

Aqua-Pro

Nutrition Management System

Instruction Manual

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Replace peristaltic pump inner tube

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Perface

Thank you for purchasing our Aqua-Pro. This manual briefly introduces the installation, and operation of Aqua-Pro. To ensure the correct use of this product, please read this manual before use.

- Because the functions of this product are constantly being improved, this manual is subject to change without prior notice.
- We strive to make this manual correct and comprehensive. If there is any error, please contact us.

Version

1111111-11111-1111111 Ver1.0 2023-06-14

Safety Precautions

- This manual only describes the functions of the product, and we do not guarantee that the product will be suitable for a specific purpose of the user.
- In order to use this product safely, please follow the instructions and precautions. If the operating instructions are violated, the product may be damaged. We do not assume any responsibility for any problems arising therefrom.
- When installing a lightning protection device or a separate safety protection circuit for this product and its control system, it needs to use other equipment to realize it. If you need to replace the parts of the product, please use the model specification specified by us.
- Do not modify this product by yourself.

Introduction

Aqua-Pro series is a multifunctional intelligent nutrient control system with water level control, mixing (nutrient pool and stock solution bucket), nutrient fertilizer distribution (EC control and pH balance control), and various irrigation modes, widely applicable to various hydroponic planting sites, such as: drip irrigation, areoponics, deep water culture,ebb & flow, wick system, NFT, etc.

The system consists of control board, sensor control module (including EC, pH,temperature, water level (*1) and other sensors), RS485 communication module, 5-inch screen and various independent device control modules. Among them, fertilizer distribution and acid balance can be realized by high-precision peristaltic pumps that can be expanded up to eight channels (* 2). The standard configuration is EC control of seven channels and pH+ or pH-control of one channel.

Each functional module of Aqua-Pro can be operated manually or automatically according to the parameters set by the user. This product has a good human-computer interaction interface and complete functions, which can meet the planting operation needs of most users, such as container planting factories, small and medium-sized plant factories, individual planting, etc.

The Aqua-pro series includes the following models:

Aqua-pro	Basic.Ver	EC and pH sensor realize the basic fertilizer distribution function .
Aqua-pro-I	Irrigation.Ver	Compared with the basic.ver, the function of water replenishment, mixing and irrigation are added.
Aqua-pro-IE	full-featured .Ver	Compared with the Irrigation.ver, the function of environmental control is added.

Users can configure the functional modules individually according to different planting scenes. For planting scenes with a large area and a large number of equipment, we recommend that users use Aqua-pro to control distribution cabinet(user-provided or customized) ,functional modules , and other equipment such as nutrition pool and mixing device,water supply pump (valve), irrigation pump, irrigation main valve, irrigation sub-valve, mixing valve, through the dry contact.

The system can set multiple irrigation sub-valves to realize the function of time-sharing (average) rotation irrigation in different areas during the time when the irrigation is set to ON .

Note:

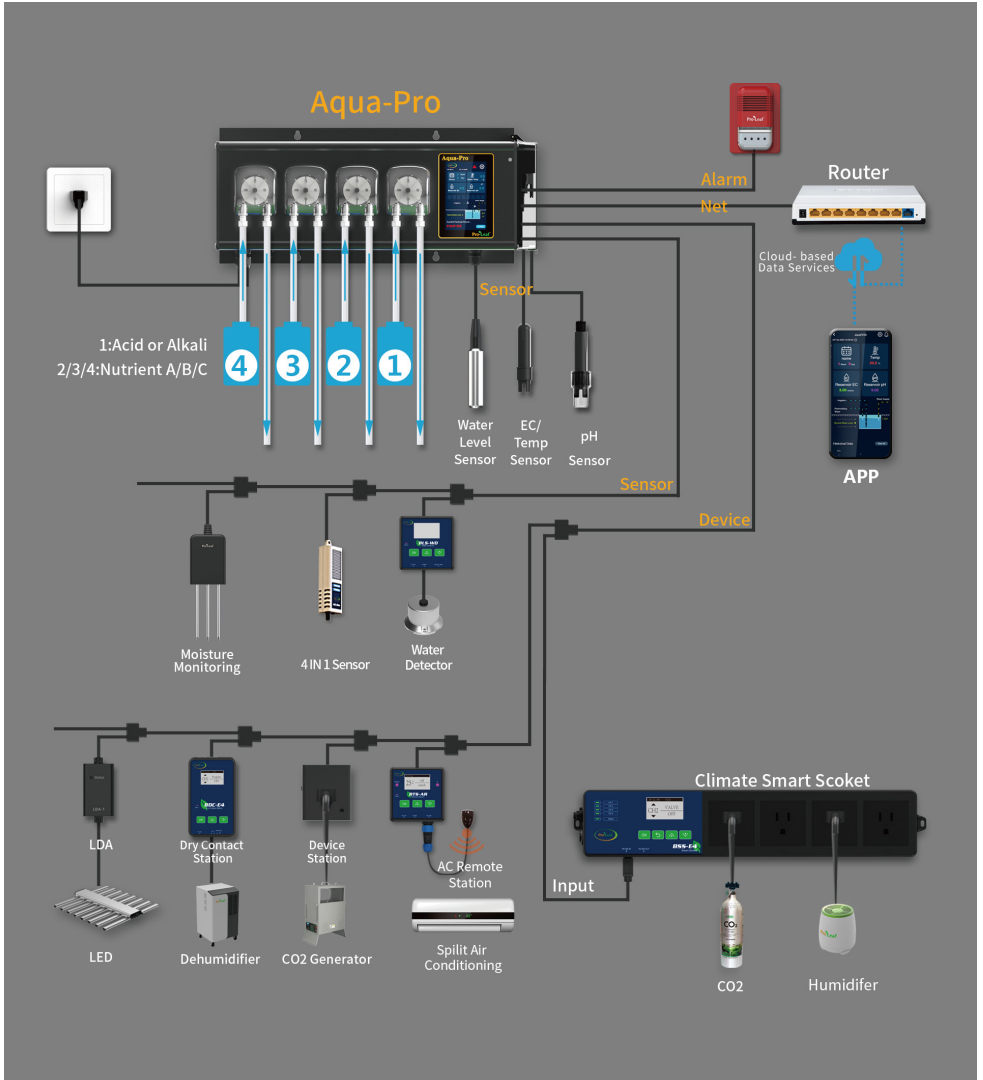
*1. The sensor is optional and needs to be purchased separately.

*2. The basic standard is 4 channels.

Technical Specifications

Product	Aqua-Pro
Model	Aqua-Pro-IE
Protection Level	IP20
Operating Temperature	0~50 degrees Celsius
Operating Humidity	≤90%, non-condensing
Operating Voltage	DC110V-230V
Operating Current	≤50mA(no sensors, devices connected)
Power Adapter Input	DC24V, 2A, Interface: DC005-2.5
Screen	5 inch LCD monitor, Resolution: 800*480
Network Port	RJ45
NC/NO Port	Dry Contact Alarm Output, Load Voltage: ≤30V; Load Current: ≤1A
Sensor Port	RJ12, 6P6C, RS485, Output Voltage: 24V, Output Current: 0.5A
Adapter Port	RJ12, 6P6C, RS485, Output Voltage: 24V, Output Current: 0.5A
Light Controller Port	RJ12, 6P6C, RS485, Output Voltage: 24V, Output Current: 0.5A
Number of sensors connected	<p>The total number does not exceed 6, and the total current does not exceed 0.5A, which can be connected:</p> <ul style="list-style-type: none"> • 4 in 1 Sensor (BLS-4) x1 • Water Level Sensor (BLS-WL) x1 • Smoke Dector (BLS-SD) x1 • Water Detector (BLS-WD) x1 • pH/EC/Temp Sensor Board (BSB-I) x1 • Moisture Monitoring (BLS-MM) x1
Number of devices connected	<p>The total number does not exceed 6, and the total current does not exceed 0.5A(when the power consumption of the device may exceed 0.5A, the device needs to have its own power supply).</p> <ul style="list-style-type: none"> • AC Remote Station (BTS-AR) x1 • CO2 Device Station, PPM Up (BCS-PU1) x1 • Control Board (BCB-12) x1 • Dry Contact Station (BDC-4) x2 • Smart Socket 120-240V (BSS-4) x6 • Light Adapter (LDA-1) x2 • 4 Channels Light Dimmer (LDA-SPE) x1 <p>Note: Two light controllers cannot be used at the same time.</p>
Communication parameters	RS485 host, baud rate 9600, no parity, 8 data bits and 1 stop bit
Certification	ETL, FCC, CE

System Connection



Accessories



1



2



3



4



5



6



7



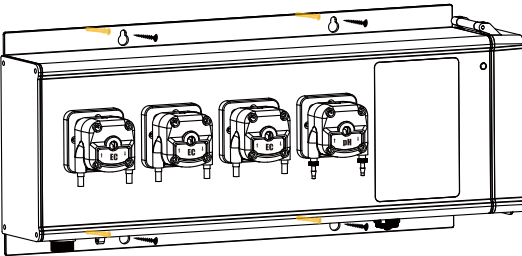
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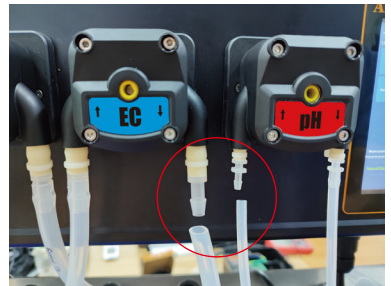
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- | | |
|-----------------------------|--|
| ① Aqua-Pro Host | ⑥ Hose (2.5 meters per channel)
Hose configuration according to peristaltic pump flow |
| ② pH Sensor | ⑦ Peristaltic pump inner tube
According to the type and number of pumps |
| ③ EC and Temperature Sensor | ⑧ pH 4.00 correction powder
pH 7.00 correction powder |
| ④ Power Cord | ⑨ Accessories |
| ⑤ Water Level Sensor | |

Installation

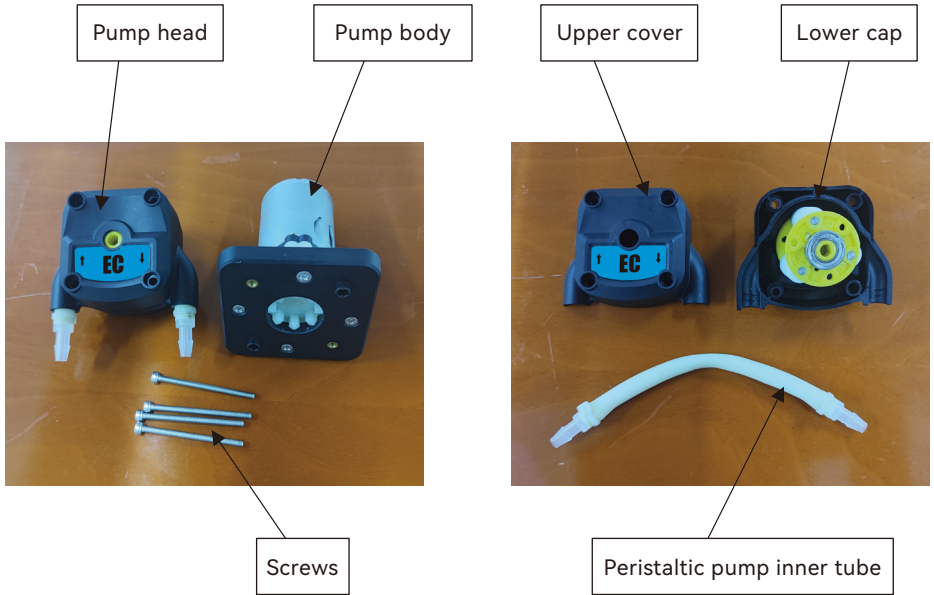


As shown in the picture, screw the controller to the wall.



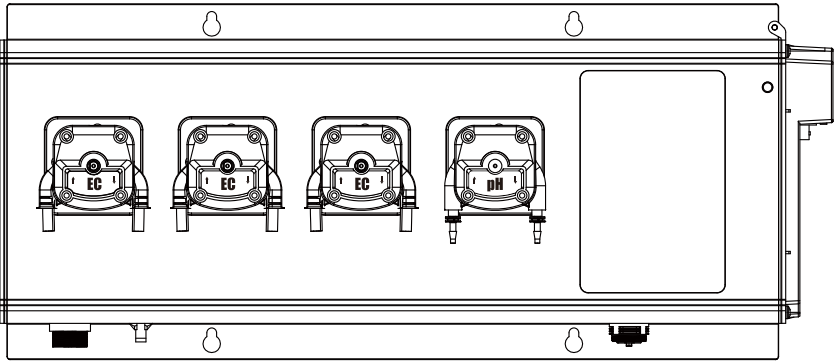
Assemble the hose and peristaltic pump as shown.

Replace peristaltic pump inner tube



1. Gently unscrew the 4 screws of the pump head to separate the pump head from the pump body.
2. Open the pump head, remove the peristaltic pump inner tube to replace the new peristaltic pump inner tube, cover the upper cover, make sure the peristaltic pump inner tube is fixed in the bottom cover slot.
3. Align the pump head with the screw hole of the pump body, tighten the four screws, and the peristaltic pump inner tube is replaced.

Device Appearance

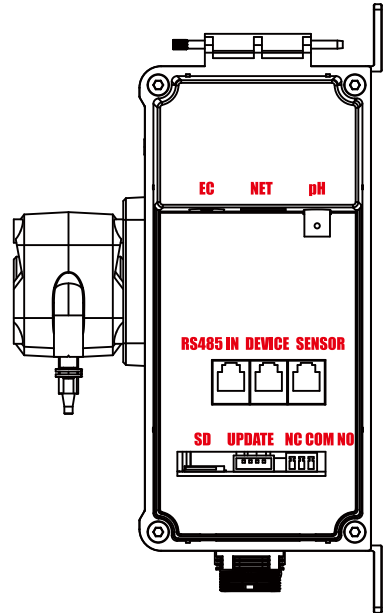


INPUT:
100-240V~2.6A 50/60HZ

**Water Level
Sensor**



INPUT:100-240V ~2.6A 50/60HZ	Plug in Power
Water Level Sensor	Connect the Water Level Sensor
EC	Connect EC Sensor
NET	Network Port
pH	Connect the pH Sensor
RS485 IN	RS485 Port
DEVICE	Connect Device Modules
SENSOR	Connect the Sensor Module
SD	SD Card
UPDATE	Screen Software Upgrade Port
NC COM NO	Dry Contact Alarm Output

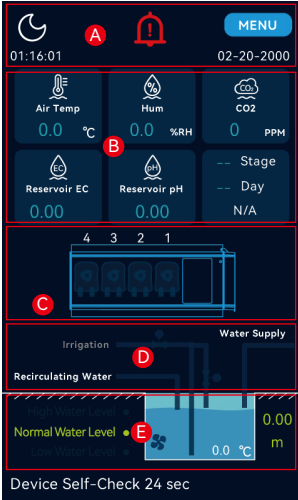


Function Description



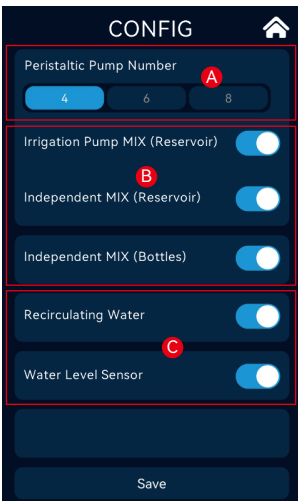
Home Page

After the device is started, it starts to load the interface. After loading to 100%, it enters the home page, including data display, device configuration and working status:



- A. Day and night mode, alarm, date, time, menu options.
- B. Air temperature, humidity, CO2 concentration value, stock solution EC value, pH value, cycle operation value.
- C. The current working status of the peristaltic pump.
- D. The current working status of each valve.
- E. Current nutrient pool water level status, height, stirring status, and stock solution pool water temperature.

Click the day and night icon several times on the home page to enter the configuration interface, where you can configure the working status of the device.



- A. Aqua-Pro can be configured with different numbers of peristaltic pumps according to the actual situation.
- B. Set the function of the irrigation pump, including the use of independent mixing, and the use of independent stock solution mixing.
- C. Set recirculating water function and water level sensor switch.



Off indicates that the function is disabled or not enabled.

If the irrigation pump has no mixing function, then there are irrigation main valve and mixing valve, if the irrigation pump only has irrigation function, there is no mixing valve.

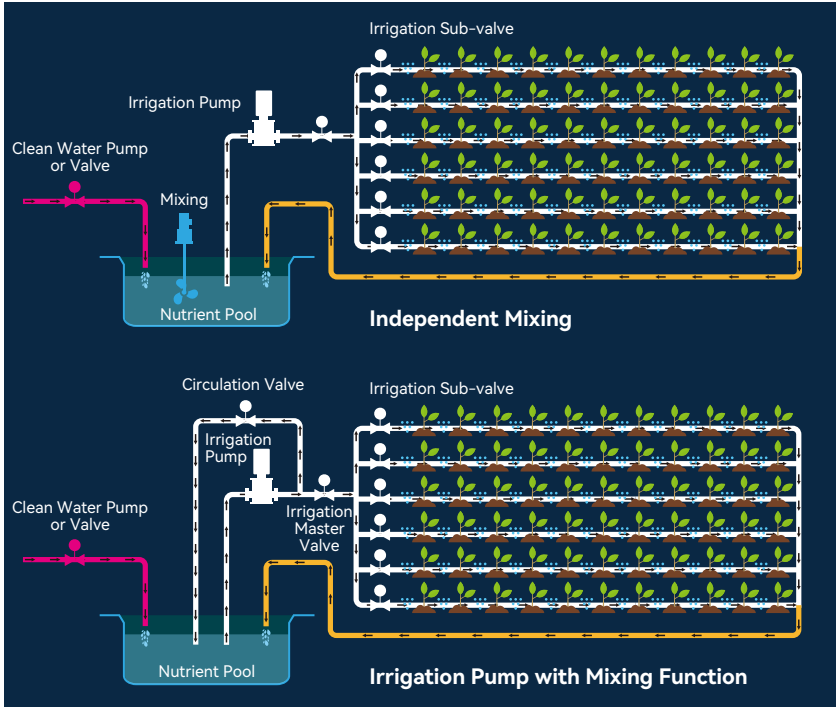
According to the actual situation on site, select whether there is backwater in the nutrient pool, and if so, enter the waiting time for backwater in the subsequent water replenishment interface.

In the same way, you can choose whether to use a dedicated water level sensor to monitor the data of the nutrient pool.

After completing the configuration selection, click the Save button to save the settings.

Applications for different planting scenes:

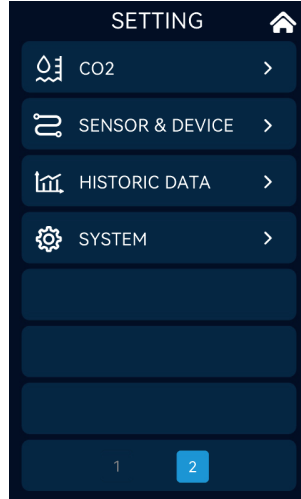
- When the nutrient pool reaches the low water level, while the system is supplementing with clean water, the nutrient pool has recirculating water. You need to consider that there may be a risk of nutrient pool water overflowing when the recirculating water is slow. The solution is that the user can set the waiting time for the recirculating water, and the system will automatically open the clean water valve or pump after the recirculating water returns for a period of time.
- There are two plans for whether the irrigation pump has the mixing function. Plan A: If the irrigation pump does not have the function of circulating mixing, the system can also control a mixing device independently. Plan B: The system starts the irrigation pump simultaneously when distributing fertilizers to carry out the circulation of the nutrient pool water, fully mixes the water and fertilizer solution. Note: When the irrigation pump has the mixing function, the system must be equipped with a circulation valve and an irrigation main valve at the same time. When mixing, the system will close the main irrigation valve and open the circulation valve while starting the irrigation pump. When the irrigation pump is irrigating, the system closes the circulation valve and opens the main irrigation valve while starting the irrigation pump.





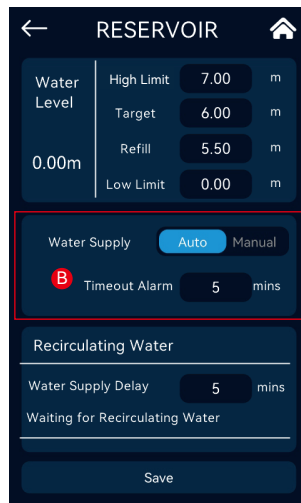
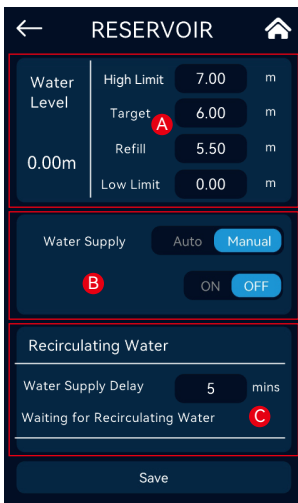
SETTING

Click **[MENU]** on the home page to enter the setting interface:



RESERVOIR

Click **[RESERVOIR]** to enter the water level and recirculating water settings:



- A. Set the refill water level, high water level, low water level, and target water level of the nutrient pool, and can display real-time water level data at the same time.
- B. It can be switched to Manual, which is convenient for users to manually add water to the target water level; In the state of automatic water replenishment, set the alarm time.
- C. Set the circulating water waiting time.

First set the replenishment water level of the nutrient pool (less than or equal to this water level, the system will automatically start the action of replenishing water), high water level (more than this water level, the nutrient pool may overflow, and the system will alarm), low water level (less than or equal to this water level, trigger to stop irrigation , stop fertilizer distribution, stop mixing), target water level.

The user sets the target water level according to the water demand of the crops and the frequency of fertilizer distribution.

The Manual function is convenient for users to manually add water to the target water level.

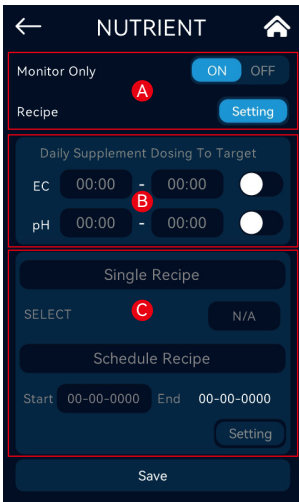
When using Aqua-Pro for the first time, first click Manual and then click ON to add water manually. After reaching the target water level, the system will automatically turn to OFF. You can also manually click OFF to turn off water addition.

In the state of automatic water replenishment, set the alarm time.If the system fails to reach the target water level within the set time, the system will alarm and continue to replenish water until the target water level is reached.

Note: When the water supply time and timeout alarm are set to zero, under the condition of irrigation priority, irrigation will not stop during the process of system triggering water replenishment, unless the irrigation is suspended due to low water level or other conditions, applicable to irrigation Non-stop NFT application scenes.

▶▶ NUTRIENT

Click **[NUTRIENT]** to enter the fertilizer distribution settings:



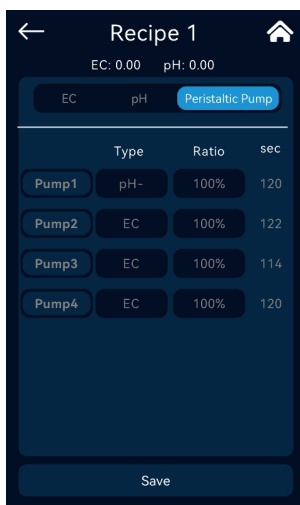
C. Click Setting and recipe to enter the recipe selection setting interface.

A. Monitor mode: In the ON state, the peristaltic pump does not operate at this time, and the system monitors the EC, water temperature, and pH value of the nutrient pool; In the OFF state, the automatic formula setting will be executed.

Click Monitor to make it in the on state. At this time, the peristaltic pump does not work, and the system will monitor the water temperature, EC and pH value of the nutrient pool.

B. Daily regular fertilizer supplement plan: the purpose is to replenish the fertilizer in the nutrient bucket to reach the target EC and PH value, even if the EC and pH peristaltic pump may not meet the conditions for restarting at this time. EC and pH can be set separately.

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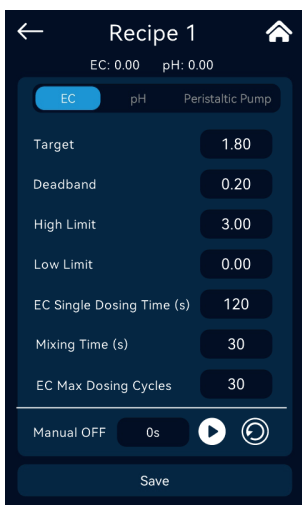
Click Recipe to enter the recipe setting interface, and click Peristaltic pump to set the working status, working type, and working time ratio of the peristaltic pump;

Set the working type of each peristaltic pump, including pH+, pH- or EC, the pump closest to the screen is Pump1, and so on. **Note: Pump1 defaults to pH type.**

If the addition ratio of the nutrient solution in each channel is not in a 1:1 relationship, you need to set the working time ratio of the single feeding time of the EC pump for each nutrient solution, and the system will use the fertilizer with the highest ratio to match the fertilizer time as a reference.

Examples are as follows:

If single Dosing time dosing=10s, Mix time=30s, there are 3 fertilizers and 1 pH-, the ratio of fertilizer A:B:C is 1:2:3; then fertilizer C corresponds to the pump within a pump operation cycle (dosing+Mix=40s, each pump is the same and fixed after setting), work for 10 seconds (ratio:100%), stop for 30 seconds; the pump corresponding to B fertilizer works $10 \times 2 / 3 = 6.66$ seconds (ratio:66.6%), stop for 33.33 seconds; the pump corresponding to fertilizer A works for $10 \times 1 / 3 = 3.33$ seconds (Ratio:33.3%) in one pump operation cycle, stop for 36.66 seconds.





EC Target value setting: set the target parameters for the user to maintain the EC value of the nutrient solution.

EC Deadband: Set the offset of automatic liquid addition after the EC reaches or exceeds the target value, and starts fertilizer distribution when the EC value is less than or equal to the target value - Dead band value, and reaches or exceeds the target value stop.

EC alarm value setting: set the low limit value and high limit value of the alarm signal. When the EC exceeds the high limit value, the system will stop the fertilizer distribution.

Single Dosing time/Mix time: set the parameters of the dosing time and interval time (the waiting time for nutrient solution mixing) in an automatic dosing cycle of the equipment.

Max Dosing cycles: Set the maximum number of continuous dosing cycles for equipment dosing before the nutrient solution EC reaches or exceeds the target value. After exceeding the set maximum value, a corresponding alarm signal will be sent and the machine will stop. Automatic dosing output, this function is to prevent out of control of dosing caused by component failure or lack of mother liquor. After manual inspection and pressing the alarm prompt symbol on the screen, the system will restart the automatic fertilizer distribution action, and at the same time, the number of EC cycles will be cleared.

After the parameters are set, click  in the EC setting interface to add the prepared stock solution into the nutrient pool, click  repeatedly to add the solution and manually mix the nutrient solution evenly until the EC reaches the target value or slightly exceeds the target value. Record the cumulative working time of a single peristaltic pump for the first fertilizer distribution, divide the cumulative working time of the peristaltic pump by the single dosing time to get the max dosing cycles, after considering a certain margin Fill in the value;

pH target value setting: set the target parameters for you to maintain the pH value of the nutrient solution.

pH deadband: set the offset for restarting the automatic liquid addition after the pH reaches the target value.

pH+ mode: When the pH concentration of the system is less than or equal to the target value, the system starts the peristaltic pump to add alkali balance liquid, and stops when it reaches or exceeds the target value.

pH- mode: When the pH concentration of the system is greater than or equal to the target value + dead band, the system starts the peristaltic pump to add acid, and stops when it reaches or falls below the target value.

Note: When both pH+ and pH-peristaltic pumps exist, the target value and dead band value set by the system should avoid the back-and-forth oscillation of adding acid or alkali caused by excessive addition of acid or alkali.

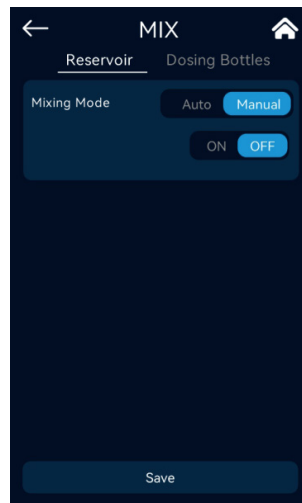
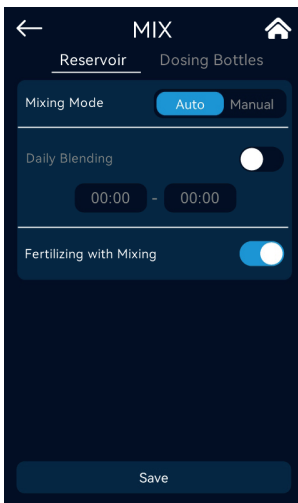
pH alarm value setting: set the low limit value and high limit value of the alarm signal sent by the device.

pH value setting for the maximum number of liquid additions: before the pH of the nutrient pool reaches or exceeds the target value, the maximum number of continuous operations for the equipment to add liquids. After exceeding the set maximum number of times, a corresponding alarm signal will be sent and the automatic liquid addition output will be stopped. This function is to prevent out-of-control liquid addition caused by component failure or lack of stock solution; after manually clicking the alarm prompt symbol on the screen, the system will restart the automatic fertilizer distribution operation, and the pH cycle number will be reset at the same time.

pH single dosing/mixing time setting: set the parameters of the dosing time and interval time (waiting time for acidic or alkaline liquid mixing) in one automatic dosing cycle of the equipment.

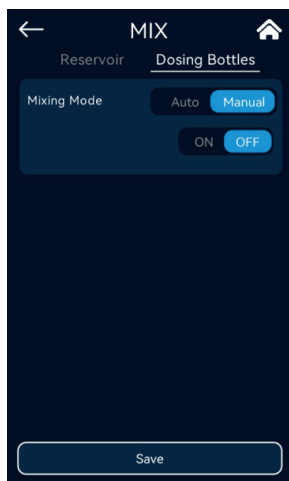
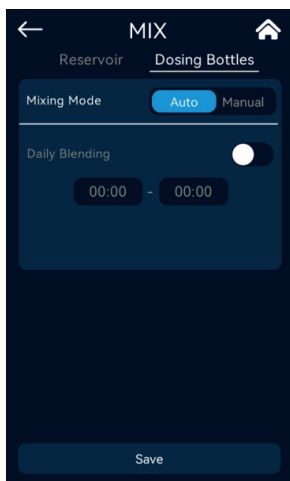
▶▶ MIX

Click **[MIX]** to enter the mixing settings:



The mixing of the nutrient pool can be set independently whether it is mixed alone or the irrigation pump and mixing when the fertilizer is distributed. If the system is set with the function of the irrigation pump and agitation, the irrigation pump will not perform the agitation during the irrigation on period. If it is independent mixing equipment is not affected. In addition, the user can set the daily mixing time, and it is recommended to set the mixing during the irrigation OFF period.

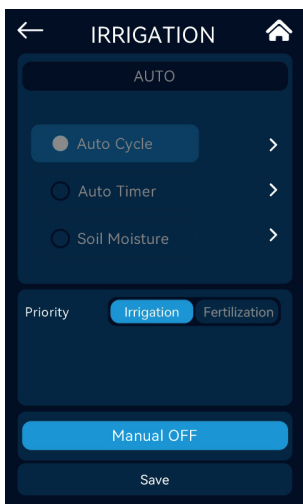
The system can also be manually started and stopped mixing.



The mixing of the stock solution tank requires an independent mixing device, which can set the daily timing mixing function and manually start/stop the mixing.

▶▶ IRRIGATION

Click **[IRRIGATION]** to enter the irrigation settings:



Irrigation Priority (system default): Prioritize irrigation during operation, unless the water level reaches the lower limit or forced irrigation causes damage to crops, such as: EC overrun, pH overrun and water temperature overrun, under these abnormal conditions the system will automatically Stop irrigation, and restart irrigation after the abnormal condition is removed.

Fertilizer distribution priority: Once EC or pH is triggered during the irrigation plan, irrigation will be stopped, fertilizer distribution will be given priority, and the target value will be reached within the specified fertilizer distribution time. This function is suitable for users with high requirements for EC and pH range. If the system is powered off and restarted, as long as the EC or pH does not reach or exceed the target value, the system will also stop irrigation.

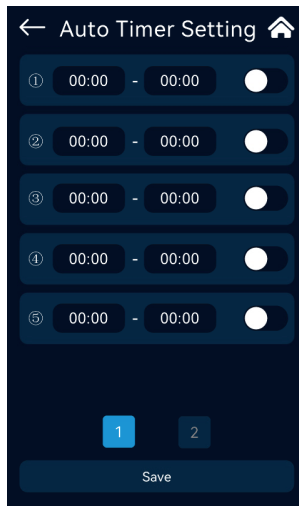
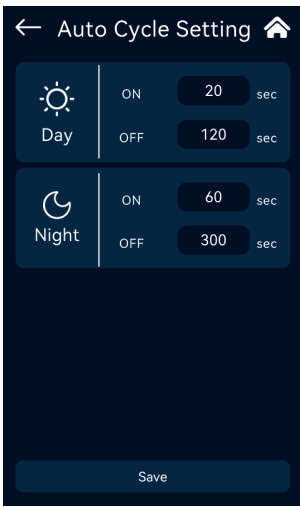
There are three modes of irrigation, namely automatic and manual stop and manual test.

Auto Cycle: You can set the opening time, closing time, and cycle every day.

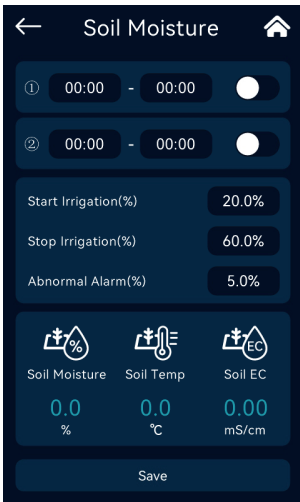
Auto Timer: Switching time and daily cycle can be set. Up to 10 groups of timers can be set.

Soil Moisture: The dry humidity of the substrate is triggered, and irrigation is started when it is less than the target value.

Manual OFF: When turned off, does not enter the automatic setting.



Note: In cycle mode, if OFF is set to 0, it indicates that Aqua-pro is in the irrigation normally open state and will not stop irrigation. In timer mode, if the start and end times are set, it indicates that Aqua-pro is in the irrigation normally open state.

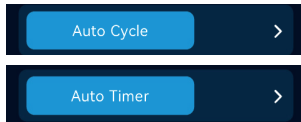


In the automatic mode, irrigation has a trigger type of substrate dryness and humidity. The substrate dryness and humidity trigger irrigation needs to be configured with a substrate dryness and humidity sensor. The user can set the time period for this type of work. During this time period, when the humidity of the substrate is less than or equal to the set The system automatically starts irrigation when the humidity is greater than or equal to the set stop value, and stops irrigation when the humidity of the substrate is greater than or equal to the set stop value. When the humidity of the matrix is less than or equal to the set minimum value, the system will alarm.



LIGHT

Click **[LIGHT]** to enter the light settings:



A. Manual OFF: manual operation is off, do not enter the automatic setting.

Auto Timer: You can set the switch and daily cycle. Up to 10 groups of timers can be set.

Auto Cycle: You can set the first turn-on time, turn-on time, and turn-off time.

B. When the LDA-SPE module is connected, it displays the intensity settings of the 4 light channels and the total intensity settings;

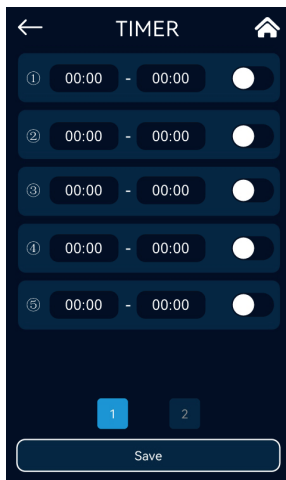
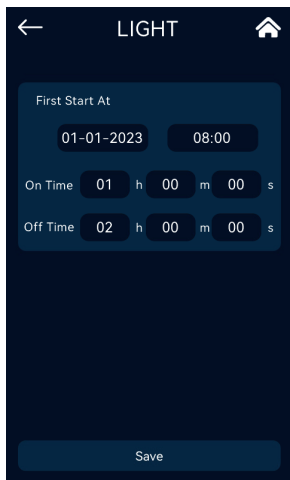
Single light intensity = CH-X (1-4) single intensity * total intensity (POWER OUTPUT).

C. Automatic temperature adjustment: When the temperature exceeds the set value, the lamp will automatically adjust to half the output of the set value, if it is lower than 40% after adjustment, it will be set to 40%.

Shutdown temperature: When the temperature exceeds the set value, it will automatically shut down.

Sunset Control: Simulates the duration of sunrise and sunset.

Auto Cycle and Auto Timer lighting data settings:



Note: In cycle mode, if OFF is set to 0, it indicates that the light is usually on, and the light will not be turned off. In timer mode, if the start and end times are set, it indicates that the light is usually on, and the light will not be turned off.



TEMPERATURE

Click **[TEMPERATURE]** to enter the temperature control settings:

The setting difference between cooling trigger value and heating trigger value must be \geq Temperature Deadband*2.

Cooling conditions:

Turn on when the Temperature Value \geq Cooling Target Temperature;

Turn off when the Temperature Value \leq Cooling Target Temperature - Deadband.

Heating conditions:

Turn on when the Temperature Value \leq Heating Target Temperature;

Turn off when the Temperature Value \geq Heating Target Temperature + Deadband.

Cooling and dehumidify lock: only select when using exhaust fan for cooling and dehumidify control.



HUM

Click **[HUM]** to enter the humidity settings:

The setting difference between the dehumidify trigger value and the Humidification Trigger Value must be \geq Humidity Deadband*2.

Dehumidify conditions:

Turn on when Humidity \geq Dehumidify Target Value;

Turn off when Humidity \leq Dehumidify Target Value - Deadband.

Humidification conditions:

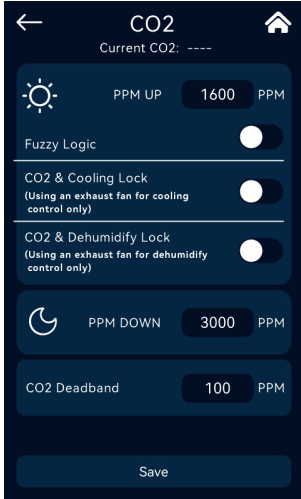
Turn on when Humidity \leq Humidify Value;

Turn off when Humidity \geq Humidify Target Value + Deadband.



CO2

Click **[CO2]** to enter the CO2 settings:



PPM UP only takes effect during the day.

When PPM is UP, you can choose whether to use Fuzzy Logic mode (using carbon dioxide cylinder).

CO2 and Cooling Lock: Select only when using the exhaust fan for cooling.

Note: Locking is selected to avoid CO2 waste. When the exhaust fan is used as a cooling device, if the cooling condition is triggered and the exhaust fan starts, the CO2 UP output will be automatically turned off until the cooling is stopped.

CO2 and Dehumidify Lock: Select only when using the exhaust fan for dehumidify.

Note: Locking is selected to avoid CO2 waste. When using the exhaust fan as a dehumidify device, if the dehumidify condition is triggered and the exhaust fan starts, the CO2 UP output will be automatically turned off until the dehumidify stops.

PPM UP conditions:

Turn on when CO2 value \leq PPM UP target value;

Turn off when CO2 value \geq PPM UP target value + CO2 Deadband.

PPM Down is only effective in dark conditions.

PPM Down conditions:

Turn on when CO2 value \geq PPM Down target value;

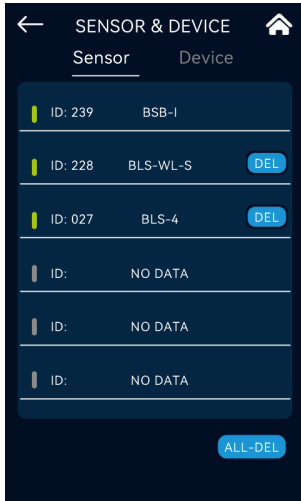
Turn off when CO2 value \leq PPM Down target value - CO2 Deadband.



SENSOR & DEVICE

Click [SENSOR & DEVICE] to enter the sensor and device settings:

➤ Sensor List



The interface will display all connected sensors. The list of supported sensors is as follows:

- BLS-4: 4 in 1 Sensor
- BLS-WL: Water Level Sensor
- BLS-SD: Smoke Dector
- BLS-WD: Water Detector
- BSB-1: pH/EC/Temp Sensor Board
- BLS-MM: Moisture Monitoring

On registered devices, the corresponding sensors can be deleted individually or collectively.

➤ Device List



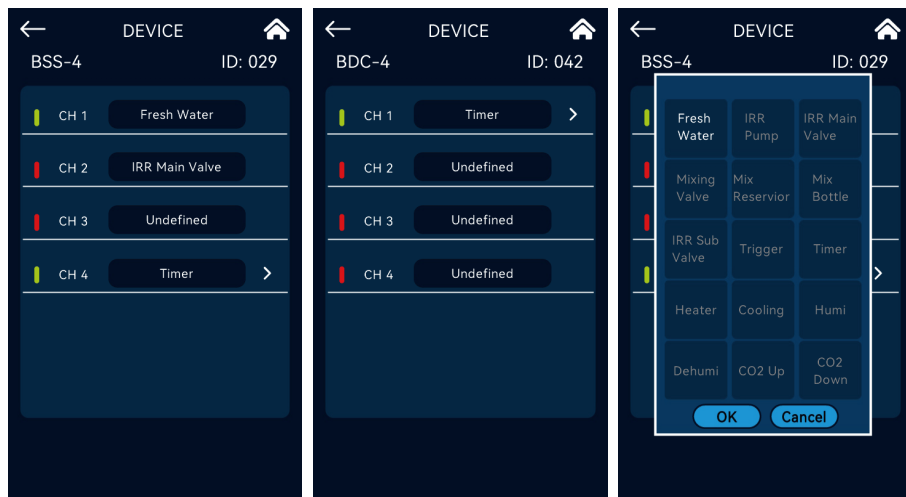
The interface will display all connected devices. The list of supported devices is as follows:

- BTS-AR: AC Remote Station
- BCS-PU1: CO2 Device Station, PPM Up
- BCB-12: Control Board
- BDC-4: Dry Contact Station
- BSS-4: Smart Socket 120-240V
- LDA-1: Light Adapter
- LDA-SPE: 4 Channels Light Dimmer

On registered devices, the corresponding sensors can be deleted individually or collectively.

Click "TEST" to locate the device. After the locating is successful, the device will continue to flash for 1 minute. When multiple devices of the same type are connected to the host at the same time, use this function to find the corresponding device in the scene, and click the device's ID to modify the name or enter the corresponding port of the device to modify the port function category.

Some modules can perform secondary settings on the type of sub-ports.

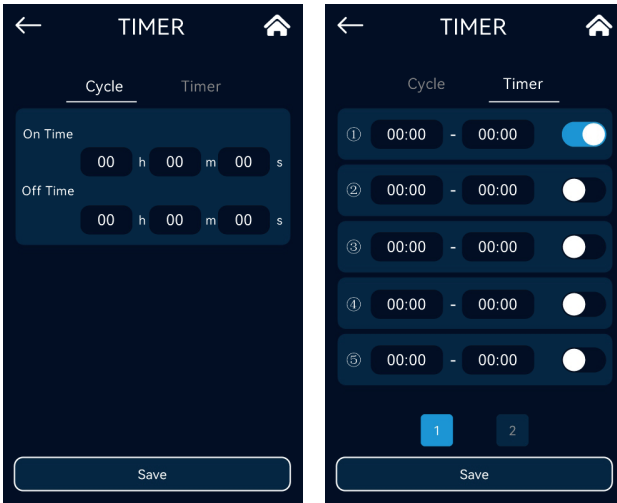


Node output control type	Note
Supply (pump or valve) (Fresh water)	Associated with the water level sensor, the water replenishment will be started when the water level is less than or equal to the replenishment water level, and the replenishment will be stopped when the target water level is reached.
Irrigation Pump (IRR Pump)	Associated with the water level sensor, there are fertilizer distribution priority mode and irrigation priority mode, and the default is irrigation priority. The irrigation pump combined with the irrigation main valve and the mixing valve can also realize the mixing function under the condition of self-circulation. When the irrigation pump executes the irrigation command, the mixing valve is closed, the irrigation pump and the irrigation main valve are opened at the same time, and when the irrigation pump performs the mixing function, Close the main irrigation valve, and the irrigation pump and mixing valve are turned on simultaneously.
Irrigation Master Valve (IRR Main Valve)	Synchronize with the irrigation pump when performing the irrigation function.
Mixing Valve	When performing the mixing function, it will act synchronously with the irrigation pump.
Nutrient pool independent mixing (Mix-Reservoir)	The separate mixing device can carry out self-timed mixing of the fertilizer liquid in the nutrient pool or synchronous mixing when the peristaltic pump is distributing fertilizers, and it also has the function of manual mixing.
Stock solution bucket mixing (Mix- Bottle)	The separate mixing device can automatically and regularly mix the stock solution, and also has the function of manual stirring.
Irrigation sub-valve (IRR Sub Valve)	Multiple sub-valves realize the irrigation function in turn.

Timer	Timer+cycle Mode
Irrigation trigger output (Trigger)	The output signal of on (dry contact conduction) after fertilizer distribution can be used to trigger the start of other equipment, such as irrigation.
Heater	Environmental Control
Cooling	Environmental Control
Humidify(HUM)	Environmental Control
Dehumidify(DEHUM)	Environmental Control
CO2 UP	Environmental Control
CO2 DOWN	Environmental Control

Among them, the function of alternate irrigation is to set the irrigation sub-valve in the port first. For example, the user first sets up 3 sub-irrigation sub-valves. Assuming that the cycle time of irrigation on is 1 hour, the system will work according to the order of the irrigation sub-valve in the port. 20 minutes.

The following is the interface for setting the 4-bit smart socket (optional):





HISTORIC DATA

Click **[HISTORIC DATA]** to enter the historical alarm data interface:

Timestamp	Alarm Description
06-20-2023 13:02	BSS-4/BCS-PU1 Device is not connected
06-20-2023 08:42	The target pH value timeout
06-19-2023 20:54	The target EC value timeout
06-19-2023 14:32	BSS-4/BCS-PU1 Device is not connected
06-19-2023 11:56	The target EC value timeout
06-19-2023 11:26	The target pH value timeout
06-19-2023 10:49	The target EC value timeout
06-19-2023 10:19	BLS-4 Sensor is not connected

<<< 01/07 >>>

Alarm type classification:

- High Water Level Alarm: Alarm when water level is high.
- Low Water Level Alarm: Alarm when water level is low.
- The target EC value timeout: In the specified time of fertilizer distribution (the maximum number of continuous operation parameters of liquid addition exceeds the preset requirements), EC cannot reach the target value.
- The target pH value timeout: The pH cannot reach the target value within the specified time of fertilizer distribution the maximum number of continuous running times of liquid addition exceeds the preset requirement).
- pH High Alarm: Alarm when pH is high.
- pH Low Alarm: Alarm when pH is low.
- EC High Alarm: Alarm when EC is high.
- EC Low Alarm: Alarm when EC is low.
- High temperature alarm(WATER): Alarm when water temperature is high.
- Low temperature alarm(WATER): Alarm when water temperature is low.
- Peristaltic tube replacement: Alarm when the peristaltic pump hose needs to be replaced.
- High temperature alarm (AIR): Alarm when ambient temperature is high.
- High humidity alarm: Alarm when humidity is high
- Low humidity alarm: Alarm when humidity is low;
- High carbon dioxide alarm: Alarm when carbon dioxide concentration is high.
- Sensor needs maintenance: Alarm when the sensor needs to be replaced.
- BLS-WL Sensor is not connected.
- BLS-4 Sensor is not connected.
- EC Sensor is not connected.
- pH Sensor is not connected.
- BLS-MM Sensor is not connected.
- BLS-WL/WD Sensor is not connected.
- BCB-12/BDC-4 Device is not connected.
- BSS-4/BCS-PU1 Device is not connected.
- LDA-1/LDA-SPE Device is not connected.
- BTS-AR Device is not connected.
- Soil Low Alarm: Alarm when soil moisture is low.
- Smoke Detector Alarm.
- Water Leakage Alarm.

Restart after power failure: The system runs related programs according to the current clock and sends an alarm to the user's mobile phone. The user can manually turn on or off functions such as water replenishment, fertilizer distribution, mixing, and irrigation.

Offline alarm and action: Environmental control four-in-one sensor: offline alarm, temperature, humidity, carbon dioxide stop working, restart after going online;

Water level sensor: offline alarm;

EC probe: offline alarm, stop fertilizer distribution, restart after online

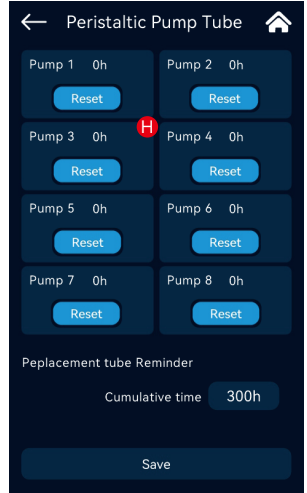
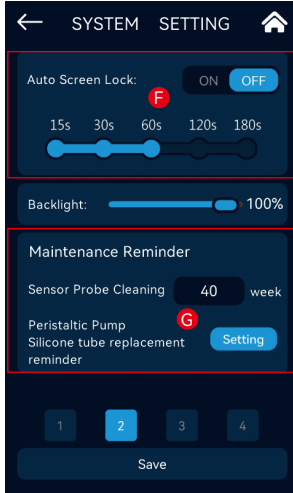
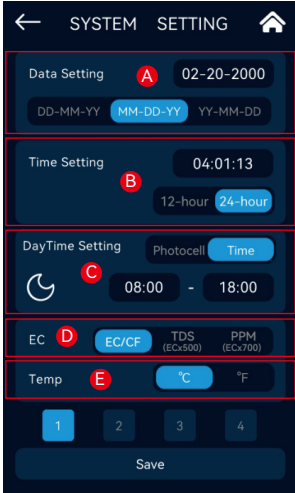
EC\pH control module: Offline alarm, stop fertilizer distribution, restart after online

Equipment control module: Offline alarm, the control equipment stops working, and restarts after going online.



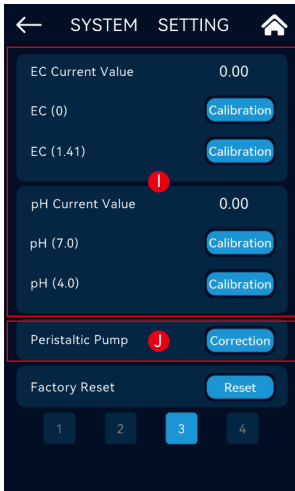
SYSTEM

Click **[SYSTEM]** to enter the system settings:



- A. Data setting
- B. Time setting
- C. Daytime setting
- D. EC unit switching
- E. Temperature unit
- F. Auto Screen Lock
- G. Maintenance reminder setting (including EC/pH sensor regular cleaning reminder and peristaltic pump silicone tube replacement reminder).

- H. Alarm when the silicone tube of the peristaltic pump needs to be replaced. Click the "Setting" button in the "Maintenance Reminder" menu to access the silicone tube reminder interface of peristaltic pump. Automatically record the cumulative working time of each peristaltic pump, and if the time reaches the time set by the user, the system will alarm.

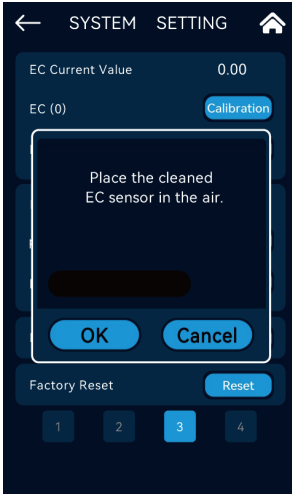


- I. EC\pH Current value and calibration.
- J. Peristaltic pump channel fertilizer absorption error manual correction function (due to various reasons such as the length of the external silicone tube of the peristaltic pump, the fertilizer absorption amount of each channel is inconsistent, etc.)

➤ EC Sensor Calibration

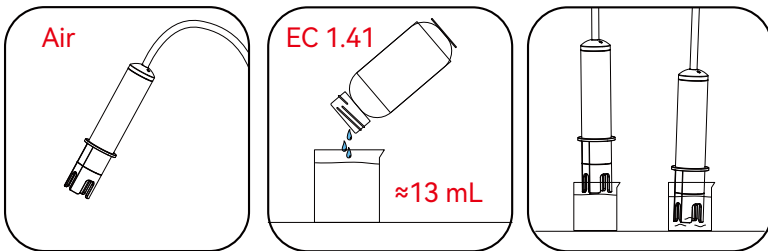
After the EC sensor has been used for a period of time, it needs to be decontaminated and calibrated regularly.

The way of maintenance: take out the sensor, dry the impurities on the surface with a soft cloth, and make the surface smooth again. According to the different water quality and production environment in different regions, it should be maintained every 15 days or 30 days; if there is a big difference between the reading and the expected value, the user can individually correct the coefficient of the EC sensor.



Press and hold the "EC (0)" button "Calibration" button to enter the EC sensor calibration state, put the cleaned EC sensor in the air, wait for the calibration of the device to end, the duration is 25 seconds, and the screen displays a 25-second countdown—calibration. After completion, it automatically enters the stage of correcting EC1.41.

Put the cleaned EC sensor in the standard solution of EC1.41, and wait for the calibration of the equipment to end, which lasts for 25 seconds - after the calibration is completed, the current value should display 1.41.



Note: Shake the sensor gently, making sure the sensor is immersed completely.

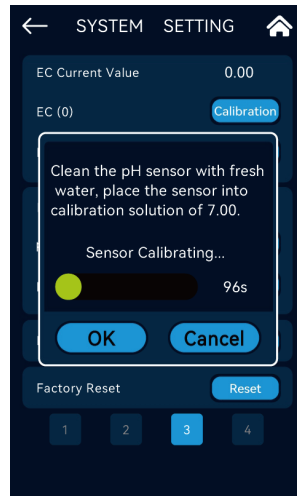
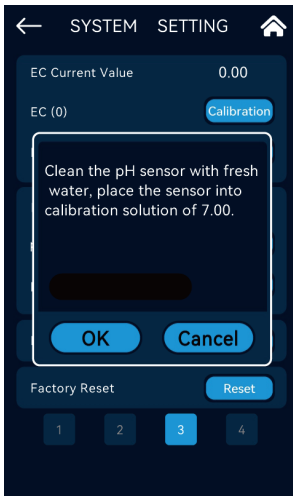
➤ pH Sensor Calibration

After the pH sensor has been used for a period of time, it needs to be decontaminated and calibrated regularly.

The way of maintenance: take out the sensor, dry the impurities on the surface with a soft cloth, and make the surface smooth again. According to the different water quality and production environment in different regions, it should be maintained every 15 days or 30 days; if there is a big difference between the reading and the expected value, the user can individually correct the coefficient of the pH sensor.

Take out the package of the sensor, pour the standard solution (4.00, 7.00) into the calibration cup, clean the sensor with a soft cloth and put it into the standard solution respectively.

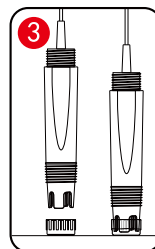
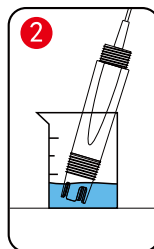
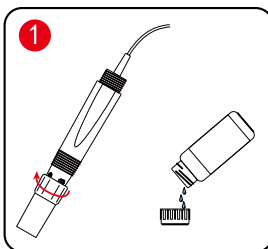
Note: The pH sensor needs to be placed in two standard liquids during calibration, it will take a long time for the reading to stabilize. To ensure the accuracy of the calibration, please be patient.



Press and hold the button "Calibration" of "pH (7.00)" or the button "Calibration" of "pH (4.00)" to enter the corresponding calibration sensor calibration state.

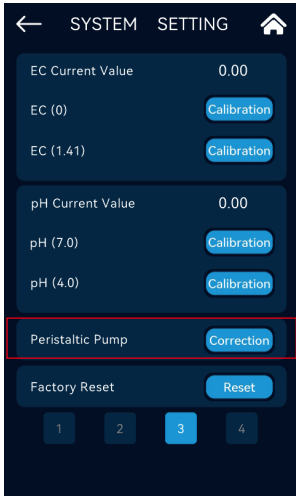
At this time, put the cleaned pH sensor in the standard solution of pH 7.00, wait for the calibration action of the equipment to end, and wait for the reading time to count down for 100 seconds. Complete the corrective action. When the calibration is complete, the current value should display 7.00.

After cleaning the probe in clean water, wipe off the water on the surface of the probe with a soft cloth. At this time, put the cleaned pH sensor in the standard solution of pH 4.00, and wait for the calibration of the equipment to end for 100 seconds.



➤ Peristaltic pump error manual correction function

Peristaltic pump channel fertilizer absorption error manual correction function (due to various reasons such as the length of the external silicone tube of the peristaltic pump, the fertilizer absorption amount of each channel is inconsistent, etc.)



Select the currently used peristaltic pump rate/minute and test working time. Use a measuring cup (purchase separately, need to be larger than the required calibration capacity) to measure it.

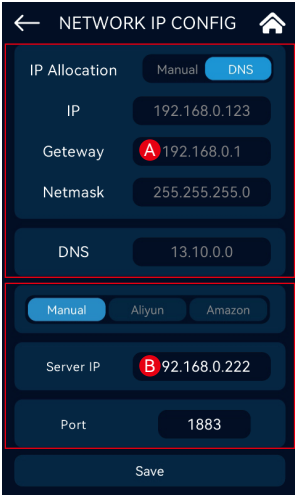
Select and current peristaltic pump rate (rate/min) and single test working time. Use a standard measuring cup (purchase separately, need to be larger than the required calibration capacity) to calibrate a single test to obtain the nutrient solution. Fill in the read value into the corresponding calibration data area and save it to automatically calculate the calibration ratio of the peristaltic pump.

➤ Network settings

Network setting interface: set the device IP and server related information after the device is connected.

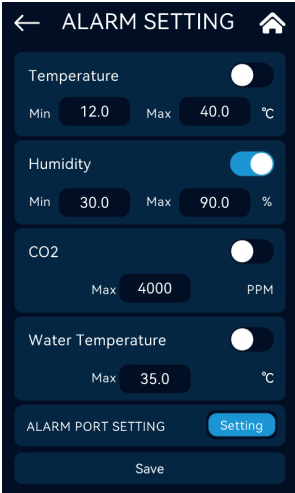


Enter the relevant setting interface through the Setting button of the "Network IP Config" menu.



- A. Set the DNS to automatically obtain the network IP, and the relevant local information cannot be modified at this time.
Set to "Manual" to set the options manually.
In Manual Mode, you can input information for Gateway, Netmask, DNS node IP and other devices respectively.
- B. Amazon Mode: use the Amazon server working mode.
Aliyun Mode: use Aliyun server working mode.
In Cloud Mode, server IP and port information cannot be modified.
Manual Local Mode: manually set to the local server working mode, you need to manually set the server IP and server port.

➤ Alarm settings



- Temperature Alarm:** switch state, low alarm value, high alarm value.
- Humidity Alarm:** switch state, low alarm value, high alarm value.
- CO2 Alarm:** switch state, high alarm value.
- Water Temperature Alarm:** switch state, high alarm value.



Alarm port (NO/NC) switch setting:

- EC alarm switch setting;
- pH alarm switch setting;
- Water level alarm switch setting;
- CO2 alarm switch setting;
- Temperature alarm switch setting;
- Humidity alarm switch setting;
- Peristaltic pump alarm switch setting;
- Online switch setting of sensors and actuators;

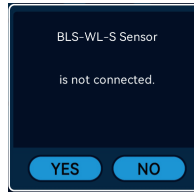
➤ **Manually calibrate water level and CO2 Settings**



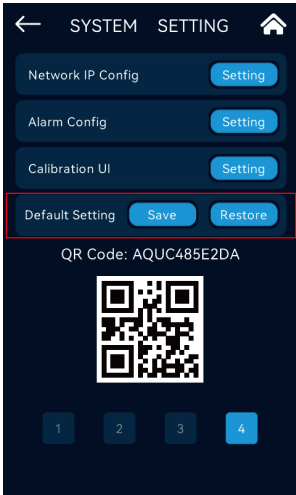
Water level sensor real-time data, calibration data.
The water level sensor is manually calibrated and reset.

CO2 real-time data, calibration data.
Calibrating and resetting the CO2 sensor manually.

If the water level sensor or CO2 sensor is not connected, it will alarm:



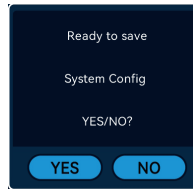
➤ Default Setting



System preset data saving function:

Pre-save the system preset data, and restore the saved data to the current configuration when needed.

During the operation, a reminder box for saving and restoring will pop up.



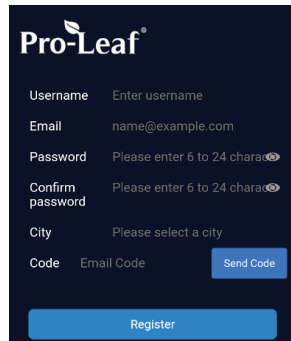
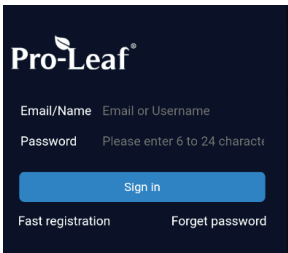
➤ Mobile phone remote control and App download and registration



iPhone

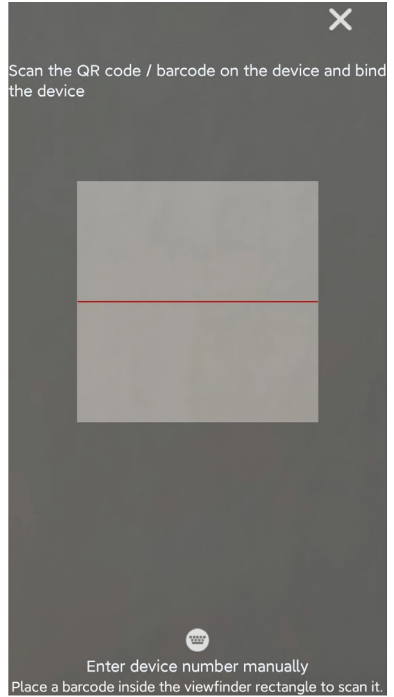
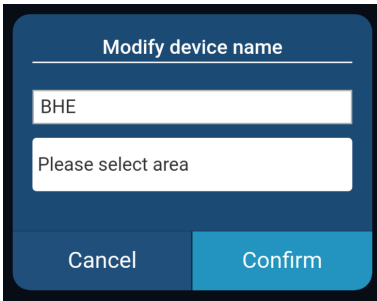
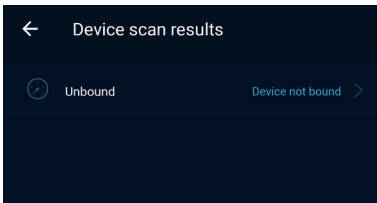
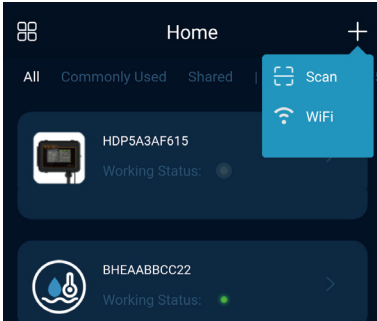


Android



Scan the QR code on your phone to download the App. After the installation is successful, the login page is displayed. And then tap [Registration], Enter the Username, Password and Email, the system will automatically send the verification code to the Email you provide, use the verification code in the mailbox (may be in the spam box), verify and complete the registration, login to the APP after successful registration.

Plug the device into the network cable, open the setting interface of the device, select [QR Code], and click the OK button. The device will then display a QR code.



Tap the plus sign on upper right corner of mobile app, use the scan function to scan the QR code; After scanning the QR code or adding it manually, by tap "Device Unbound"; Enter the device name, select the device area, and tap OK to bind successfully.

➤ SD Card Function

The SD card stores upgrade firmware, device registration information, etc. Please ensure SD is inserted in the slot when using.

Configuration Setting Upper Limit Table

General Items	Subitems	Minimum configurable value	Maximum configurable value	Note
Water Level	High Alarm Value	Greater than the target water level	9.99m	
	Target Water Level	Greater than the start water level	Less than the high alarm value	
	Start Water Level	Greater than the low alarm value	less than the target water level	
	Low Alarm Value	0	Less than the start water level value	
	Automatic water replenishment timeout	0	999mins	If it is 0, it means no effect
	Circulating Water Waiting Time	0	999mins	If it is 0, it means no effect
EC	Target Value	Greater than (low alarm value + safety interval value)	Less than the high alarm value	Target
	Deadband	Greater than 0 (EC)	Less than ((high alarm value - low alarm value)/2)	
	High Alarm Value	Greater than (target value + safety interval)	Less than 6.00 (EC)	High Limit
	Low Alarm Value	Greater than 0 (EC)	Less than (high alarm value - deadband value)	Low Limit
	Single filling time (seconds)	0	999	EC single Dosing time
	Interval value (seconds)	0	9999	EC single Dosing time
	The maximum number of cycles of liquid addition (times)	0	999	Max Dosing Cycles
pH	Target Value	Greater than (low alarm value + safety interval value)	Less than the high alarm value	Target
	Deadband	Greater than 0 (pH)	Less than ((high alarm value - low alarm value)/2)	
	High alarm value	Greater than (target value + safety interval)	< 6.00 (EC)	High Limit
	Low alarm value	Greater than 0 (EC)	Less than (high alarm value - deadband value)	low Limit
	Single Dosing time	0	999	
	Interval time value	0	9999	
	Maximum number of cycles for adding liquid	0	999	Max Dosing Cycles
Fertilizer Ratio	Working ratio of EC peristaltic pump (%)	10	100	Peristaltic pump No. 2-8, No. 1 fixed at 100%, pH
Periodic Table	Periodic table days setting (days)	0	90	0 days means the stage is skipped

General Items	Subitems	Minimum configurable value	Maximum configurable value	Note
Irrigation	Fertilizer priority irrigation waiting time (seconds)	0	9999	
	Day cycle on (seconds)	0	9999	
	Day cycle off (seconds)	0	9999	
	Night cycle on(seconds)	0	9999	
	Night cycle off (seconds)	0	9999	
Light	Automatic temperature reduction dimming value	0	Less than the auto-off dimming value	
	Auto off dimming value	Greater than the automatic temperature reduction dimming value	50	
	Sunrise and sunset values (minutes)	0	180	
	Test run limit (seconds)	0	9999	
Temperature	Daytime start cooling value (Celsius)	Greater than (heating value + safety interval value)	60.0	
	Daytime start heating value (Celsius)	0	Less than (cooling value - safe interval value)	
	Nighttime start cooling value (Celsius)	Greater than (heating value + safety interval value)	60.0	
	Nighttime start heating value (Celsius)	0	Less than (cooling value - safe interval value)	
	Deadband value (degrees Celsius)	0	99.8	
Humidity	Daytime Start dehumidify value (%)	Greater than (humidify value + deadband value)	60.0	
	Daytime Start humidify value (%)	0	Less than (dehumidify value - safe interval value)	
	Nighttime Start dehumidify value (%)	Greater than (humidify value + deadband value)	60.0	
	Nighttime Start humidify value (%)	0	Less than (dehumidify value - safe interval value)	
	Deadband value (%)	0	30	
CO2	Daytime PPM UP (ppm)	0	9999	
	Nighttime PPM DOWN (ppm)	0	9999	
	Deadband value (ppm)	0	1000	

General Items	Subitems	Minimum configurable value	Maximum configurable value	Note
System settings	Sensor cleaning cycle (week)	0	999	
	Peristaltic pump service life (hours)	0	999	
Alarm parameter setting	Low Alarm Temperature (Celsius)	0	Less than the high alarm value	
	High alarm temperature (Celsius)	Greater than the low alarm value	60.0	
	Low humidity (%)	0	Less than high humidity	
	High humidity (%)	Greater than low humidity	100.0	
	CO2 high alarm value (ppm)	0	9999	
	Water temperature high alarm value (Celsius)	0	60.0	

Product Maintenance

1.Storage of pH Glass Electrodes

Short-term: store in buffer solution with pH=4

Long-term: store in buffer solution with pH=7

2.Cleaning of the pH glass electrode

If the glass electrode bulb is contaminated, the electrode response time may be prolonged. CCl₄ or soap solution can be used to remove dirt, and then continue to use after immersing in distilled water for a day. When the pollution is serious, it can be soaked in 5% hydrofluoric acid solution for 10-20 minutes, rinsed with water immediately, and then immersed in 0.1mol/L HCl solution for a day before continuing to use.

3.Treatment of glass electrode aging

The aging of the glass electrode is related to the gradual change of the glue layer structure. Older electrodes are sluggish in response, high in membrane resistance, and low in slope. Soaking and corroding the outer glue layer with hydrofluoric acid solution can generally improve the performance of the electrode. If this method can be used to regularly remove the inner and outer adhesive layers, the life of the electrode will increase.

4. Storage of the reference electrode

The best storage solution for silver-silver chloride electrode is saturated potassium chloride solution. High-concentration potassium chloride solution can prevent silver chloride from precipitating at the liquid junction and maintain the liquid junction in working condition. This method is also applicable to the storage of composite electrodes.

5. Regeneration of the reference electrode

Most of the problems of the reference electrode are caused by the blockage of the liquid junction, which can be solved by the following methods:

(1) Junction of soaking solution: use a mixture of 10% saturated potassium chloride solution and 90% distilled water, heat to 60~70°C, immerse the electrode about 5cm, and soak for 20 minutes to 1 hour. This method can dissolve the crystals at the end of the electrode.

(2) Ammonia immersion: When the junction of the immersion solution is blocked by silver chloride, it can be leached with concentrated ammonia water. The specific method is to clean the inside of the electrode, and then immerse it in ammonia water for 10-20 minutes after emptying the liquid, but do not let the ammonia water enter the inside of the electrode. Take out the electrode and wash it with distilled water, and then add the filling solution again and continue to use it.

(3) Vacuum treatment: put the hose around the liquid junction of the reference electrode, use a water flow suction pump, and the liquid in the suction part passes through the liquid junction to remove mechanical blockages.

(4) Boiling liquid junction: The liquid junction of the silver-silver chloride reference electrode is immersed in boiling water for 10-20 seconds. Note that the electrode should be cooled to room temperature before the next boil.

(5) When the above ways are ineffective, the mechanical way of sandpaper grinding can be used to remove the blockage. This way may cause the sand particles under grinding to be inserted into the liquid junction, resulting in permanent blockage.

Troubleshooting

➤ Failure to add sensor

If the corresponding value still shows "----" after 5 seconds of plugging in the device, it means that the registration is not successful or it is plugged into the wrong port. If the port is correct, please plug the 485 port again.

➤ Device adding failed

If there is no corresponding device on the interface after connecting to the Device, or the corresponding status of the device still shows offline for more than 10 seconds, then it may be that the wrong interface is connected or the registration has not been successful. Re-plug the interface when the interface is correct.

Note: For some control types such as CO2 generator (BCS-PU1), you need to manually press and hold the button on the side until the light of the device keeps flashing before sending the registration command to the Aqua-Pro device, otherwise the registration will not be displayed on the Aqua-Pro device information.

If the accumulative number of connected devices exceeds 6, you need to delete unused devices before connecting new devices.

➤ **Failed to add light controller**

If you find that the corresponding lighting device does not appear on the interface after connecting to Light, or the corresponding status of the lighting device still displays offline after more than 10 seconds, then it may be that the interface is wrongly connected or the registration is not successful. Re-plug the interface when the interface is correct.

If the total number of connected lighting devices exceeds 1, you need to delete unused devices before connecting new devices.

➤ **The controller has no display**

Make sure that the power wiring is correct and the power supply can supply power normally.

➤ **The number displayed by the controller changes frequently**

Check whether there are other interference devices around, and pay attention to stay away from these interference devices or take shielding measures.

➤ **The controller cannot be calibrated**

The standard solution was not prepared correctly or the electrode is damaged.

➤ **The test is inaccurate after being calibrated by the standard solution pH4.00, pH6.86, pH10.00.**

Judging whether the standard solution is polluted or not, replace the standard solution to re-calibrate the indication value, and the response is slow; another possibility is that the electrode bulb is covered by dirt, and the response will slow down. Please clean it according to the corresponding method according to the type of pollutant, and the response speed is slow in winter. It is normal.

➤ **The screen display area is a horizontal bar "----"**

When the screen displays horizontal bars, it means that the measured value exceeds the range.

