

QTech Irrigation Management

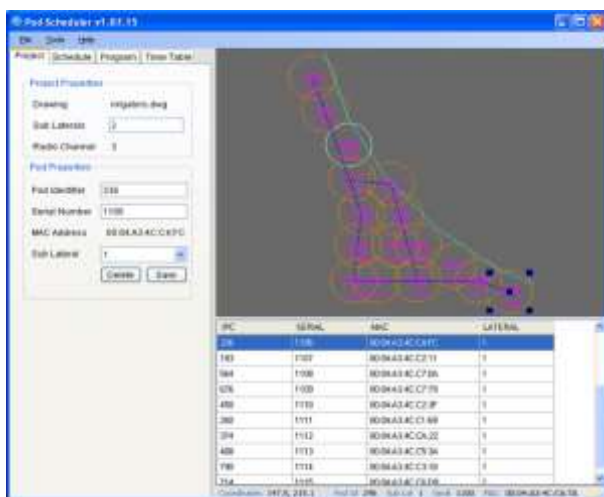
Independent Solar/Battery Control - Wireless

The QTech Irrigation Management System (QIMS) is a hardware and software suite of products used to configure (schedule) and control fixed set irrigation sprinklers. The primary aim of the system being to individually manage the operation of irrigation sprinklers via a Radio / Mesh Network.

The QIMS system design provides a low cost controller (IPC – Irrigation Point Controller) at each sprinkler point (G-Set™ Pod or Post). The IPC is self-contained, powered from an on-board Lithium battery, with an integral solar cell. The IPC operates low power latching solenoids to control the irrigation sprinkler. All of the IPC's communicate via a 900Mhz mesh radio network, allowing watering schedules to be centrally managed. The core of the irrigation solution being to provide even water application over large areas at a low rate in a controlled manner, this avoids water run-off and maximises growth.

The four system component parts;

- **Irrigation Point Controller (IPC):** Devices used to control the solenoid valve at each sprinkler, G-Set™ Irrigation Pod or Post.
- **EP3:** Hand held wireless device used to configure and test IPC's.
- **Irrigation Network Controller (INC):** This is a permanently installed and powered device that is used to monitor and record the state of each IPC in a system. It can also configure and test IPC's. Standalone or QIMS windows software mode of operation.
- **IPC Scheduling Software:** Windows software application that is used to create the scheduling files used for configuring the IPC's operation, these files are used by the EP3 and INC.



Irrigation Point Controller

Irrigation Point Controller (Wireless IPC)

The Irrigation Point Controller (IPC) is a standalone irrigation controller that is updated by radio, but is totally independent in its operation. The IPC is designed to operate a 4ohm latching valve coil, by sending out a DC pulse that changes the position of the plunger in a solenoid valve, turning the valve on or off. The IPC operates on a time schedule and is able to apply that schedule in a flexible cycle.

When the IPC schedule reaches the end of the cycle it simply starts the process again. This process continues indefinitely until a change is made to the schedule, that change is applied by a radio transmission to the IPC. The radio communications is either directly with each IPC in the field or by mesh communications topology enabling the IPC to be updated from the EP3 or INC out of sight of the IPC.

The IPC is formed so that the solar panel is angled to get the best energy input from the sun throughout the year. This charging energy flows into an encapsulated lithium polymer battery to maintain operation even in the low sunlight (solar radiation) winter months. The IPC mounting should be generally North facing to obtain the best result, but if there is foliage, trees or other impediments to the best placement then it would be oriented toward the best sun position. In poor solar energy conditions and should the internal battery level drop too low the IPC will switch into a hibernation mode preserving the battery to prevent damage occurring with in-sufficient battery energy.

Features

- Solar panel & lithium polymer storage battery (1500mAh)
- Fully encapsulated (water proof) electronics
- ARM integrated controller CPU
- Latch solenoid operation (Baccara 3way only 4ohm 9-12V)
- Real time clock/calendar on board - high accuracy
- Maximum of 255 minutes per irrigation event and up to 16 operational slots per cycle.
- Field replaceable battery



Benefits

- Low maintenance - Electronic components are encapsulated
- Low running costs - Connected to a renewable power source
- Many independent IPC's - Lower risk of one device causing the an entire system to fail

EP3 Hand Held Programmer

EP3 Hand Held Programmer

EP3 is a handheld battery powered wireless device for configuring and testing the Irrigation Pod Controller's (IPC). The EP3 communicates directly with IPC's in point to point local mode or via the mesh radio network. Configuration files (for pod lists, schedules and firmware upgrades) are loaded into the EP3 via a removable SD card.

Features

- The EP3 display is a resistive touch sensitive mono-colour OLED graphical display.
- Easy to use via soft keys on the display to step the various menu options and operator functions. The device is supplied with a stylus making the operation quick and responsive.
- Boot loader mode to enable field upgrades of the IPC firmware.



Benefits

- IPC status easily checked in the field.
- Simple updating of IPC schedule in the field.
- Operation by Mesh enables the system to update IPC's that are not visible directly to the EP3
- Fault finding tool

IPC Manager

IPC Manager

The **IPC Manager** is a Microsoft window-based computer software application that is the primary configuration tool for an IPC controlled irrigation network. The software allows the selection and grouping of IPC's for an irrigation system design, the management and control of the operational schedule for the IPC's in the network. The software provides an easy to use UI (user-interface) for system designers, installers and users. As well as managing the IPC list, creation of user defined schedules and irrigation cycles (sprinkler switching times), the software generates the system (POD and Schedule) files for use by both the INC and EP3.

Irrigation systems are designed by appropriately skilled designers and installers. These designs will take into account many factors about the layout of the irrigation system, the flow of water and dispersion rates via primary and sub-laterals in the pipe network as well as size and application rates of the sprinkler heads. It is not the purpose of the IPC Scheduler to be an irrigation system design application, but a tool that allows the irrigation control system to be over-lay on the Irrigation Designers lay out.

Features

- IPC Manager - defines the irrigation network number of sub-laterals, IPC radio channels in use, lists of all IPC's on the property, schedules and time slots.
- IPC Manager - enables a reference .dwg drawing to be added to the IPC project, circles and arcs are used to signify the IPC position. The program enables you to add the pod/post references to the drawing with the QTech reference number (short descriptor for mac address). These references to the pod/post can either be numbers or names. The drawing can then be printed to get a full drawing of the final layout.
- IPC Manager- enables creation of irrigation schedules specific to the property. When the schedules and IPC data are entered and saved a set of configuration files are then created (for pod lists and schedules). These files are then transferred to the EP3 handheld programmer or INC using an SD card.
- IPC Manager- the design can and should be saved. This creates a .prj file that encapsulates all of the design including location of the drawing file, the QTech numbers for each POD/Post and the full layout.

Benefits

- Ease of system configuration.
- Flexible individual schedule periods.
- Simple update of the schedule
- Operation by Mesh enables the system to update the IPC's that are not visible directly to the EP3

IPC Network Controller

IPC Network Controller (Wireless - INC)

The IPC Network Controller (INC) is a permanently installed and powered device that is a gateway between the IPC network and the PC based (NUC) QTech Irrigation Management System (QIMS). The INC is actively communicating (background polling) with the installed IPC's via the mesh radio network or via direct communication with geographically located Repeaters. The INC logs a record of its communication with the IPC's and their last known status; such as last valid Poll, Battery state, Clock Error. From the INC you can manually trigger communications with a specific IPC, where you can send a schedule (revised or otherwise), control the valve / solenoid, initiate a status request. System configuration files, POD list, Schedule lists come from the IPC Scheduler application as they do for the EP3.

The INC may function in standalone mode whereby the user will operate the INC via the resistive touch sensitive mono-colour OLED graphical display, the same as used on the EP3. In this mode the system information held is in a summary state. However the INC is generally implemented with the QIMS system on an Intel NUC PC. See the QIMS application data sheet.

QIMS provides a user friendly dashboard user interface to integrate with the INC. The software provides the same operational functions as if being operated from the INC touch screen but from the convenience of your PC. As well as providing more extensive visual operational analysis of the IPC network and their state.

Features

- Stand alone or QIMS connected mode.
- Details the state of the IPC network,

Benefits

- Ease of system configuration.
- PC connectivity option, data collection and records of system function.



900Mhz Radio Network and Mesh

The radio's used in the QTech system are purpose designed and the circuit has been certified compliant under the AS / NZ 4268:2008 classification license free general user radio licence for short range devices.

At 900Mhz and 100mw power output (with the associated aerial systems) the radio system is deemed to operate line of sight, thus each radio device should be in sight of the next and no further than 100m away. While terrain dependent it should be noted that practical installations have proven that these distances in most cases to be worst case and in general much greater separation is achieved.

Mesh network, is a network topology in which each IPC relays data for the network. All mesh IPC's co-operate in the distribution of data in the network. Mesh networks can relay messages using either a *flooding* technique or a *routing* technique. With routing, the message is propagated along a path by *hopping* from IPC to IPC until it reaches its destination.

So the EP3 or INC firstly establishes a route to a given IPC using network flooding, when the IPC receives the request it will respond with a route response message. Once a route has been established the EP3 or INC will send the actual message to the IPC using multi-hop communications.

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