

HERON ELECTRIC COMPANY LTD

IRRIGATION CONTROLLERS

Advanced Options Manual

This manual refers to MCI Controllers running software version 761.

Doc Ref: MCI100S Two Wire Mains Advanced

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1 Changing Configuration Options

This manual describes the advanced features of the controller. Changing the configuration options of your controller activates advanced features. To access the configuration options: press and hold down the **"Manual Advance"** for **10 seconds**.

The advanced options are from Option 16 onwards. The basic Options (1-15) are listed here for completeness.

IMPORTANT: Always fully test any new configuration after you have changed any options to check the controller functions as you require.

Basic Options 1-15.

Option	Function - See Basic Manual for detailed description	Default Value	Allowed Values
1	Set number of valves.	32	4-150
2	Set number of Daily automatic starts.	3	0-30
3	Set number of Weekly automatic starts.	0	0-32
4	The number of irrigation programs	1	1-15
5	Set pump pressurisation time in minutes.	0	0-59
6	Set pump pressurisation time in seconds.	2	0-59
7	Rain sensor connected and number of historical rain days	0	0-4
8	Spare	0	0
9	Controller does a permanent Stop instead of Freeze	0	0/1
10	Display Low Tank instead of Freeze or Stop	0	0/1
11	Use Percentage Up and Down	0	0/1
12	Spare	0	0/1
13	Use 'Disable Automatic Starts' facility	0	0/1
14	Spare	0	0/1
15	DISPLAY ADVANCED OPTIONS (OPTIONS 16 TO 81)	0	0/1

2 Advanced Options

Option	Function	Default Value	Allowed Values	Section
16	Allocate 'I1' input to a specific program	1	1-15	4
17	Over Load 1 threshold	10	5-100	8
19	Maximum number of automatic started programs to run together	0	0-8	4
20	Maximum number of cycling programs to run together	0	0-1	6
21	Allow only one program to run whether 'normal' or 'cycling'	1	0/1	6
22	<i>Multi-Interface board uses alarm op as 4th op.</i>	0	0/1	*
23	Run valves synchronously	0	0/1	3
24	Use wean facility	0	0/1	7
25	Chain Programs 1,2,3 and 4	0	0/1	7
26	<i>Single Analog Interface Board Fitted</i>	0	0/1	*
27	<i>Remote Input interface Board Fitted</i>	0	0/1	*
28	<i>Multi-Interface Board Fitted</i>	0	0/1	*
29	Cycling programs to take priority over all automatic started programs	0	0/1	6
30	Program 1 will take priority	0	0/1	4
31	Program 1 Options	0	0/127	4
32	Program 2 Options	0	0/127	4
33	Program 3 Options	0	0/127	4
34	Program 4 Options	0	0/127	4
35	Program 5 Options	0	0/127	4
36	Program 6 Options	0	0/127	4
37	Program 7 Options	0	0/127	4
38	Program 8 Options	0	0/127	4
39	Irrigation by Volume Time Out	0	10	
40	Manually Start programs in parallel	0	0/1	4
42	Valve names use a letter suffix	0	0/1	3
44	Put Controller in configuration mode	0	0/1	3
45	Put controller in test mode	0	0/1	8
49	Display optical errors (Heron Use Only)	0	0/1	N/A
50	Heron Use Only	0	0/1	N/A
51	Display output current	0	0/1	8
52	Heron use Only	0	0/1	N/A
53	Pump 2 Control (Multi-Wire Card)	0	0/1	N/A
54	Heron Use Only	0	0/1	N/A
55	Controller address – PC option	1	0-5	*
56	Baud Rate- PC Option	2	0- 2	*
57	Keypad security	0	0- 99	11
58	Delay between valves in Seconds	0	0-59	4
59	Pump 1 Control (Multi-Wire Card)	0	0/1	N/A
65	Number of Log Days – PC option	0	0-32	*
66	Number of Log Days Confirmation- PC Option	0	0-32	*
70	Number of Automatic Start programs to back-up	0	0-16	5
71	Number of Continual Cycling programs to back-up	0	0-16	6
72	Water Meter 1 – Connection Address	0	0/1	N/A
73	Water Meter 1 – Size	0	0/1	N/A
74	Water Meter 2 – Connection Address	0	0/1	N/A
75	Water Meter 2 – Size	0	0/1	N/A
76	Water Meter 3 – Connection Address	0	0/1	N/A
77	Water Meter 3 – Size	0	0/1	N/A
78	Flow Hold Off	0	0/1	N/A
79	Flow Percentage Error	0	0/1	N/A
80	Test Flow Meter Pulse Minute Counter	0	0/1	N/A
81	Monitor Flow	0	0/1	N/A
82	GSM module connected /Site Number#	0	0/1	*
83	Text shut down faults Only#	0	0/1	*
84	Send text message on every fault#	0	0/1	*
85	Fault Monitor Inputs#	0	0/1	*
86	Text message day count#	0	0-99	*

87	Max number of faults before system shut down	0	1-99	*
90	Card Communication re-trv seconds leave 2	0	0/1	N/A
91	Engineering - Card Address 1	0	0/1	N/A
92	Engineering - Card Address 2	0	0/1	N/A
93-100	Engineering - Card Address 3 to 10	0	0/1	N/A
101	Engineering - Card 1 Current Calibration	0	0/1	N/A
102	Engineering - Card 2 Current Calibration	0	0/1	N/A
103-110	Engineering - Card 3 to 10 Current Calibration	0	0/1	N/A

75D software only

*Described in another manual

3 Customising Irrigation Programs

This section describes how to :-

- how to customise your irrigation programs to use named valves
- set whether valves run in parallel in a program
- change the order in which valves run in a program

Valves Names Use a Letter (Option 42)

If you need more than one valve with the name GREEN10, you can add a letter so you can have names such as: -

GREEN10a
GREEN10b
GREEN10c

To enable this you must set Option 42 to 1

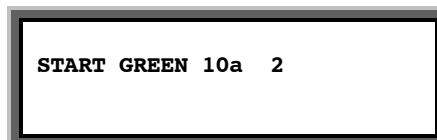
Manual Valve Start With Named Valves

The operation of a manual valve start will change with named valves, as you will need to select the correct name. For example if you wish to manually start 'GREEN10a' proceed as follows: -

To start a valve: -

- Press **'Start'**
- Press ">" to move the flashing arrow to point at "VALVE"
- Press **"Select"** and the page below is shown.
- Now press **"Select"** to display the correct valve name, i.e. **GREEN**
- Now enter the valve number.
- Press ">" to move the flashing arrow to the right
- Now enter the optional letter i.e. 'a' by repeatedly pressing **'Select'**.
- Press ">" and enter the run time for the valve.

In the example below GREEN10a as been set to run for 2 minutes.



START GREEN 10a 2

Now press **"Select"** to start this valve and the following page is displayed.



TIME 12:11
GREEN 10a 1:59

Customising Programs

You only need to do this if: -

- You wish to vary the number of valves that run in parallel.
- You wish to vary the order in which valves run in the program
- You wish to change valve names

First you need to select the configuration mode by setting **Option 44 to 1**. **When you have finished you should now set Option 44 back to 0**. This prevents the sequence number and the valve names being changed.

Now you need to enter the program, you wish to customise. Press ">" to display the 'Enter Program Page' as shown below.

```
ENTER PROG 1
```

Now press **'Select'** to edit program 1 and the first page of Program 1 will be displayed. If the controller is new it will be the default configuration as shown below.

```
1 VALVE 01 00:00
1 VALVE 02 00:00
1 VALVE 03 00:00
1 VALVE 04 00:00
```

Changing the Zone Number (Asynchronous)

In the example above, there are four valves displayed called VALVE 01, VALVE 02 VALVE 03 and VALVE 04.

The number on the left is the irrigation zone number for the valve. They are all set to 1 so all valves are in the same zone (zone1). As they are in the same zone NO valves will run together.

If, for example, you wanted VALVE 01 and VALVE 02 to run together you would need to assign them to different irrigation zones, as follows: -

```
1 VALVE 01 00:00
2 VALVE 02 00:00
1 VALVE 03 00:00
1 VALVE 04 00:00
```

To do this move the cursor over the zone number for VALVE 02 and change it to 2.

Important: You must set the valves you wish to run together at the beginning of the program. Please see the next section about moving valves within the program. If you need to guarantee what valves will run together you need to run the controller in synchronous mode.

Changing the Valve Order

If, for example, you wanted VALVE 04 to run before VALVE 03 then you would need to change the page to the following: -

1	VALVE 01	00:00
1	VALVE 02	00:00
1	VALVE 04	00:00
1	VALVE 03	00:00

Now VALVE 04 appears before VALVE 03 in the list so VALVE 04 will run first.

To do this move the cursor so it is over VALVE 03 and the page will automatically ask you to enter the Name Reference Number. In the example below it is currently at 003 which is the reference for VALVE 03.

1	VALVE 01	00:00
1	VALVE 02	00:00
1	NAME 003	
1	VALVE 03	00:00

Now change **Name Reference Number** to 004 which will be the **Name Reference Number** for VALVE 04.as shown below.

1	VALVE 01	00:00
1	VALVE 02	00:00
1	NAME 004	
1	VALVE 03	00:00

Now press '>' and VALVE 04 will be the third valve in the program.

Changing the Valve Name (if you are using named valves)

If you are using named valves you can change the valve name in the same way as changing the valve order. For example, if we want to add the name GREEN 10 to the first position in the program above proceed as follows: -

Enter Program 1 and move the cursor over VALVE 01 and the page will automatically display NAME 001 as shown below: -

1	NAME 001	00:00
1	VALVE 02	00:00
1	VALVE 03	00:00
1	VALVE 04	00:00

Now enter the new **Name Reference Number**. The **Name Reference Number** is shown on the Serial Number Page for this valve. For example, if the **Name Reference Number** is '007' for GREEN10 type in 7 as shown below.

1	NAME 007	00:00
1	VALVE 02	00:00
1	VALVE 03	00:00
1	VALVE 04	00:00

Now press '>' and the page will show GREEN10 in the first position.

1	GREEN 10	00:00
1	VALVE 02	00:00
1	VALVE 03	00:00
1	VALVE 04	00:00

IMPORTANT when you have finished you should now set the Configuration Option 44 back to 0.

Running In Synchronous Mode for Parallel Valves

In the previous description the program was running in **Asynchronous** mode, where valves were set to run in parallel by setting them into zones 2 and 3 etc. When an asynchronous program runs it effectively runs the zones independently and depending upon your valve times different valves will run together. If you need to guarantee what valves run together you need to set the controller to run in **Synchronous** mode. In Synchronous mode valves are grouped together and the controller will not move onto the next group until all valves have finished their run times in the current group.

To set synchronous mode you need to set Option 23 to 1. When you come out of Options the controller will **convert all your programs to Synchronous operation**. This will take about 60 seconds.

Your programs will now be similar to the following.

A	VALVE 01	00:00
B	VALVE 02	00:00
A	VALVE 03	00:00
B	VALVE 04	00:00

Now, for example if we want the first 2 valves to run together and then the next 2 valves to run together change the program to the following.

A	VALVE 01	05:00
A	VALVE 02	10:00
B	VALVE 03	08:00
B	VALVE 04	09:00

Now when this program runs it will run all the valves marked with an 'A' until it reaches a valves marked with a 'B'. So in the above program it will run VALVE 01 and VALVE 02 together. The program will then run all valves marked with a 'B' together until it reaches a valve marked with an 'A' again.

The important point is that the program will not move onto the next group until all valves have run the specified time. In the above example VALVE 03 and VALVE 04 will not run until VALVE 02 has finished.

Important: Ensure that your program never has a consecutive string of more than 8 'A's or 8 'B's anywhere as the controller not be able to run the program. The controller will then resort to running one valve at a time. This still applies even if the valve times are 0. If you have valves at the end of your program that you don't use set the left hand column to A, B, A, B etc for these valves.

4 Irrigation Program Options

Maximum Number of Automatically Started Programs to Run Together (Option 19)

This specifies the maximum number of automatically started irrigation programs that can run at the same time. If this option is set to '0', only one irrigation program can run at any time. Setting this option to 2 will allow 2 irrigation programs to run at the same time.

Note: A maximum of 4 irrigation programs can run at any time. This includes automatically started AND continually cycling programs. See option 20 below.

Allocate Remote Start input to a Program (Option 16)

The Remote Start Input can be assigned to initiate any irrigation program. Enter the number of the irrigation program you want it to initiate. If this option is not set, the Remote Start Input will trigger irrigation program 1 by default.

Program 1 will Take Priority (Option 30)

This allows program 1 to take priority over any other automatically started irrigation programs. If you need his facility set Option 30 to '1'. Default is '0'.

With Option 30 set, if a program is running, and program 1 wishes to start, it will cut-in and run. The halted irrigation program will continue from where it was stopped, once program 1 has completed.

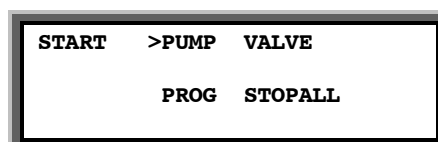
Note: You must set option 19 and 20 to 1 and set option 21 to 0.

Delay Between Valves (Option 58)

A delay between the operation of the valves within an irrigation program can be introduced using this option. The delay can be set from 1 to 255 seconds. Enter the number of seconds delay required. The delay will apply to all irrigation programs.

Allow Programs to be Manually Started in Parallel (Option 40)

With Option 40 set, programs can be manually started in parallel. Operation of the controller is exactly the same except that pressing **Start/Stop** will **always** show the following page.



To manually stop the controller you must press **Start/Stop** to display the page above and then press '>' to move the cursor to 'STOPALL' and then press **Select**.

To allow programs to run in parallel you must also set one or both of the parallel program Options (Option 19 or 20).

Program Configuration Options: Option 31 to 38

Program configuration options allow individual programs to be customised. Option 31 relates to program 1 Option 32 to program 2 etc. Programs 1 to 8 can be individually customised.

The following 6 features can be set for each program.

	Value	Description of facility
Program has Continual cycling facility	+1	See section 6
Program Valve time in Hours and Minutes	+2	Sets time in hours and minutes instead of minutes and seconds
Program ignores Percentage reduction	+4	Ignores percentage reduction whether set manually or by rain sensor (always runs at 100%)
Program ignores the Freeze input	+8	Program ignores the freeze or Stop inputs.
Program can be started via Analogue input on MF interface	+16	See MF interface manual
Program can be started via light	+32	See Light sensor manual
Multi-wire controllers Only	+64	

To include a feature add the value of the facility to the Option.

For example suppose you require continual Cycling on Program 1 and Program 1 to Ignore Freeze input. For program 1 we must change Option 31. Now Continual Cycling has a value 1 and 'Ignore Freeze Input' has a value 8. The required value for Option 31 is **1+8=9**.

Program Ignores Percentage Reduction (+4)

This facility allows a program to ignore any percentage reduction that is set. For example you may not want indoor irrigation to be affected by the rain sensor percentage reduction. As described above add 4 to the appropriate Program Option number.

Program Ignores Freeze Input (+8)

This facility allows a program to ignore the Freeze Input. For example you may have two different irrigation systems one which uses a water storage tank and one that uses mains water. This facility can prevent the mains water irrigation from being suspended when the water storage tank runs low. As described above add 8 to the appropriate Program Option number.

Program Runs Valves in Parallel (+64)

This is for multi-wire controllers only.

Irrigation By Time or Volume (Option 39)

If irrigation programs are to be specified in terms of time, then option 39 must be set to '0'. If irrigation programs are to be specified in terms of volume (litres or gallons per minute) then option 39 must be set to '1'. Default is '0'.

To irrigate by time the valve information for each valve must be set to "Use Time". To irrigate by volume the valve information for each valve must be set to "Use Volume".

5 Automatic Start Options

The controller allows daily and weekly automatic starts to be set. You can specify the number of each type of automatic starts you wish to use. You can specify up to **30 daily** automatic starts and up to **32 weekly** automatic starts, see 'Basic Manual'.

Number Automatically Started Programs to Back-Up (Option 71)

If an 'Automatically Started' program cannot run because another program is running the controller can remember that a program tried to start. The controller will run the program when the other program(s) have finished. Option 71 controls the number of automatic starts that the controller will remember. Values between 0 and 16 are allowed.

Set Option 71 to 0 if you do not want any Automatic Starts remembered. Set Option 71 to '1' for one start to be remembered, set to 2 for 2 starts etc. Default is 0.

6 Continual Cycling Option

The continual cycling facility allows an irrigation program to continuously cycle. Programs continually cycle between a specified start and stop time, with a programmable delay between cycles. This is normally used for misting or propagation applications.

To set a program to continually cycle add **+1** to the appropriate Program Option. Option 31 is for Program 1 and Option 32 is program 2 etc. See Section 3 for more details.

Setting Up Continual Cycling

An extra page will be displayed after the Automatic Start Pages, as shown below, for each continually cycling program. This page allows you to:

- Specify the start and stop times for the continual cycling period
- Set the delay period (in hours and minutes) between each cycle
- Disable / Enable the continual cycling program.

```
CYCLE PROG 1
CYCLE NEVER
WAIT 0:00
```

Now Press **"Select"** to enter the start and stop times for continual cycling and the delay period between cycles.

In the example below, program 1 has been set to continually cycle from 6:00 hours to 21:30 hours, with a 20 minute delay between each cycle.

```
CYCLE PROG 1
CYCLE 06:00 > 21:30
WAIT 0:20    NEXT 13:30
```

The time that the next cycle will begin is automatically calculated and displayed if the real time is within the cycling range. In the example above, the next continual cycle of program 1 will begin at 13:30 hours.

Disabling Continual Cycling

You can disable the continual cycling program by pressing the **"Select"** button when the continual cycling page is displayed.

```
CYCLE PROG 1
CYCLE NEVER
WAIT 0:00
```

To re-enable continual cycling press the **"Select"** button again. The start times will be redisplayed.

```
CYCLE PROG 1
CYCLE 06:00 > 21:30
WAIT 0:20    NEXT 13:30
```

Other Options You May Want to Set

Back-up Cycling Program (Option 71)

If a 'Continual Cycling' program cannot run because another program is running the controller can remember that a program tried to start. The controller will then run the program when the other program(s) have finished. Option 71 controls whether the cycling program will be backed up.

Set Option 71 to 0 if you do not want any cycling starts remembered. Set Option 71 to '1' for the cycling program to be backed up.

Allow Only One Program to Run whether 'Normal' or 'Cycling' (Option 21)

If option 21 is set to '1', only one irrigation program will ever run at any time. Option 21 overrides options 19 and 20 i.e. specifying how many automatically started and continually cycling programs can run at the same time. Default is '1'.

Note: If you want either automatically started or continually cycling irrigation programs to run at the same time, then you **must** set option 21 to '0'.

Cycling Programs to take Priority Over Auto Start Programs (Option 29)

This option allows any of the continually cycling programs to take priority over any automatically started irrigation program.

With this option set, if an automatically started irrigation program is running, the continually cycling program will cut-in and run. The halted automatically started irrigation program will then continue from where it was stopped, once the cycling program has completed.

Note: You must set option 19 and 20 to 1 and set option 21 to 0.

7 Wean and Chaining Facility

Setting Weaning Programs (Option 24)

The wean facility allows Programs 2,3 and 4 to be operated at less frequent intervals than Program 1. For example Program 2, will start half as many times as Program 1, see table below.

Programs 2,3 and 4 are automatically triggered after Program 1 finishes.

Irrigation Initiated	Irrigation Programs Run			
	Prog 1	Prog 2	Prog 3	Prog 4
First Time	X			
Second Time	X	X		
Third Time	X		X	
Fourth Time	X	X		X
Fifth Time	X			
Sixth Time	X	X	X	
Seventh Time	X			
Eighth Time	X	X		X
Ninth Time	X		X	

That is:

Program 2 will start every **second time** program 1 starts

Program 3 will start every **third time** program 1 starts

Program 4 will start every **fourth time** program 1 starts.

To activate the wean facility the following options must be set:

Chaining Programs (Option 25)

The chain facility allows Programs 1,2,3 and 4 to be chained together. With the option set hen ever Program 1 finishes tart, Programs 2 will start and so on.

:

8 Installation and Test Options

OL1 Threshold (Option 17) 2-Wire Decoder controllers ONLY

Option 17 sets the threshold at which OL/1 message is displayed. If you have many decoders on your system and/or your cable is old you may need to increase Option 17. Default is 10.

Test Mode (Option 45) 2-Wire Decoder controllers ONLY

Test Mode is used to test the decoders in the system. To put the controller in Test Mode set option 45 to 1. In Test Mode the controller will run every valve in a program but for zero time.

Test mode will not run valves in parallel.

Display Output Current (Option 51) AC output controllers ONLY

Option allows the controller display the output current on the two wire cable. This is useful to check the valves are connected and working.

Max Faults (Option 87)

Option 87 is the maximum number of faults that are allowed before the controller will switch off all irrigation programs.

Keypad Security (Option 57)

If you require a security code to be entered before the controller can be used, then set option 57.

Set option 57 to any number from '01' to '99'. This number will become the third and fourth digits of the security code. The first and second digits of the security code will be '57'.

For example, if option 57 has been set to '15', then the security code "5715" must be entered whenever the controller is operated.

The user must enter the security code if the keypad is not used for three minutes.

9 Fertigation (Option 41) (available late 2007)

To operate fertigation you need the fertigation board. The fertigation board is **board number 2**. All fertigation valves should be set up in Valve Information as being attached to board 2. The fertigation board is **normally mounted above the irrigation valve output board**.

With option 41 set to 1, programmes are automatically set up with a pair of valves as shown below. The fertigation valve is the 2nd valve in the pair. The 1st valve is the irrigation valve. When ever the program runs it will run an irrigation valve with the fertigation valve. In the example below both VALVE 01 will run with FERT 04 and then VALVE 02 will run with FERT 01.

Note: If the fertigation valve is set to zero time or zero flow then there will be no fertilizer.

A	VALVE 01	10:00
A	FERT 04	03:00
B	VALVE 02	10:00
B	FERT 01	05:00

To operate fertilizer followed by fresh water, you need to enter each irrigation valve twice in the program. In the example below VALVE 01 is entered twice, but for the second entry the fertilizer time is set to 0 so there will be no fertilizer just fresh water.

A	VALVE 01	20:00
A	FERT 04	06:00
B	VALVE 01	05:00
B	FERT 04	00:00

The fertiliser pump is connected to the pump output (across O1, C1) of the fertilizer board.

If a flow meter is used for fertiliser, the flow meter is connected to the flow meter input of the fertiliser board. (across I3, C2). This will be Flow Meter Number 2.

10 Volume Meters

Up to 3 water meters can be connected to the MCI controller. The water meters can be used to:-

- run the irrigation
- logging water usage
- check irrigation is in the correct flow range

Volume Meter Card Address (Options 72, 74,76)

Option 72, 74 and 76 designate the card that the Volume meters you are using are connected to.

Option 72 applies to Volume Meter 1, Option 74 applies to Volume Meter 2, Option 76 applies to Volume Meter 3.

If for example Volume Meter 1 is connected to card 2, set Option 72 to 2.

Volume Meter Type (Options 73, 75,77)

Options 73, 75 and 77 define the water meter types. Set these options as described in the following table.

Option 73 applies to Volume Meter 1, Option 75 applies to Volume Meter 2, Option 77 applies to Volume Meter 3.

	One pulse per Litre	One pulse per 10 Litres	One pulse per 100 Litres	One pulse per Gallon	One pulse per 10 Gallons	One pulse per 100 Gallon
Options 73,75,77	1	2	3	11	12	13

Flow Rate Alarm Hold Off (Option 78)

The Flow Rate Alarm Hold Off allows the irrigation system to settle down after a valve opens and prevents flow rate alarms during this period. **The option is in 10 seconds intervals.** Typically you may set this to 2 ie 20 seconds. For large irrigation systems you may need to set this much longer.

Flow Rate Percentage Error (Option 79)

This option allows you to set the maximum allowed percentage error in the irrigation flow rate. Typically you may set this to 25. If the flow rate error is larger than the threshold, the irrigation will be stopped and the controller will activate the alarm output (see next section). If this is set to 0 then no alarms will be raised.

Maximum Interval Between Pulses (Option 39)

Set Option 39 to the longest time that you expect between pulses from any flow meter (the irrigation will stop if the controller has not received a pulse from flow meter in this time). To set this value you must know your minimum irrigation flow rate.

For example, if the minimum irrigation flow rate would give a pulse every 3 minutes set Option 39 to 4. Now if a pulse is not received in 4 minutes the irrigation will stop.