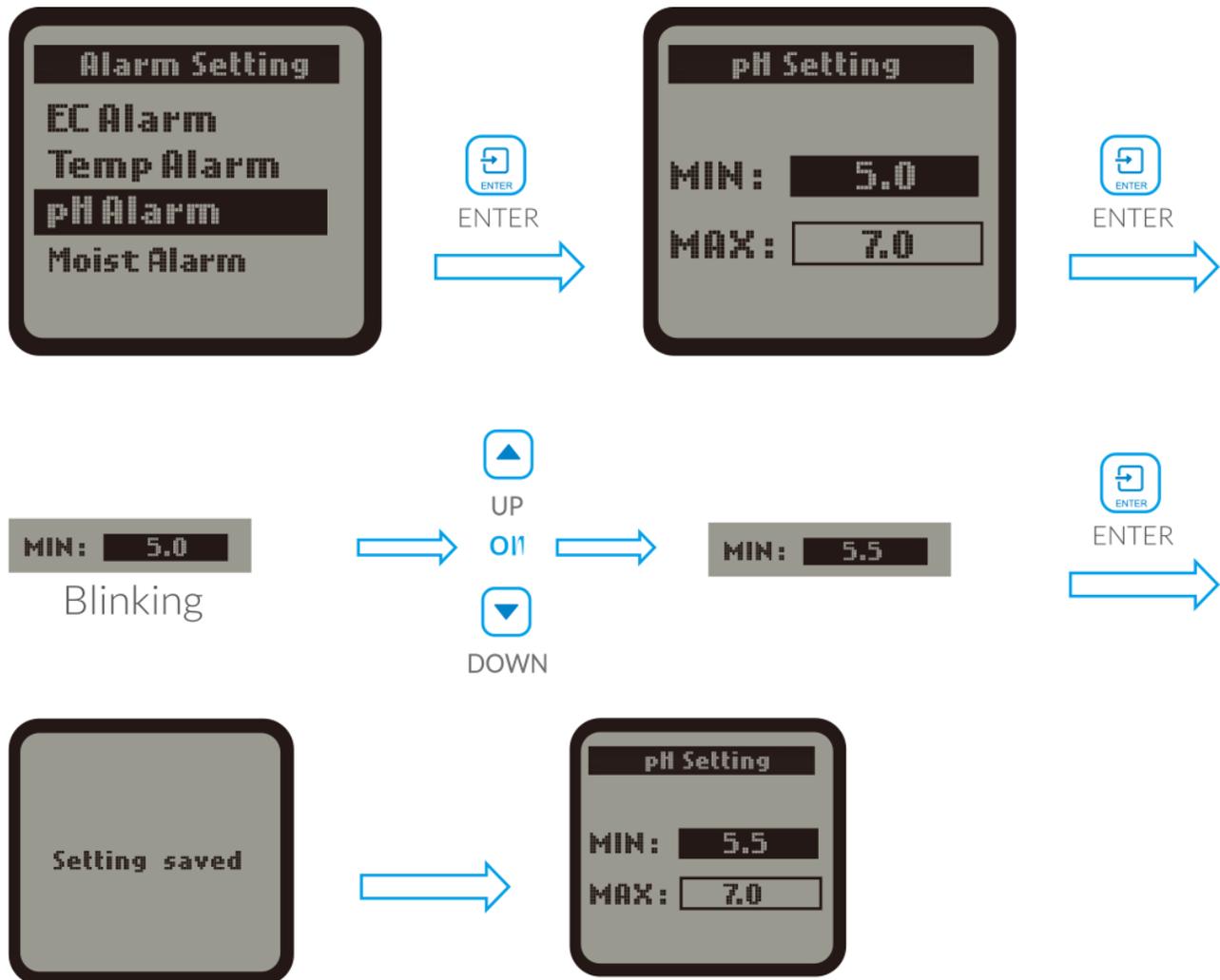
When the Temp Alarm is selected, press the ENTER button to enter the Temp Alarm setting page. The LCD screen will display the MIN value and the MAX value. Press ENTER button to activate the setting page and the MIN value will be highlighted and blinking. Press UP button or DOWN button to change the MIN value, then press the ENTER button to confirm and save the change. The LCD screen will show "Setting saved".



User can also press DOWN button to select the MAX value directly for change. If keeps unchanged for the MIN value. The setting of MAX value is similar to setting of MIN value.

### c. pH Alarm

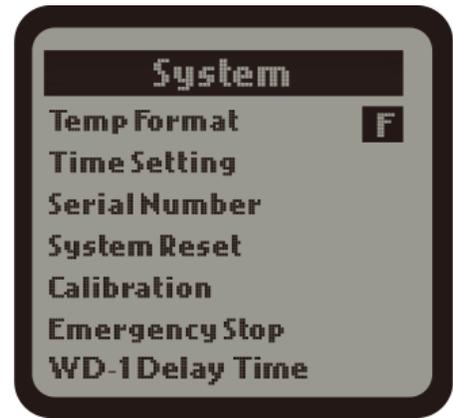
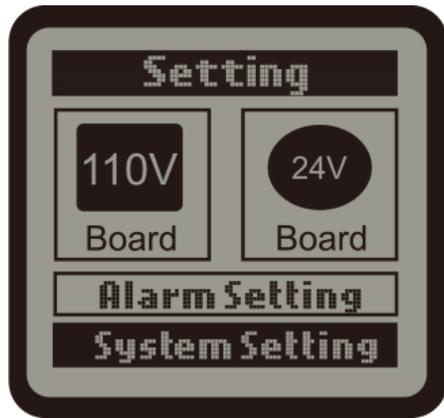
When the pH Alarm is selected, press the ENTER button to enter the pH Alarm setting page. The LCD screen will display the MIN value and the MAX value. Press ENTER button to activate the setting page and the MIN value will be highlighted and blinking. Press UP button or DOWN button to change the MIN value, then press the ENTER button to confirm and save the change. The LCD screen will show "Setting saved".



User can also press DOWN button to select the MAX value directly for change. If keeps unchanged for the MIN value. The setting of MAX value is similar to setting of MIN value.

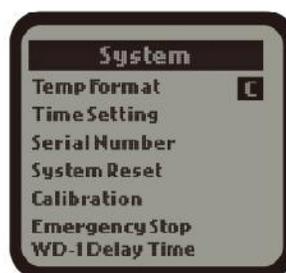
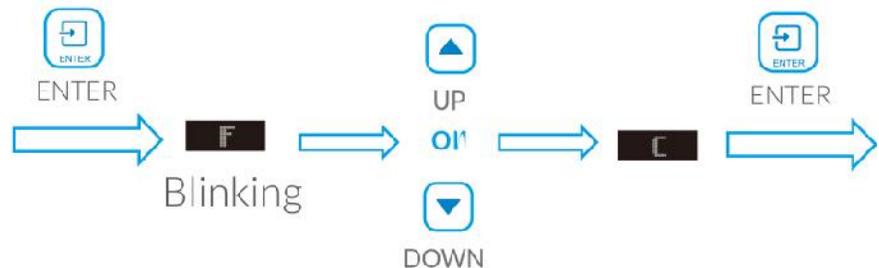
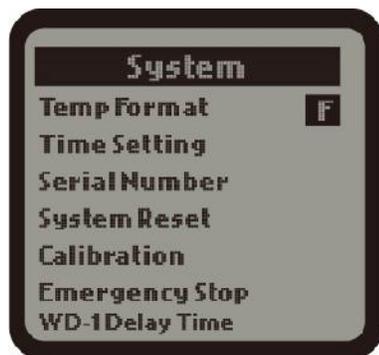
## SYSTEM SETTING

On the Setting page, press DOWN button to select the System Setting, Press ENTER button and the LCD screen will display five Settings for selection: Temp Format, Time Setting and Serial Number, System Reset, Calibration. User can press UP button or DOWN button to select anyone of them for setting.



a. Temp Format

When the Temp Format is selected, press the ENTER button and the temperature symbol F or C will be highlighted and blinking. Press UP button or DOWN button to convert the temperature format between F and C. Finally, press ENTER button to confirm and save the change. The LCD screen will show "Setting saved".



b. Time Setting

When the Time Setting is selected, press the ENTER button and the LCD screen will display will show the default time if it's the first time to use this unit. The time consists of two lines:

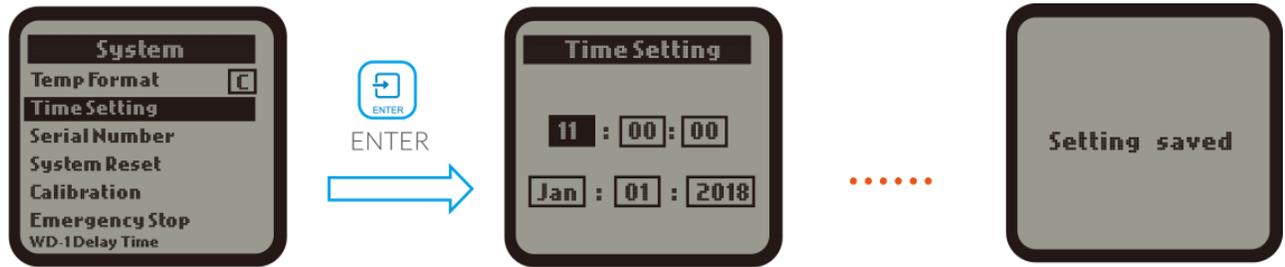
1<sup>st</sup> line : HOUR: MINUTE: SECOND

2<sup>nd</sup> line : MONTH: DATE: YEAR



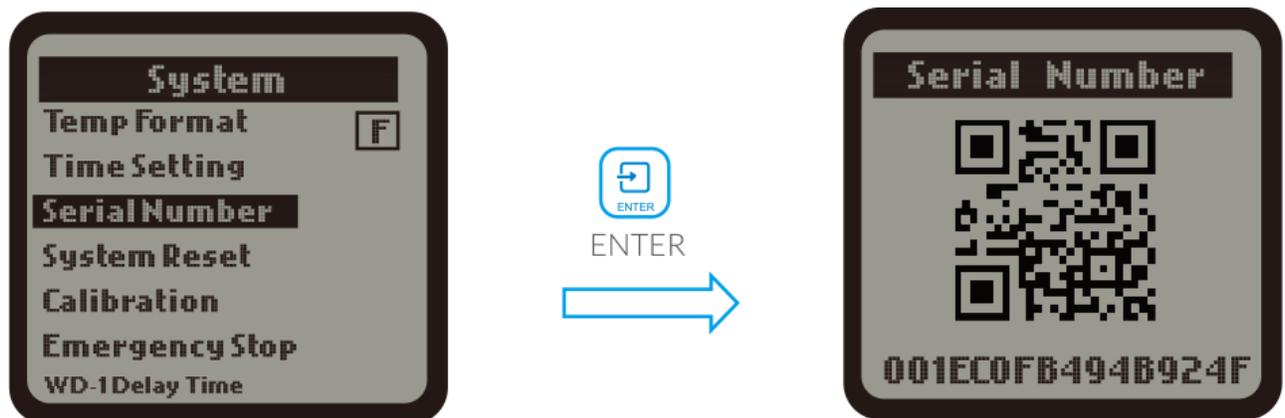
Press ENTER button and the HOUR will be highlighted and blinking, Press UP or DOWN button to change the hour. Press ENTER button again and the cursor will skip to the next, the MINUTE will be highlighted and blinking. Similarly, you can change the MINUTE and SECOND. When the 1st line of time ( HOUR:MINUTE:SECOND) has been changed, press ENTER button and the LCD screen will display " Setting saved"

The date setting(MONTH:DATE:YEAR) is similar to above time setting



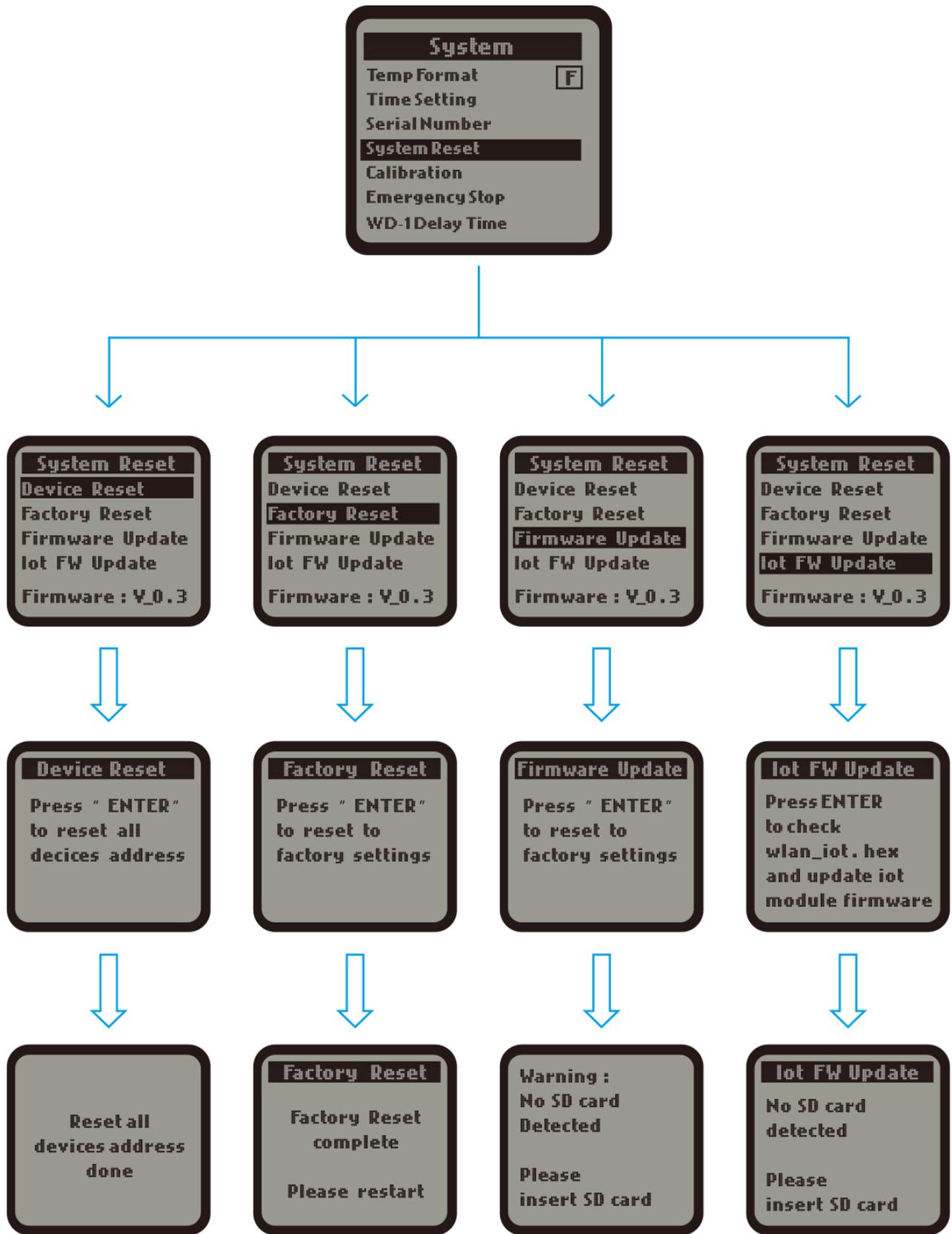
### c. Serial Number

When the Serial Number column is selected, press ENTER button and the LCD display will show the QR code and serial number



### d. System Reset

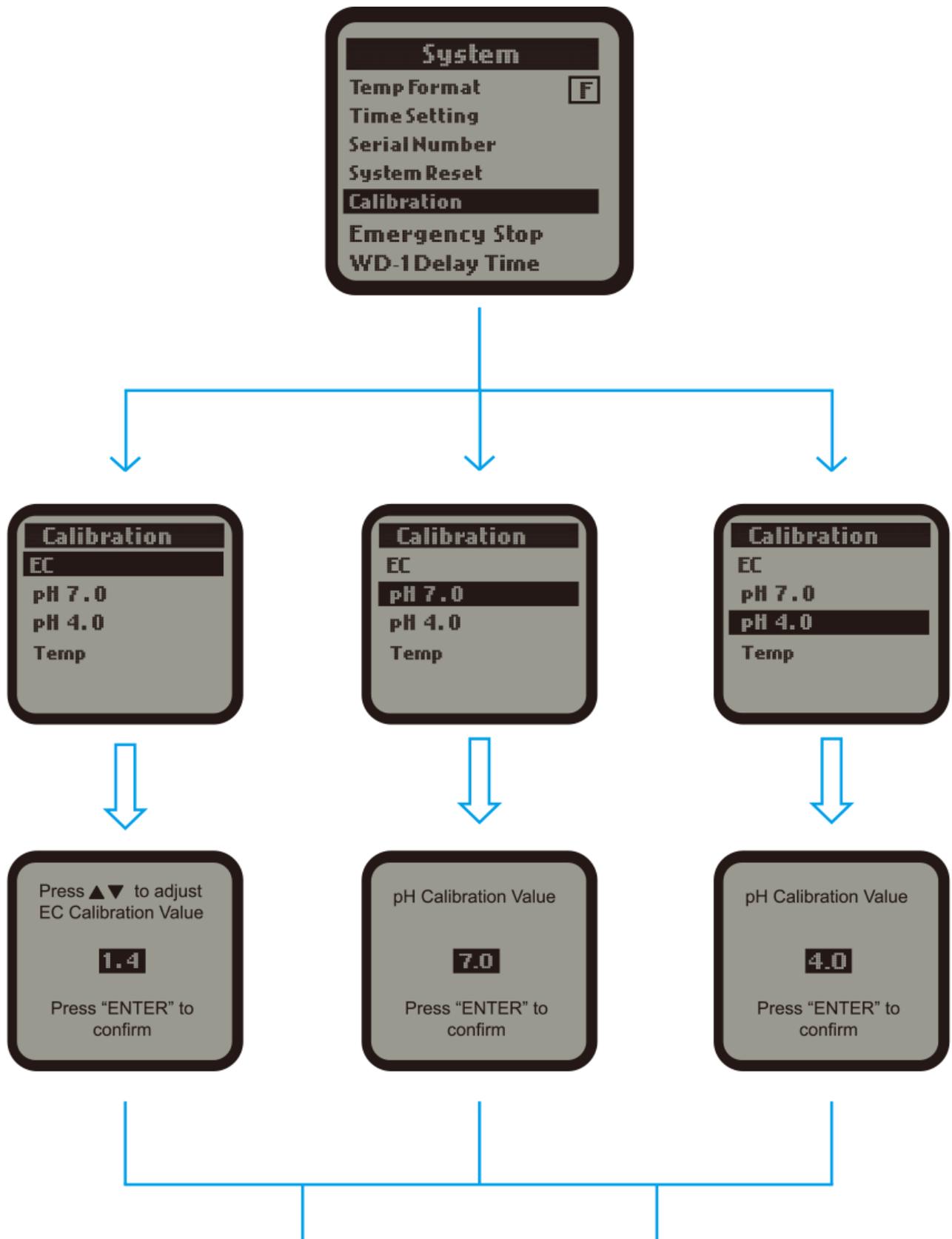
When the System Reset column is selected, press ENTER button and the LCD display will show Device Reset, Factory reset, Firmware Updated lot FW Update. Press UP button or DOWN button to select anyone of them for setting.

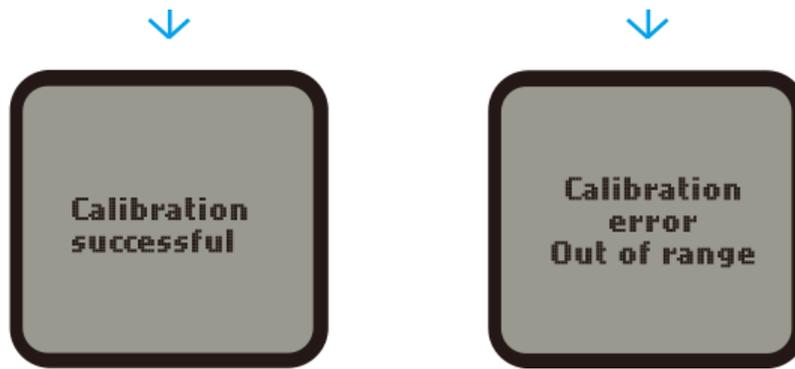


**NOTE :** For the Firmware Update and lot FW Update, make sure to insert the MicroSD card with the latest version of upgrade software

e. Calibration

When the calibration column is selected, press ENTER button and the LCD display will show Calibrate EC, Calibrate Ph7.0, Calibrate Ph4.0. Press UP button or DOWN button to select anyone of them for calibration.





**NOTE :**

- 1). Please note there are two results for the calibration. One is successful, the other is unsuccessful ( failure ).
- 2). Please calibrate pH7.0 first. Calibration pH4.0 should be processed after the calibration pH7.0 within half an hour.
- 3). Before calibration, the corresponding probe should be placed in the corresponding standard solution and allowed to stand for more than 1 minute.

**f. Emergency Stop**

The Emergency Stop function can be selected when there is abnormal condition found on the Control Boards. Press the DOWN button to select "Emergency Stop" and then press the ENTER button to confirm your selection. The LCD screen of Aqua-X will show "Auto Resume in 30 min" and then show "Resume" automatically in 30 minutes. If without midway intervention by pressing the ENTER button. On the same interface, press the ENTER button again. the Emergency Stop function will be activated again.



**NOTE :**

1. When the "Emergency Stop" function is selected, all devices on all boards ( 24V & 110V ) will stop working for half an hour and then resume to work in 30 minutes. Press the ENTER button again and all devices on all the boards will

stop working for another half an hour.

2. In the stop mode, press the ENTER button within 30 minutes and the stop mode will be cancelled immediately, and return to normal working state.

## GENERAL INFORMATION

### WARRANTY

Aqua-X Irrigation Controller ( NFS-1 ) only uses high quality components. Under normal operating conditions, the mechanical and electronic components are covered by a three-year warranty from the original date of purchase. For service, return the NFS-1 Irrigation Controller in the original packaging to your shop with the original sales receipt

Components that are excluded from warranty are components that have failed due to abnormal usage.

In the case of defects of the Aqua-X Irrigation Controller ( NFS-1 ), the Controller will either be replaced or repaired using new or reconditioned products or parts. If the Controller will be replaced this limited warranty period, i.e. ( three ) 3 years from the date of purchase of the original product

### RETURNS

All returns need to be done in the original packaging in order to avoid damages of the product during transport. Defective products need to be returned to factory or service shop for repair. Non-professionals DO NOT open the cabinet to prevent electric shock or damage to the equipment

a). Please use TrolMaster's components for better performance.

b) In the case of defects of the Aqua-X Controller, the Aqua-X Controller will either be replaced or repaired using new or reconditioned products or parts by TrolMaster within three-year warranty from the original date of purchase. For service, return the Aqua-X Controller in good packaging to our agent with the

original receipt

c) Non-professionals DO NOT open the cabinet to prevent electric shock or damage to the Aqua-X Controller.

## ENVIRONMENTAL AND DISPOSAL CONCERNS:

THIS PRODUCT CONTAINS A BATTERY AND OTHER COMPONENTS WHICH MUST BE DISPOSED OF PROPERLY



This symbol displayed on a product, its accessories, or its packaging indicates that this product may not be discarded as household waste. Dispose of the equipment through a recycling center that handles electronics and electrical appliances. By disposing of the equipment in the proper and lawful way you will be helping to prevent possible damage to the environment and risk to public health.

## TROUBLESHOOTING

Some of the most common issues or problems can be found within this section. Before returning the unit for service, please consult the troubleshooting points below, additional information can be found online at [www.troulmaster.com](http://www.troulmaster.com)

PROBLEM	RESOLUTION
The Aqua-X Irrigation Controller (NFS-1) is connected to power, but it does not seem to be working / no display.	Check the low-volt power supply is plugged incorrectly to the Aqua-X Irrigation Controller (NFS-1).
The Temperature, pH, EC values on the main screen display horizontal line or flashing.	Horizontal line indicates the corresponding sensor error, flashing indicates the corresponding value exceeds the alarm range.
BELL icon is flashing.	It indicates that there is an alarm state. Alarm status includes temperature, pH, EC value exceeds range or water sensor alarm.

<p>OA6-24, OA6-110, DSP-1 or WD-1 can not be added to the Aqua-X Controller.</p>	<p>Check if mix up input ports. 24 CONTROL port for OA6-24, 110V CONTROL port for OA-110 &amp; DSP-1, WATER DETECTOR port for WD-1. Check if the number of connected device exceeds its maximum (max. 30pcs for WD-1, max. 5pcs for 24 or 110V Control Board &amp; DSP-1).</p>
<p>Water sensor associated output failed.</p>	<p>The same output can only be associated with a water sensor.</p>
<p>The setting parameters are cleared.</p>	<p>If the added board is offline and a new board is added at the same position, the setting parameters of that board and the setting parameters of its associated water sensor will be cleared.</p>
<p>The total number of three devices OA6-24, OA6-110 &amp; DSP-1 is less than 5pcs, but can not continue to add a new device.</p>	<p>Remove one or more devices with the same voltage after adding 5 devices (110V or 24V, DSP-1 belongs to 110V device), it is no longer possible to add any device with the same voltage. If need to add more, you need to process "System Reset → Device Reset" to clear all device addresses.</p>
<p>Cannot connect to the network.</p>	<p>Please make sure that the network path is workable (you can check whether the network cable is workable to any Internet-connected device).</p>
<p>The microSD card is damaged.</p>	<p>Please do not pull out the microSD card on the main interface (displaying current temperature, pH, EC values).</p>



**WARNING :** DO NOT allow the the Aqua-X Controller to be exposed to water or excessive heat. DO NOT open or attempt to repair or disassemble the Aqua-X Controller, as there are no user-serviceable parts inside. Opening the controller will void the warranty.

1. If the surface of the Aqua-X Controller is dirty, wipe it with a dry towel.

2. The Aqua-X Controller is designed for indoor use only, it should be operated under natural ventilation conditions.
3. For safety, it is necessary to connect the ground wire. If a short circuit did occur, the current would flow through the ground wire, causing a blown fuse or tripped circuit breaker.
4. The Aqua-X Controller should be positioned in a place that it's easily to be pulled out when a fault occurs.

## REGISTRATION

TrolMaster Agro Instruments Co.,Ltd. will occasionally release updated firmware for the Aqua-X Irrigation Controller ( NFS-1 ).

By registering your NFS-1 Irrigation controller on our website [www.trolmaster.com](http://www.trolmaster.com) , we can notify you when an update is available

We will not sell, rent or share your personal information.



## SPECIFICATIONS

Input Voltage	100-240VAC, 50/ 60Hz
Tension D'entrée	100-240VAC, 50/ 60Hz
Certifications	ETL/FCC
Certifications	ETL/FCC

Degree of Ingress Protection	IP20
Indice de protection	IP20
OA6-24 24V Control Board:	Max. 5pcs per set
OA6-110 110V Control Board:	Max. 5pcs per set
DSP-1 Program Device Station:	Max. 5pcs per set
	Note: combination application is workable for the three components, but the total qty can not exceed 5pcs.
AMP-2 Sensor Board:	Max. 1pc per set
PCT-1 or PCT-2 EC/Temp Sensor:	Max. 1pc per set
PPH-1 or PPH-2 pH Sensor:	Max. 1pc per set
WD-1 Water Detector :	Max.25 pcs per set
WCS-1 Water Content:	Max 8 pcs per set
pH Alarm Setpoint Range	0~14
EC Alarm Setpoint Range	0~5
Temp Alarm Setpoint Range	32°- 122°F
pH Alarm Default Value	5~7
EC Alarm Default Value	1~2.5
Temp Alarm Default Value	63°- 70°F
Max Distance to Device to be connected	1000 meters
	Temperature 32-122°F
Working Environments	Humidity ≤90%
Water Content Setpoint Range	0~100%
Water Content Alarm Default Value	10~90%

Remarks : combined application is available for 24V Control Board ( 6 outputs each ), 110V Control Board ( 6 outputs each ) and Program Device Station ( 1 output each ) but control up to 30 outputs per set