

AutoFog Controller

Ideal for cooling and humidifying greenhouses and grow chambers

- **Operates humidifying fans (spinning disk type)**
- **OR High pressure fogging system with 6 zones**
- **OR Low pressure fogging system with 6 zones**
- **Operates stirring fan**
- **Adjusts fog quantity proportionally to error**
- **Used to lower temperature AND/OR to humidify**
- **PC computer interface**

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Autogrow Systems Ltd

www.autogrow.com

Ph +64 9 415 2380

1. Overview

In brief:-

Outputs

The AutoFog has six 24V AC outputs with current capability of 1A each

When set up as a high or low pressure fogging system the outputs are as follows:-

1. Stir fan (optional)
2. Pump
3. Zone 1
4. Zone 2
5. Zone 3
6. Zone 4
7. Zone 5
8. Zone 6 (or alternatively, ALARM output)

When set up as a spinning disk, fan fogger the outputs are as follows:-

1. Fan control
2. Spinning disk
3. Water control
8. ALARM

In addition to the alarm output the unit has a built in sounder

Inputs

- Senses temperature and humidity using the Autogrow aspirated enviro sensor

The above are used to intelligently control temperature and humidity in a growing environment.

The function of the AutoFog controller is to measure and control the environment temperature and humidity by operating a fog generating fan unit or a pump driven nozzle type fogging system. Settings are available which enable the controller to use fogging to lower the temperature when it becomes too hot and also to fog when the humidity is too low.

Fogging to reduce temperature will only occur if the humidity is not too high. The user selects the temperature at which fogging can commence and also the maximum value of relative humidity at which fogging is permitted. If both of these conditions are met then fogging will commence. In the case of the spinning disk fogger this is achieved by first starting the fan and then the spinning disk. The water solenoid valve is then pulsed on and off to create “puffs” of fog. The user selects the minimum and maximum fog ON times as well as the fog OFF time. Within these limits the controller will vary the puff size in proportion to the error. So, for example, if the temperature is 1 degree above the set point then a very small puff of fog will be produced. If the temperature continues to

rise then the puff size will get bigger until the temperature is 5 degrees above the set point when the maximum puff size will result. Similarly, for a pressure fogging system, the puff size is varied according to the demand for cooling or humidification.

In the case of humidification, the puff size increases every time the RH increases by 2% so that the maximum puff size is reached when the RH is 10% below the set point

Measurements:-

The standard Autogrow aspirated sensor box (or the mini aspirated sensor) is used to measure temperature and humidity which is fed to the controller by means of a single cable.

2. Settings

The controller is set by pressing the mode button to get the required main menu item, then pressing the UP arrow to enter the required sub menu and finally pressing the mode button again to move down through the sub-menu to the required screen

When the required screen has been reached, the up or down buttons can be pressed to change the setting, and finally, the save button is pressed to store the changed setting in permanent memory.

MAIN MENU

M0 Readings of temperature, humidity and current status
M0(b) Wet leaf reading (if selected on dip switches)

M1 OVERRIDES

M2 SETTINGS

M3 DATE AND TIME (displays the current date and time)

M4 CALIBRATIONS

M5 ALARMS

M6 SYSTEM

OVERRIDE SUB-MENU

M10 Stir Fan control (RUN, OFF, AUTO)

M11 Fog Control (RUN, OFF, AUTO)

M12 Z1 enable

M13 Z2 enable

M14 Z3 enable

M15 Z4 enable

M16 Z5 enable

M17 Z6 enable

SETTINGS SUB-MENU

- M20 Stir if RH above xx%
- M21 Fog if temperature above xx deg (for cooling)
- M22 but only fog if RH is below xx% (for cooling)
- M23 Fog if RH is less than xx% (for humidifying)
- M24 but only if temperature is above xx deg (for humidifying)
- M25 Pulse ON time minimum (secs) (calculates the puff size between these limits)
- M26 Pulse ON time maximum (secs)
- M27 Pulse OFF time (minutes and seconds) (time between puffs)
- M28 Allow fogging: Day/Night/Both/OFF
- M29 Allow Stir fan: Day/Night/Both/OFF

DATE _ TIME SUB-MENU

- M30 Set minutes
- M31 Set hours
- M32 Set Day
- M33 Set Month
- M34 Set Year
- M35 Set Sunrise time
- M36 Set Sundown time

CALIBRATION SUB-MENU

- M40 Calibrate RH (adjust the Cal value to match a precision RH meter)
- M41 Calibrate Temperature
- M42 Calibrate Solar sensor zero (if fitted)
- M43 Zero Solar sensor scale (if fitted)
- M44 Calibrate Solar sensor scale (if fitted)
- M45 Return all calibrations to factory defaults

Alarms SUB-MENU

- M50 Alarm enable ON/OFF
- M51 Temperature minimum
- M52 Temperature maximum
- M53 RH minimum
- M54 RH maximum

SYSTEM SUB-MENU

- M60 Communications address (for PC communications)

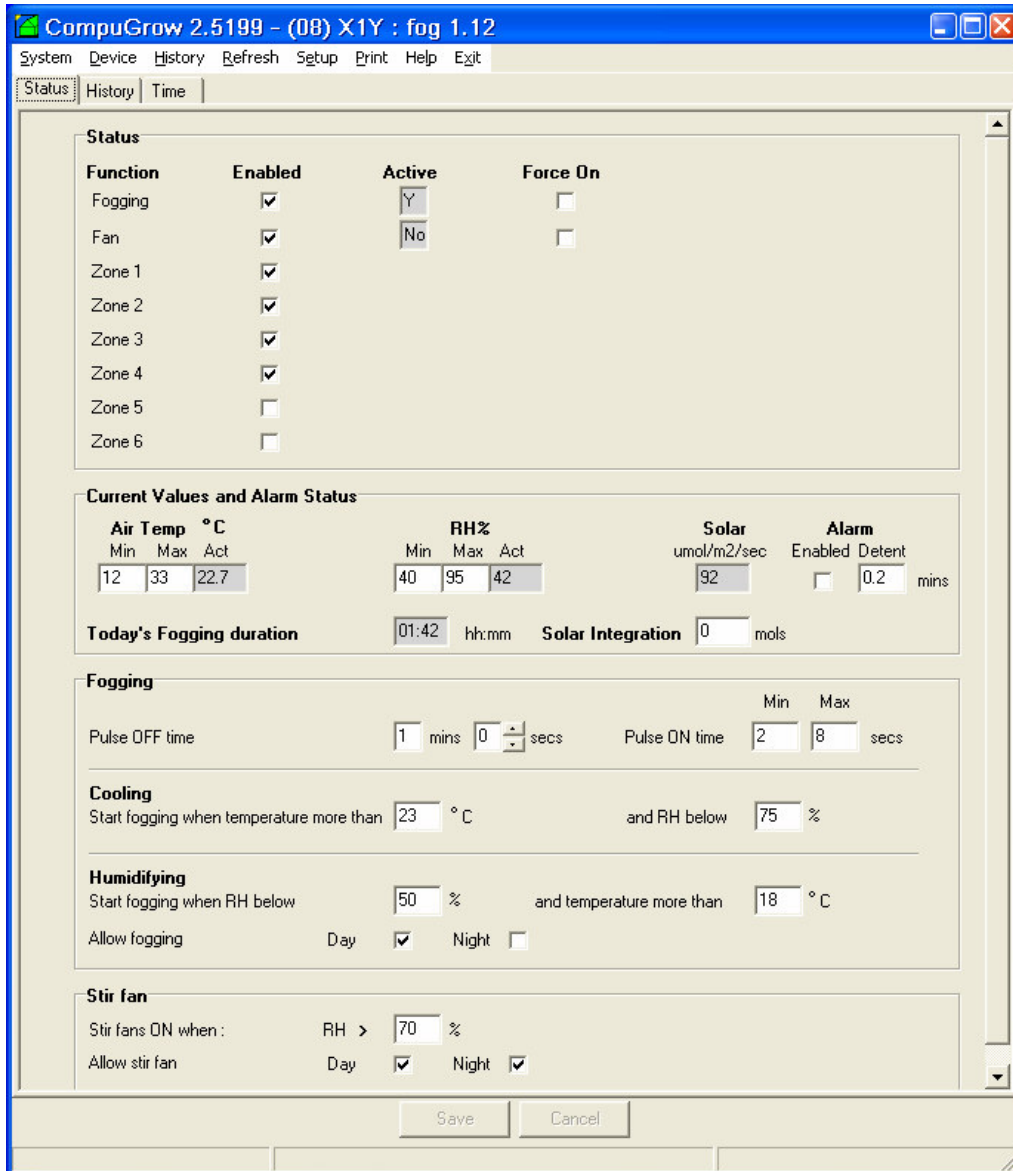
FACTORY DEFAULT SETTINGS

To return the controller to the factory default values do the following:-

Switch off the power and wait 30 seconds. Hold the MODE, SAVE and DN buttons pressed while switching on. The values loaded give a good starting position for most system.

3. Using the PC

Setting the controller from the PC is extremely simple as all the settings are available on one screen.

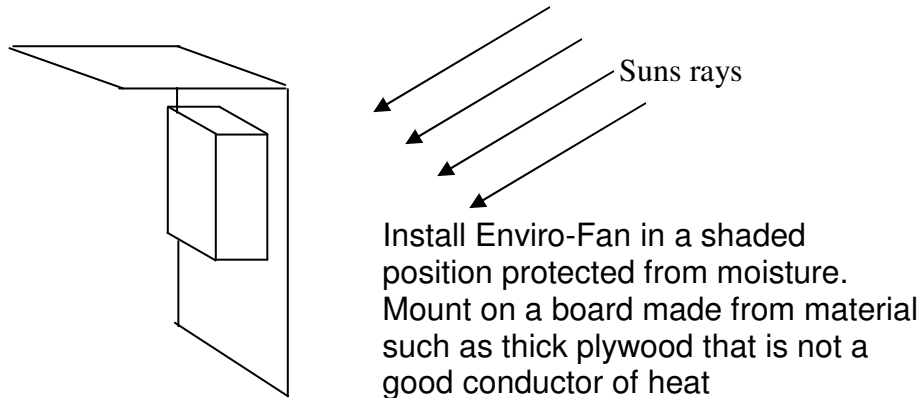


In addition to the settings, the measured data is logged and displayed graphically. In the history tab you can view graphs of all the data that has been logged. In the Time tab the controller clock can be set as well as the dawn (sunrise) time and dusk (sundown) time.

4. Installation

Install (and store) the controller in a cool, dry well ventilated, shaded position.

Normally this means that a shade cover must be provided in the greenhouse or control room to protect it from the sun's rays. This is important as the surface temperatures of items in a greenhouse or other closed area, in full sun, may easily exceed 60 deg C (140 deg F). **If this is allowed to happen the warranty is voided.** The shade cover will also prevent condensation drips falling onto the controller.



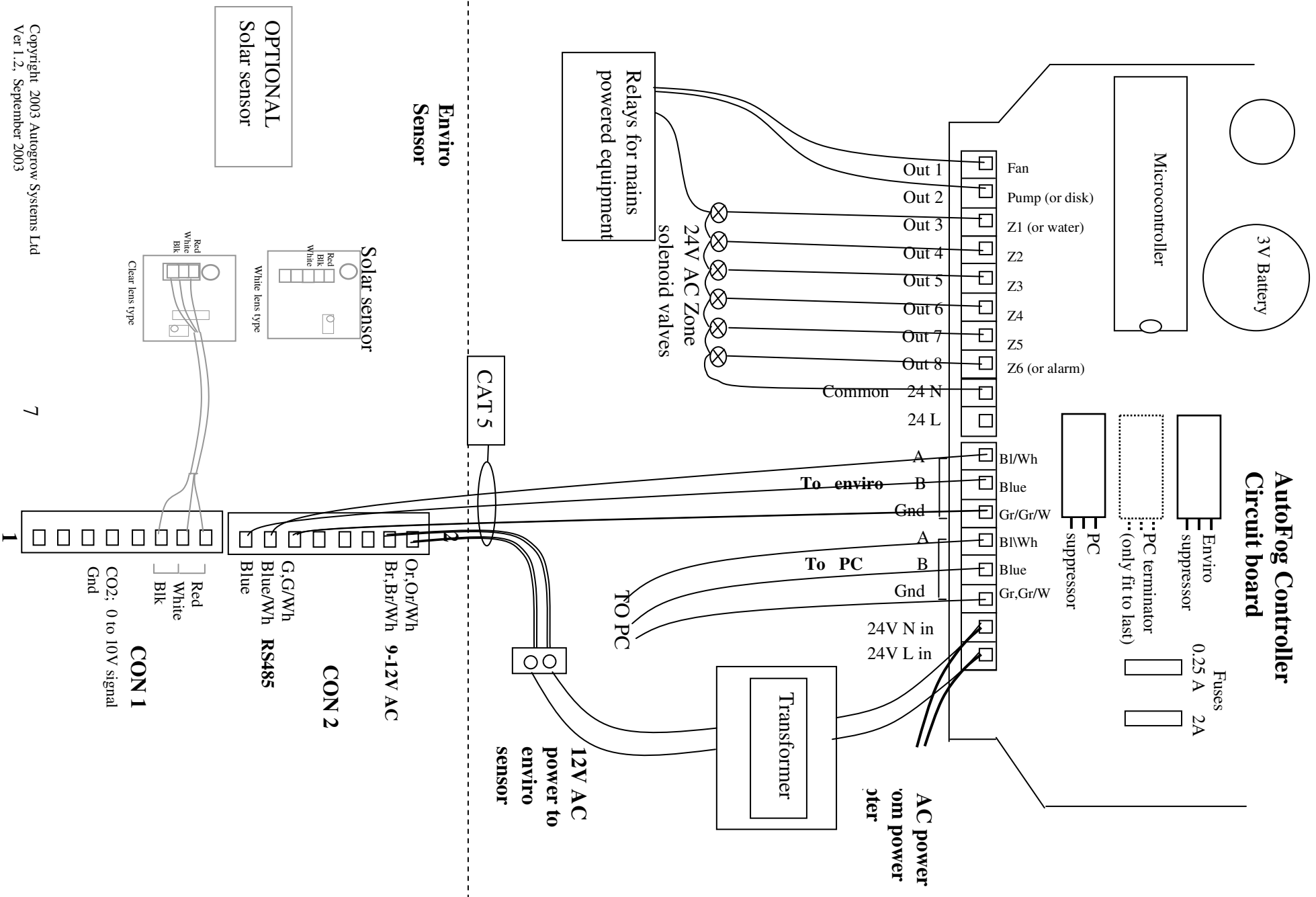
For the longest life the product should not be exposed to high temperatures or humidity for long periods of time.

Install the aspirated temperature and humidity sensor close to the growing canopy so the air that is sampled is representative of the air experienced by the crop.

Avoid spraying chemicals directly onto the enviro sensor box or the controller. If connected to a PC, then pause the fan for a suitable period before spraying. This can be done from the "setup" menu on the PC.

Connect the units using **STRANDED** CAT5 cable as shown in the following diagrams.

AutoFog Controller Circuit board



Switch settings

The dip switches are used to configure the controller to suit the application that it is used in. For example, is it to be used with a spinning disk fan fogger or with traditional pressure fogging/misting.

The switches should be moved to the ON position in order to select the named function. In the off position the default configuration is selected.

- Switch 1 Spinning disk fan/fogger (default is pressure fogging)
- Switch 2 Stir fan installed (default is no stir function)
- Switch 3 Alarm output required (default is no alarm output)
- Switch 4 Pump ON during wait interval (default is pump OFF)
- Switch 5 Must be OFF
- Switch 6 Must be OFF
- Switch 7 USA date format (default is UK format)
- Switch 8 Temp in degrees F (default is deg C)

Notes:

Switch 3:-

The zone 6 output may alternatively be used for a remote external alarm. This output is 24V AC and if a “voltage free” contact is required for an autodialler or alarm system then a small relay with 24V AC coil may be connected to this output.

Switch 4:-

This switch programs the pump output so that it runs continuously during a fogging cycle even during the wait period when no zones are open. Alternatively the pump may be allowed to turn off during the wait period.

Switch 5:- not used must be left off

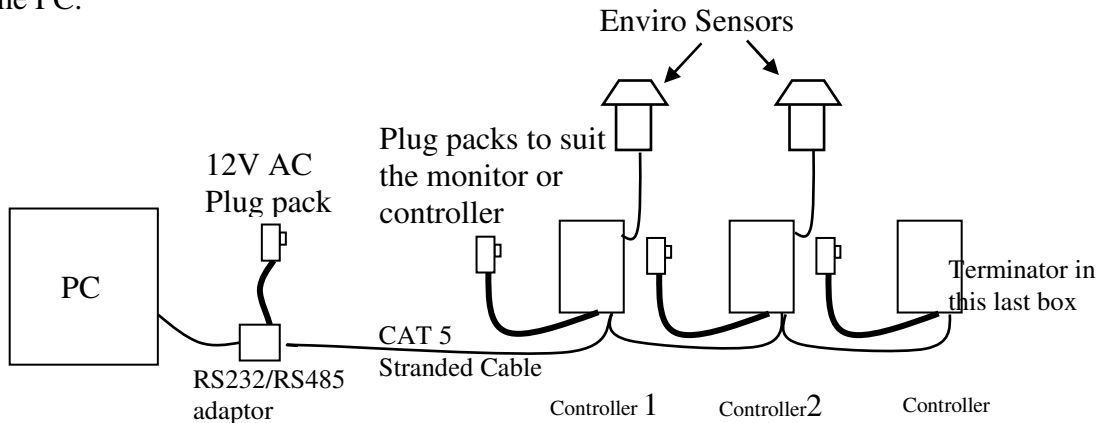
Switch 6:- not used must be left off

Switch 7:- USA date format mm/dd/yy

Switch 8:- Deg F

5. PC Interface

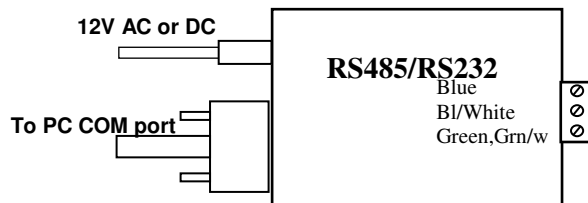
Controller addresses. When the PC requests data from a monitor or controller it first sends the address for that monitor. All monitors/controllers must have a different address and this is set pressing the “MODE” button to get to the “System” sub menu. The base address for these monitors is 34. Press the up or down arrows to change the address and when the required address is displayed, press save to store it in permanent memory. Set up the controllers in sequence starting with the first one at 34 and working upward from there. ie set the first controller to 34 the second to 35 the third to 36 etc. Make a note of the address of each controller and its type as you will need to enter this information on the PC.

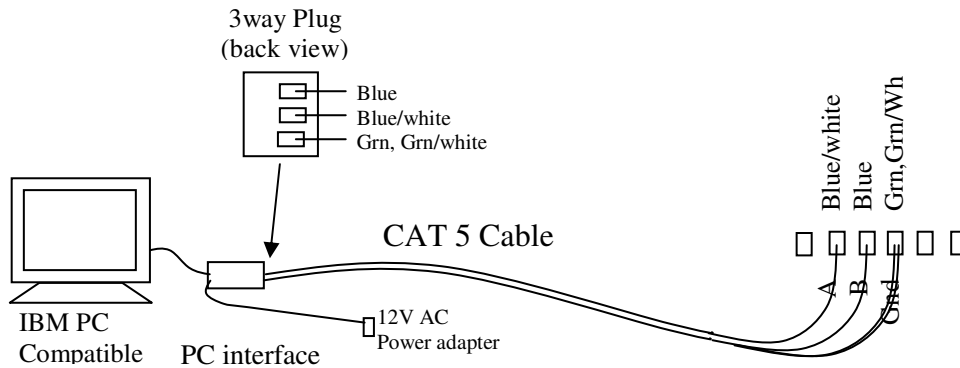


Terminator. If this is not the furthest monitor/controller from the PC then the terminator must be removed and the Data comms cable will be connected as shown and will then loop back out of the box and on to the next monitor/controller. Only the furthest monitor should have a terminator connected. See connection diagrams above.

The PC Interface.

The RS484/RS232 optically isolated interface box should be installed adjacent to the PC computer. It requires a 12V AC supply. A lead is supplied to connect this to a free DB9 COM port on the back of the PC. The CAT 5 cable should be connected as shown below.





Connection of PC interface to the TRS2000

Software installation

The CompuGrow software is suitable for PC compatible computer running Windows 95/98/Me/2000/XP. The computer must have a free serial COM port and should be a Pentium or better. If no serial port is available a USB port with a USB to serial converter may be used.

To install the software on your PC, insert the disk in drive A and execute the CompuGrow install program. This will self-install the software onto your hard drive. You will be prompted during installation to select a folder. The default folder is C:\Program Files\Compugrow\ . When the program is executed it will create some sub-folders under the main folder. Each system (greenhouse group) installed will have its own sub-folder where the files for each of its monitors is stored. Each file will save the data for the whole current month.

Setting up the PC software. When the Compugrow software is first executed the first task is to select the serial COM port that the RS232/RS485 adaptor is connected to. (Note that the adaptor must be one supplied by Autogrow as it performs some special functions as well as converting the signal levels.)

Next, go into Main/setup/add system and add the systems or group names for your monitors. For example if you have say two greenhouses (maybe one growing tomatoes and the other lettuce) and the lettuce greenhouse is divided into two growing systems, say lettuce-main and lettuce-nursery then you might add three systems:- Tomatoes, Lettuce1 and Lettuce2. Once you have allocated names to your systems the next job is to allocate the monitors to each system. To do this, go into Main/setup/configure and select the first system. Now add a short name for each monitor and alongside enter its address number and select the type of monitor that it is. EPT = EC/pH/Temperature, EPR = EC/pH/RunOff, TRS = Temp/RH/Solar

When you save this information the PC will try to communicate with these monitors on the selected port.

If it fails to communicate this could be due to a number of factors:-

- 1) Wrong COM port on PC selected or COM port not installed
- 2) No power to monitors
- 3) No power to the PC adaptor

- 4) More than one monitor with the same address
- 5) Address set on PC different to address set on monitor
- 6) Wires crossed between monitors and PC adaptor
- 7) No terminator fitted at furthest monitor in the chain
- 8) Terminators left inside the boxes of the intermediate monitors or two terminators fitted at the end monitor (one inside the box and the other outside)

Finally set the logging frequency to be either every minute or every 5 minutes. The software creates one file for each monitor for each month..

6. Fault-Finding

RH reading incorrect – check calibration and replace the plug-in sensor.

No temperature or RH reading – check power supply to the enviro-sensor – check cable to enviro-sensor.

No communications to PC – check cable between PC and controller. Check power supply to PC interface. One of the PC interface lights should blink as the power to the interface is switched off/on. Click on “refresh” and ensure that one light on the PC interface blinks. If one light blinks but not the other then check that the controller address matches that set on the PC. If neither blink then check that the correct PC comm. Port is selected and that the PC is functioning correctly. The last thing to try is to remove the suppressor diodes from all of the controllers and the PC interface. If this clears the fault then reinstall them one at a time until the faulty suppressor is found.

Graph missing on PC. Check date and time are correct.

Other operational functions can be checked by adjusting set-points to force the suspect operation to activate. Remember to allow sufficient time for a response when doing this.

It is often useful to return the controller to its factory default settings as described below.

FACTORY DEFAULT SETTINGS

To return the controller to the factory default values do the following:-

Switch off the power and wait 30 seconds. Hold the MODE, SAVE and DN buttons pressed while switching on. The values loaded give a good starting position for most systems.

7. Maintenance

Periodically, brush away any dust and fluff from the underside grill of the enviro-sensor. If badly contaminated then it is advisable to also clean inside the case. Switch off power to the Enviro-sensor and open the case by removing the front plate then withdraw the plastic box and fan assembly. Carefully, brush any dust from the fan and observe the condition of the little slots on the side of the RH sensor (the larger white round sensor). If clogged then replace the sensor (simply pull out the old one and insert a new one).

Ensure the fan turns freely and is clear of obstructions. Switch on the power and check that the fan rotates quietly. If noisy, replace the fan.

After replacing the RH sensor it is advisable to check its calibration against an accurate humidity meter.

Calibrations should be made by comparing the reading with an accurate instrument that has recently been laboratory calibrated. In the case of the solar sensor the ZERO must be set first. To do this, completely cover the light sensor so that it is completely dark. Then go into the Zero Solar screen and increase or decrease the CAL reading so that it is 0001. Then press the down button once so that the reading changes to zero. Now save.

8. Warranty

The warranty on the controller and temperature sensor is limited to 2 years – return to factory. Before returning the unit for service you must call your supplier for a return authorization .

RH sensors and fans carry only a 6 month warranty from their respective manufacturers.

This warranty specifically excludes any parts that have been broken or damaged by water, chemical attack or excessive temperature. In particular, the controller and PC interface must be stored and used in a dry, shaded and well ventilated situation. At no time must the case temperature be allowed to exceed 60 deg C (140 deg F).

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