

THE

TomTech

IC20

IRRIGATION COMPUTER



Climate & Irrigation Control at Your Fingertips

TomTech
total control for horticulture

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THE TOMTECH IC20 IRRIGATION COMPUTER

The Tomtech IC20 Irrigation Computer is a truly universal control system to handle all aspects of irrigation including any or all of the following:

All types of irrigation for protected crops

All types of outdoor irrigation

All types of misting and fogging systems

Nutrient feeding controlled by pH and conductivity

This is achieved by making the computer configurable to meet particular irrigation requirements by plugging expansion boards into the main computer. Only the boards required to meet the irrigation requirement need be fitted. Without any boards fitted the computer has the following facilities:

- * Outputs to control 16 solenoid valves (can be increased to a maximum of 144).
- * Outputs for control of two water supply pumps. Each pump has an input for low water level shut off.
- * Analogue inputs for 8 sensors (can be increased to a maximum of 16) for measuring pH, conductivity, humidity, temperature, light etc.
- * Digital inputs for 6 external triggers which may be used to initiate irrigation.
- * Inputs for weather station providing wind speed and direction, light, temperature humidity and rain information.
- * Inputs for three water meters.

Easy To Programme

The IC20 computer has a built in 4 line screen and keypad. All settings are programmed in plain English by selecting options from a selection offered by the computer at each step. There is very little to remember when programming the computer since each setpoint will be displayed in turn together with the current value. Any setpoint can then easily be changed if required.

Irrigation Monitoring

Once the computer has been set up it is important to be able to check what irrigation is in progress. In the MONITOR mode the computer will show the current readings for all measured parameters, e.g. light, pH etc., and also show what irrigation is in progress and what valves are open. If feeding is being used it will show the pH and EC targets and the dosing pump rates.

Alarms

Alarms may be set to operate both internal and external alarms in the event of any measured parameter going out of specified range, failure of the water supply etc. When an alarm sounds the display will show the cause of the alarm. The computer will always fail safe so that, for example, if there is a pH alarm then acid dosing will be stopped until the problem is resolved.

HOW THE IC20 CONTROLS IRRIGATION

The computer will control the irrigation for the entire nursery which might be in several glasshouses and outside areas. Each area will have individual requirements, this is achieved by using 'GROUPS'. 16 separate groups may be defined containing any selection of valves. Each group may then be programmed independently.

For larger water distribution systems master valves may be defined. The master valve will be opened while that group is irrigating. Master valves may be used to automate feeding when using a Dosatron type diluter by using one master valve to direct water through the diluter and another to bypass the diluter. Since the master valve may be defined for each group some groups can have feed applied, while others receive plain water.

A rinse valve may also be used with each group to prime the irrigation pipework system prior to opening the distribution valves.

For water supply the IC20 computer will control two separate pump systems, either pump or no pump at all may be selected for each group. The appropriate pump will then be switched on when irrigation is taking place.

Up to three water meters may be connected to the IC20. These might be used to monitor water flow associated with each pump and water supply into the nursery. One of these meters may be used to provide maximum and minimum flow rate alarms.

IRRIGATION CONTROL PROGRAMMES

The IC20 will control more than just basic irrigation. A full suite of programmes is supplied with the standard software to control all types of water application both in the glasshouse and for outdoor applications. Each 'Group' of valves is independently programmed with its own requirements, the irrigation requirements of all 16 groups is being checked all of the time so that the computer can be carrying out 16 different watering jobs at once.

A selection of different trigger programmes may be selected for each individual group. Each irrigation group may be controlled by 'Time of Day' with up to 8 starts each day. For applications where watering is not required every day the 'Day of Month' programme allows the irrigation to be programmed to occur on particular dates allowing a full month to be pre-set in advance. The 'Light Sum' programme will trigger irrigation according to the light energy received by the plants, light energy values equivalent to values from one bright sunny minute up to 9999 bright sunny minutes may be used. 'Link Start' enables one group to follow another.

For propagating and cooling applications the 'Temperature & Humidity' programme will control misting or fogging systems to maintain an elevated humidity and/or reduce the air temperature by providing day and night temperature and humidity thresholds while the 'Mist By Time' programme may be used where frequent water application is needed with day and night time intervals of up to 99 minutes between applications.

The computer also has 6 inputs, these may be used with a special 'External Trigger' programme to allow irrigation to be started from an external trigger source such as a start tray or wet leaf.

It is sometimes useful to be able to start one group following another. The 'Link Start' programme will allow a group to begin with a programmable time delay after a previous group has finished. This can be used to split watering so that the crop receives water in multiple parts.

As well as automatic watering individual valves and groups of valves may be irrigated manually.

Automatic Water Volume Adjustment

The most difficult aspect of irrigation is applying the correct amount of water to meet the plants requirements. These requirements will change from day to day depending on the prevailing weather. As the result of a year long trial a very close correlation has been found between the humidity and the water requirements. From this trial a correction programme has been developed to allow the volume of water applied to be corrected according to the humidity. Once set this will allow the irrigation programme to maintain the ideal conditions without regular adjustment.

For outdoor applications another problem is rainfall. The IC20 can be used with a rain sensor to measure this natural rainfall. Rainfall correction can be used with any or all groups to automatically vary the volume of water applied to allow for this natural rainfall.

NUTRIENT FEEDING

For feed applications pH and conductivity electrode systems may be connected to any of the 8 analogue inputs allowing the acidity and feed concentration to be measured. A plug in card is required to provide control signals for up to 4 dosing pumps. These may be used to dose acid and/or feed in response to changes in pH and conductivity.

Different feed requirements may be programmed for each individual valve group as each group has its own target pH and conductivity values. The conductivity may also be varied with light intensity. This allows different crops with different nutrient requirements to be fed from a single system.

Up to four feed boards may be fitted to the IC20 providing control for four independent feed systems where, for example, several N.F.T systems have to be controlled.

An additional water meter input is provided on each feed board so that the volume of feed applied may be measured. In addition this water meter may be used to shut off feeding if flow stops.

The feed board has transistor outputs capable of switching 24 v DC and can drive a wide variety of different dosing pumps via suitable relays. Tomtech also manufacture a range of peristaltic dosing pumps which connect directly to the feed board and are suitable for NFT and other low pressure systems.

FULLY EXPANDABLE

The IC20 computer may be expanded by plugging in up to 8 cards to control additional valves, feed etc. Where this is insufficient a number of IC20's may be linked together to build as large an irrigation system as required. The IC20 may also be linked to other Tomtech computers including the HC80, HC120 and HC160 environmental control computers and the IC2 irrigation computer allowing both environmental and irrigation control to be integrated together. Where this is done the IC20 will share the resources of the system. For example it may use weather station and sensor readings from an HC120.

A printer may be connected to the IC20. Statistical data for all measured parameters may be printed in tabular and graph form.

A P.C. (Personal Computer) or compatible computer may be connected, allowing remote programming of the IC20, monitoring of the system, and archiving of statistics by using the Tomtech Environment Manager software.

IC20 SPECIFICATION

Computer Housing:	Stainless steel enclosure finished in epoxy-powder paint with 6mm. thick safety glass door.
Mains power:	120 or 240 volt AC 50 or 60 Hz. +/-10%
Analogue Inputs:	8 analogue inputs each configurable for measuring temperature, humidity, light, pH or conductivity. The number of analogue inputs may be doubled to 16 by plugging in an ATD card.
Weather Station Inputs:	Special purpose inputs for wind speed, wind direction, light, rain, outside temperature and humidity.
Digital Inputs:	6 low voltage inputs through opto-isolators for use with start trays etc.
Valve Outputs:	16 outputs without any additional cards plugged in. 16 extra valves can be added on each plug in card. Up to 144 valves can be controlled in total. Valve outputs are all relay isolated. Relays have changeover contacts for 24v AC or DC valves.
Pump Outputs:	Provision for controlling two separate pumps for water supply. Outputs are relay isolated with changeover contacts rated 240 v AC.
Alarm output:	Relay isolated, with changeover contacts rated 240 v AC 8 amps.
Feed Control:	Up to 2 independent feeding systems can be controlled by plugging in a feed control card for each system. Each feed system can have up to four dosing pumps.
Display:	4 lines of 40 characters LCD supertwist reflective display
Printer:	Serial printer output for an Epson compatible printer
Communications:	RS422 communication port for connection to other Tomtech computers and to a P.C.