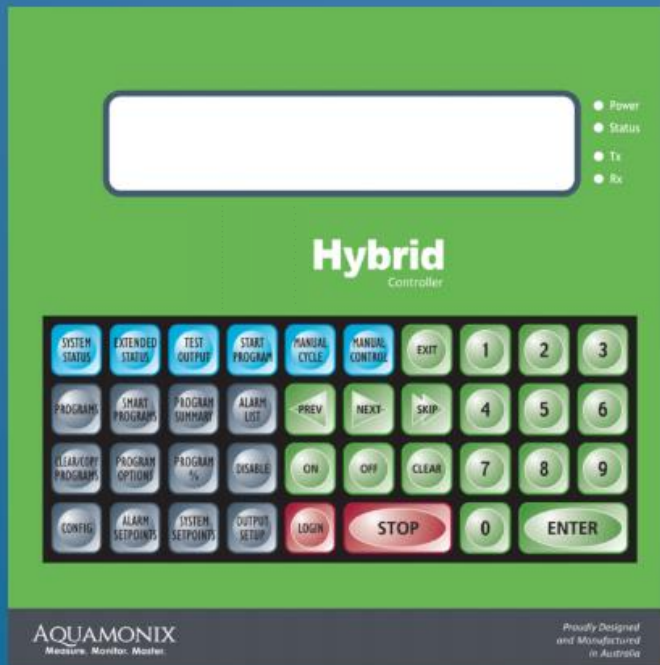




**AQUAMONIX**  
Measure. Monitor. Master.

# OPERATION AND CONFIGURATION MANUAL



## HYBRID MpG CONTROLLER

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## 1.0 QUICK START

### 1.1 QUICK TIPS ABOUT KEYS

If you are familiar with computers and irrigation controllers, or you are just keen to get started, here are a few tips about the keys to get you started.

- First you need to press the LOGIN key before you can enter a password.
- The SYSTEM STATUS key changes only the left hand side of the display and does not affect the screen that you are currently using.
- The EXIT key takes you back to the default status screen **but does not undo changes** you have confirmed with the ENTER key.
- Function keys will jump you straight to the function that they select. Pressing the same function key again allows you to navigate through a function.
- You can also navigate using the NEXT, PREV and SKIP keys in most cases.
- ENTER is required to confirm everything you type.
- Use the CLEAR key if you make a mistake. (will only remove the last action)
- The STOP key is an emergency stop button that turns off all stations and pumps.
- To minimise the possibility of error, all times are in 24-hour format.
- The SKIP key is used to go to the next step on multiple entry screens.

### 1.2 CONTROLLER SETUP

To setup the controller quickly:

1. Press the LOGIN key and enter a technician level password.
2. Press the CONFIG key and then press the ENTER key, this will take you to the Quick Setup menu.
3. Set the time and date using the number keys, press the ENTER key to confirm each entry.
4. Set the number of local, TWIN and RIC stations if available, press the ENTER key to confirm each entry.
5. Set the number of irrigation pumps, press the ENTER key to confirm each entry.
6. Press the EXIT key to exit the menu.
7. The controller will save settings and will be ready to use.

## 2.0 THE BASICS

### 2.1 THE DISPLAY

The display is split into two parts as shown below.

12:00:00		System Idle
01/01/15		
Thu		
Week 2		

System status display – the left hand side of the screen is used for system status and operated by the SYSTEM STATUS Key (see 2.2 SYSTEM STATUS).

Main display – the right hand side of the display operates with all other keys. It is used for showing user input and program status

### 2.2 SYSTEM STATUS DISPLAY

The SYSTEM STATUS key allows the operator to select different aspects of the system status. It starts at the time and date then cycles through all the sensor inputs. It only displays sensors that have been configured so the list of sensors shown may vary from controller to controller.

To select the next system status item press the SYSTEM STATUS key.



#### 2.2.1 TIME AND DATE

Time and date is the initial state that is shown below.

12:00:00
01/01/15
Thu
Week 2

Time – 12:00:00 is the time current time in 24-hour format.

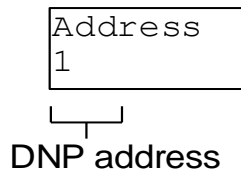
Date – 01/01/15 is the current date in the format DD/MM/YY so the date is the 1 January 2015.

Day of week – Thu is the day of the week so the day is Thursday.

Week number – Week 2 is the week number. All programs run on a 2-week (14-day) cycle

### 2.2.2 ADDRESS

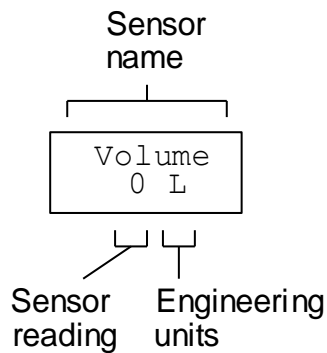
The DNP address is shown as follows:



The DNP address is the unique address used by the central computer to communicate with this controller.

### 2.2.3 SENSOR DISPLAY (CURRENT, MOISTURE, FLOW, PRESSURE, CURRENT SENSE, VOLUME, TEMPERATURE, LEVEL ETC.)

The sensor display shows the state of different sensors:



Sensor name – Volume indicates the amount of water that has passed through the flow meter.

Sensor reading – 0 indicates that the water volume is currently 0.

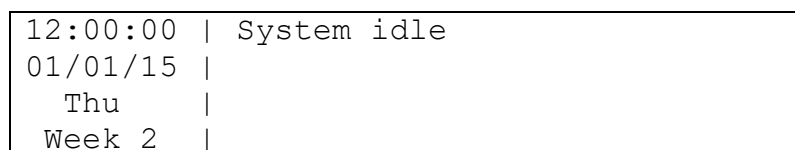
Engineering units – Volume is measured in Litres.

## 2.3 MAIN DISPLAY

The EXIT key takes you out of any other function and brings you to status screen. If there are multiple status screens to display, the controller will rotate through them with each one shown for 3 seconds.

### 2.3.1 IDLE STATUS

When no programs are running the display will look similar to the display below.



Status indicator – System Idle shows that no programs are running.

### 2.3.2 IRRIGATION DISABLE STATUS

The following is displayed when the irrigation is disabled.

12:00:00		Irrigation disabled -	
01/01/15		Timer 1 hour 0 minutes	
Thu			
Week 2			

Status indicator – Irrigation disabled indicates that the rain switch function is activated.

Disable state – 1 hour 0 minutes indicates that irrigation has been manually disabled and will remain disabled for a further 1 hour. The irrigation disable state can display any of the following.

- Rain Switch On – the rain sensor switch has disabled irrigation
- Manual On – irrigation has been manually disabled indefinitely
- Timer – irrigation will remain manually disabled for the number of hours and minutes displayed.

(see 4.2 IRRIGATION DISABLE for more information on disabling irrigation).

### 2.3.3 PROGRAM STATUS

The following is displayed when a program is running.

12:00:00		Program 1	
01/01/15		Group 1	00:05:00
Thu		Stations 1,2	
Week 2		Pumps 1	

Program name – Program 1 indicates that program 1 is running. The status indicator may also display Test to indicate valve test operation or Manual to indicate manual station on operation.

Group number – Group 1 indicates that the program is currently running group 1.

Group minutes remaining – 00:05:00 indicates that there is five minutes remaining on the current group (group 1).

Stations – Stations 1,2 indicates that stations number 1 and 2 are active due to this program.

Pumps – Pumps 1 indicates that pump 1 is active due to this program.

## 2.4 ALARM LIST

The alarm list shows a list of events which may indicate a problem with the irrigation system. The alarm list records:

- the power on and off times
- events that cause the irrigation system to skip to the next station,
- events that cause irrigation to stop immediately and
- other events that may indicate a potential problem.

There are up to 10 alarms numbered 1 through 10. Alarm 1 is the most recent alarm and alarm 10 is the least recent alarm

Pressing the ALARM LIST key at any time will jump you straight to the alarm list screen from any other screen.



12:00:00		Alarm 1
01/01/15		11:00:00 01/01/15
Thu		Rain switch sensor on
Week 2		

Alarm number – Alarm 1 indicates the most recent alarm.

Alarm time – 11:00:00 indicates that the alarm occurred at 11:00:00 am. The time is shown in 24-hour format.

Alarm date – 01/01/15 indicates that the alarm occurred on 1 January 2015.

Alarm description – Rain switch sensor on indicates that the alarm has been triggered by the rain sensor activating.

To see the next alarm, use the ALARM LIST key as shown.



You can also use the prev and next keys to navigate through the alarms.

## 2.5 RESTRICTED ACCESS

The controller uses multi-level password security to prevent unauthorised access. Until you have gained access to the controller the display backlight will turn on for only five seconds after each key press.

To get to the password screen press the LOGIN key as shown.



The password entry screen is shown below.

```
12:00:00 | Login
01/01/15 | Enter password _
  Thu    |
Week 2   |
```

**Password entry** – as the password is entered a \* will appear for each number key that is pressed. If you make a mistake you can press the CLEAR key and start again.

If, for example, the password is **1234**, press the following keys.



When you have been granted access the display back light will remain on. Once you stop using the controller for more than 10 minutes it will automatically turn the display back light off and you will require a password to gain access again.



## 3.0 MANUAL OPERATION

### 3.1 TEST OUTPUTS

The Test Outputs function turns on a station without turning on the pump. This is used for testing valves. To run a valve test press the TEST OUTPUTS key shown below.



The Test Outputs screen is shown below.

```
12:00:00 | Valve test
01/01/15 | Station number 1
  Thu    |
Week 2   |
```

Station number – 1 indicate that the default station to test is station 1.

If you want to test station number 1 simply press ENTER as shown.



If for example you want to test station number 2 then, press the keys shown.



After pressing ENTER, it will confirm the station you have selected with a display similar to the one below.

```
12:00:00 | Valve test
01/01/15 | Valve 1 On
  Thu    |
Week 2   |
```

Station number – 1 indicates that the station 1 valves have been opened.

After a short delay it will return to the status screen (see 2.3 MAIN DISPLAY).

Once the valve test has started the NEXT and PREV keys can be used to scroll through the valves.

### 3.2 MANUAL CONTROL GROUP

The Manual Control function turns on a group of stations (it also turns on pumps if applicable). To turn a station on, press the MANUAL CONTROL key shown below.



The station on screen is shown below.

12:00:00		Manual Control
01/01/15		Run for 0 hrs 5 mins
Thu		Stations 1,2
Week 2		(ON/OFF to add/remove)

**Run hours** – Run for 0 hrs 5 mins indicates that the manual control will run for 5 mins. Use the number keys followed by the ENTER key to set the number of hours and minutes to run the group.

**Station Numbers** – Stations 1,2 This is a list of the stations which are currently selected to run.

To add stations to run, enter the station number followed by the ON key. Once the ON key is pressed the station will appear in the station numbers list.

For example, to add station 5 press the following:



To remove a station enter the station number and press the OFF key. Once the OFF key is pressed the station will disappear from the station numbers list.

For example, to remove station 5 press the following:



Once you have entered the stations you require press the ENTER key.

The pump selection screen will only be available if pumps have been configured on the controller. A screen similar to the display below will be displayed.

12:00:00		Manual Control
01/01/15		Pumps 1,2
Thu		
Week 2		(ON/OFF to add/remove)

Pump List – Pumps 1, 2 is a list of the pumps which are currently selected to run with this manual control.

To add pumps to the list enter the pump number followed by the ON key. Once the ON key is pressed the pump will appear in the pump list.

For example, to add pump 2 press the following:



To remove a pump, enter the pump number and press the OFF key. Once the OFF key is pressed the pump will disappear from the pump list.

For example, to remove pump 2 press the following:



Once you have entered the pumps you require press the ENTER key

Once all the required pumps have been entered press the ENTER key and the manual control will start immediately. When the manual control has finished the controller will revert to an idle state.

### 3.3 START PROGRAM

The Start Program function is used to manually start programs. To start a program manually, press the START PROGRAM key shown below.



The Start Program screen is shown below.

```
12:00:00 | Start program now
01/01/15 | Enter program number to
  Thu    | start  1 (1-17)
Week 2   |
```

Program number – 1 indicates that the default program to start is program 1.

If you want to start program number 1 simply press ENTER as shown.



If for example you want to start program number 2, then press the keys shown.



After pressing ENTER, it will confirm the program you have selected with a display similar to the one below.

```
12:00:00 | Start program now
01/01/15 | Enter program number to
  Thu    | start  1 (1-17)
Week 2   | Program 1 started
```

After a short delay the display will return to the status screen (see 2.3 MAIN DISPLAY).

### 3.4 PROGRAM CONTROL

Programs can be controlled when the main display is showing the status

#### 3.4.1 SKIP FORWARDS

To skip to the next group in all running programs (or next station in a valve test) press the NEXT key.



#### 3.4.2 SKIP BACKWARDS

To move back to the previous group in all running program (or station on a valve test) press the PREV key.



#### 3.4.3 PAUSE

To temporarily turn off all stations and pumps (pause operation) press the OFF key. This works even if no programs are running.



#### 3.4.4 RESUME

To resume after a pause operation (or to update the program display) press the ON key.



#### 3.4.5 STOP

To stop ALL programs immediately, press the STOP key. This works regardless of what is screen is currently displayed, however a password may need to be entered first.



## 4.0 SETTINGS

### 4.1 PROGRAM % WATER BOOST

The Program % acts as a scale factor to change the amount of water used when running a program. The program scale factor can be any value from 0% to 999%.

Pressing the PROGRAM % key will scroll you through each program and allow you to change the scale factor.



The Program % screen will be similar to the display below.

12:00:00		1 Program 1 run time
01/01/15		Normal run: 05:00:00
Thu		Scale factor 200%
Week 2		Scaled run: 10:00:00

Program Number – indicates which program you are looking at, use the NEXT and PREV keys to scroll through the programs.

Scale factor – 200% indicates that the current scale factor for Program 1 is 200%.

If for example you wish to change the scale factor to 50% press the following keys.



## 4.2 IRRIGATION DISABLE

The irrigation disable option prevents any programs from automatically starting for a specified number of hours or can stop all programs until told otherwise.

Pressing the DISABLE key at any time will jump you straight to the irrigation disable screen from any other screen.



The irrigation disable screen will be similar to the display below.

```
12:00:00 | Irrigation Disable
01/01/15 | Program starts are disabled
  Thu    | indefinitely
Week 2  |
```

Disable setting – “disable for 1 hour” indicates the number of hours that the programs will remain disabled. “disable indefinitely” indicates that programs starts are disabled until manually enabled again. “allowed to start as scheduled” indicates that programs will start normally.

If you want disable programs starts until you manually enable them again, press the following keys.



If you want to manually re-enable program starts then press the following keys.



If for example you wish to disable program starts for 24 hours (i.e. until the same time the following day) then press the following keys.



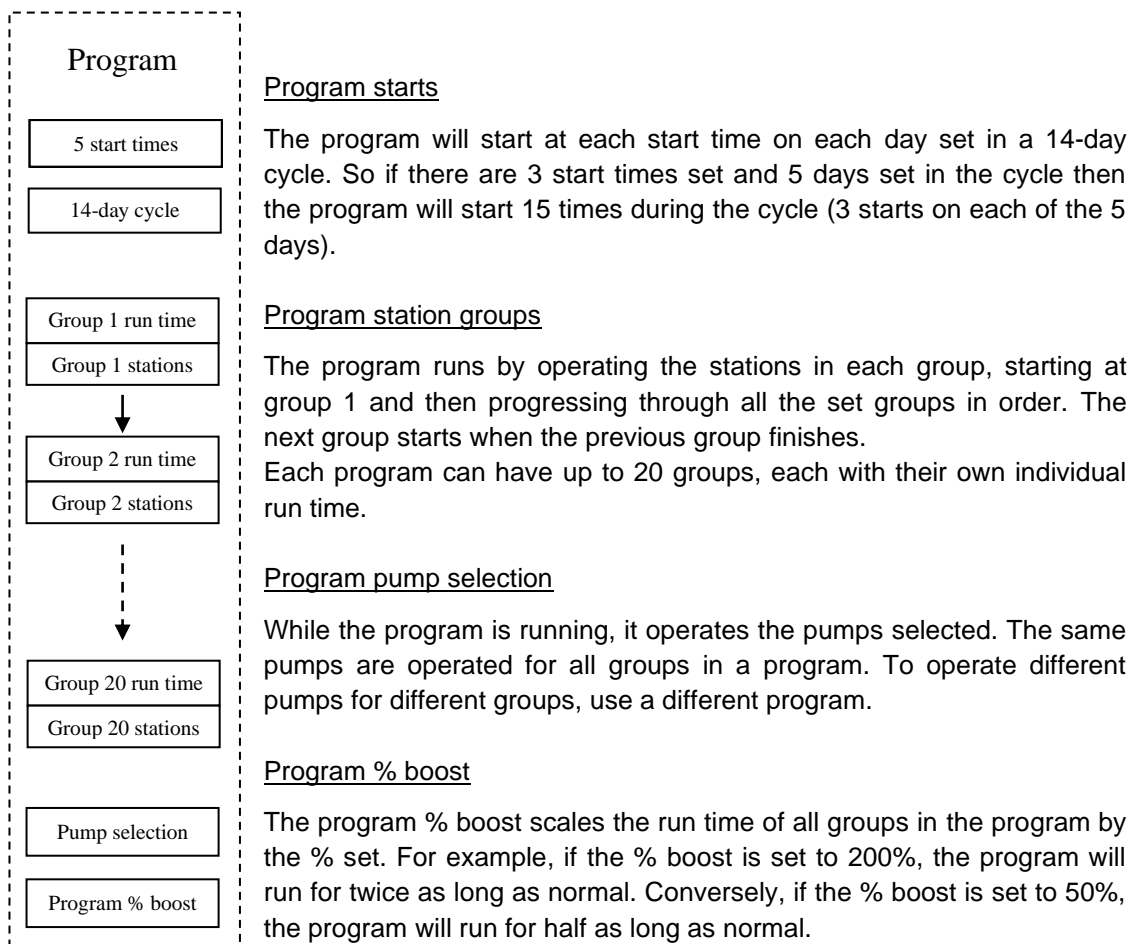
Press EXIT to return to the status screen (see 2.3 MAIN DISPLAY). The status will show that the disable has been activated. The status will show the number of hours and minutes of disable period remaining.

## 5.0 PROGRAMS

There are ten standard programs and six optional programs. A standard program consists of 5 start times and is capable of activating up to 20 groups. Each standard program has a 14-day cycle and a % boost facility. If the current day is active and the current time is equal to any one of the five start times the program will commence.

All stations in Group 1 will run for the run time in Group 1 scaled by the % boost. Once Group 1 has finished Group 2 will commence in the same manner. All groups (with run times greater than zero) will operate sequentially right through to Group 20 and once finished will return to an idle status.

NOTE: All programs have the ability to overlap therefore care must be taken when setting up programs not to overload the system.





## 5.1 STANDARD PROGRAMS

Standard programs are accessed through the PROGRAMS key. There are fifteen standard programs numbered 1 through 10. Each program has 5 start times, a 14-day cycle, 20 groups, a pump selection and a % boost.

Pressing the PROGRAMS key at any time (except when you are already in the programs function) will jump you straight to the programs function from any other screen.



The programs screen is shown below.

```
12:00:00 | Programs
01/01/15 | Enter program number to
  Thu    | edit  1 (1-10)
Week 2  |
```

Program number – 1 indicates that pressing ENTER will allow you to edit program number 1 of the currently selected library.

### 5.1.1 SELECTING A PROGRAM

If for example you want to view or change program number 2, then press the following keys.



To select program 2 using the NEXT key, press the following keys.



You can press the NEXT key several times to select other programs. You can also use the PREV key to assist with selecting in this way.

### 5.1.2 START TIME

After you have chosen the program to view or change you will see the start time screen which looks similar to the display below.

12:00:00		Program 1	Times to start		
01/01/15		Start 1	Off	Start 4	Off
Thu		Start 2	Off	Start 5	Off
Week 2		Start 3	Off	(24hr time)	

Program name – Program 1 indicates that you are accessing program number 1.

Start time – There are 5 start times per program, to navigate through the start times use the NEXT and PREV keys. For each start time, the Off indicates that the start time is not used (set by pressing the OFF key). If all start times are OFF, the program may still be started by the Semi Auto Start function (see 3.3 START PROGRAM).

The start time is in 24-hour format.

If for example you want to start the program at 1:30am you would press the following keys.



All times are in 24-hour format so if you wish to start a program at 11:15pm then you would press the following keys.



Once all the start times you require are set up press the DONE key to progress to the next step.

### 5.1.3 DAY CYCLE

After you have set up the start times (or pressed the SKIP key) you will see the Days cycle screen which looks similar to the display below.

```

12:00:00 | Program 1 Days to start
01/01/15 | Week 1 Su __ Tu __ Th __ Sa
    Thu   | Week 2 __ Mo __ We __ Fr __
Week 2   | (Set days: 1 All, 2 None, 3

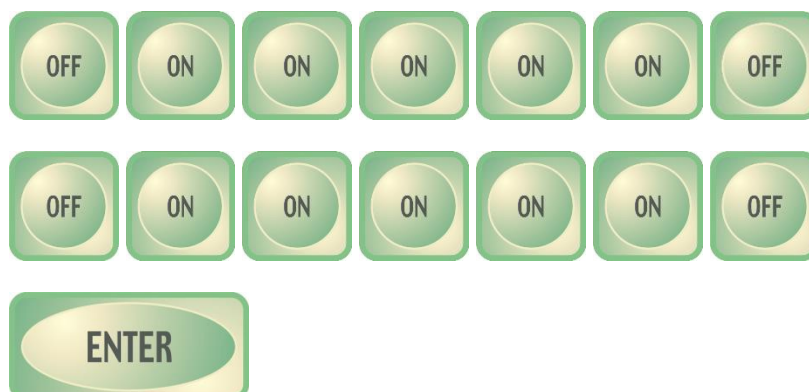
```

Program name – Program 1 indicates that you are accessing program number 1.

Day cycle – Week 1 Su \_\_ Tu \_\_ Th \_\_ Sa and Week 2 \_\_ Mo \_\_ We \_\_ Fr \_\_ indicate which days the program will run. The flashing day is the current day.

Set up the Day Cycle using the NEXT, PREV, ON, OFF or numeric keys. You can also use the NEXT and PREV keys to navigate across. Once finished press the ENTER key to save the changes.

If for example you want run a program from Monday to Friday every week then you press the following keys.



This would show a display as follows.

```

12:00:00 | Program 1 Days to start
01/01/15 | Week 1 __ Mo Tu We Th Fr __
    Thu   | Week 2 __ Mo Tu We Th Fr __
Week 2   | (Set days: 1 All, 2 None, 3

```

### 5.1.4 GROUPS

After you have selected the days to start (or pressed the SKIP key) you will see the group screen which looks similar to the display below.

```

12:00:00 | Program 1 Group 1
01/01/15 | Run for 0 hrs 5 mins

```

Thu		Stations 1,2
Week 2		(ON/OFF to add/remove)

Program name – Program 1 indicates that you are accessing program number 1.

Group number – Group 1 indicates that you are accessing group 1 of program 1.

To select a group, use the NEXT and PREV key until the group number you wish to edit is displayed or use the numeric keys to enter the group number. Then press the ENTER key.

Run hours – Run for 0 hrs 5 mins indicates that the group will run for 5 mins.

Use the number keys followed by the ENTER key to set the number of hours and minutes to run the group.

Station Numbers – Stations 1,2 This is a list of the stations which are currently selected to run in this group.

To add stations to the group enter the station number followed by the ON key. Once the ON key is pressed the station will appear in the station numbers list.

For example, to add station 5 press the following:



To remove a station enter the station number and press the OFF key. Once the OFF key is pressed the station will disappear from the station numbers list.

For example, to remove station 5 press the following:



Once you have entered the stations you require press the ENTER key.

Pressing the SKIP key in this screen will skip all the groups and advance you to the next step.

### 5.1.5 PUMP SELECTION (OPTIONAL)

The pump selection screen will only be available if pumps have been configured on the controller. A screen similar to the display below will be displayed.

12:00:00		Program 1
01/01/15		Pumps 1,2
Thu		
Week 2		(ON/OFF to add/remove)

Program name – Program 1 indicates that you are accessing program number 1.

Pump List – Pumps 1, 2 is a list of the pumps which are currently selected to run in this program.

To add pumps to the list enter the pump number followed by the ON key. Once the ON key is pressed the pump will appear in the pump list.

For example, to add pump 2 press the following:



To remove a pump, enter the pump number and press the OFF key. Once the OFF key is pressed the pump will disappear from the pump list.

For example, to remove pump 2 press the following:



Once you have entered the pumps you require press the ENTER key

### 5.1.6 WATER BUDGET ENTRY

After you have set up the groups and pumps (or pressed the SKIP key) you will see the Water Budget Entry screen which looks similar to the display below.

```
12:00:00 | Program 1
01/01/15 | Normal run: 05:00:00
  Thu    | Scale factor 200%
Week 2   | Scaled run: 10:00:00
```

Program name – Program 1 indicates that you are accessing program number 1.

Scale factor – 200% indicates that the current scale factor for Program 1 is 200%.

If for example you wish to change the scale factor to 50% press the following keys.



Once you have entered the water budget you require press the DONE key to progress to the next step.

### 5.1.7 SUMMARY

At the end of the program all the information entered into the program is condensed in to a final summary screen. This screen is displayed for 10 seconds after the program has been entered for the user to perform a quick check of the program.

The program summary screen will look similar to the display below.

```
12:00:00 | Program 1
01/01/15 | Starts 1 time on 7 days
  Thu    | Runs for 10:00:00 at 200%
Week 2   |
```

Program name – Program 1 indicates that you are accessing program number 1.

Starts – Starts 1 time on 7 days indicates the number of start times and days which are active.

Run time – Runs for 10:00:00 at 200% indicates that the total runtime of all the groups is 10 hours and the program % boost is set to 200%

## 5.2 SMART PROGRAMS

Smart programs are accessed through the SMART PROGRAMS key. There are five optional standard programs:

- 11 Looping
- 12 Frost Protection
- 13 Heat Protection
- 14 Fertigation
- 15 Filter Flush program
- 16 Pond Fill
- 17 Remote Pump

Pressing the SMART PROGRAMS key will scroll you through each of the above programs. You can also use the NEXT and PREV keys to navigate through these programs.



### 5.2.1 LOOPING

The looping program is designed to be used if there is a requirement for a program to run with a large number of starts. The operation of the looping program is different from the normal programs in that the watering restarts each time the loop duration has expired and does not cease until it reaches the end time.

Start time – The time of day the program will start on each of the days selected in the day table (24 hr time).

End time – The time of day the program will stop (24 hr time). If set to Off program will loop continuously until stopped by the user or by an alarm.

Cycle (loop) duration – The duration after the program starts before the program will restart. If the program run longer than the cycle time then the program will restart immediately (hr:mins). For example, if the program takes 1 hr to run through and the cycle time is set to 3 hrs then the loop sequence will be: program runs for 1 hr, program waits for 2 hrs for cycle duration to elapse, then program is restarted and the sequence begins again.

### 5.2.2 FROST & HEAT PROTECTION PROGRAMS

The frost and heat protection programs works in a similar method to the looping programs except it does not use start times or a day cycle to start. The frost & heat programs will activate when the temperature outside exceeds a predetermined setpoint. When the frost or heat program activates, it will stop any other programs which are running and continue to cycle until the temperature recovers.

Min Temp (frost program) – Setpoint temperature, frost protection program will start when the temperature drops below this setpoint and stops when the temperature rises back above this setpoint.

Max Temp (heat program) – Setpoint temperature, heat protection program will start when the temperature rises above this setpoint and stops when the temperature drops back below this setpoint.

Cycle (loop) duration – The duration after the program starts before the program will restart, same as the looping program (hr:mins).

### **5.2.3 FERTIGATION PROGRAM**

The Fertigation Program is used to control a fertigation pump connected to the irrigation system.

Pre Wash time – The run time the program will run each group for before activating the fertigation pump (hr:mins).

Post Wash time – The run time each group will run for after the fertigation pump has stopped (hr:mins).

The runtime for each group is the time the fertigation is applied to each group. The total runtime for each group is the addition of the pre wash time, the post wash time and the fertigation time.

### **5.2.4 FILTER FLUSH PROGRAM**

The filter flush program is used to control and flush up to six filters

Run Time – This is how long the pumps have to run for before forcing a flush cycle to happen (hr:mins). Other programs are paused during a flush cycle.

Flush time – This is the run time each filter will flush for this time is in minutes and seconds (min:secs). Each flush valve is activated for this amount of time in sequence.

Pause time – This is the pause time after flushing a filter and before each filter will flush for this time in minutes and seconds (min:secs). Caution: During this pause time, no flush valves are active and pressure may build, use this setpoint to maintain pressure if valves close slowly.

Note: The runtime can be overridden by a Pressure differential switch if one is connected to the controller.

### **5.2.5 FILL PROGRAM**

The fill program is used to control a digital output which can be connected to a pump or outlet used to fill a pond, lake or tank. This program uses the analogue level sensor to determine if the low start point or the high stop point has been reached.

The fill level can be specified differently during an off peak time if required.

Peak Start Level – The pond fill program starts when the level drops below this setpoint.

Peak Stop Level – The pond fill program stops when the level rises above this setpoint.

Off-peak start/stop Level – setpoints used during the Off-peak window

Off-peak start/stop times – Between the start and stop times, the program will use the Off-peak level setpoints (24 hr time)



### 5.3 CLEAR AND COPY PROGRAMS

The CLEAR/COPY PROGRAMS key can be used to clear an individual program or all programs in memory. It also allows you to copy a program which is useful to write a new program based on an existing program.

Pressing the CLEAR/COPY PROGRAMS key once at any time will jump you straight to the Clear Programs function from any other screen.

Press the CLEAR/COPY PROGRAMS key twice to access the Copy programs function.



## 6.0 ALARMS

Alarms are used to prevent damage to equipment as well as informing the user that something has changed in the system. When used correctly, alarms are a very useful tool in determining faults in the irrigation system. If an alarm is triggered, a message will be displayed on the screen and will remain there until a key has been pressed.

If a controller is connected to a Central Control System (CCS), then all alarms are reported to the central.

For a complete list of the alarms supported by the controller, see *APPENDIX A: ALARMS AND ALARM SETPOINTS*.

### 6.1 ALARM ACTIONS

When an alarm is triggered the controller responds depending on the severity of the alarm.

The most severe alarms cause the controller to stop all irrigation including any programs/manual controls that are running.

For less severe alarms, the controller will initially assume that a problem only exists with the currently running station and will try and continue irrigating by skipping the current station. However, if skipping stations does not prevent the alarm from being triggered, then the controller will stop all irrigation.

Some alarms do not trigger any action from the controller. This may be because the controller can not take any suitable action, or that the alarm is an information only alarm.

The three different actions the controller may take.

1. **Shutdown** – Immediately stop all irrigation.
2. **Skip, skip, skip, shutdown** – Skip the currently running station. If the same alarm is triggered three times in a row, then stop all irrigation.
3. **None** – Take no action.

### 6.2 ALARM LIST

When pressed, the ALARM LIST key will display a description of any recent alarms along with the time the alarm occurred.



```
12:00:00 | Alarm 1
01/01/15 | 11:00:00 01/01/15
Thu      | Rain switch sensor on
Week 2   |
```

Using the NEXT and PREV keys will scroll you through the ten most recent alarms.

## 6.3 ALARM SETPOINTS

Alarms Setpoints determine under what conditions an alarm is triggered and so must be configured before alarms will be triggered. Pressing the ALARM SETPOINTS key displays the Alarm Setpoints for the controller. Alarm setpoints only appear if the corresponding sensor has been set up in the System Config (see 7.0 CONFIGURATION).

Pressing the ALARM SETPOINTS key repeatedly scrolls through the Alarm Setpoints. The NEXT and PREV keys can also be used to scroll. For a complete list of the Alarm Setpoints available, see **Error! Reference source not found. Error! Reference source not found.**

### 6.3.1 CONFIGURING SETPOINTS

1. Scroll through the setpoints until you reach the one you want to edit.
2. If the screen displays only `off` below the setpoint name then the setpoint is disabled and you must press the ON key to enable the setpoint.
3. Enter the value for the setpoint using the numeric keys and then press the ENTER key to confirm.
4. There may be more than one value needed to configure the setpoint. If this is the case, simply repeat step 3. You will notice that the cursor automatically moves to the next field when you press the ENTER key.
5. The OFF key can be used to disable most Alarm Setpoints (and hence also disable the alarms).

#### Analogue Sensors

Alarm Setpoints for analogue sensors have both a setpoint and a timeout that must be configured.

- **Setpoint** – The sensor reading required to trigger the alarm condition.
- **Timeout** – How long (in minutes and seconds) the sensor must remain in the alarm condition before the alarm is triggered.

#### Digital Sensors

Alarm Setpoints for digital sensors have only a timeout.

- **Timeout** – How long (in minutes and seconds) the sensor must remain in the alarm condition before the alarm is triggered.

## 7.0 CONFIGURATION

The CONFIG key will enter the Configuration menu where you can change the configuration of the controller. This menu sets up what is connected to the controller and how the controller will operate. Do not adjust these values unless you are authorised to do so as damage to the irrigation system is possible with incorrect settings. The amount of settings that are accessible will vary depending on the access level of the current user.

For a complete list of the settings that can be changed using the CONFIG key, see *APPENDIX B: SYSTEM CONFIG MENU ITEMS*.



## 8.0 SERIAL PORTS

The master controller board is fitted with four serial ports, named A, B, C and D. (Serial ports on slave cards can only be used to communicate with the master). Each serial port can be configured for either RS-232 or RS-485 operation via jumper settings. The positioning of the jumpers varies between board models but the numbering is consistent across all of them:

<i>Port</i>	<i>Jumper number</i>	<i>RS-232</i>	<i>RS-485</i>
A	J17	remove	1-2
B	J14	1-2	2-3
C	J15	1-2	2-3
D	J16	1-2	2-3

**Note:** the serial port jumpers only affect the receive side of the circuit. An incorrectly configured serial port will still be able to transmit data but will be unable to receive any response.

On the terminating ends of an RS-485 cable it is necessary to set the terminating resistors. Installing a jumper across pins 1-2 of the following connectors will enable the terminating resistors.

<i>Port</i>	<i>Terminating resistor jumpers</i>
A	J2, J3
B	J4, J5
C	J6, J7
D	J8, J9

## 9.0 CONNECTION INFORMATION

To maximize the available outputs on the controller the output connections will vary depending on the following parameters:

- Number of pumps, fertigation pumps.
- Number of filter stations.
- Fill Output
- Number of conventional stations.

The master valve is always output 1. Conventional stations then begin at output 2. Other outputs are optional and are assigned the highest numbers only if they are configured. Starting from the highest number, the following are assigned in order:

1. Irrigation pumps
2. Fertigation pump
3. Filter output
4. Fill output

See the example output assignment on the following page.

Example of output assignment (blank indicate spare output):

<b>Pumps</b>	2	4	0	4	1
<b>Fertigation</b>	0	1	0	1	1
<b>Filters</b>	4	0	0	3	2
<b>Fill Output</b>	0	0	0	1	1
<b>Stations</b>	6	9	14	2	0

<b>Output 1</b>	Master Valve	Master Valve	Master Valve	Master Valve	Master Valve
<b>Output 2</b>	Station 1	Station 1	Station 1	Station 1	Spare
<b>Output 3</b>	Station 2	Station 2	Station 2	Station 2	Spare
<b>Output 4</b>	Station 3	Station 3	Station 3	Spare	Spare
<b>Output 5</b>	Station 4	Station 4	Station 4	Spare	Spare
<b>Output 6</b>	Station 5	Station 5	Station 5	Spare	Spare
<b>Output 7</b>	Station 6	Station 6	Station 6	Spare	Spare
<b>Output 8</b>	Spare	Station 7	Station 7	Fill	Spare
<b>Output 9</b>	Spare	Station 8	Station 8	Filter 3	Spare
<b>Output 10</b>	Spare	Station 9	Station 9	Filter 2	Spare
<b>Output 11</b>	Filter 4	Spare	Station 10	Filter 1	Spare
<b>Output 12</b>	Filter 3	Fertigation	Station 11	Fertigation	Fill
<b>Output 13</b>	Filter 2	Pump 4	Station 12	Pump 4	Filter 2
<b>Output 14</b>	Filter 1	Pump 3	Station 13	Pump 3	Filter 1
<b>Output 15</b>	Pump 2	Pump 2	Station 14	Pump 2	Fertigation
<b>Output 16</b>	Pump 1	Pump 1	Spare	Pump 1	Pump 1

## APPENDIX A: ALARMS AND ALARM SETPOINTS

The following is a list of all the Alarms supported by the controller. Also listed are the Alarm Setpoints (accessed through the ALARM SETPOINTS key) that must be configured for the alarms to be triggered. Alarm setpoints are only configurable if the corresponding sensor has been set up in the Configuration (see 7.0 Configuration).

### ALARM ACTIONS

When an alarm is triggered the controller responds depending on the severity of the alarm.

The most severe alarms cause the controller to stop all irrigation including any programs/manual controls that are running.

For less severe alarms, the controller will initially assume that a problem only exists with the currently running station and will try and continue irrigating by skipping the current station. However, if skipping stations does not prevent the alarm from being triggered, then the controller will stop all irrigation.

Some alarms do not trigger any action from the controller. This may be because the controller can not take any suitable action, or that the alarm is an information only alarm.

The three different actions the controller may take.

4. **Shutdown** – Immediately stop all irrigation.
5. **Skip, skip, skip, shutdown** – Skip the currently running station. If the same alarm is triggered three times in a row, then stop all irrigation.
6. **None** – Take no action.

### VALUE SENSORS

Value sensors have both a setpoint and a timeout that must be configured.

- **Setpoint** – The sensor reading required to trigger the alarm condition.
- **Timeout** – How long (in minutes and seconds) the sensor must remain in the alarm condition before the alarm is triggered.

### ON/OFF SENSORS

On/Off sensors have only a timeout.

- **Timeout** – How long (in minutes and seconds) the sensor must remain in the alarm condition before the alarm is triggered.

The OFF key can be used to disable most alarm setpoints (and hence also disable the alarm).



Alarm	Alarm Use	Alarm Action	Sensor (Configuration setting)	Sensor Type	Alarm Setpoint	Setpoint Desc (Analogue Only)
Pump 1 Fault	Pump 1 reports fault	Stop pump 1	Pump fault signal from pump 1 (Pump Fault 1)	On/Off	Pump Fault 1 input	N/A
Pump 2 Fault	Pump 2 reports fault	Stop pump 2	Pump fault signal from pump 2 (Pump Fault 2)	On/Off	Pump Fault 2 input	N/A
Pump 3 Fault	Pump 3 reports fault	Stop pump 3	Pump fault signal from pump 3 (Pump Fault 3)	On/Off	Pump Fault 3 input	N/A
Pump 4 Fault	Pump 4 reports fault	Stop pump 4	Pump fault signal from pump 4 (Pump Fault 4)	On/Off	Pump Fault 4 input	N/A
Pump 5 Fault	Pump 5 reports fault	Stop pump 5	Pump fault signal from pump 5 (Pump Fault 5)	On/Off	Pump Fault 5 input	N/A
High Pressure 1	When the pressure in the line reaches a critical level.	Shutdown	Pressure transducer 1 (Pressure 1)	Value	High pressure 1 error	<i>The pressure the system should not exceed (in kPa).</i>
High Pressure 2			High pressure error switch 1 (High pressure sw 1)	On/Off	High pressure sw 1 error	N/A
			Pressure transducer 2 (Pressure 2)	Value	High pressure 2 error	<i>The pressure the system should not exceed (in kPa).</i>
			High pressure error switch 2 (High pressure sw 2)	On/Off	High pressure sw 2 error	N/A
Intermediate Pressure 1	When the pressure in the line reaches a high level.	Skip, skip, skip, shutdown	Pressure transducer for system 1 (Pressure 1)	Value	Int pressure 1 warning	<i>The pressure the system should not exceed (in kPa).</i>
			Intermediate Pressure Error sw 1 (Int pressure sw 1)	On/Off	Int pressure sw 1 warning	N/A
Intermediate Pressure 2		Skip, skip, skip, shutdown	Pressure transducer 2 (Pressure 2)	Value	Int pressure 2 warning	<i>The pressure the system should not exceed (in kPa).</i>

Alarm	Alarm Use	Alarm Action	Sensor (Configuration setting)	Sensor Type	Alarm Setpoint	Setpoint Desc (Analogue Only)
			Intermediate Pressure Error sw 2 (Int pressure sw 2)	On/Off	Int pressure sw 2 warning	N/A
<b>Low Pressure 1</b>	When the pressure in the line is too low to run the system properly.	Skip, skip, skip, shutdown	Pressure transducer 1 (Pressure 1)	Value	Low pressure 1 warning	<i>The pressure the system should not run below (in kPa).</i>
			Low Pressure Error sw 1 (Low pressure sw 2)	On/Off	Low pressure sw 1 warning	N/A
<b>Low Pressure 2</b>			Pressure transducer 2 (Pressure 2)	Value	Low pressure 2 warning	<i>The pressure the system should not run below (in kPa).</i>
			Low Pressure Error sw 2 (Low pressure sw 2)	On/Off	Low pressure sw 2 warning	N/A
<b>Diff Pressure</b>	When the differential pressure between two points in the line reaches a high level	None		On/Off		N/A
<b>High Current 1</b>	When the motor draws too much current and must be shut down for protection.	Shutdown	Current transducer 1 (Current 1)	Value	High current 1 error	<i>The current the motor should not exceed (in Amps).</i>
<b>High Current 2</b>			Current transducer 2 (Current 2)	Value	High current 2 error	
<b>High Flow 1</b>	When the flow in the line is higher than expected.	Skip, skip, skip, shutdown	Flow meter 1 (Flow 1 input)	Value	High flow 1 warning	<i>The flow the system should not exceed (in L/min).</i>
<b>High Flow 2</b>			Flow meter 2 (Flow 2 input)	Value	High flow 2 warning	
<b>Low Flow 1</b>	When the flow in the line is lower than expected.	Skip, skip, skip, shutdown	Flow meter 1 (Flow 1 input)	Value	Low flow 1 warning	<i>The flow the system should run below (in L/min).</i>
<b>Low Flow 2</b>			Flow meter 2 (Flow 2 input)	Value	Low flow 2 warning	

Alarm	Alarm Use	Alarm Action	Sensor (Configuration setting)	Sensor Type	Alarm Setpoint	Setpoint Desc (Analogue Only)
Unscheduled Flow 1	When there is a flow recorded while no irrigation is taking place on either system.	None	Flow meter 1 (Flow 1 input)	Value	Unscheduled flow 1	<i>The flow the system should not exceed while no irrigation is occurring (in L/min).</i>
Unscheduled Flow 2			Flow meter 2 (Flow 2 input)	Value	Unscheduled flow 2	
No Flow	Irrigation is running but no flow is being recorded.	Shutdown	No flow switch (Bore DD err sw 1)	On/Off	No flow sw error	
High Level Error 1	When the water level is too high.	Shutdown	High level switch 1 (High level sw 1)	On/Off	High level sw 1 error	N/A
High Level Error 2			High level switch 2 (High level sw 2)	On/Off	High level sw 2 error	N/A
High Level Warning 1	When the water level is too high.	None	High level switch 1 (High level sw 1)	On/Off	High level sw 1 warning	N/A
High Level Warning 2			High level switch 2 (High level sw 2)	On/Off	High level sw 2 warning	N/A
Low level 1	When the water level is too low.	Shutdown	Low level switch 1 (Low level sw 1)	On/Off	Low level sw 1 error	N/A
Low level 2			Low level switch 2 (Low level sw 2)	On/Off	Low level sw 2 error	N/A
Phase Failure 1	When one of the three phases is out.	Shutdown	Phase failure error switch 1 (Phase fail err sw 1 input)	On/Off	Phase failure sw 1 error	N/A
Phase Failure 2			Phase failure error switch 2 (Phase fail err sw 2 input)	On/Off	Phase failure sw 2 error	N/A
High Local Current Sense Error	When the current draw of the local stations reaches a critical level.	Shutdown	Local current Sense (built in)	Value	High current sense error	<i>The current draw of local stations should not exceed (in mA).</i>

Alarm	Alarm Use	Alarm Action	Sensor (Configuration setting)	Sensor Type	Alarm Setpoint	Setpoint Desc (Analogue Only)
<b>High Local Current Sense Warning</b>	When the current draw of the local stations reaches a high level.	Skip, skip, skip, shutdown		Value	High current sense warning	<i>The current draw of local stations should not exceed (in mA).</i>
<b>Low Local Current Sense</b>	When the current draw of the local stations is less than expected.	Skip, skip, skip, shutdown		Value	Low Current Sense Error	<i>The current draw of local stations should not run below (in mA).</i>
<b>High TWIN Current Sense Error</b>	When the current draw of the TWIN stations reaches a critical level.	Shutdown	TWIN current sense (built in to TWIN interface translator)	Value	High twin curr error	<i>The current draw the TWIN stations should not exceed (in mA).</i>
<b>High TWIN Current Sense Warning</b>	When the current draw of the TWIN stations reaches a high level.	Skip, skip, skip, shutdown		Value	High twin curr warning	<i>The current draw the TWIN stations should not exceed (in mA).</i>
<b>Low TWIN Current Sense</b>	When the current draw of the TWIN stations is less than expected.	Skip, skip, skip, shutdown		Value	Low twin curr error	<i>The current draw the TWIN stations should not run below (in mA).</i>
<b>RIC High Flow</b>	When the average RIC flow is higher than expected.	None (the flow calculations, and hence the alarms, are only calculated at the end of the irrigation on the RIC)	Flow meter for RIC (connected to RIC)		RIC High flow	<i>The flow rate that the average flow rate on the last RIC irrigation cycle should not exceed (in L/min).</i>
<b>RIC Low Flow</b>	When the average RIC flow is lower than expected.				RIC Low flow	<i>The flow rate that the average flow rate on the last RIC irrigation cycle should not run below (in L/min).</i>

<b>Alarm</b>	<b>Alarm Use</b>	<b>Alarm Action</b>	<b>Sensor (Configuration setting)</b>	<b>Sensor Type</b>	<b>Alarm Setpoint</b>	<b>Setpoint Desc (Analogue Only)</b>
<b>TWIN Board Current Overload</b>	TWIN line current is higher than 1.6A	Skip	TWIN board communication (built in to TWIN interface translator)			
<b>TWIN Board Line Fused</b>	TWIN path wires are joined in dead short	Skips all Twin Stations				
<i>Twin Board Comms Error</i>	When master card fails to poll TWIN card	Skips all Twin Stations				
<i>Twin Board Checksum Error</i>	Corrupt response from TWIN card during communication	Skips all Twin Stations				
<i>Twin Decoder Failed</i>	Twin Board returned failed to switch on / off a decoder	Skip				
<i>Twin Decoder Timeout</i>	No response from TWIN card for station on / off command	Skip				
<i>Twin Port Busy</i>	<i>Serial Port is configured incorrectly</i>	<i>Skip</i>				

## APPENDIX B: SYSTEM CONFIG MENU ITEMS

The System Config is a series of menu items that allow the settings and functions of the controller to be changed. Some menu items are dependent and will only be available if other functions have been configured.

To change a setting, enter a new value using the numeric, ON and OFF keys and then press the ENTER key to confirm. If you enter the wrong value, you can use the CLEAR key to clear the value and start again. The OFF key can be used to disable most functions in the System Config. The ON key is needed to enable or toggle some functions in the System Config.

Menu Item	Section	Access Level	Description
<b>Time and Date</b>	CONTROLLER SETTINGS	Supervisor	Set the system time and date for the controller. The time and date are used to make sure programs are started at the correct time on the correct day. They are also used to timestamp alarms and events for reporting.
<b>Default Access</b>	CONTROLLER SETTINGS	Technician	Default Access is the access level that is granted to an operator before they login. The factory setting is <code>operator</code> which means that any user can start/stop or write programs without logging in.
<b>Idle Logout</b>	CONTROLLER SETTINGS	Supervisor	A user is automatically logged out if they do not press a key for the Idle Logout time.
<b>Local valves</b>	OUTPUT SETUP	Supervisor	This setting is the number of local stations connected to the controller. Local stations are the conventionally wired stations that are connected to the controller by a single common and a separate active for each station. These are usually 24VAC solenoids.
<b>TWiN valves</b>	OUTPUT SETUP	Supervisor	This is the number of TWiN (Two Wire Irrigation Network) stations connected to the controller via the TWiN board and will only be displayed if the TWiN port is set up in the <code>COMMUNICATIONS</code> section. The controller will access these stations immediately after the local stations. This means that the first TWiN station will be addressed by the controller as the station number directly after the last local station. I.e. if there are 5 local stations and 10 TWiN stations the first TWiN station would be station 6 to the controller and the last TWiN station would be station 15.
<b>No of RiCs</b>	OUTPUT SETUP	Supervisor	This is the number of RiCs (Remote Irrigation Controllers) in the RIC network connected to the controller MODBUS port.

Menu Item	Section	Access Level	Description
<b>RiC valves</b>	OUTPUT SETUP	Supervisor	This is the number of stations connected to each RIC (Remote Irrigation Controller) and will only be displayed if the RIC port is set up in the COMMUNICATIONS section. The controller will access these stations immediately after the local stations and the TWIN stations. This means that the first RIC station will be addressed by the controller as the station number directly after the last local plus TWIN station. i.e. if there are 5 local stations and 10 TWIN stations the first RIC station would be station 11 to the controller.
<b>Local pumps</b>	OUTPUT SETUP	Supervisor	This is the number of pumps physically connected to the controller. If no pumps are connected then set to 0 else up to 5 pumps can be configured. These pumps are in addition to the master valve output.
<b>Fertigation pumps</b>	OUTPUT SETUP	Supervisor	Set this parameter to 1 if a fertigation pump is connected otherwise set it to 0.
<b>Filter outputs</b>	OUTPUT SETUP	Supervisor	This is the number of filter stations that are connected to the controller. If no filter stations are connected then set to 0 else up to 6 filter stations can be connected.
<b>Fill run outputs</b>	OUTPUT SETUP	Supervisor	Set this to 1 to create an output that will be used by the pond fill program.
<b>All on/off sensors</b>	ON/OFF SENSORS	Technician	Configure which physical inputs the ON/OFF sensors are connected to
<b>All value sensors</b>	VALUE SENSORS	Technician	Configure which physical inputs the Value sensors are connected to
<b>CCS address</b>	COMMUNICATIONS	Technician	This is the address of the controller when connected to a central system or Mobile Link and should not be changed unless instructed to by a commissioning engineer.
<b>CCS connection type</b>	COMMUNICATIONS	Technician	The CCS connection type. Choose the type which corresponds with the installed communications method.
<b>CCS baud rate</b>	COMMUNICATIONS	Technician	The baud rate for communications over the CCS serial port. This should match the baud rate of the communications equipment (usually radio or modem).
<b>Slave cards</b>	COMMUNICATIONS	Technician	This entry is to activate any slave cards a controller is connected to. Pressing the ON key will detect all the cards connected.
<b>TWIN port</b>	COMMUNICATIONS	Technician	The serial port on the controller used to communicate to the Two-Wire interface translator. Valid ports are 2 – Port B and 3 – Port C. Configuring this port will activate all the features of the TWIN system.
<b>MODBUS port</b>	COMMUNICATIONS	Technician	The serial port on the controller used to communicate to MODBUS devices. Valid ports are 2 – Port B and 3 – Port C.
<b>Moisture probes</b>	COMMUNICATIONS	Technician	Number of Sentek moisture probes connected to the controller MODBUS port

Menu Item	Section	Access Level	Description
<b>MODBUS interval</b>	COMMUNICATIONS	Technician	The amount of time between MODBUS sensor polls
<b>RIC comms timeout</b>	COMMUNICATIONS	Technician	The number of seconds before a RIC poll request fails
<b>RIC status interval</b>	COMMUNICATIONS	Technician	The amount of time between RIC status polls
<b>RIC shutoff time</b>	COMMUNICATIONS	Technician	The maximum run time for a RIC station. Do not exceed this time when writing programs for RIC stations.
<b>Watering end</b>	PROGRAM OPTIONS	Operator	The Watering End time is a time of day at which no automatic irrigation is to take place. If an irrigation program is running and this time of day is reached, the program will be stopped and an alarm logged.
<b>Irrigation Method</b>	PROGRAM OPTIONS	Supervisor	The irrigation can be controlled in two ways, time or volume (recorded by Flow 1). If you want the irrigation programs to operate on a time basis set to 1, otherwise set to 2 if to operate using volume recorded by Flow 1. This affects all non-fertigation programs including Manual Control and Manual Cycle.
<b>Fertigation Method</b>	PROGRAM OPTIONS	Supervisor	The fertigation pump can be controlled in two ways, time or volume. If you want the fertigation programs to operate on a time basis set to 1, otherwise set to 2 if to operate using volume.
<b>Cancel when power out</b>	PROGRAM OPTIONS	Supervisor	The controller has the ability to resume any irrigation programs during power up that were running when power was lost to the controller. The Cancel When Power Out setting is the maximum amount of time the power can be off for to resume programs. If the power is off for longer than this time no programs will be resumed.
<b>Station on delay</b>	SYSTEM SETPOINTS	Supervisor	Station on delay is the time after the last station closed before the current station opens. This is used on systems which require the pressure to build up to close the current station or open the next station. The time is in minutes and seconds.
<b>Station off delay</b>	SYSTEM SETPOINTS	Supervisor	Station off delay is the time after the current station opened before the last station closes. This is used to avoid pressure spikes between stations when using slow valves. The station off delay is the opposite of the station on delay so there is no need to use them together. The time is in minutes and seconds.
<b>Last station hold</b>	SYSTEM SETPOINTS	Supervisor	This is the time the last station will remain open after the pump / master valve has been given the signal to stop. This is used on systems where the pressure in the line is to be drained. The time is in minutes and seconds.
<b>Pump delay</b>	SYSTEM SETPOINTS	Supervisor	If the controller is set up to run pumps, the starting of the each pump can be delayed using this setpoint. The delay can be used to stagger the starting of pumps for electrical reasons (ie reduce the starting current into the panel). The time is in minutes and seconds.



Menu Item	Section	Access Level	Description
All alarm setpoints	ALARMS	Supervisor	See appendix A.



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