IntelliDose
Installation and user guide

- Doses up to 8 parts of nutrient, additives and pH
- Measures Conductivity, pH, Temperature
- Displays EC, CF, TDS, ^{o}C, ^{o}F, pH
- USB – PC Interface (USB cable and software supplied)
- Variable ratios for nutrient part (change from vegetative to generative)
- Auto schedule of nutrient ratios and EC's
- Proportional Dosing (for rapid dosing between irrigations)
- Direct drive dosing valves or dose pumps (keeps costs down)
- Irrigation with day/night control – precision timer
- Day/Night EC levels
- Water level control – to lower EC
- AutoSet and maintenance wizards
- Software included – compatible with Windows XP, Vista, 7, 8

Autogrow
SYSTEMS

Contents

Quick-start page with helpful hints

Important notice:
When using automatic dosing equipment all chemicals must be
in dilute form especially acids and alkalis.
Acids and alkalis should be diluted to a maximum strength of 2% or less.

Quick-start

This is not a substitute for reading the relevant sections of the manual but is included to emphasise some important and useful points.

Install the controller to one side of the mixing tank where it will not be exposed to splashes and vapours (especially acid vapour). Remember that the sensor leads must be able to reach the sample pot which should be mounted low down just above the top of the mixing tank. **See section H for detailed installation notes**.

Typical installation using solenoid valves
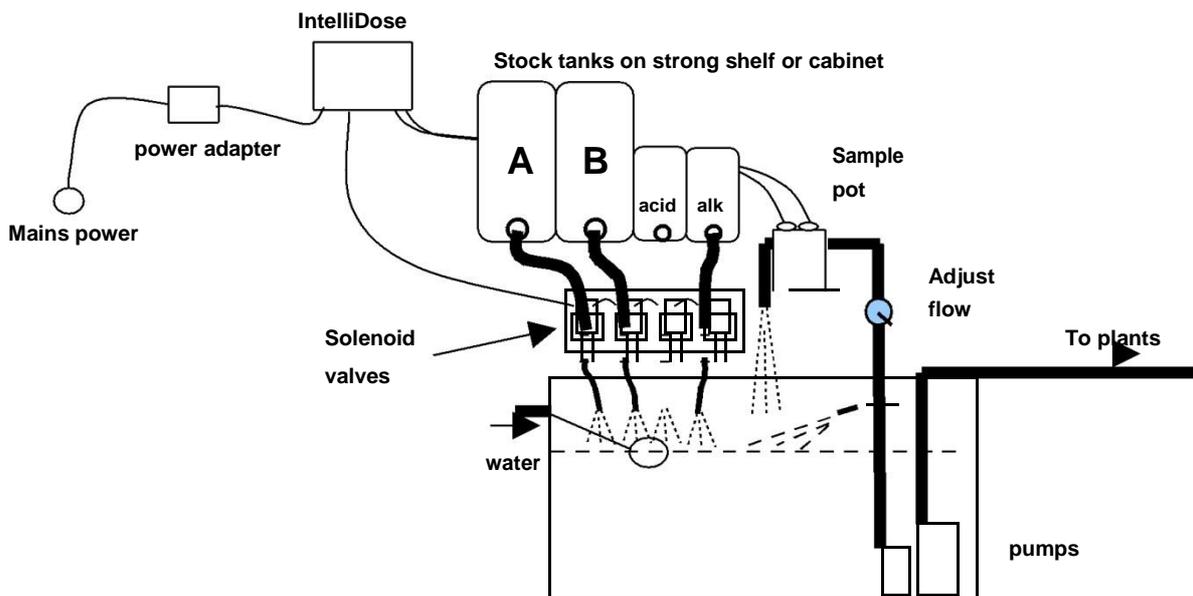
HINTS:
- *(1) Keep sample pot low down just above top of tank as many small pumps have quite low head pressure capability*
- *(2) Mount IntelliDose away from spray and humidity from tank and stock solution, preferably just outside grow room*
- *(3) Adjust the valve in the pipe to the sample pot to achieve a steady flow without excessive turbulence or air bubbles in the sample pot*

Clean the EC sensor and calibrate all sensors before use – see section J for details

Fill all stock tanks and mix tank with plain water and run for a day to check for leaks and observe operation is correct. (This saves the hassle of emptying a stock tank of nutrient or acid if a leak is found).

IMPORTANT:-
When using an automatic doser, the stock solutions and acid/alkali must be **very**
dilute. This is particularly important if a small mixing tank (eg under 250gal)

NB: The acid or alkali for pH adjustment must be diluted to no more than 2%
You may need to experiment with the dilution rate of the nutrients so that a 3 to 8 second dose results in a TDS change of 50ppm (0.1EC or 1CF) and for pH a 3 to 8

second dose results in a pH change of about 0.1pH. In any event, the acid should be diluted to below 2% strength to ensure that it does not react adversely with your nutrient and this will also increase the life of tubing and solenoid valves etc.

It is also important that the tank is continually stirred while dosing and that there is a continuous gentle flow through the sample pot. If the sample pot is mounted too high there is a danger of the flow ceasing if the pump loses pressure (head) for any reason such as wear or partially clogged input filter.

Software installation
When installing software it may be necessary to temporarily turn off your virus checker if you get an error message when the installer tries to copy files into the program files folder.

Windows XP note. It has been found that whenever a new USB controller is connected to Windows XP it detects the new hardware and requests that the drivers are reloaded. When this happens click to allow it to reload drivers and allow it to search for new software and then to install automatically.

Windows 2000 note: Older machines running under windows 2000 may occasionally experience the USB going off-line. We have found that some older machines have USB difficulties if the USB lead is over 2m (6ft) in length. If a cable longer than this is required we suggest using an "active" USB cable. These are available from most computer/electronics stores.

Section A - Introduction to the IntelliDose^{TM} Hydroponic doser

The IntelliGrow hydroponic doser is, without doubt, the most advanced and user friendly small doser on the market. It has a wide range of possible applications which we will discuss briefly in this section. In order to keep the user interface as simple as possible, only the readings and settings relevant to the selected features are displayed on the controllers LCD and on the PC computer. To add extra features you have to select them by going into the configure menus on either the controller or the PC.

Features
A full specification is attached as appendix 1. Here we will review the features available to you. Remember, to enable any feature mentioned here you will need to go into the configuration menus on either the controller or PC to select them. When the controller is supplied it is set up as a simple two-part nutrient plus pH lower, timed dosing controller.

PC interface
A USB cable and IntelliGrow^{TM} software are supplied with the IntelliDose. You have a license to use this software on a single computer and you are permitted to download upgrades at no cost from the Autogrow web site *www.autogrow.com* as they become available. The IntelliGrow 2 software will support multiple controllers which may be any combination of IntelliDose ver 2(USB) and/or IntelliClimate(USB) controllers.

Selection of units
You may select either EC, CF or TDS (ppm) units for the nutrient strength and either degrees C or degrees F for temperature. The acidity or alkalinity is always measured in pH. In this manual we will use EC (electrical conductivity) to denote ether EC, CF or TDS. The date format is selectable between mm/dd/yy and dd/mm/yy formats. (The TDS standard used for this controller is EC x 500 but it is also possible to select ECx640 and ECx700)

Mixing nutrients - IMPORTANT - PLEASE READ THIS CAREFULLY!

When using any automatic doser it is important that the nutrients and acid/alkali are very dilute. The instructions on many dry powdered nutrients tell you to prepare the stock solutions to quite a concentrated level (100:1 or more). Liquid nutrients are also very concentrated. For a small mixing tank this will be too strong and even if very short doses are given the system will overshoot. If using powdered nutrient mix them into water so that for each 1Kg of powder you obtain at least 20ltrs of solution. Liquid nutrients should be diluted with water to make up at least 5 times their original volume. Acids and alkalis should be diluted to be less than 2% strength. (if using strong acids, always wear goggles, gloves and add the acid to the water then stir well). When you have the dilution right you should get a 0.1 mS/cm change in EC when you add around 25ml of A and B stock solutions. In a similar way, the pH should change by about 0.1pH when 25mL of stock solution is added. If it changes by less than this – that is fine but if it changes by more then you will need to dilute the stock solution further.

One part or two part dosing.

For one part dosing only one dosing solenoid valve or pump is used to add nutrient to the mixing tank. When two part dosing is selected then two dosing valves/pumps will be used to add part A and part B stock solutions. In this case it is sometimes found that the part A and part B do not dose at exactly the same rates (one tank empties quicker than the other). There are a number of reasons why this may occur including different pipe arrangements, filters partly blocked, tanks or dosing valves mounted at different heights and even the fact that the two solutions may have different specific densities. To compensate for this you may adjust the two dose rates electronically by reducing either A or B dose rates below 100%. For example if you set A at 100% and B at 95% then B will dose a little less than A each time that a dose is added to the tank. This is set by trial -and-error starting with both A and B at 100%. (Always leave one at 100% and reduce the other)

Multi-part dosing.

With 3 to 8 part dosing, the ratios may be varied to suit a feeding schedule as recommended by the nutrient supplier. In this case the ratios between all of the nutrient parts can be individually varied. A schedule may be added at the PC which will automatically vary the nutrient ratios and EC as required. This can be used to gradually and automatically change the mix from vegetative to generative whilst at the same time gradually changing the EC. Note that on each date specified, the settings change to the new values and then stay at these settings until the next date in the schedule is reached. Once the last entry is reached the settings just stay at those values permanently. It is important to note, that when using variable ratios for the various nutrient part, the dose time must be set to be long enough that the part with smallest ratio still gets a dose of at least one second. When set for more than 2 nutrient parts the dose interval must be set for greater than 0 seconds.

Sequential dosing (default ON)

This causes the dosing pumps or valves to activate in sequence, one after the other and allows high current valves or pumps are connected to the unit without fear of overloading the controller or its power adapter. **If in doubt** about the current required to drive the pumps then **always select sequential dosing**. If 3 or more nutrient parts are selected sequential dosing is enforced to avoid damage to the controller.

Proportional dosing (default OFF)

This causes the dose size to automatically vary in proportion to the error and is useful when you want the tank to dose up quickly. If this is selected then the dose size is specified as both a maximum and minimum dose time. The controller then looks at the size of the error and if large gives large doses but as the EC or pH setpoint is approached, the controller will give smaller and smaller doses approaching the minimum size. This is useful in irrigating (drip) systems that do not re-circulate as it allows rapid dosing after each irrigation occurs. This feature is not available with more than 2 part mixes.

AutoSet

The purpose of AutoSet is to carry out a number of dosing tests to find the most suitable dose timings and dose interval for your system. It requires the system to be

fully functional with a reservoir tank full of fresh water (no nutrients added) and recirculating pump running. Autoset is particularly useful in setting up systems when proportional dosing is required to achieve really fast dosing. AutoSet also calculates the interaction between EC dosing and pH and then takes this into account when dosing pH. This avoids the tendency that some dosers have in overdosing pH lower. Note that if your system is not correctly configured then AutoSet will stop part way through and report what sort of problem it is experiencing. You must correct the problem if the system is to work correctly. **The usual causes for AutoSet not functioning properly are nutrient stock solutions or pH solution being too concentrated or else the pumps/solenoid valves have not been primed with the final solution.**

Different EC for day and night

This feature is useful for crops that need a weaker solution during the heat of the day and a stronger mix when it cools down at night time. (eg to help prevent tip burn in lettuce) The user can define when "day" starts and ends and this does not have to align in any way with actual day time ie you can set day to start at 11am and end at 3:30pm if you wish. Note that the controller is able to both strengthen the mixture (by dosing) and weaken the mixture by adding water.

Automatic addition of water

By installing a mixing tank (reservoir tank) with two water level ball valves, one at a low level and the other at a high level it is possible for the controller to dilute the nutrient tank by adding water. This is does by operating a solenoid valve in line with the high level valve. See diagram later in this manual. This function is mainly of interest to lettuce growers.

Irrigation

This allows a pump to be switched on periodically for a set time to irrigate plants in pots or bags. The irrigation can be specified to operate in the "day only" mode or it can have a different interval set for day and night. For example you could set it to irrigate for 4 minutes every 1 hours 35 minutes during the day and for 4 minutes every 5 hours at night. (or not at all during the night)

Alternatively, it can be set to come one once every day at the same time. This could even be used to operate lighting (instead of irrigation) for indoor crops.

If the pump is a mains voltage pump then a relay will be needed to re-power the 24V DC so that it can supply mains power to the pump. Your distributor should have convenient relay boxes available for this

Fail safe dosing

Dosing may be inhibited if any of the following is detected.
- EC probe failure
- pH sensor module failure
- EC of zero measured
- pH   outside   limits   detected

Alarms

The alarms can be enabled to operate on the controller (buzzer and contact closure), the PC via its sound card and even make a telephone call via the PC modem. If your Telco has a text paging service available then the PC can even send text (SMS) messages to a cell phone. Any enabled alarm will sound when either the EC, pH or temperature deviates outside user set limits.

Outputs

The outputs voltages for dosing and irrigation control are all dependent on the power supply adapter used.

Power supply

The controller requires a power supply between 12V and 24V either AC or DC. Whatever power is applied will appear at the outputs (when they are ON). The default power adapter included with this controller is compatible with the solenoid valves or pumps supplied. Note that the outputs are limited to a current of 1.2A inductive load and 3A resistive load. The power supply should be sized according to the maximum load that can be applied at any one time. The maximum total draw at any one time should not exceed 4A. Normally we supply a 24V DC power supply.

How to use this manual

The IntelliDose has a number of advanced modes of operation and so we have divided this manual into sections, each of which represents a particular feature. Please start by reading section C which gives basic setting information for the one or two part nutrient doser and then refer to the chapters that cover features that you require.

For installation advice, go to the installation section at the back of this manual.

Getting Started.

Follow the installation instructions in the installation section and when everything is installed and connected up do the following.

Switch on the power. Check that the power light on the front panel is on and that the LCD display has some information on it. Install the software on your PCs hard drive. To do this, follow the instruction in section **I** of this manual.

Once installed, execute the IntelliGrow software in the usual way. The IntelliGrow software should automatically detect any connected controllers and should communicate straight away and you will see information from the controller(s) on the PC screen. For new or replacement controllers you will be asked to give the controller a name. Use a short meaningful name like Doser1, Doser2 etc then if you ever add an IntelliClimate it is obvious which is which.

Section B – Settings

B1 – Setting from the PC

ORDER OF SETTING UP A NEW CONTROLLER
1) **Install PC software**
2) **Set the configuration of the controller to match the physical equipment. Print the wiring diagram and connect the dosing valves accordingly.**
3) **If using scheduling set this or load a ready made file from disk**
4) **At the controller, clean the EC probe**
5) **At the controller calibrate both EC (TDS) and pH**
6) **At the status tab set dose times (or use the autoset wizard)**
7) **Enable all functions that you wish to use**
8) **Check the time/date on the PC and on the controller**

Configuration

The configuration settings are shown below and as you will see, most are self-explanatory. In the first group you can select the units that you prefer.

Next are the dawn and dusk time settings. These are only needed if you select "Irrigate during day only" or "different EC for day/ night". The times entered here do not have to align with the actual day time and for indoor growing they will be set to reflect the period that the lights are on. After changing any settings you must click the save button at the bottom to send them to the controller.

Next select the number of nutrient parts that you wish to automatically dose. This needs some careful consideration. For example, there is no need to include an additive that is used only once in the initial tank of water. Similarly, a flushing agent which is added to a fresh tank of water for the last day or two certainly does not need to be automatically dosed. Remember also, that you have a total of 8 outputs (9 from version 3.03) and the more you use for nutrients, the less will be available for pH dosing and irrigation. Having selected the number of nutrients that are to be dosed continue by selecting the pH dosing required, then whether irrigation output is required. If you wish to have a different EC (TDS) for day and night then this can also be selected and if selected you can also chose to add water automatically to reduce EC.

As soon as you have used all of the 8 available outputs (9 from version 3.03) the options will appear greyed out and will be un-selectable. The only way to select them is to go back and deselect some previous choices.

Then you can select "scheduling" if desired. This gives you the opportunity to set up a complete growing schedule by specifying the nutrient ratios and EC for each stage of growth. This schedule or table is very easy to modify and so if the plant growth is slower or faster than expected you can easily make alterations at any time. Note that it is possible to save the schedule to disk so that it can be used for future grows. We supply a standard schedule based on the recommendations as published by various

manufacturers of three part nutrients. This should be modified to suit the particular species of crop that you are growing and also to suit your climatic conditions.
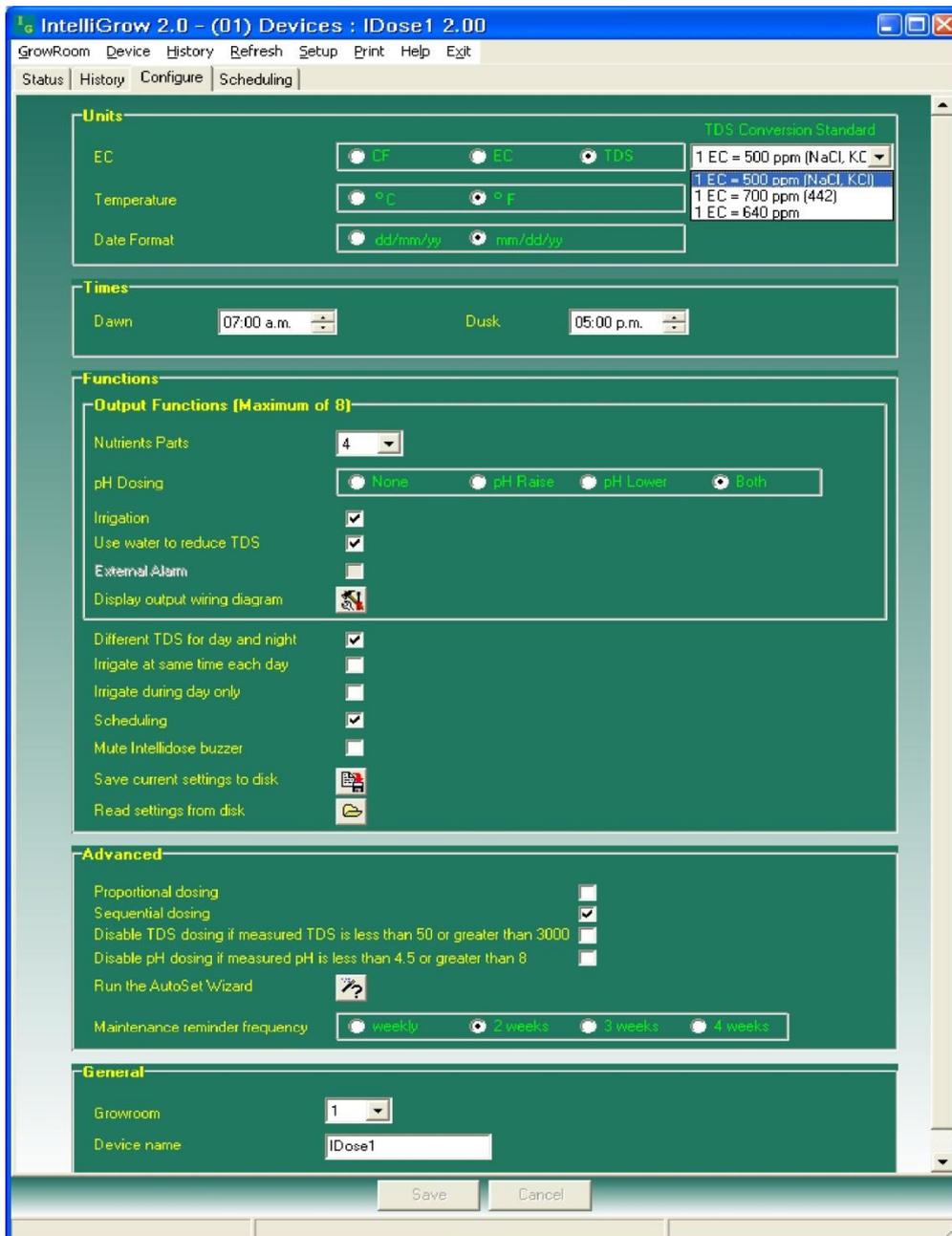
In the Advanced section you can select proportional dosing if required. This will only work satisfactorily on systems that irrigate large quantities of water from the tank and therefore need very rapid dosing to get the EC and pH back to correct levels. If this is not the case then deselect this option.

Sequential dosing should always be selected unless there is a good reason not to. In fact if you select more than 3 nutrient parts it will be enforced anyway. It should only be used with 1 or 2 part mixes and where you intend setting the dose interval to zero in order to achieve continuous dosing. This is

sometimes used on very large irrigated systems so that continuous dosing occurs while irrigation takes place and fresh make-up water is entering on a continuous basis.

The fail safe disables for dosing should always be enabled for safety. These prevent dosing if the controller suspects that a probe has become faulty or if the EC/pH are too far out.

The Autoset wizard is useful for automatically setting up the dose times and dose intervals and it also leads you through some basic settings. NOTE: you must follow the directions very carefully if you use this. In particular, the tank must hold only pure water and the dosing system must be fully primed with the correct strength nutrient. If the Autoset fails and reports a problem then you must correct this first then empty and refill the tank with fresh water before continuing.
The "Save current settings to disk" and "Restore settings from disk" do exactly that. They fetch all settings from the controller and store them in a file on the PC hard drive. This allows you to quickly reset the controller to a previously saved setup that was known to work well for a particular season, for example.

Scheduling tab

This is where you enter the settings for various stages of growth. The line, highlighted in yellow shows the current settings. The settings will change at midnight at the start of the date specified and will stay at those values until the next date is reached. When the bottom of the schedule is reached, the settings will remain at those values.

New lines are easily added using the + button and entries are deleted by selecting that day and clicking the x button. The following table is based on recommendations issued by various manufacturers and is suitable for a crop grown in good environmental conditions. The settings should be edited to suit the particular crop that you are growing and also to suit your climatic conditions. For example, in hot, dry conditions the EC or TDS should be lowered and in cool, humid conditions it may be raised. In either of these cases growth of the crop will be slowed and so the dates will need to be changed to lengthen out the grow period.

Note that the dates in the table are relative to the specified start date. This means that a schedule that was created for a start date of 15 January can easily be reused starting from any other date.

Status (and settings) tab

This screen allows you to view readings and settings for functions that have been enabled in the configuration menu.

Below is shown a typical setup for a system with most aspects enabled.

The first block shows the current readings together with their alarm minima and maxima. The alarm enable allows the alarm to be turned on or off and the detent time helps avoid false triggering as the fault condition has to be present for the full time specified.

In the next block, all of the main functions can be enabled, disabled or forced on. Note that when forced on, the function will perform a normal operation for its normal time and then stop automatically.

The "set-point" section is self-explanatory and typical settings are shown above.
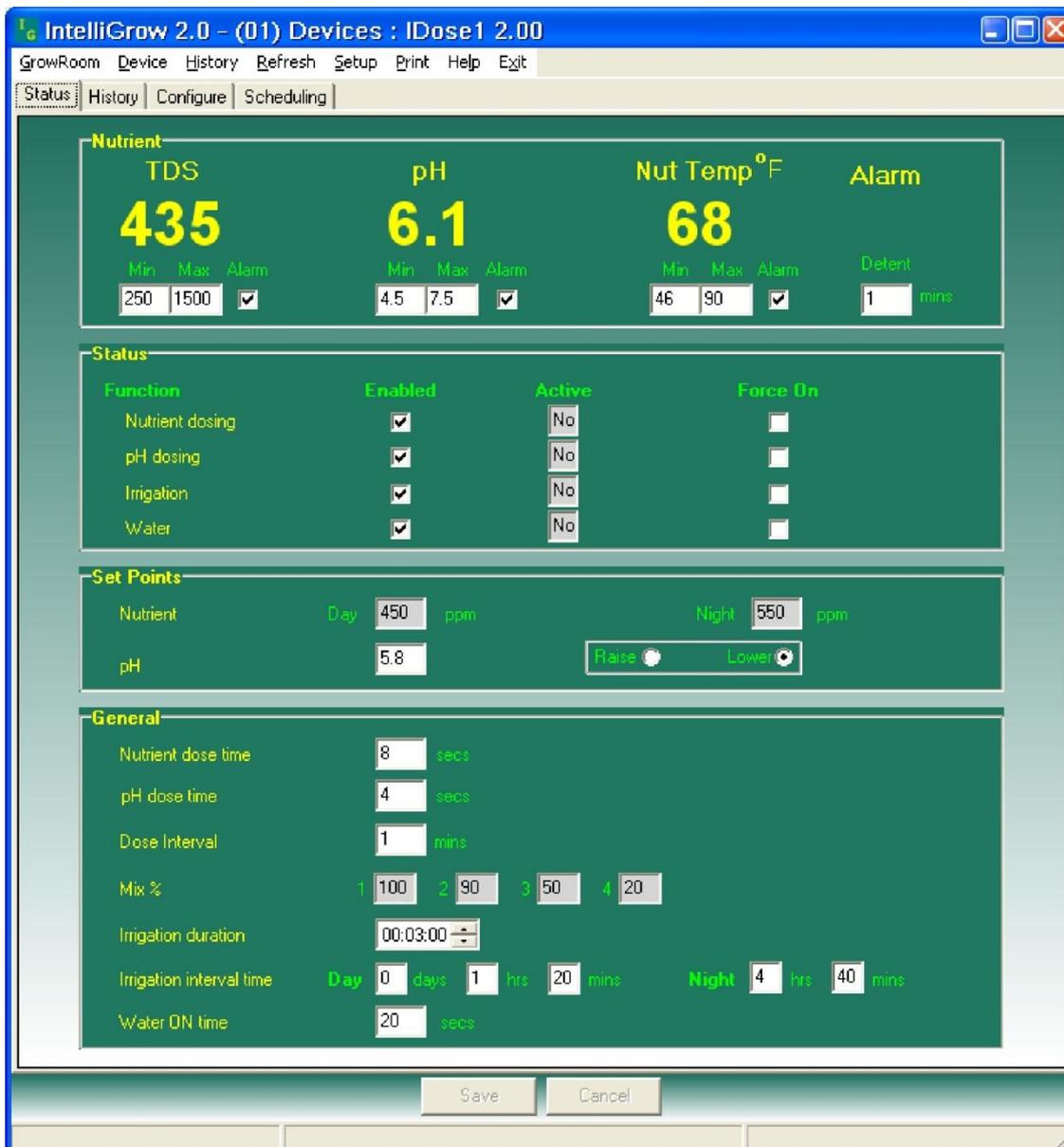
Dose times
Note that if scheduling has been selected then settings like the nutrient set points and nutrient dose ratios will appeared "greyed out" on this tab as they are derived from the entries on the schedule tab and cannot be altered here.

Dosing times and intervals can be set by trial and error

Scheduling tab

This tab only appears if scheduling has been selected in the configure tab.

This tab is where you enter the settings for the first stages of growth. The line, highlighted in yellow shows the current settings. The settings will change only at midnight at the start of the date specified and will stay at those values until the next date is reached. When the bottom of the schedule is reached, the settings will remain at those values. If the PC is not connected when a change is scheduled then the change will happen as soon as the PC is reconnected after the due time. New lines are easily added using the **+** button and entries are deleted by selecting that row and clicking the **x** button. The following is a simple example for a 4 part mix. Extra columns appear if more than 4 parts has been selected. The settings should be edited to suit the particular crop that you are growing and also to suit your climatic conditions. For example, in hot, dry conditions the EC or TDS should be lowered and in cool, humid conditions it may be raised. In either of these cases growth of the crop will be slowed and so the dates will need to be changed to lengthen out the grow period.

Note that the dates in the table are relative to the specified start date. This means that a schedule that was created for a start date of 16 April can easily be reused starting from any other date.

History tab

This tab allows you to view graphically all data logged from the controller.
This is very useful for diagnosing problems
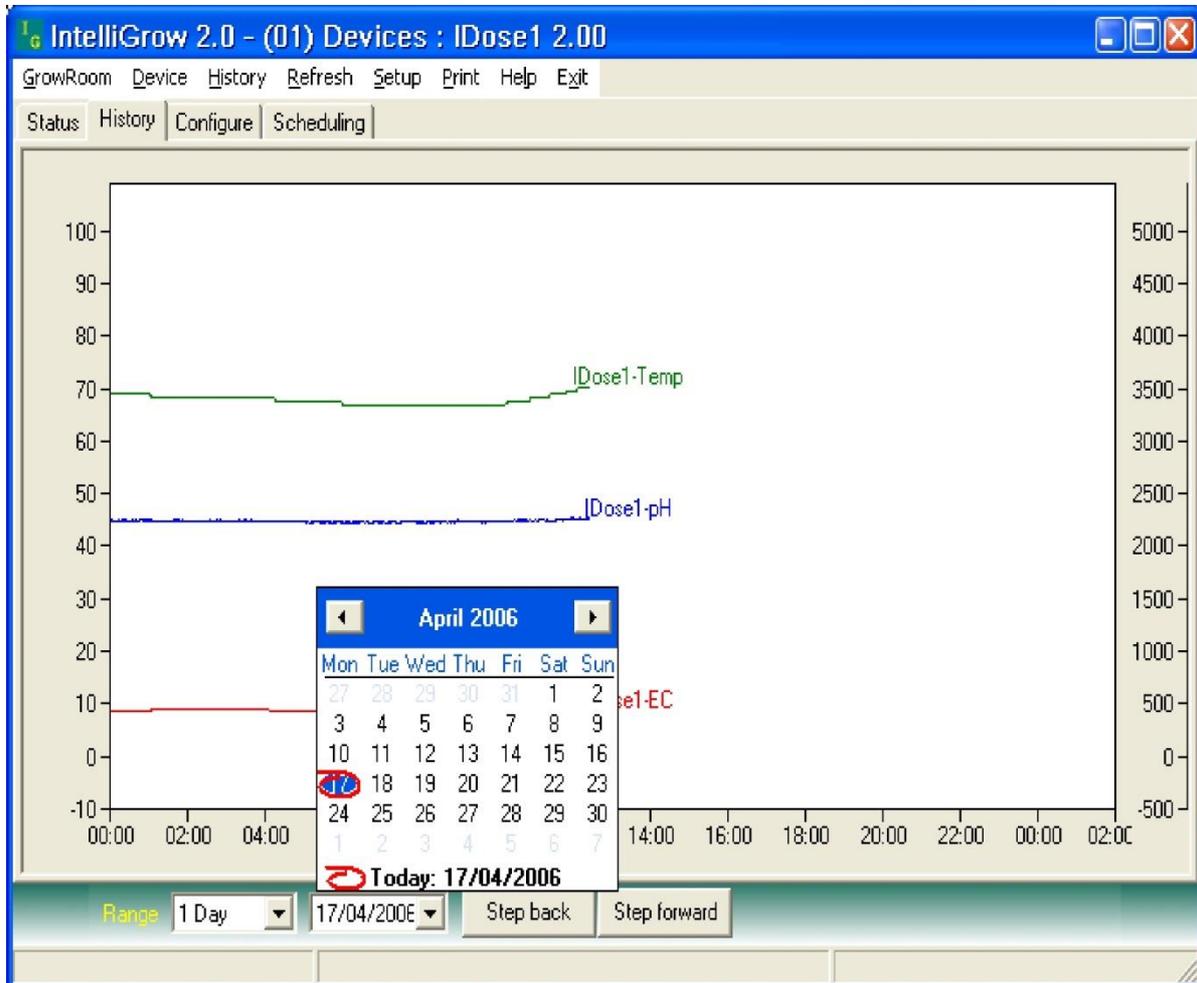
The pop-up calendar allows you to easily view records from previous days, months or years.

B2 – Setting from the controller key pad

Just about all settings available at the PC are also available from the keypad. Exceptions are the scheduling which is not available without a PC and the calibrations which are only available at the controller and not at the PC.

Operation of the keypad is similar to a cell phone. The two keys at the bottom of the display are "soft keys". This means that their function at any particular time is shown on the screen above them. After switching on you will find that the right hand key has the label "menu" on the lcd above it and the left hand key is unused at this point. To the right of the LCD screen are two arrow keys. These are for moving down or back up, through the menus and when you are in a screen which allows you to edit a numeric value they are used for incrementing or decrementing the values. They are also used to select between different options.

On first pressing the "menu" button, you will find yourself in the **main** menu. Use the down arrow to move down through this and you will find the following items

DOSING
CALIBRATION
OVERRIDES
IRRIGATION
ALARMS
CLOCK
CONFIGURE

If you wish to make a change to, say, irrigation timings, you would move down to irrigation and then press the "enter" key in order to enter the Irrigation sub-menu. Now again by pressing the down and/or up arrows move through this sub-menu to find the item that you wish to change and then press enter to access this item. After making any changes the soft keys will allow you to either save the new setting or to cancel and exit out of that screen.

The setting order is the same as when using the PC and the settings that you will access are also the same and so we suggest that you uses the previous pages on PC settings to guide you through the setting procedure.

General section - 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 must be the time that the solenoid valve opens for. If you are using a small reservoir tank you must ensure that your stock solutions are very dilute. Ideally, you are trying to achieve a dose time such that the EC(TDS) goes up by about 0.1EC (50 ppm) for each dose. If you need to set the dose time to a very small number to achieve this then you need to dilute the stock solution. The minimum time that any valve should open for is 1 second, so, if at any stage you have a ratio for one of the nutrient parts set for, say 20%, then the minimum dose time has got to be at least 100/20 = 5 seconds. This is because 5 seconds corresponds to a 100% dose and 20% is only 1/5th of this so the valve for this nutrient part will only open for 1 second. The process is similar for pH dosing where you are trying to achieve a change of, about, 0.1pH 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 minute for a small tank and up to 10 minutes for very large systems.
If the dose interval is set to zero then the valves will open continuously while the measured EC and pH are below the set point and close as soon as they exceed the setpoint. 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 added simultaneously such that rapid dosing is required in order to maintain the EC and pH.

Irrigation intervals and durations for day and night are also set here as is the water ON time for each addition of water. This should be set so that each time it adds water it dilutes the nutrient by about 0.1EC (1CF or 50ppm).

Section C - Simple one or two-part doser

In the advanced menu on the IntelliDose or the advanced tab on the PC
select the units that you wish to use and then select one or two part dosing.

If you wish to use AutoSet then turn to Section A in this manual, alternatively, to
set up manually, continue below. (You cannot use AutoSet for 3 part nutrients).

To set manually
1) Calibrate the EC and pH sensors as described below
2) In "Configure" on the controller or the PC select one or two part nutrient
3) In Dosing settings set the desired EC, pH and pH raise or lower
4) In Dosing settings set the EC dose time. This should be set so that each dose raises the EC by about 0.1mS/cm (1CF or 50ppm)
5) In Dosing set the pH dose time so that each dose alters the pH by about 0.1pH
6) In Dosing settings select either pH raise or pH lower. The most usual selection is pH lower (acid dosing) and if you are unsure then select this. If you find that the pH continually drifts down below 5.5pH then change this to pH raise and ensure that you have a dosing valve or pump connected the pH raise output and to a stock tank containing pH raise (alkali)
7) In Dosing settings set the dose interval. This is the time taken for each dose to mix in and for the EC and pH readings to stabilise. For a small system, 2 or 3 minutes is typical. Larger systems may require 10minutes or more. Note that dosing will not occur unless the reading has been below the setpoint continuously for this amount of time

Calibrate EC sensor
2) Clean the face of the probe. Remove the shroud from the end of the probe and use a little kitchen liquid scouring cleaner such as "Jif" on a **clean** "Scotchbrite" nylon scouring pad. Alternatively, use 600 grit wet-and-dry paper with the Jif. Use a circular motion to scour the face of the probe and then rinse well in running water. Do not touch the face of the probe but shake off any residual water.
3) Replace the shroud and then place in the calibrating solution. The solution supplied has an EC of 2.77mS/cm (CF=27.7, ppm = 1382). Allow about 5 minutes for the temperature compensation to fully kick-in and then press the menu button to get down to the Calibrate screen. Then press "Enter" to get to the Calibrate sub-menu where you will again press menu to step through this sub menu until you reach the "Calibrate EC" screen. Then press "Enter" again, to get into the "Calibrate EC screen". Now press either the UP or Down arrow keys to get the calibrated reading to correspond with the Standard calibrating solution (normally 2.77mS/cm, 27.7CF or 1382ppm). When this is achieved, press the save button to save this in permanent memory.

Calibrate pH sensor

1) The glass bulb at the end of the pH electrode should be shiny and clear. If necessary, clean the glass bulb at the tip of the sensor with a very soft "child's" toothbrush or a special cleaning tool with a little liquid scouring agent such as "Jif". The bulb is very delicate – TAKE CARE.

2) Rinse thoroughly in water and then place in the pH 7 buffer solution. NOTE THAT YOU MUST **ALWAYS** CALIBRATE AT **pH 7 BEFORE pH4**.

3) Allow a few minutes for the reading to stabilise and then press the menu button to reach the Calibration screen. Press Enter to get into the Calibration sub-menu and then "Enter" the Calibrate pH 7 screen. Now press the up and down arrows until the reading exactly matches the calibration solution (eg pH 7.0). Press "Save" to store the calibration.

4) Rinse the probe and place in pH 4 buffer solution. Allow to stand for a few minutes until there is no further change in the pH reading. Now use the Menu and Enter keys to navigate to the Calibrate pH 4 screen. Press the up and down arrows to get the calibrated reading to match the calibration solution and then press "Save" to save the calibration and exit from that screen.

The EC probe should be cleaned regularly – every 2 weeks and all calibrations checked. In addition it is advisable to use a hand held meter to check the EC and pH every day. If ever the hand held instrument and controller readings differ then all probes should be cleaned, checked and recalibrated.

Section D – Multi-part dosing General

Best dosing accuracy is achieved with larger dose sizes and if any of the ratios of a multi-part mix is set to a small value then it important to ensure that its dose time is still above 1 second .

For example, say a dose time is set to 5 seconds and one part is set to a ratio of 10%. This means that a ratio of 100% = 5 seconds and so a ratio of 10% will equal only ½ second. This is not sufficient time for a valve to open and close and so the dosing of this part will be very inaccurate if it manages to dose at all. The solution is to increase the dose time to 10 or even better 20 seconds. At ten seconds the 10% component will dose for 1 second (just long enough but still not very accurate) while at 20 seconds it will dose for 2 seconds which should be much more accurate. However, you may now find that each of these larger nutrient doses raises the EC by more than the desired 0.1 EC (50ppm). The only solution to this is either to 1) dilute the stock solutions, or 2) use a larger reservoir tank or even a combination of both of these. If diluting the stock solutions, it is important to dilute them all in exactly the same ratio. Eg 1 part nutrient to 3 parts of water (makes a 25% solution). This would result in each dose casing the EC to rise by ¼ of its previous value.
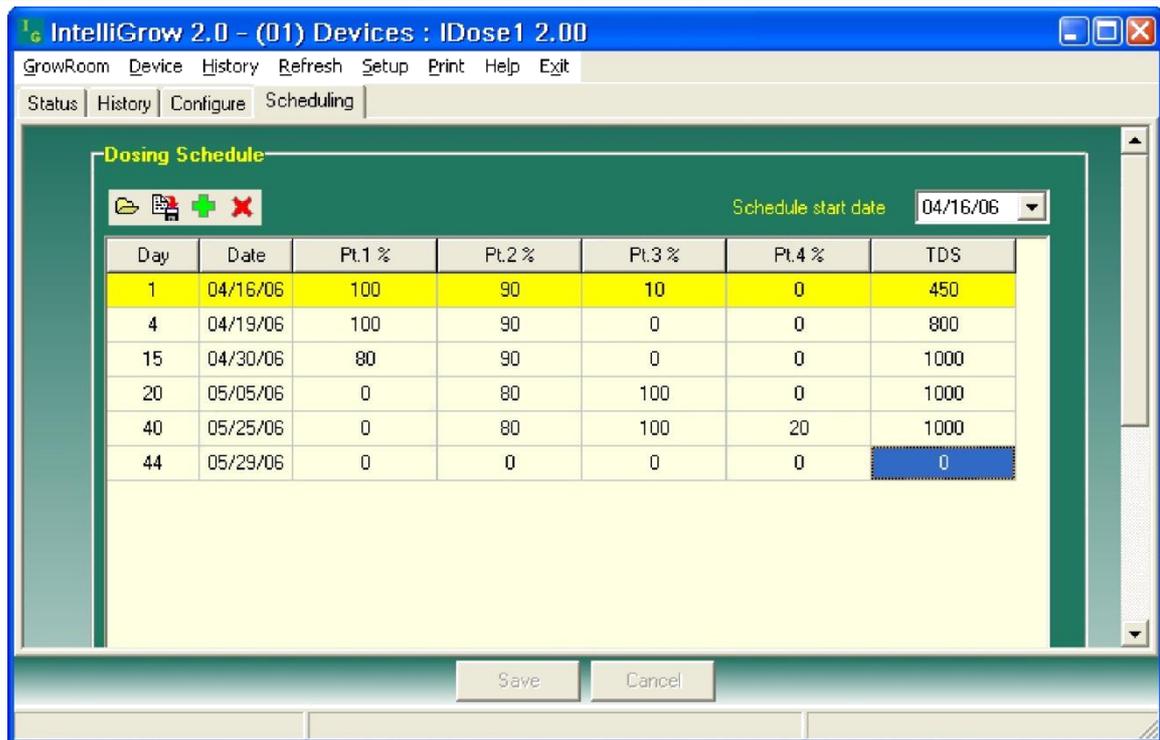
Another approach is to dilute only the nutrient parts that require the low % ratios. For example, a recipe recommends 100:50:10. If the dose size was set to 5 seconds the part A would dose for 5 seconds, part B for 2.5 and part C for only 1/2 second. By diluting part C in water with one part C to 4 parts water we will reduce its strength to 1/5th of the original. Then we would schedule 100:50:50 which would be much more accurate.

Using a schedule

At the PC, it is possible to schedule automatic changes in a two or three part dosing regime. To do this go into "Configure" tab and select "two or three part dosing" and "Scheduling". A new tab "Scheduling" will appear which will allow you to tabulate the required Pt1:pt2:Pt3 ratios and EC for each stage of growth. Note that changes can be on a daily basis or less often as necessary. It is usually required to make frequent changes during the cutting or seedling stage and then less frequently as the crop matures.

Of-course every crop develops at a different rate and so the table is very easy to modify. Days can be added, or deleted at will and dates can easily be changed.

Changes will only happen if the PC is connected and on line. If the PC is taken "off-line" then when it is next connected if any change is required it will be made straight away. Normally, changes will take place at midnight preceding the date specified.

Autogrow SYSTEMS

IntelliGrow 2.0 – (01) Devices : IDose1 2.00

GrowRoom Device History Refresh Setup Print Help Exit

Status | History | Configure | Scheduling

Dosing Schedule

Schedule start date 04/16/06

Day	Date	Pt.1 %	Pt.2 %	Pt.3 %	Pt.4 %	TDS
1	04/16/06	100	90	10	0	450
4	04/19/06	100	90	0	0	800
15	04/30/06	80	90	0	0	1000
20	05/05/06	0	80	100	0	1000
40	05/25/06	0	80	100	20	1000
44	05/29/06	0	0	0	0	0

Save   Cancel

Section E – Proportional Dosing (default OFF)

Proportional dosing allows rapid dosing toward the set point. A maximum dose time must be entered as well as a minimum dose time. The maximum time should be set so that a dose of this size would raise the EC from its raw water value to 80% of the setpoint value in a single dose. The minimum dose time should be set to achieve a rise in EC of 0.1mS/cm (CF=1, ppm=50). The controller will then select the most appropriate dose size within this range depending on the measured EC. This means that when starting with a tank of pure water, the controller will make one very large dose followed by smaller and smaller doses as the setpoint is approached.

Note that proportional dosing is not available for use with 3 (or more) part mixes.

Section F – Sequential Dosing (default ON)

By selecting sequential dosing, the dosing outputs will operate in sequence, one after the other. This allows a small power supply to be used with dosing devices that draw a heavy current. For example, small peristaltic pumps typically draw 1.2 Amps or so at 24V DC. If three part dosing was used and three pumps were allowed to come on at the same time the power supply would need to be rated at about 4 or 5 Amps. By selecting sequential dosing a 2Amp supply could be used.

Section G - AutoSet

This section describes the AutoSet function. This is most easily used from the PC although it is possible to use AutoSet from the controller.

What AutoSet does –

The purpose of AutoSet is to carry out a number of dosing tests to find the most suitable dose timings and dose interval for your system. It can only be used with one or two part systems. **The nutrient type (one or two part) must be selected prior to running AutoSet. You also need to select if proportional dosing is required.**

Before using AutoSet, the system must be ready to operate.
- **EC and pH sensors must be calibrated**
- **Mixing (reservoir) tank must be full of plain water**
- **Stock tanks must be filled with the usual nutrient and pH solutions and any taps turned on**
- **The dosing pumps/valves must have been primed (ie operated by forcing on from the PC until the stock solution is discharged). When doing this, ensure that you catch the discharge in a bucket as the tank water must not contain any nutrients when AutoSet is started.**
- **The circulating pump must be running**.

Note that if the stock solutions or their concentrations are ever altered then the system will need to be re-set, either manually or by re-running AutoSet.

When AutoSet is run the system will ask you to confirm that the system is ready and will then ask for other settings. For most of these it will offer assistance. Once all settings are entered you will be asked to confirm that you wish to continue into the automatic part of the setup. Once you have confirmed this, leave the system until it has performed all of its tests which might take over 30 minutes on bigger system. At the end of the setup process the PC and controller will inform you if it was successful or not. If unsuccessful, then there was probably something wrong in the system (eg a stock solution tap not turned on or circulating pump not running). Refer to the fault finding section if this happens. In some cases it might offer to set the EC dose times and interval only and inform you that the pH could not be achieved and will normally give you a reason for this.

After correcting the problem you can either run AutoSet again (after emptying the tank and refilling with plain water) or you can complete the setting manually.

Section H - Installation

Mount the IntelliDose controller within 1.5 metres of the sample pot but in a position well away from water splashes or mist/vapour rising from the reservoir tank. It should be mounted in a cool, dry place out of direct sunlight. Remove the screws holding the back on and fit the mounting feet, then screw to the wall. If using the dry wall (plaster board) anchors use the longer screws supplied but if fixing to a ply back board use the shorter screws
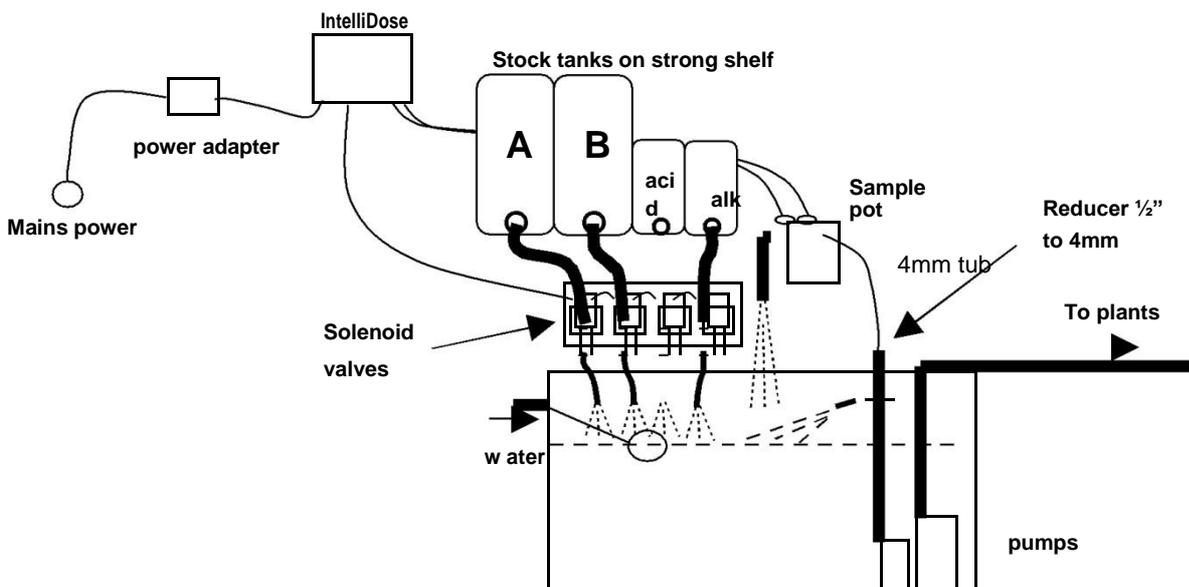
Typical installation using peristaltic pumps
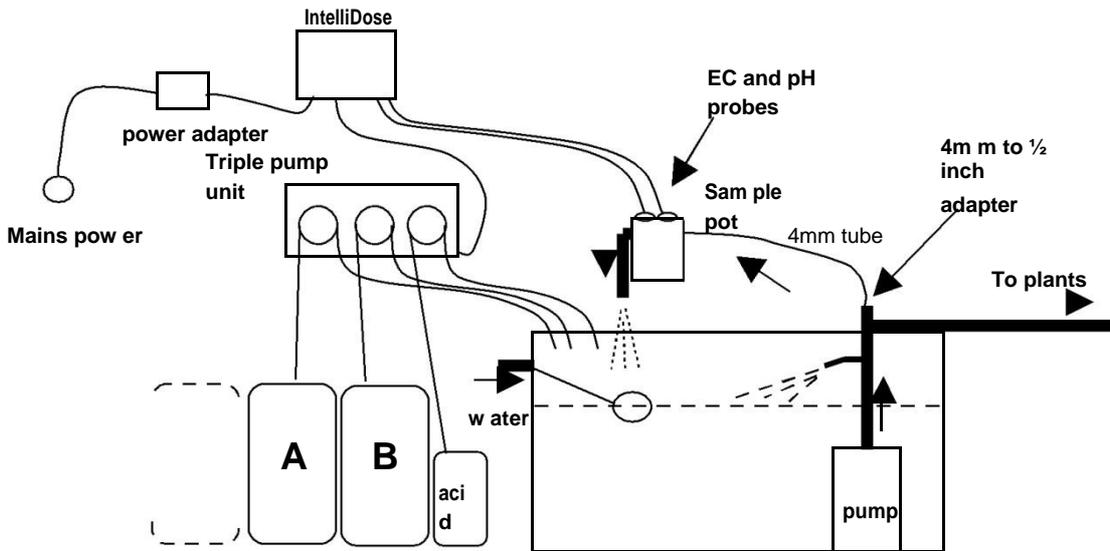
HINT:

(1) Keep sample pot low down just above top of tank as many small pumps have quite low head pressure capability

(2) Mount IntelliDose away from spray and humidity from tank and stock solutions

Typical installation using solenoid valves

Note that 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 an outlet from a Tee fitting. Ensure that your pump has excess capacity before doing this.

Layout showing use of high and low water levels

IntelliDose
CONTROLLER

PC

USB

Sampl

4mm tubing

Rubber grommet
pushed into Tee

To plants

Solenoid
valves

High level

Low level

Water in
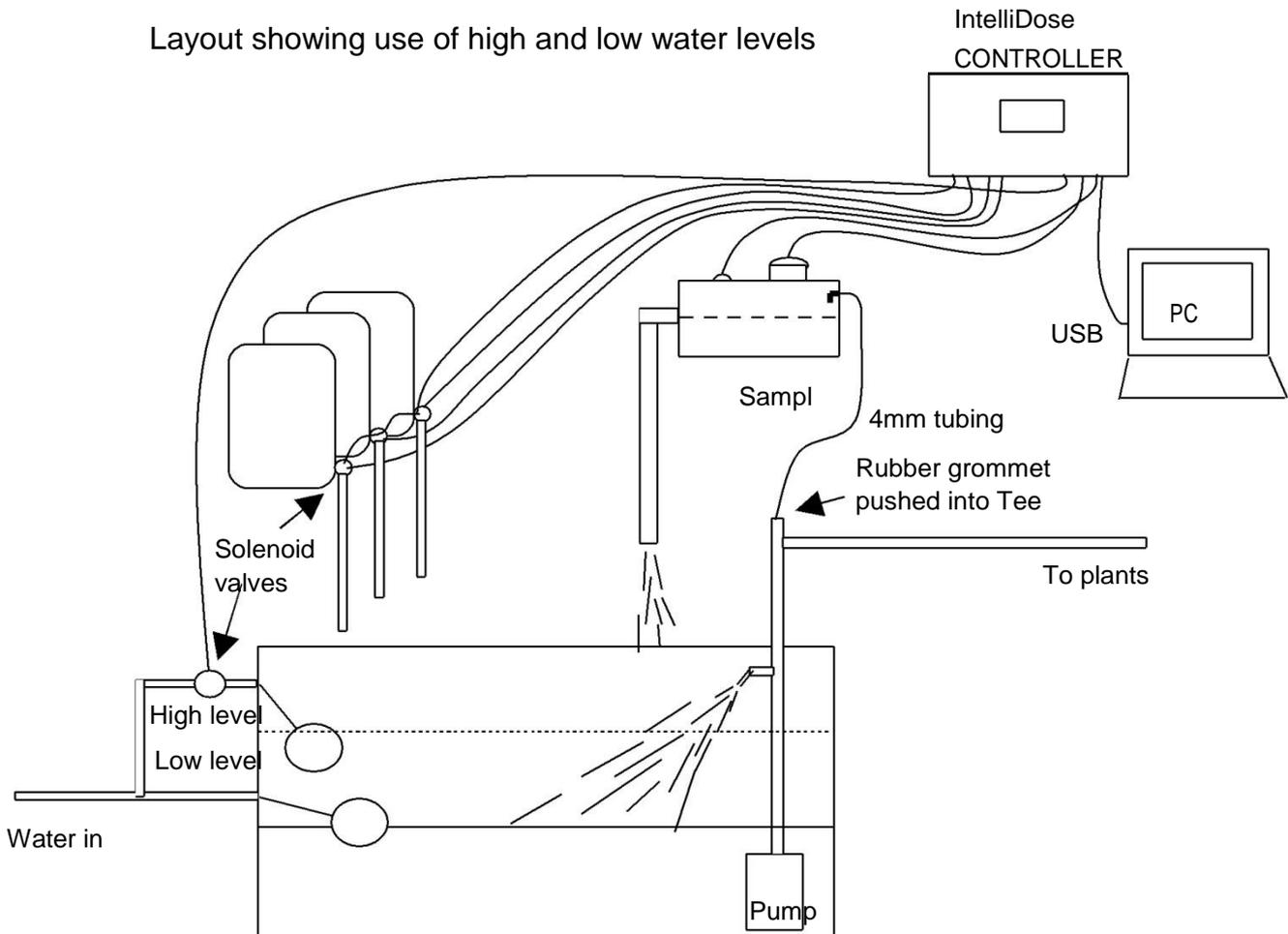
Pump

NOTES:
1) If irrigation is used then a second small pump should be used to continuously circulate the solution through the sample pot and keep the tank stirred. The irrigation pump would then need a "pump start relay" with a 24V DC coil to switch it on only when an irrigation is called for.
2) If the irrigation water is returned to the reservoir tank then allowance must be made for the level to rise a little above the float valve level.

The power supply to the IntelliDose must be between 12V and 24V either AC **OR** DC. **The outputs to the solenoid valves or pumps will be the same as the supply going into the controller**. This means that if 24V AC solenoid valves are used then the supply adapter must provide 24V AC. Never connect a power supply exceeding 24V to the controller. A 24V DC power supply adapter is normally supplied together with either 24V DC solenoid valves or 24V DC peristaltic pumps

Connection diagram for 1,2 or 3 part nutrient dosing
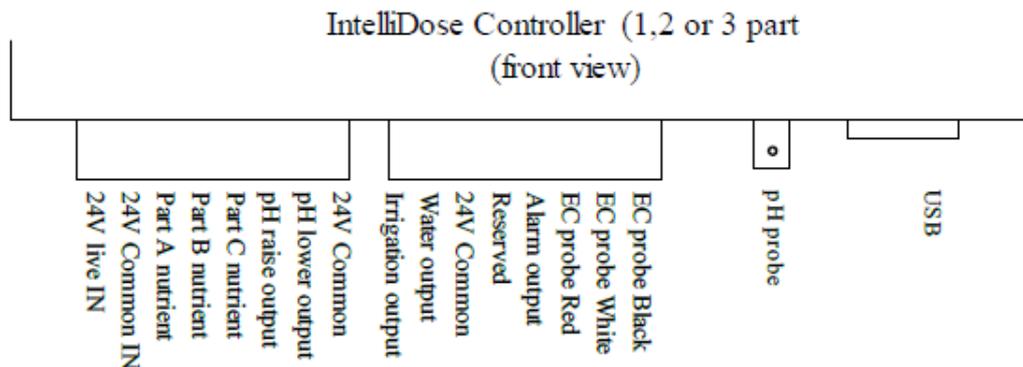
The low voltage power from the adapter is connected to the two left connection on the left hand connector. With many power supplies the cable is a screened "co-axial" type. In this case the screen should be connected to the "Common" and the centre wire to the 24V line connection on the controller.

The connection diagram for more than three part nutrients must be printed by the PC IntelliGrow software AFTER configuration has been complete. If you are not intending to use a PC connection and have no access to one for the set up procedure, please ask your supplier if they are able to pre-configure and print out the wiring diagram for you.

Solenoid valves
Secure the solenoid valve panel to the wall. If using the plaster board anchors, screw the anchors in firmly until they are flush with the wall. The anchors supplied are self drilling and so there is no need to predrill the wall. Just position them, give them a light tap to get started and then turn to drill/screw in with a Phillips or pozi screw driver. Use the longer metal screws to fix the valve plate to the nylon anchors or if fixing to a solid wood back board, use the shorter screws supplied.
Next connect the valve using the cable supplied to the outputs as shown above. Check that the voltage rating of the valves matches the voltage rating of the power supply eg if the valves are 24V DC then the supply should also be 24 V DC.
The solenoid valves are installed as shown overleaf.

Peristaltic pumps
You can direct drive 24V DC 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 and so to run three pumps at the same time, you will need a 4 or 5A, 24V DC

power supply. To avoid the necessity of such a powerful supply you may select the "Sequential dosing" option (in the configure menu). In this case, pumps are run one after the other and so at any one time there is only one pump running. A 2A, 24V DC supply is sufficient for this. We have available a 2.5A supply that allows 2 part (but NOT 3 part) dosing to run simultaneously or 3 part dosing to run sequentially.

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. If you shorten these pipes ensure that they are of equal length or the flow rates from the A, B, C tanks will be unequal.

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)

Some valves have breather pipes which must reach up to top of stock tanks

Stock Tank A

Stock Tank B
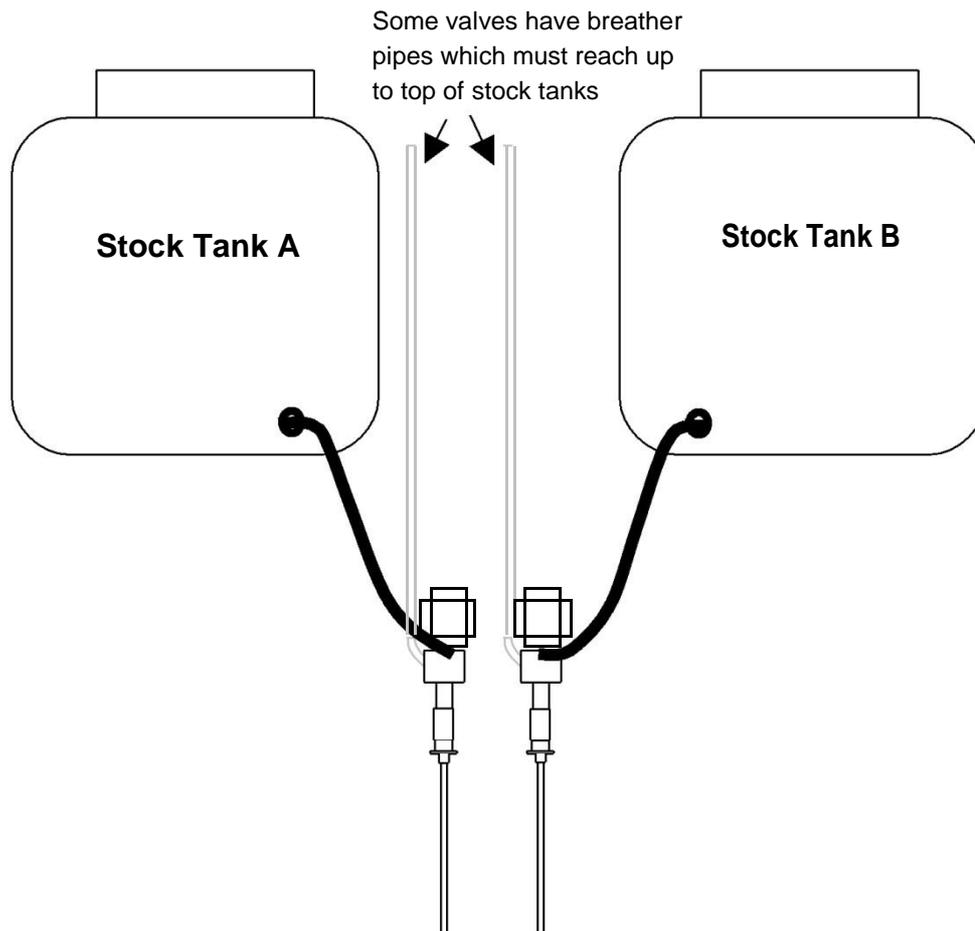
1) Thoroughly clean tanks to ensure that no plastic shavings are left in them
2) Test with water first to ensure no water leaks and system operates correctly then fill tanks with the stock solutions
3) For acids and alkalis, ensure that they are diluted to less than 2% strength

4) Some valves have breather pipes that must reach the top of the stock tanks. These pipes ensure that the tubes are fully emptied after each dose. Note that although some valves have tube shapes moulded on the side these might be closed off in which case no breather is required. If in doubt, check by blowing through the side tubes to see if they are blanked off.

5) Wire the two solenoid valves to their respective connections on the controller as shown in the wiring diagram
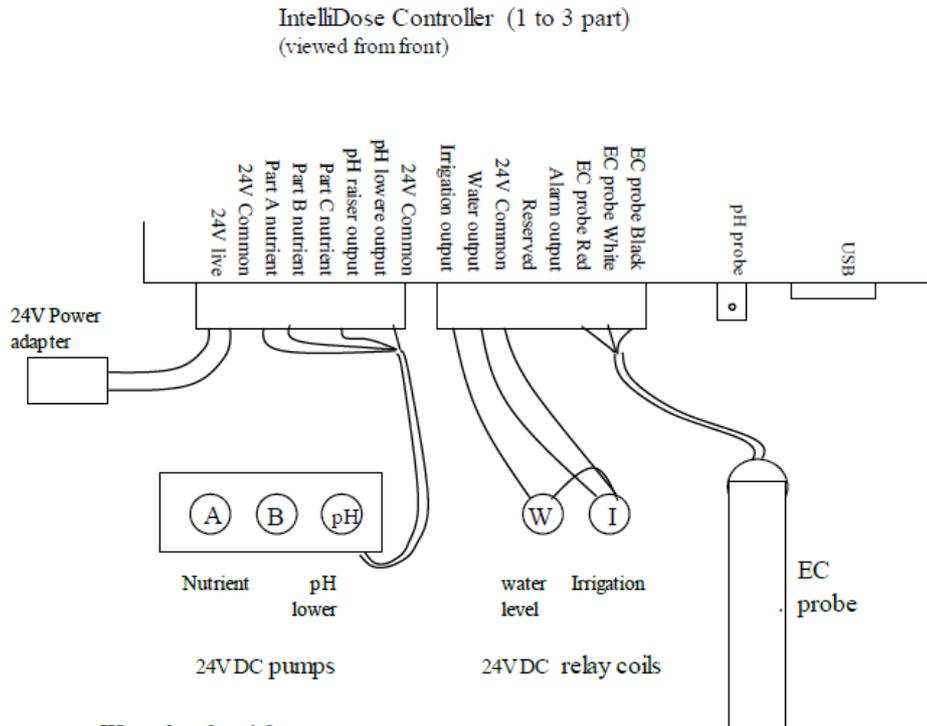
Wiring diagrams
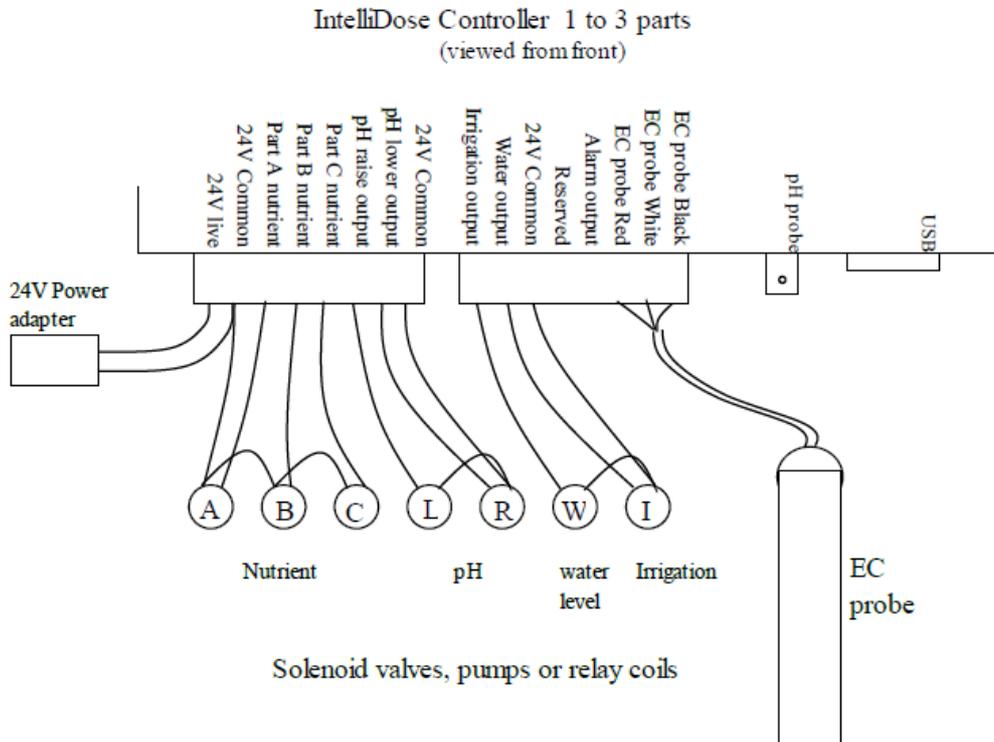
IntelliDose Controller 1 to 3 parts
(viewed from front)

Note that all the connections marked **24V common** are connected together internally and you may connect the return from any solenoid valve or pump to any of these commons
The common wire from the power supply is the bare silver wire.

IMPORTANT

The voltage at the outputs will always be the same as the voltage from the power adapter. We normally supply 24V DC unless a different voltage or AC has been specifically requested.

Wiring Peristaltic pump wiring

IntelliDose Controller (1 to 3 part)
(viewed from front)

Wire colors for triple pump
Black = common (connect to any common)
Red = left pump (eg nut A)
White = mid pump (eg nut B)
Blue = right pump (eg pH lower or part C)

Note that the right hand pump may alternatively be connected to
Nutrient part C, pH lower or pH raise.

Note that all the connections marked 24V common are connected together internally and you may connect the return from any solenoid valve or pump to any of these commons.

IMPORTANT

The connection diagram for more than three part nutrients must be printed by the PC Intelligrow software AFTER configuration has been complete. If you are not intending to use a PC connection and have no access to one for the set up procedure, please ask your supplier if they are able to pre-configure and print out the wiring diagram for you.

Section I – Software installation

Note that you may need to temporarily disable your virus checker during the installation process otherwise you may get an *error copying files* message during the installation

Double click the Intelligrow installation executable to start the installation process. Click **Install** to begin the Installation.

Choose the Directory to install the Intelligrow Software.
"C:\Program Files\Intelligrow" is the default and is recommended.

When the Installation Complete window pops up you have successfully installed Intelligrow and the USB Drivers.
NOTE:If you get an ***Error Copying Files*** message you may need to disable any virus checker or firewall software you have running and then reinstall IntelliGrow.

Note that the Ver 2 software and above is not compatible with version 1 controllers. If you have a version 1 controller and wish to upgrade to version 2 software then your controller must be returned to you distributor for upgrading.

Section J – Maintenance

Clean EC probe

Remove shroud from end of probe. Apply a little white (non scented) liquid scouring paste (eg liquid JIF) to the face of the probe and rub with a circular motion using the finger tip or a clean cloth. Rinse under running water – do not touch the face of the probe. If the probe is very dirty, use the liquid scourer on an abrasive nylon scouring pad such as ScotchBrite. Replace the shroud and check calibration.

Calibrating the EC probe

After cleaning and rinsing the probe, shake vigorously to remove any surplus water. Now place the probe in EC standard solution and allow the temperature compensation to take full effect by leaving for 5 minutes or more. Calibration solutions are usually 2.76mS/cm referenced to 25°C but any calibration solution may be used.

The reading should settle to within 0.1 EC (1 CF or 5ppm) of the value stated on the bottle. If not then navigate to the EC calibration screen on the controller (not available on the PC) and press the up/down arrows until the reading exactly matches the value printed on the bottle. Note that calibration solutions are easily contaminated or changed by evaporation and should be replaced with fresh solutions every 3 months or more frequently if high accuracy is required.

Cleaning the pH electrode

The pH electrode is supplied with a protective cap or cover over its active end. Its purpose is to keep the glass bulb moist during storage and transit. This cover must be removed before use.

The glass bulb at the end of the pH electrode should be shiny and clear. If not then it may be cleaned by brushing with a soft toothbrush or special cleaning tool together with a little liquid scourer such as Jif or Soft Scrub. Do this very carefully as the glass bulb is extremely delicate. Rinse thoroughly with clean water.

Calibrating the pH electrode

Every week you should check the pH calibration.

To do this place the probe in the pH7 buffer solution and allow to stand for 10 minutes. The reading should be 7.0 +/- 0.1 pH. If not then navigate to the pH 7 calibration screen and use the up/down arrows to correct the displayed reading. When correct, press save.

Next rinse the probe in fresh water and shake off excess water. Now place in the pH 4 buffer solution and allow to stand for 10 minutes. The reading should be 4.0 +/-0.1. If not navigate to the pH 4 calibration screen and use the up/down arrows to correct. Now press save to store the calibration.

IMPORTANT: The pH 7 calibration MUST be carried out before the pH 4 calibration.

pH electrodes last for between 6 months and two years. As soon as the electrode shows signs of drifting or slow response it should be renewed.

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 retighten. 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 vapours.

Section K - 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 4A 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 4A fuse. DO NOT ATTACH WIRE OR ALUMINIUM FOIL ACROSS IT.

2) Cannot calibrate pH. Replace the pH electrode with a standard BNC gel filled electrode.

3) EC calibration out or EC reading varies. Ensure that there is a small non-turbulent flow of solution past the face of the EC probe. Ensure probe has been properly cleaned and is free from grease or oil. (water should easily wet the face and should not bead).

4) pH fails to dose. Ensure that the controller is set for raise or lower to match the solution used. ie if you are using acid (pH down) then set

the controller to pH lower and ensure that that pump/solenoid is connected to the pH lower output.

5) pH overdoses. Check that the controller is set for pH raise or lower as described in 4 above. Also, check that the dose time is not excessive. Each dose should change the pH by about 0.1pH

6) EC overdoses. Check that there is adequate flow through the sample pot and that the EC dose time is not excessive. Each dose should change the EC by 0.1 (CF1 or 50ppm)

Section L – Specification

8 outputs (9 from version 3.03) which can be flexibly configure to operate 1 to 8 part variable ratio nutrient dosing, pH raise, pH lower, Irrigation, add water and alarm

Output voltage same as supplied voltage 12V to 24V AC or DC. Normally 24V DC supplied Nutrient measurement units EC, CF or ppm (EC x 500)

Measured range 0.00 to 9.99EC, 0.1 to 99.9CF, 0 to 4999 ppm Nutrient resolution 0.01 mS/cm, 0.1 CF, 5ppm

Nutrient measurement accuracy +/- 0.1 EC, 1.0 CF or 50ppm - temperature compensated Nutrient dosing range 0.10EC to 5.99EC, 0.1 to 59.9CF, 50ppm to 2999 ppm

pH resolution and accuracy – 0.1

pH pH measurement range 2pH to 12pH pH dosing range 4.5pH to 8pH

Nutrient and pH dosing times settable from 1 second to 25 seconds

Dosing interval settable from 0 minutes (continuous dosing) to 25 minutes Dosing operates valves sequentially to reduce power surge

Temperature resolution and accuracy 1^oC, 2^oF

Temperature measuring range 0-50°C, 32-125 ^{o}F

Operating temperature range 0-45°C, 32-110°F (and not in direct sunlight)

Power source – mains transformer pack supplied; specify mains voltage and pin type (power to controller can be between 12V and 24V either AC or DC to suit the output devices) Outputs will have the same voltage as the supplied voltage from the power pack.

Large graphics display using simple four key interface (similar to cell phone key operation) Nutrient sensor uses DiPulse^{TM} technique to resist fouling

Dosing fail safe shut-off (can be disabled)
- if nutrient is below 0.1EC, 1CF, 50ppm
- if pH below 4.5pH or above 8.0pH
- if sensor fault detected (some pH faults cannot be detected) USB connection and software supports multiple controllers Sample pot supplied.

Valves available separately with cables and flow restricting pipes Valves chemically resistant to 5% Phosphoric acid, 2% Nitric acid

Compatible triple peristaltic pumps available separately as an alternative to solenoid valves.

Section M – Advanced Irrigation Features

IntelliDose firmware version 3.01 released March 2015 expands on the original irrigation functionality by providing the ability to control up to 4 irrigation stations with an optional master pump.

Each station is assigned its own duration and control is either:

➢ **Sequential** - where each station is run in turn, all being triggered by a single trigger (day/night interval or time of day) or
➢ **Independent** – where each station is completely independent, each having its own trigger (day/night interval or time of day).

If a master pump is selected then this output will run each time any of the station outputs is run, to accommodate having a single irrigation pump with each station being watered by opening a solenoid valve.

Irrigation outputs are configured on the IntelliDose by navigating through the following menus:

Menu > Configure > Advanced > Output

➢ **Irrigation** – to enable all irrigation functionality
➢ **Station Outputs Use Station Outputs** – select No to provide backwards compatibility with pre-version 3.01 wiring configurations; Yes enables up to 4 outputs to be assigned to irrigation stations
➢ **Station Outputs No. Station Outputs** – select from 1 to 4 stations
➢ **Pump Output** – Select Yes/No for a separate pump output which is activated each time any of the stations is activated
➢ **Station Mode** – chose between **Independent** and **Sequential**

Irrigation settings for each station in **Independent Mode** are accessed by navigating through the following menus:

Menu > Irrigation >

Irrig Stn 1 – access irrigation settings for station 1

➢ **Irrig Run Time** – specify how many hours/minutes/seconds the station will run
➢ **Irrigate every** – specify the daytime irrigation interval days/hours/minutes (if **Irrigate at same time each day** is No)
➢ **Irrigate every** – specify the nighttime irrigation interval days/hours/minutes (if **Irrigate at same time each day** is No)
➢ **Irrigate at**: - specify the time of day to start irrigation (if **Irrigate at same time each day** is Yes)
➢ **Irrigation Enabled/Disabled** – temporarily enable or disable the station (note the output remains assigned to this station even if disabled)
➢ **Irrigate during** – specify if irrigation will occur during both Day & Night or Day Only

> ➢ **Irrigate at same time each day** – specify if the irrigation for this station is triggered at a single time of day only (or triggered using daytime/nightime interval)

Each station's settings can be accessed in a similar manner.

Irrigation Overrides are accessed by navigating through the following menus:

Menu > Overrides > Force Irrig. 1 – immediately start irrigating station 1

Menu > Overrides > Force Irrig. 2 – immediately start irrigating station 2

Menu > Overrides > Force Irrig. 3 – immediately start irrigating station 3

Menu > Overrides > Force Irrig. 4 – immediately start irrigating station 4

Irrigation settings **in Sequential Mode** are accessed by navigating through the following menus:

Menu > Irrigation >

> ➢ **Irrig 1 Run Time** – specify how many hours/minutes/seconds the station will run
> ➢ **Irrig 2 Run Time** – specify how many hours/minutes/seconds the station will run
> ➢ **Irrig 3 Run Time** – specify how many hours/minutes/seconds the station will run
> ➢ **Irrig 4 Run Time** – specify how many hours/minutes/seconds the station will run
> ➢ **Irrigate every** – specify the daytime irrigation interval days/hours/minutes (if **Irrigate at same time each day** is No)
> ➢ **Irrigate every** – specify the nighttime irrigation interval days/hours/minutes (if **Irrigate at same time each day** is No)
> ➢ **Irrigate at**: - specify the time of day to start irrigation (if **Irrigate at same time each day** is Yes)
> ➢ **Irrigation Enabled/Disabled** – temporarily enable or disable irrigation (note the outputs remains assigned to stations/pump even if disabled)
> ➢ **Irrigate during** – specify if irrigation will occur during both Day & Night or Day Only
> ➢ **Irrigate at same time each day** – specify if irrigation is triggered at a single time of day only (or triggered using daytime/nightime interval)

In Sequential mode the whole irrigation cycle can be forced on by navigating to the menu:

Menu > Overrides > Force Irrig. 1 – immediately start irrigating all stations, one at a time

IMPORTANT

If Station Outputs is set to Use Station Outputs then a different wiring strategy is used compared to previous firmware versions. It is therefore critical when wiring up an IntelliDose using firmware version 3.01 or later to verify the wiring diagram using IntelliGrow software. This is especially important if upgrading an existing IntelliDose to the new firmware or if replacing an older IntelliDose with a newer one.

Please also note that with this revision the irrigation cycle is now taken from the **start** of the cycle (previously it was taken as the interval from the end of one irrigation to the start of the next).

This means that if you set an irrigation interval of 1 hour then the irrigation will start exactly one hour apart.

So for example, if the interval is 1 hour and the duration is 20 minutes and irrigation begins at the start of the day at 6am then irrigation will be as follows:

0600-0620
0700-0720

Using the advanced Irrigation Features in IntelliGrow PC software

Configure Tab

Irrgation Mode - chose between:

➢ Single Output (for backwards compatibility – only one output is used for irrigation)
➢ Sequential (for single trigger and each irrigation station runs in turn)
➢ Independent irrigation (up to 4 irrigation stations with own triggers and durations)

Number of irrigation stations -   0 to 4, where 0 means no irrigation is configured

Separate pump output – indicate if a main pump output should be activated along with each station

For **Single output** or **Sequential** irrigation you can specify whether the trigger is 'Irrigate at same time each day' OR 'Irrigate during day only'

For **Independent** irrigation these settings can be set for each station

The wiring diagram has been updated to accommodate the new irrigation scheme:
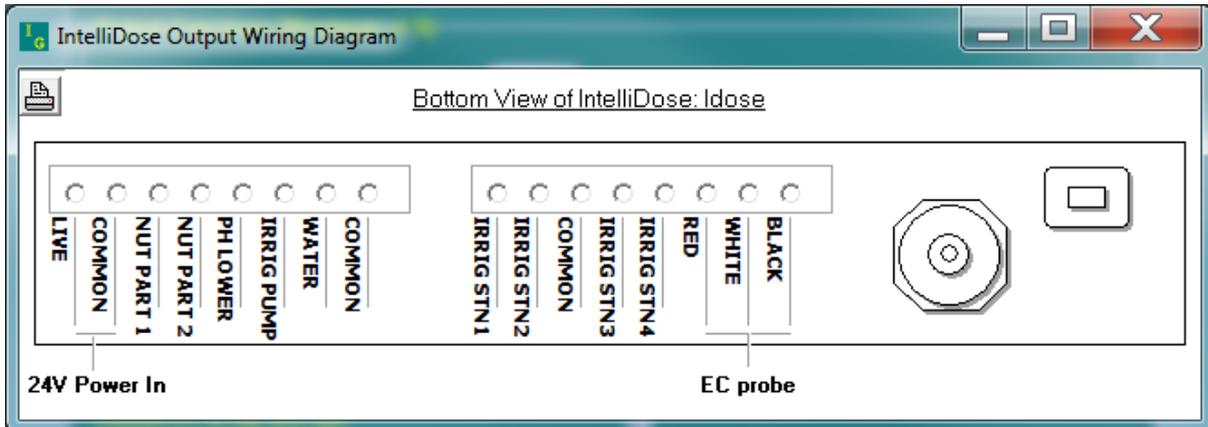
IMPORTANT

When using **sequential** or **independent** irrigation stations and a **Separate pump output** there will be one additional output allocated to the irrigation pump. This is to accommodate the scenario where a single pump drives the irrigation while individual solenoid valves are operated for watering each station. This additional output is labelled as '**Irrig pump**' on the wiring diagram and only needs to be used if using a single irrigation pump.

If individual irrigation pumps are used for watering each station then it is not necessary to use the Separate pump output.

Status Tab

Each **independent** irrigation station can be disabled or forced on:

Each **independent** irrigation station can be set to use a different duration and trigger:

When using single output or sequential irrigation then only one irrigation trigger can be specified:

Upgrade

If the firmware version of your IntelIDose is prior to 3.01 and you would like to take advantage of this new functionality please contact your local Autogrow distributor to find out how you can upgrade your controller.