



PHEC-B2

Digital Nutrient Controller



Manual

www.pro-leaf.com



- Read all instructions before operating controller
- Do not put your controller in an area where it can get wet or sprayed
- There is no serviceable parts in controller. Do not attempt to repair the unit
- Make sure to verify your power source prior to plugging controller into outlet
- This controller is designed for inside use only
- Use caution when operating controller in extremely humid environments
- Do not use controller for purposes other than the unit was designed to function

DESCRIPTION

The Pro-leaf PHEC-B2 is a digital nutrient system, featuring industrial-grade pH, EC and built-in temperature sensor. The controller precisely monitor and control the pH, conductivity of a solution automatically by four dosing pumps. The High/Low alarm control lockouts, keep the solution in a safe range. Easy operation, user friendly setting and pH, EC sensor calibration.

✂ Prepare the system to operate

Test the system before operation,clear all the parts with fresh water.

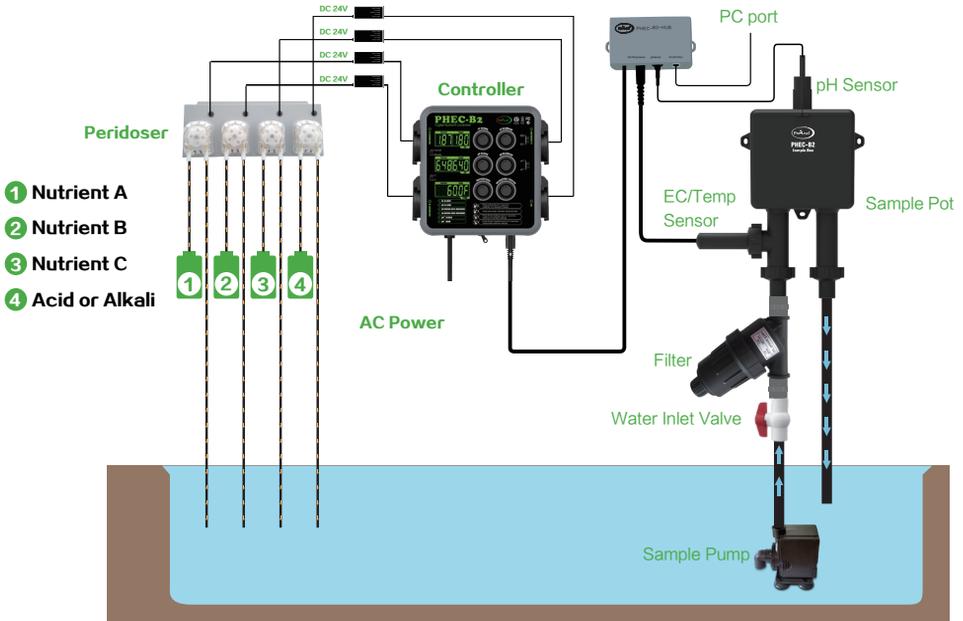
Step 1. Install the whole system to a wall or board,close to the nutrient tank. Make sure the tubes to the dosing pump are in the same length.

Step 2. Fill the fresh water to the nutrient tank.

Step 3.Power the controller and sample pump, turn on the controller.

Step 4. Check the EC,pH sensor with the calibration solution, calibrate the sensors if necessary. Please go to page 13.

Step 5. Set the desired EC,pH value for your plants.





Hardware Contents



①



④



⑤



⑪

PHEC-B2 P70

or



PHEC-B2 P1000



②



x 2

⑥



⑦



⑧



x 4

⑫



x 3

⑬



③



⑨



x 4

⑩



⑭

x 8

x 2

① PHEC-B2 Main controller

② Sample Pot

③ Sensor Hub

④ pH Sensor

⑤ EC/Temp Sensor

⑥ Connector

⑦ Filter

⑧ Water Inlet Valve

⑨ Sample Pump

⑩ 24V Power Adapter

⑪ Peristaltic Pumps

⑫ Solution tubes

⑬ Calibration Solution

EC 1.413

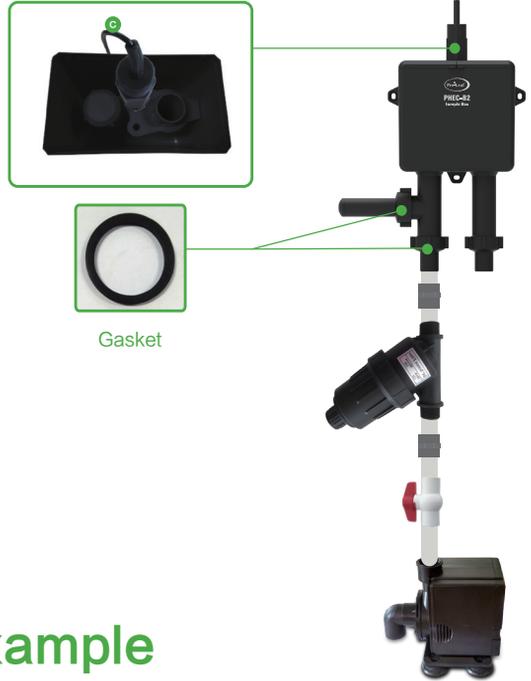
pH 4.0

pH 7.0

⑭ Fitting Kits

✂ How to set up the sample pot

1. Mount the sample pot to the wall where close to the nutrient tank.
2. Fit the filter to water inlet valve by two connectors, connect the water sample pump.
3. Fit the pH sensor and EC/Temp sensor in the sample pot. Make sure the gasket fit when installing the EC sensor.
4. Adjust the water inlet valve to let the gentle water current fulfill the sample pot.

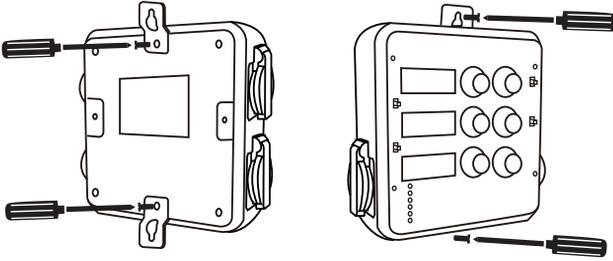


✂ Installation Example

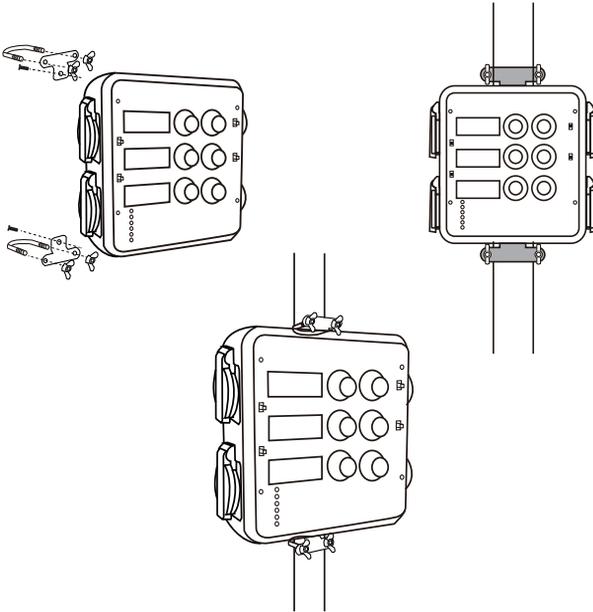


✂ Installation

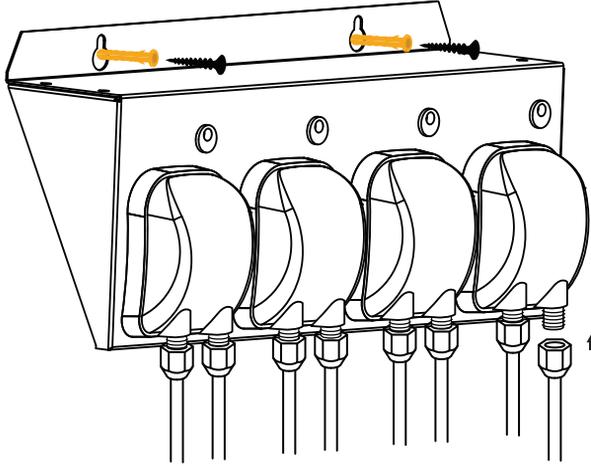
Mount the unit to a wall



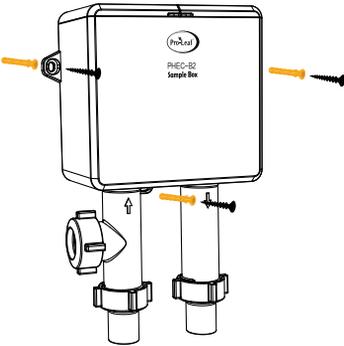
Screw the controller to the grow tent tube with a U bolt



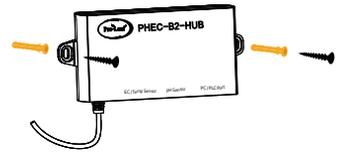
Mount the dosing kit to a wall, connect the tub to the peridoser



Mount sample pot



Mount the sample pot and sensor hub to a wall



✂ Main Controller

Plug the power cable into socket, turn on the switch at the bottom of controller.



Factory Setting

EC Settings	1.8
EC Bandband Settings	0.2
EC Limit Low	0.5
EC Limit High	4.0
EC Max Dosing Cycle	50
EC Dosing Time	10sec
EC Dosing Mix Time	20sec
EC Nutrient Ratio	1: 1: 1
EC Alarm Sound	MUTE
Monitor/Operataion Mode	Control Mode

pH Settings	5.60
pH Bandband Settings	0.2
pH Limit Low	4.0
pH Limit High	8.0
pH Max Dosing Cycle	50
pH Dosing Time	3sec
pH Dosing Mix Time	30sec
pH Alarm Sound	OFF
pH Monitor/Control Mode	Control Mode
pH+/pH- Control Mode	pH- Mode

⚙️ Operation Instruction

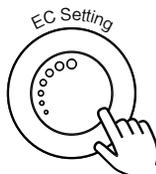
Before setting up

- First select the MONITOR mode before setting up. To avoid wrong dosing before the setting is confirmed.
- Set up the EC, pH value, deadband, alarm limit, dosing time, interval and Max dosing cycle. Select the pH mode, acid or alkali.
- If the nutrient A, B, C is not under the ratio 1:1:1, you can set it up the related proportion.
- Choose the CONTROL mode after the setting is confirmed.
- The alarm mode is optional as gaiwei of audible or mute.

⚙️ EC Setting

EC Range: 0~9.99

EC Target Setpoint: Click the EC Setting knob, turn to set the target value, press again to confirm the setting.



EC Deadband: Click the knob and turn to set the dead-band(hysteresis), press again to confirm the setting. **Setting Range 0.1~0.5**

EXAMPLE : If the EC set-point is 1.80, the deadband(hysteresis) is 0.20. The dosing pumps of Nutrient A,B,C will be triggered when the EC is lower or at 1.6, and stop when EC reach 1.8.



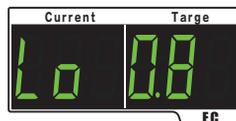
EC Alarm Limit: The alarm will be on when the EC is lower than the low limit or higher than the high limit.

Press the EC Setting knob for **3** seconds.

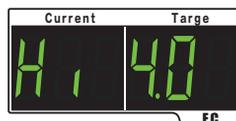
Low Limit: Display read "Lo", turn the knob to set up the EC low limit.

High Limit: Press again the knob, display showed "Hi", turn the knob to set up the EC high limit. Click to save the setting.

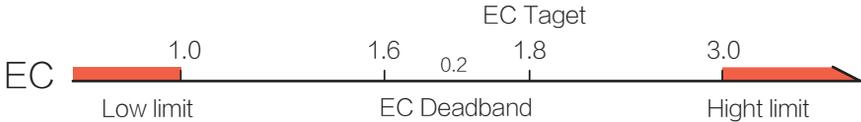
When the EC is over limit, the alarm will be triggered audible or mute. The EC display window will be flash, alarm LED will be lit. The alarm will be clear automatic when the EC return to the safe range.



Low Limit Setting



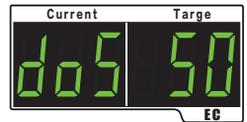
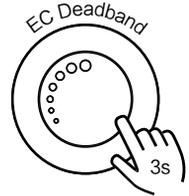
High Limit Setting



EC Max dosing cycle: If the the pump continue dosing,over the max cycle, the controller will lock out all the pumps to prevent overdosing. Normally three dosing cycle should change the reservoir by 0.1 EC or 0.1 pH point.

Press the EC deadband knob for 3 seconds, turn to set the maximum cycle. When the max dosing lock out is triggered,display reads "dos" by flashing,the EC DOSING OVER MAXIMUM led is lit,alarm is on until it's be cleared by pressing any knob.

Setting range is from 10-200 cycles,factory setting is 50 cycles.



EC Max dosing cycle

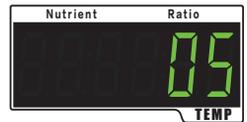
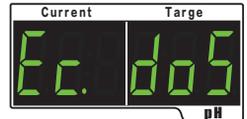
EC single dosing/mixing time setting: Set the parameters of the dosing time and interval time in the device automatic dosing cycle.

Long press the knob "dosing time / mixing time"

For 3 seconds - the pH box shows "EC.doS" in the temperature "current value" box to display the current setting parameters as shown on the right

Turn the knob - adjust the options to be set, in "EC.doS", "EC.Int", "PH.doS", "PH.Int" sequence

Click the knob "dosing time / mixing time" - enter the setting item



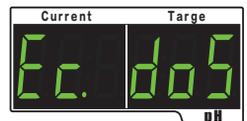
EC single dosing/mixing time setting

Dosing time

When "EC.doS" is displayed in the pH "current value" box

Turn the knob - rotate clockwise to increase EC dosing time and counterclockwise to decrease

Click the button "Dosing time / mixing time" - save the data and automatically switch to the setting time

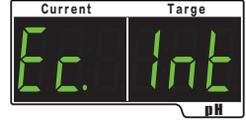


Intervals

When "EC.Int" is displayed in the pH "current value" box

Turn the knob – rotate clockwise to increase the EC interval and counterclockwise to decrease

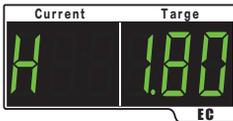
Click the button "Adding time / mixing time" – complete the settings



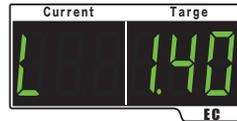
Note: The minimum dosing time is 5 seconds and the maximum value is 120 seconds; the minimum interval time is 10 seconds and the maximum value is 300 seconds. When the concentration of the nutrient solution A, B, C is high, it is recommended to set the dosing time to the minimum value to avoid the nutrient solution EC exceeding the target value because the concentration is too high.

EC Min/Max Recall:

Click the EC Setting and EC Deadband knobs simultaneously to display the EC min/max record. The screen will return to normal display after 5 seconds (or immediately if you click both knobs simultaneously again), the record will be reset.



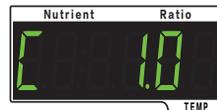
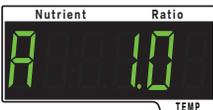
EC max recall



EC min recall

EC Nutrients Part Ratio:

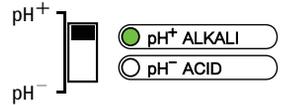
The controller can operate up to 3 dosing pumps each with their own dose volume. For Example, if the part ratio of nutrient A,B,C is 2:1:1, press the NUTRIENT RATIO knob, the window displays A 1.0, turn the knob to change it to A 2.0, click again to set the part ratio for nutrient B and C.



pH Setting

Mode: pH+: Alkali pH-: Acid

Use the switch to select the pH mode. There is 30 seconds delay between the mode switch.



pH Setting:

Click the pH Setting knob, turn to set the target value, press again to save the setting.



Setting range: 0-14

pH Deadband:

Click the knob and turn to set the deadband (hysteresis), press again to confirm the setting. **Setting Range 0.1-1.**



EXAMPLE:

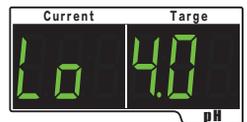
pH- Mode: If the pH set-point is 5.80, the deadband (hysteresis) is 0.20. The pH dosing pumps/Acid will be activated when the pH is at 6.0, and stop when pH goes down to 5.8.

pH+ Mode: If the pH set-point is 5.80, the deadband (hysteresis) is 0.20. The pH/Alkali dosing pumps will be activated when the pH is at 5.6, and stop when pH goes up to 5.8.

pH Alarm Limit: The alarm will be triggered when the pH is lower than the low limit or higher than the high limit

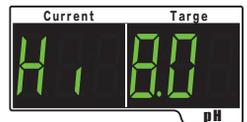
Press the pH Setting knob for 3 seconds.

Low Limit: Display read "Lo", turn the knob to set up the pH low limit.



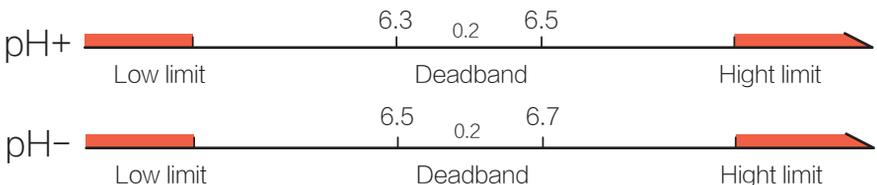
Low Limit

High Limit: Press again the knob, display showed "Hi", turn the knob to set up the pH high limit. Press again to confirm the setting.



High Limit

When the pH is over limit, the alarm will be triggered audible or mute. The pH display window will be flash, alarm LED will be lit. The alarm will be reset automatic when the pH return to the safe range.



pH Max dosing cycle: If the the pH pump continue dosing,over the max cycle, the controller will lock out all the pumps to prevent overdosing. Normally three dosing cycle should change the reservoir by 0.1 pH point.

Press the pH Deadband knob for 3 seconds, turn to set the maximum cycle. Then the max dosing lock out is triggered,display reads "dos" by flashing,the pH DOSING OVER MAXIMUM led is lit,alarm is on until it's be cleared by pressing any knob.

Setting range is from 10-200 cycles,default setting is 50 cycles.

pH single dosing/mixing time setting: Set the parameters of the dosing time and interval time in the device automatic dosing cycle.

Long press the knob "dosing time / mixing time"

For 3 seconds - the pH box shows "EC.doS" in the temperature "current value" box to display the current setting parameters as shown on the right

Turn the knob - adjust the options to be set, in "EC.doS", "EC.Int", "PH.doS", "PH.Int" sequence

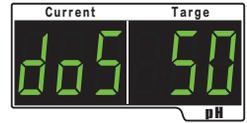
Click the knob "dosing time / mixing time" - enter the setting item

Dosing time

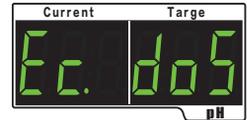
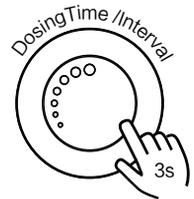
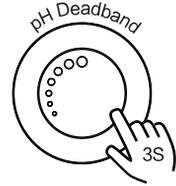
When "pH.doS" is displayed in the pH "current value" box

Turn the knob - rotate clockwise to increase pH dosing time and counterclockwise to decrease

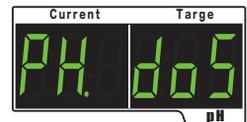
Click the button "Dosing time / mixing time" - save the data and automatically switch to the setting time



pH Max dosing cycle



pH single dosing/mixing time setting

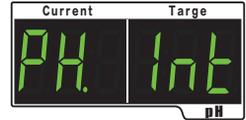


Intervals

When "PH.Int" is displayed in the pH "current value" box

Turn the knob – rotate clockwise to increase the pH interval and counterclockwise to decrease

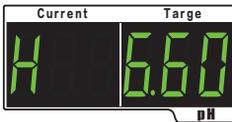
Click the button "Adding time / mixing time" – complete the settings



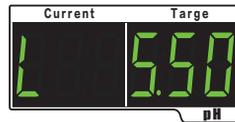
Note: The minimum dosing time is 3 seconds and the maximum value is 60 seconds; the minimum interval time is 10 seconds and the maximum value is 300 seconds.

pH Min/Max Recall:

Click the pH Setting and pH Deadband knobs simultaneously to display the pH min/max record. The screen will return to normal display after 5 seconds (or immediately if you click both knobs simultaneously again), the record will be reset.



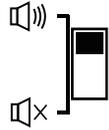
pH Max Recall



pH Min Recall

Alarm

There are audible and mute modes for alarm function.



When the alarm will be triggered:

Setting	Range	Alarm Trigger	LED Light
EC Low Limit	0~9.9	When EC is lower than the Low Limit	EC ALARM
EC High Limit	0.1~9.9	When EC is higher than the High Limit	EC ALARM
EC Max Dosing Cycle	10~200	When EC dosing cycle is over maximum	EC DOSING OVER MAXIMUM
pH Low Limit	0~13.9	When pH is lower than the Low Limit	pH ALARM
pH High Limit	0.1~13.9	When pH is higher than the High Limit	pH ALARM
pH Max Dosing Cycle	10~200	When pH dosing cycle is over maximum	pH DOSING OVER MAXIMUM

Operation Mode

Control Mode: The EC and pH nutrient will be adjusted automatic by the controller, the dosing pump will be turn on and off by controller.

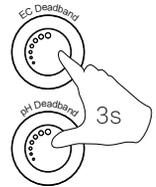
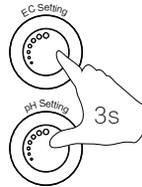


Monitor Mode: The controller only monitor the EC/pH level of nutrient, alarm function is on in this mode.

The dosing will be interrupted when switch the control mode to monitor mode. The EC and pH dosing pumps will not operate in the same time.

Override/Manual

- Press the both knobs of EC Setting knob and pH setting knob for 3 seconds, the nutrient dosing pump will be activated manually.
- Press the both knobs of EC Deadband knob and pH Deadband knob for 3 seconds, the pH dosing pump will be activated manually.
- Once release the press, the pump will stop dosing.



EC DOSING OVERRIDE/TESTING pH DOSING OVERRIDE/TESTING

Temperature Unit

The temperature can be displayed in Celsius and Fahrenheit, select the units by the switch.

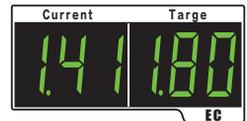
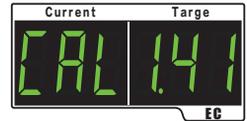
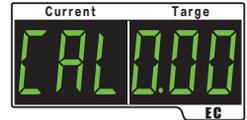


CALIBRATION

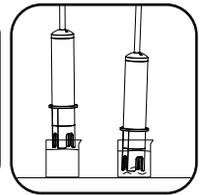
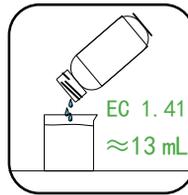
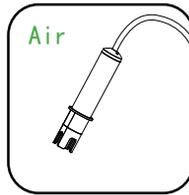
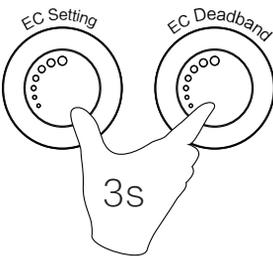
How to calibrate EC sensor

The conductivity sensor is factory calibrated. For accurate measurement, the probe should be cleaned every 30 days. If the EC reading is inaccurate, calibration is requested.

Step 1. Place the cleaned EC sensor in the air, press both EC Setting and EC Deadband knobs simultaneously for 3 seconds. EC display read “CAL 0.00”, there is 10 seconds counting down. The controller moves to next step, display read “CAL 1.41”



Step 2. Prepare some 1.41 EC calibration solution into a clean dry cup. Sink the EC sensor into the solution. There is 10 seconds counting down. When the calibration is done, display showed the current EC value 1.41.

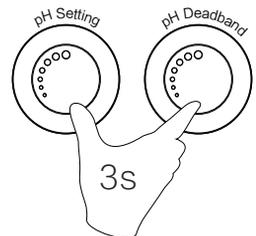


Shake the sensor gently, making sure the sensor immersed completely

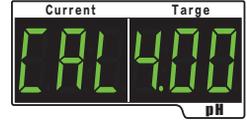
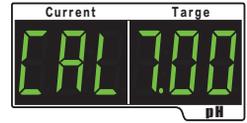
How to calibrate pH sensor

Step 1. Clean the pH sensor with fresh tap water. Use the soft toothbrush and gently brush around the glassware to remove heavy contamination. DO NOT knock the pH sensor on the side of container, the pH sensor is fragile.

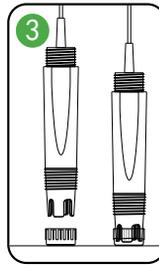
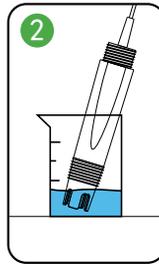
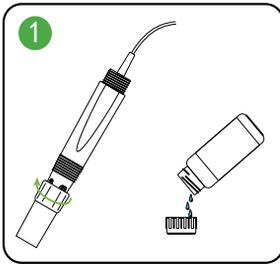
Step 2. Place some calibrations of 4.00 and 7.00 in two clean and dry cup.



Step 3. Place the pH sensor in the calibration solution of 7.00, press both pH setting and pH deadband knobs simultaneously for 3 seconds, display read CAL 7.00, and 30 seconds counting down. After the calibration is done, the controller move to calibration of 4.00. Display reads CAL 4.00 by flashing.



Step 4. Clean the pH sensor with fresh water, place the sensor into calibration solution of 4.00. There is 30 seconds counting down.

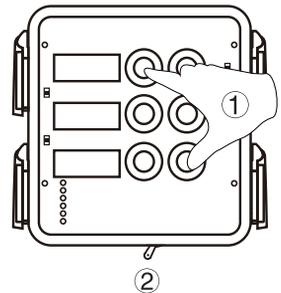


Note: To interrupt the EC calibration, click both knob of EC simultaneously.

Important: The ph sensor should be stored in KCL storage solution to ensure accuracy.

Factory Setting

Press and hold “EC Setting” and “Dosing Time/Mixing Time” knobs to restart the device. When the “FAC” is displayed in the pH interface, the device will be restored to the factory settings, so the parameters will be restored to the default parameter state.



Trouble shooting

a EC&pH sensor inaccurate

Make sure the sensor probe is well cleaned. Calibrations are requested.

The warranty of pH sensor is 6 months. If the sensor is still inaccurate after calibration, please replace a new probe. After the device is installed, there are occasions when the EC/pH fluctuates violently. It cannot be stabilized by conventional EC/pH settings. If this happens, you need to check and solve the problem as follows:

- ① Check the structure of the sampling section to see if the sample is clean.
- ② Check the inspection plane of the EC/pH sensor carbon rod to see if it is clean.

When the data is not normal after cleaning, put the EC/pH sensor into the standard calibration solution to see if the value is accurate.

When viewing the numerical deviation is large, the EC/pH sensor needs to be placed in the standard calibration solution for sensor calibration.

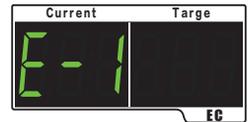
If the problem is not resolved, please contact your dealer/supplier.

Important:

The pH sensor should be stored in KCL storage solution to ensure accuracy.

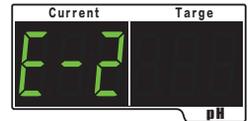
b EC error code E-1

- ◆ Check the connection between sensor hub and controller.



c pH error code E-2

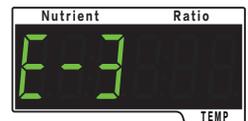
- ◆ Check the connection between sensor hub and controller.
- ◆ Check the connection between EC sensor and sensor hub.



d Temperature error code E-3

If the calibration fails during 5 minutes, display reads E-3.

- ◆ Check if the sensors are well sunk in the calibration solution.
- ◆ Check the calibration solution is correct.
- ◆ Check the sensor connections.
- ◆ Check if the sensors are damaged.



Please contact your dealer if the problem can't be solved.

e If the peridoser not working

- ◆ Check the setpoint on the controller, if the peridoser should be triggered
- ◆ Check the operation mode is control or monitor, the peridoser will not dosing under MONITOR mode. There is 30 seconds delay when switch from MONITOR MODE to CONTROL MODE.

Check the connection of the power adapter

Specification

	pH	EC	Temperature
Setting Range	0.0-14.0	0.0-9.9 EC	(n/a)
Unit	pH	EC (mS/cm ³)	°C/°F
Accuracy (25°C/77°F)	0.1pH	0.1EC	1°C/1°F
Calibration	Two points (pH4.00/pH7.00)	Two points (0EC/1.413EC)	(n/a) (n/a)
ATC	YES	YES	(n/a)
Operation Environment	Temp:40-105°F / 4-40°C, Humidity ≤ 95%		
Power Input	AC110-240Vac /50-60Hz		
Power Output	AC120Vac /14.5A AC240Vac /10.0A		
Peristaltic Pumps	PHEC-B2 P1000	PHEC-B2 P70	
	1000ml/min	70ml/min	
Control Mode	Monitor/Control Mode		
Alarm	High/Low alarm, audible or mute		(n/a)
Peridoser setting range	Dosing time: 3-60s	Dosing time: 5-120s	
	Interval time: 10-300s	Interval time: 10-300s	
PC connection	RS485(ModBus)		
Controller Dimension (LxWxH)	17.83cm × 18.79cm × 7.59cm		
Sensor Hub Dimension(LxWxH)	15.80cm × 7.00cm × 3.7cm		
Sensor cable length	5m	2.2m	

Limitation of liability

The warranty term is for 1 year beginning on the date of purchase. Misuse, abuse, or failure to follow instructions is not covered under this warranty. Babala will not be liable for any consequential, indirect, or incidental damages of any kind, including lost revenues, lost profits, or other losses in connection with the products.

