

# **EC Mini Controller**

## **Installation and user guide**

**Simple, Robust, Reliable**

- **Measures EC or CF or TDS**
- **Doses nutrients on-demand as they get used up**
- **Displays EC (or CF/TDS), Total Dose count (DCT) and Dose count per hour (DC/h)**
- **Direct drive dosing valves or dose pumps (keeps costs down)**

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## **Important notice:**

When using automatic dosing equipment all chemicals must be in dilute form, especially any liquids that are acidic.

If a small mixing tank is used, the nutrient stock solutions must be very dilute in order that the valves can open for a reasonable time (at least 2 or 3 seconds) without overdosing.

## **1 - Introduction to the pH Mini Controller**

The EC Mini Monitor/Controller is from a family of monitors and dosers that have been proven over many years. This new Monitor/controller has but built upon this pedigree of simplicity and innovative features.

### ***Features***

The EC Monitor/Controller may be used as a simple monitor or may have two solenoid valves or peristaltic pumps added to turn it into a complete dosing control system.

### ***Fail safe dosing***

Dosing may be inhibited if any of the following is detected.

- EC sensor module failure
- Dose count per hour exceeded (DC/h)

The last of these is useful if a leak should develop or the pump fail and should prevent continuous dosing

### ***Alarms***

The alarms can be enabled to operate on the controller when the EC or DC/h deviates outside the user set-point.


### ***Outputs***

The 24VDC outputs allows direct drive of 24VDC solenoids or small peristaltic pumps. Always ensure that the current capability of the power adapter is greater than the current draw of the solenoids or pumps. The pumps that we supply take a peak current of 1Amps. The controller has a maximum current drive ability of 1A. Note that although we normally supply a 24V DC adapter, this controller will operate from 12V to 24V either AC or DC. Note that whatever voltage is applied will be present at an active output. For this reason

the solenoid valves or pumps must match the voltage, capacity and AC/DC of the power adapter.

## 2 - Menu structure and settings

The menu structure of the MiniController is split into 2 sections, “Readings” and “Settings”. Toggling between the 2 menus is achieved by pressing the “Menu” button. Once in the Readings or Settings Menu, navigation is achieved through the “Up” and “Down” arrow keys. Settings may be changed by holding down the “Edit” button and then pressing the “Up” or “Down” arrow keys.



<b>Readings</b>		
Display EC		
Display Dose Count Total (DCT)		
Display Dose Count per hour (DC/h)		
Display System Status		
<b>Settings</b>		
S1	Set Point	The Desired ECLevel
S2	Dose time(secs)	The time in seconds that the solenoid valve will open in order to add nutrient.
S3	Dose interval	The time in minutes between doses to allow for mixing to occur.
S4	Force Dose	This forces a Dose to occur straight away.
S5	Alarm Deviation	If the measured EC deviates from the set-point by more than this value the alarm will sound (if enabled).
S6	Alarm Dose Count	If the Dose Count per hour reaches this value then the alarm is sounded and the dosing is inhibited (if enabled).
S7	Alarm ON/OFF	This enables/Disables the Alarm functions.
S8	Calibration	Calibrate using 27.7 EC buffer.
S9	Temperature Unit	Select between *C of *F
S10	Conductivity Unit	Select between EC, CF, TDS

The new setting is automatically saved when the edit button is released. Some “Readings” can be zeroed; to do this hold down the “Edit” button and then press the “Down” arrow.

### ***Dose and dose interval timings.***

Dose times and interval are set by trial and error. The smaller the reservoir the smaller the dose times need to be. The strength or concentration of your stock solutions will also affect the dose time setting. Obviously, the stronger the stock solution, the shorter the time that the solenoid valve needs to open for. If you are using a small reservoir tank you must ensure that your stock solutions are very dilute. Ideally, you should try to achieve a change of, about, 0.1EC (1CF or 50ppm) for each dose.

The dose interval is set to allow time for a dose to fully mix in before the controller makes the decision as to whether another dose is required. Normally set to 1 or 2 minutes for a small tank and up to 10 or 20 minutes for very large commercial systems.

If the dose interval is set to zero then the valves will open continuously while the measured EC is below the set point and close as soon as they exceed the set point. This feature can be used as a simple in-line injection system in which irrigation water is rapidly taken from a small tank and fresh water is simultaneously added such that rapid dosing is required in order to maintain the EC.

### 3 – Installation

Mount the MiniController within 1.5 meters of the sample pot but in a position well away from water splashes or mist/vapor rising from the reservoir tank. It should be mounted in a cool, dry place out of direct sunlight. The sample pot is typically mounted low down, just above the reservoir tank. This ensures that the flow through the sample pot is unlikely to stop completely if there is a partial loss of pressure in the system (e.g. pump filter partly blocked)

#### ***Peristaltic pumps***

You can direct drive 24VDC peristaltic pumps if you have the appropriate power supply. The small pumps available from our distributors draw a current of up to 1.2 Amps.

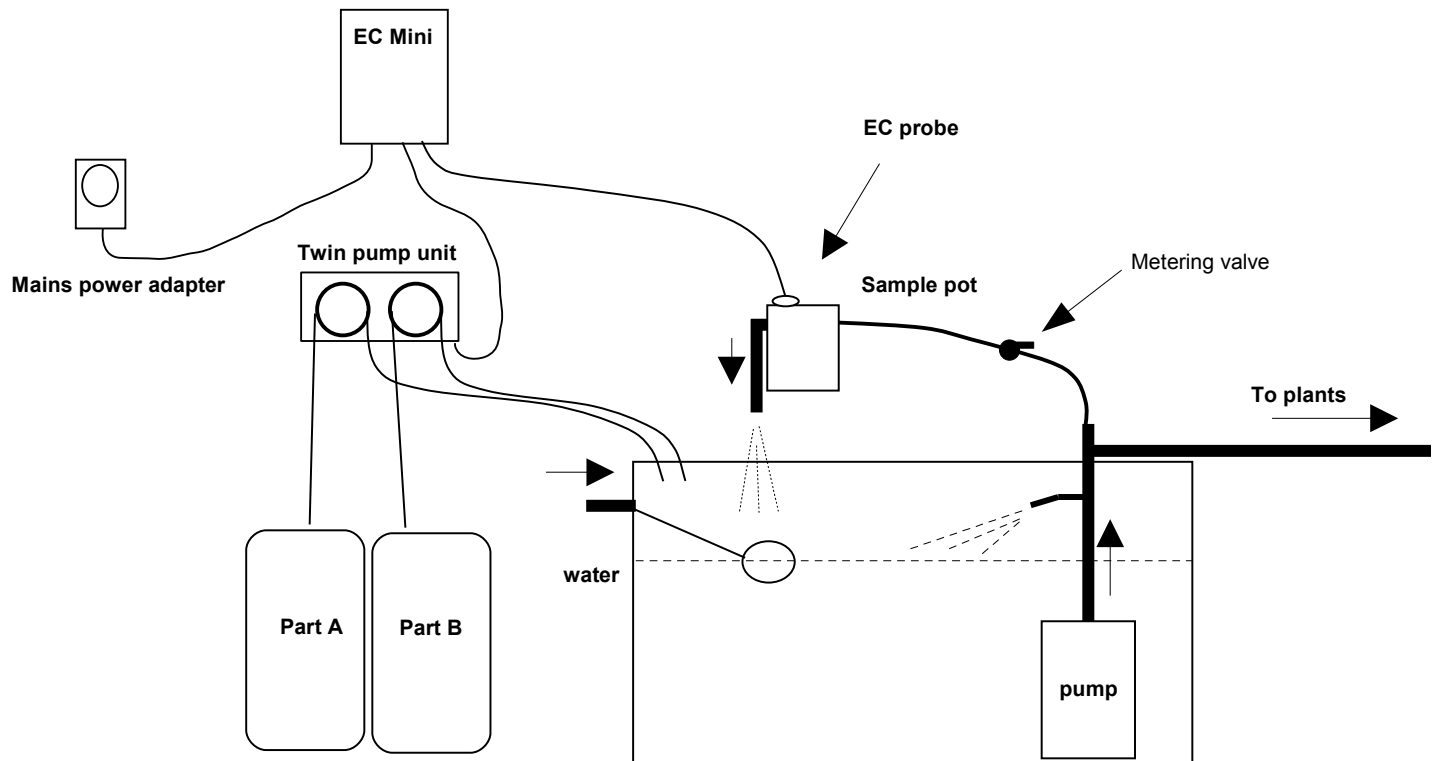
#### ***Solenoid valves***

You can direct drive 24VDC solenoid valves. Check that the current rating of the power supply is adequate for the valves or pumps used.

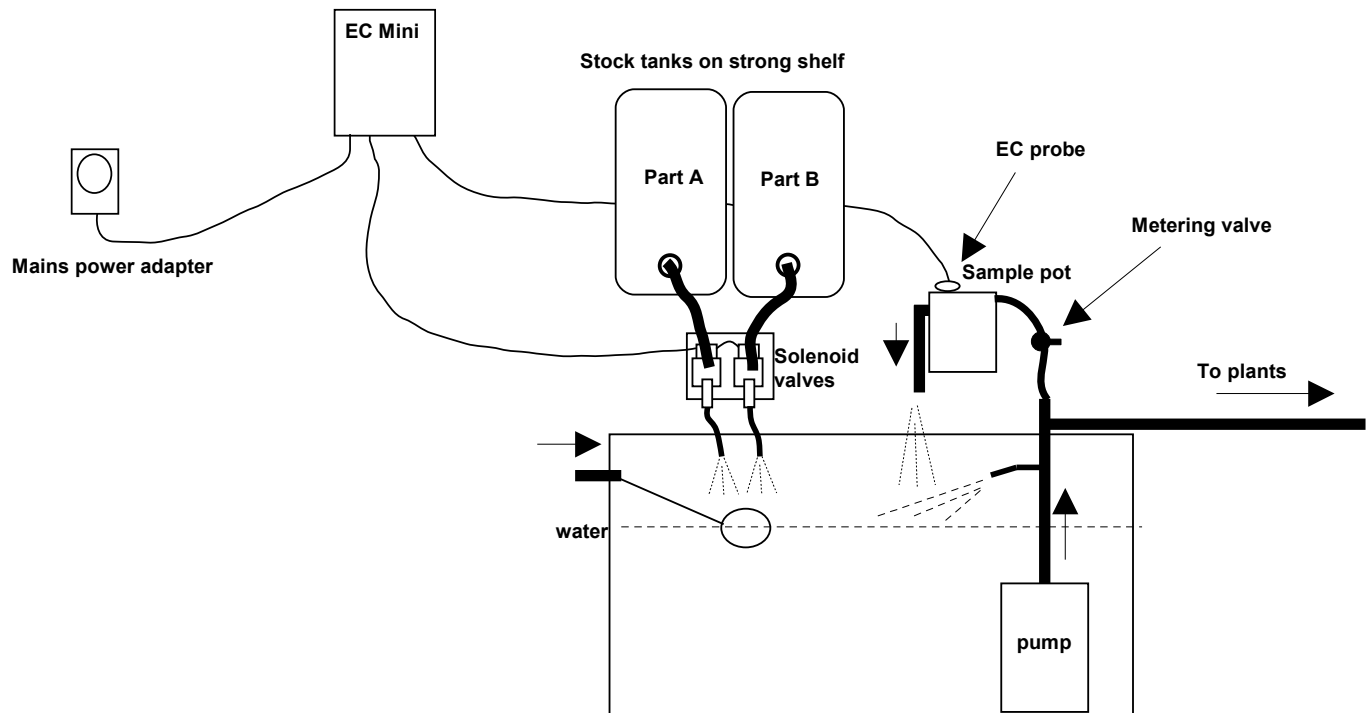
#### ***HINT:***

- (1)Keep sample pot low down, just above top of tank as many small pumps have quite low head pressure capability***
- (2)Mount MiniController away from spray and humidity from tank and stock solutions***
- (3)A small jet of water may be directed over the surface of the tank to stir and aerate the nutrient solution. This can be achieved by heating and squeezing with pliers, one outlet from a Tee fitting. Ensure that your pump has sufficient capacity to do this.***

## *Typical installation using peristaltic pumps*



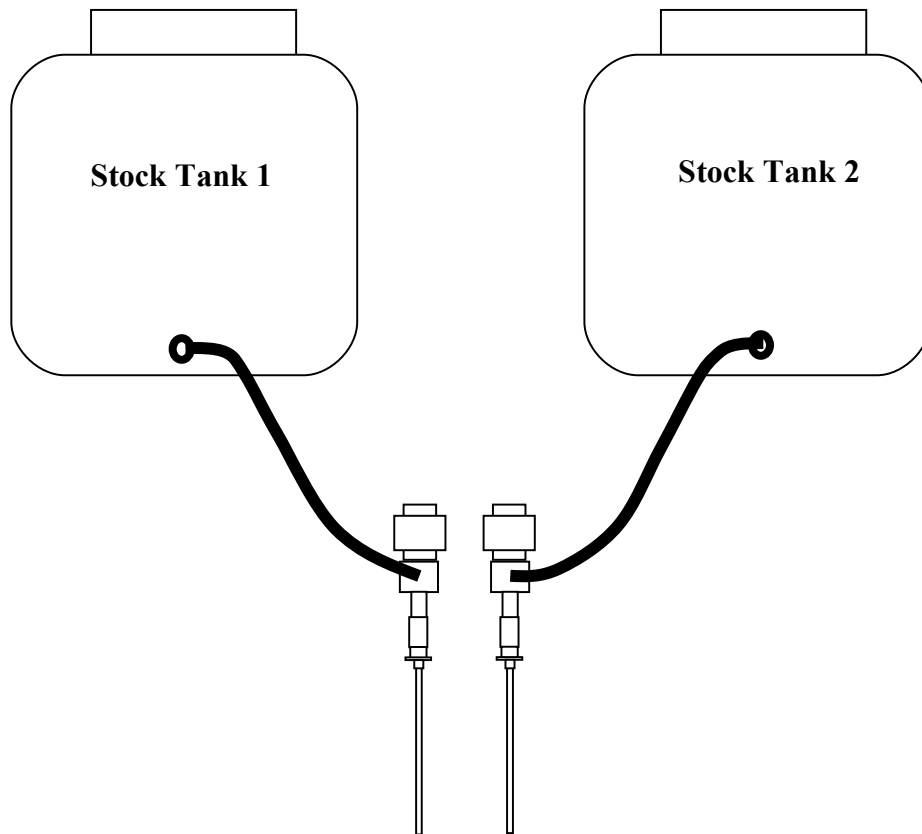
## *Typical installation using solenoid valves*





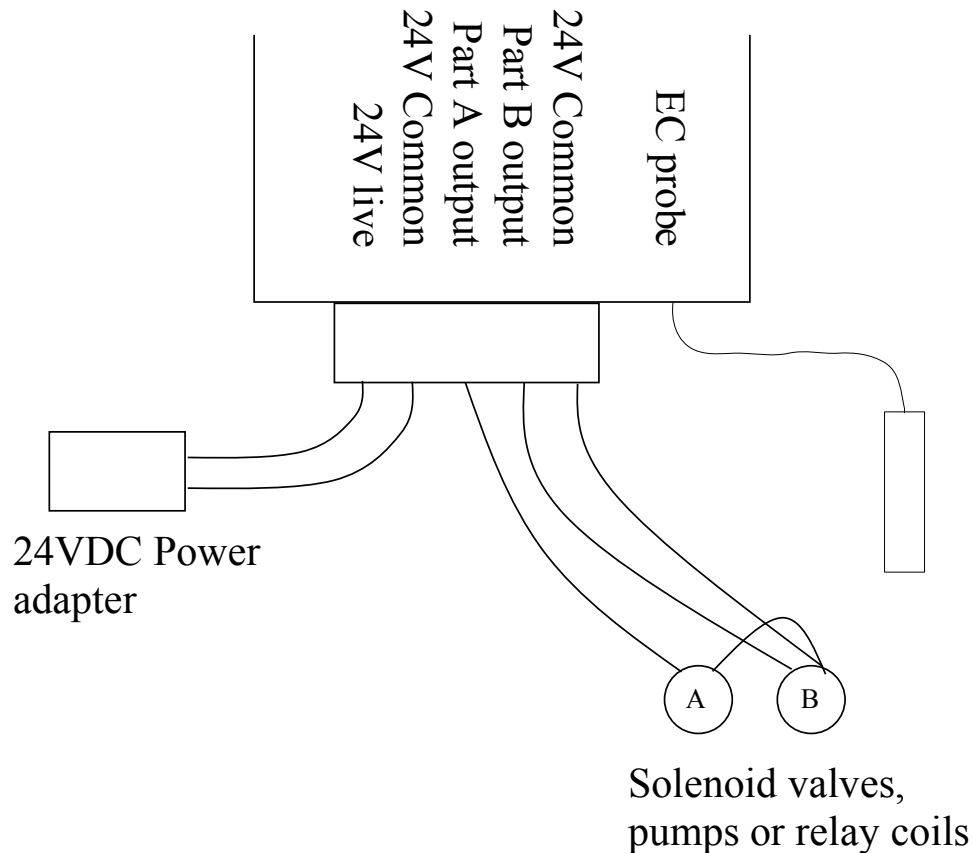
### ***To install stock tanks and solenoid valves***

- 1) If the stock tanks are to be installed on a raised shelf this must be attached to the wall in a very strong way as full stock tanks can be very heavy, and if the shelf was to give way could result in a serious injury. If in doubt, get a skilled tradesman to install the shelf.
- 2) Carefully drill clean holes near the bottom of the stock tanks. Insert the tank fittings and tighten securely. Thoroughly clean out the drums. Attach the flexible hose to the tank fittings and lead down to the solenoid valve board. Push the tubes on to the inlet at the front of the valves
- 3) Fit the reducers and thin tubes to the bottom outlet pipes. Thin 5mm tube is used here to restrict the flow through the solenoid valves, which might otherwise be too great for small systems.
- 4) After filling the stock tanks, leave the lids loose to allow air to enter the tank as the stock solution is drawn off via the solenoid valves. (or drill a small hole through the lid)



## Wiring diagrams

### EC Mini Controller (viewed from front)



Note that all the connections marked “24V **common**” are connected together internally and you may connect the return wire from any solenoid valve or pump to any of these commons. The 24V live wire is normally marked by a white stripe or white printing along its length.

## 4 – Maintenance

### ***Cleaning the EC probe***

The face of the EC probe must be kept in pristine condition. Never touch with the fingers which may carry oily deposits from perspiration. The probe face may be cleaned removing the shroud and by brushing with a soft toothbrush or clean kitchen Scotchbrite (fine nylon scourer) with a little liquid scouring liquid such as Jif or Soft Scrub. Rinse thoroughly with clean water.

### ***Calibrating***

Every week you should check the EC calibration.

To do this, place the probe in the 2.77 (CF 27.7) standard solution and allow to stand for 5 minutes. The reading should be 2.8mS/cm +/- 0.1 mS/cm. If not, navigate to the calibration screen, hold in the edit key and use the up/down arrows to correct the displayed reading. When the edit button is released the new calibration will be saved.

Next rinse the probe in fresh water and shake off excess water.

### ***Peristaltic pump maintenance***

These require very little maintenance other than occasional greasing of the rubber tubes (using special rubber grease from the manufacturer). The grease may be applied via the two greasing access points in the clear plastic pump covers.

When the tubes become flattened they should be replaced.

Hint: it is sometimes possible to extend the life of the tube by sliding the tube around a little so that a new section of tube is exposed to the rollers. To do this, loosen the two screws in the front cover, slide

tube and then re tighten. Finally, add extra grease via the two greasing points in the front cover.

### ***Solenoid valves***

These need very little maintenance but if the flow rates of the A and B solutions becomes unequal the valves can easily be opened up for inspection and cleaning. If a valve stops working completely there is a possibility that the solenoid coil has become defective. The coils can be replaced.

### ***General maintenance***

Frequently inspect your system for leaks and repair these as soon as possible. Water dripping onto solenoids or pumps will soon cause them to fail. Ensure the controller, pump unit and solenoids are kept clean and shielded from all water splashes and vapors.

## 5 - Fault finding

- 1) Unit is completely dead – ie no display, no power light and no outputs

Check that the power pack is functioning (by measuring with a voltmeter if possible) and that it is plugged in, switched on and properly connected to the controller. If the unit still fails to function then the probability is that the internal 1A fuse (20mm x 5mm miniature glass fuse) may have been blown. The most likely cause of this happening is that wires connecting to the solenoid valves or pumps have touched together and shorted out. To fix this, it is important to clear the fault first. Inspect all wiring and ensure that all wires are well insulated right to the point where they enter the connector. Also check the connections at the solenoid valves. Then replace the fuse with a genuine 1A fuse (maximum 2A). **DO NOT ATTACH WIRE OR ALUMINUM FOIL ACROSS IT.**

- 2) Cannot calibrate. Clean the EC probe
- 3) EC fails to dose. Ensure that the controller is set correctly and that the measured EC is consistently below the set point.  
Check that the Dose count per hour has not exceeded the alarm value – if so, reset it to zero and observe operation to see why it is excessive
- 4) EC overdoses. Check that the dose time is not excessive. Each dose should change the EC by about 0.1EC (1CF)

## **6 – Warranty**

The warranty on the controller is limited to 2 years – return to factory. Before returning the unit for service you must call Autogrow Systems Ltd for a return authorization .

EC sensors carry a 12 month warranty, solenoid valves and pumps carry a 12 month warranty from their respective manufacturers. Pump tubing has no warranty.

This warranty specifically excludes any parts that have been broken or damaged by water, chemical attack or excessive temperature. In particular, the controller and power adapter must be stored and used in a dry, shaded and well ventilated situation. At no time must the case temperature be allowed to exceed 55 deg C (130 deg F).

This warranty expressly excludes liability for consequential damages or for charges for labor or other expense in making repairs or adjustments, or loss of time or inconvenience.