DIY Universal Measured Irrigation Controller Kit User Manual

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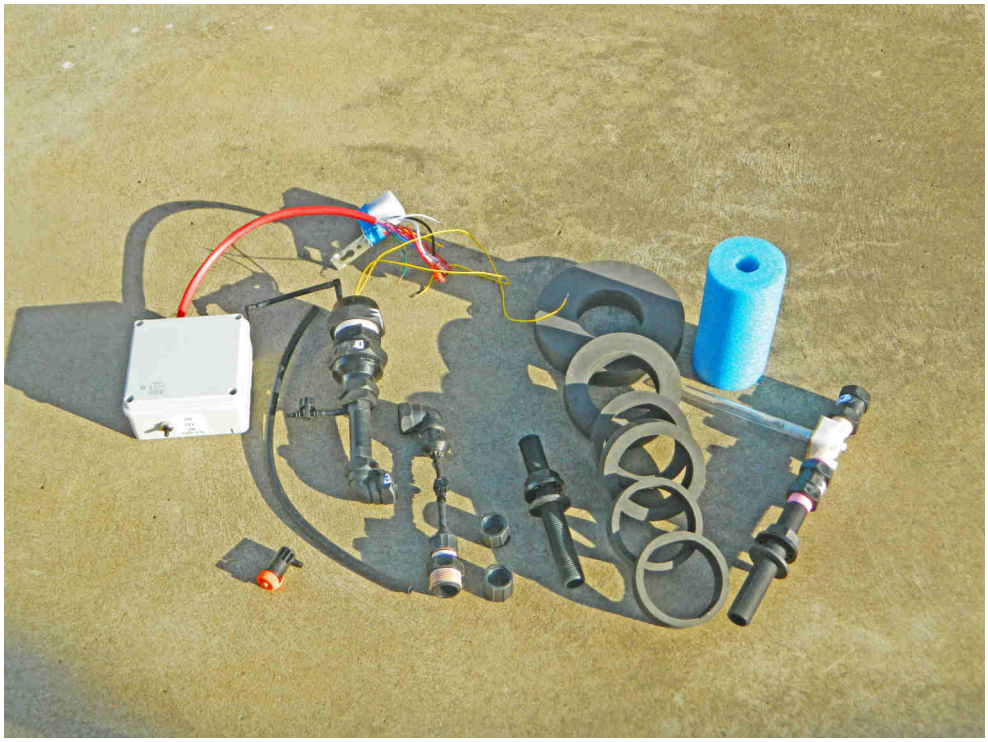

DIY Universal Measured Irrigation Controller Kit

Dr Bernie Omodei
Measured Irrigation
5/50 Harvey Street East, Woodville Park SA 5011
Mobile 0403 935277
Email bomodei@measuredirrigation.com.au
Website www.measuredirrigation.com.au

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1. Introduction to the DIY Universal Measured Irrigation Controller Kit

Measured irrigation is an irrigation scheduling method that satisfies the following two conditions:

1. *Variations in the water usage throughout the year are controlled by the prevailing net evaporation rate (evaporation minus rainfall).*
2. *The volume of water discharged by each emitter during an irrigation event is controlled directly without the need to control the flow rate or the duration of the irrigation event.*

It is assumed that the irrigation system (either pressurised or gravity feed) for your garden or small plot of land has already been established and that you have a suitable solenoid valve for the irrigation system.

The DIY Universal Measured Irrigation Controller Kit is easy to assemble to become a weather-based irrigation controller. It is easy to adjust the water usage and the irrigation frequency.

The DIY Universal MI Controller Kit can be used for gravity feed or pressurised irrigation, for drip or sprinkler irrigation, for pressure compensating drippers (PC) or non pressure compensating drippers (NPC).

The water usage for the DIY Universal MI Controller Kit is directly proportional to the net evaporation rate experience by you plants. This is a unique feature of measured irrigation. An adjustable control dripper allows you to adjust the water usage. The irrigation frequency can be adjusted by changing the float ring or adjusting a control screw. A switch on the irrigation control box allows you to restrict the irrigation to night time only.

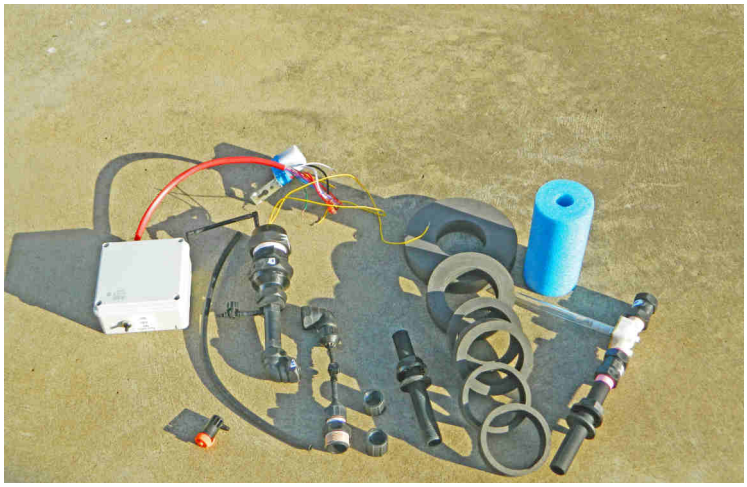
The DIY Universal Measured Irrigation Controller Kit can be purchased online from the Measured Irrigation website:
https://www.measuredirrigation.com/product-page/diy-universal-measured-irrigation-controller-kit

I recommend that you watch the Measured Irrigation video:
DIY Universal Measured Irrigation Controller Kit
https://www.youtube.com/watch?v=T0bn4SZ0tpY

2. Instructions for assembling the DIY Universal Measured Irrigation Controller Kit

The kit does not include an evaporator. The components in the kit are as follows:

- Valve assembly with inlet pipe
- Cylindrical float
- 6 float rings
- Outlet pipe (15mm BSP)
- 2 round plastic nuts (15mm BSP)
- Inlet assembly with 4mm valve
- Float switch assembly with 4mm valve
- Flexible overflow tube
- Adjustable control dripper
- Irrigation control box with light sensor



Step 1. Choose a suitable evaporator. The evaporator is a plastic container with vertical sides with an opening of at least 20cm x 20cm and a height of at least 15cm (a hobby box is ideal).

A hobby box makes an ideal evaporator

Step 2. Drill two 20mm holes opposite each other in opposite sides of the evaporator. The centres of the holes should be no more than 5cm higher than the bottom of the evaporator.

Step 3. Insert the inlet pipe (connected to the valve assembly) through one of the holes in the evaporator and attach one of the round plastic nuts.

Insert the inlet pipe through one of the holes

Attach a round plastic nut

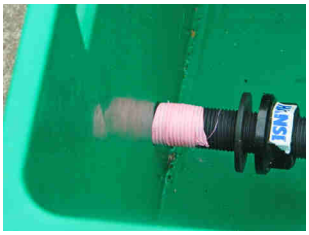
Step 4. Insert the outlet pipe through the other hole in the evaporator so that the washer is on the inside. Attach the other round plastic nut.

Step 5. Connect the outlet pipe to the valve assembly (use teflon tape).

Insert the outlet pipe through the other hole

Connect the inlet pipe to the valve assembly

Step 6. Wrap teflon tape around the inlet pipe and the outlet pipe as close as possible to the sides of the evaporator. To prevent water leaking from the evaporator, tighten the internal backing nuts against the external round plastic nuts.



Wrap teflon tape around the inlet and outlet pipe

Tighten the internal backing nuts against the external round plastic nuts

Step 7. Attach the inlet assembly to the inlet pipe (use teflon tape). Note that the inlet side of the valve extends farther than the outlet side.

Attach the inlet assembly to the inlet pipe

Step 8. Attach the float switch assembly to the outlet pipe (use teflon tape).

Attach the float switch assembly to the outlet pipe

Step 9. Connect a water supply to the inlet assembly.

Connect the water supply to the inlet assembly

Step 10. Adjust the float shaft (clear plastic tube) so that it is vertical. Be very careful to avoid putting any stress on the fragile plastic float shaft.

Step 11. Slide the cylindrical float over the float shaft.

Step 12. Connect the flexible overflow tube to the top of the float shaft.

Adjust the float shaft so that it is vertical

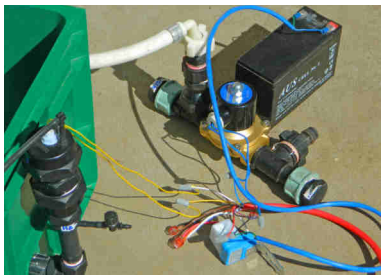
Slide the cylindrical float over the float shaft

Connect the overflow tube to the top of the float shaft

Step 13. Connect one of the wires from the float switch assembly to the **yellow** wire from the control box. Connect the other wire for the from the float switch assembly to the **white** wire from the control box.

Step 14. Connect a 12V DC solenoid valve to the water supply for your irrigation system. Connect the **blue** wire from the control box to one of the wires from the solenoid valve. Connect the **green** wire from the control box to the other wire from the solenoid wire.

Step 15. Connect a 12V DC power supply to the **red** wire (positive) and the **black** wire (negative) from the control box.



Connect the colour-coded wires from the control box to the float switch assembly, the solenoid valve and the power supply

Changes required for an alternative solenoid valve with an alternative power supply (not 12V):

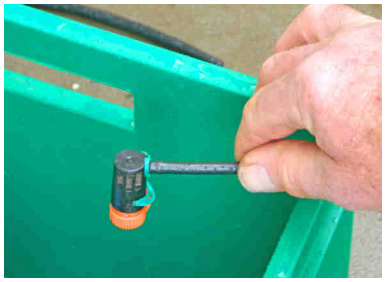
Disconnect the **blue** wire from the 12V DC solenoid valve.
Disconnect the **green** wire from the 12V DC solenoid valve and connect it to one of the wires from alternative solenoid valve.
Connect the other wire from alternative solenoid valve to one of the wires from the alternative power supply.
Cut the **pink** wire (connected to the **black** wire) and reconnect it to the other wire from the alternative power supply.

Step 16. Connect the outlet from the solenoid valve to the irrigation system.

Connect the outlet from the solenoid valve to the irrigation system

Step 17. Connect the adjustable control dripper to the irrigation system and position it so that it drips water into the evaporator during the irrigation. (If the irrigation system uses pressure compensating drippers, replace the adjustable control dripper by a pressure compensating dripper.)

Connect the adjustable dripper to the irrigation system



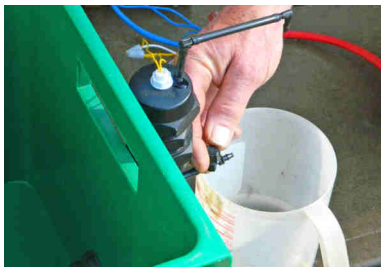
Position the adjustable control dripper so that it drips water into the evaporator

Step 18. The switch on the control box had 3 positions: **ON** (switch up), **OFF** (middle position), and **ON night only** (switch down). If you are happy for the irrigation to occur at any time of day, then flick the switch up. If you want the irrigation to occur at night time only, then flick the switch down. For the initial setup flick the switch up to the **ON** position.

Switch with 3 positions: ON, OFF, ON night only

Step 19. Close the 4mm valve on the inlet assembly. Close the 4mm valve on the float switch assembly. Turn on the water supply to the inlet assembly. Slowly open the valve on the inlet assembly until water is dripping from the outlet at the top of the float switch assembly at approximately 6 drips per second. Slowly open the valve on the float switch assembly until water is dripping from both outlets at the same rate.

Close the 4mm valve on the inlet assembly



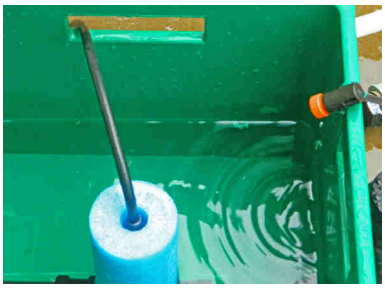
Close the 4mm valve on the float switch assembly

Water drips from both outlets at the same rate

Step 20. Turn on the water supply for the irrigation system and the irrigation should start. Fill the evaporator with water until the float jumps up and water stops dripping from the upper outlet on the float switch assembly. The irrigation stops as soon as enough water has drained from the lower outlet on the float switch assembly.

Fill the evaporator with water until the water stops flowing from the two outlets

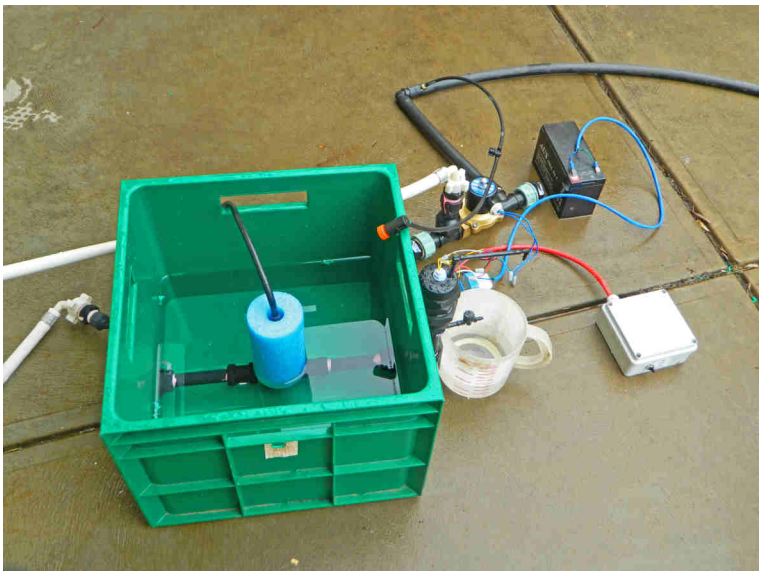
Step 21 The float falls as water slowly evaporates from the evaporator. When the float has fallen below the low level, the irrigation starts automatically provided that the switch on the control box is in the ON position. If the switch on the control box is in the ON night only position, the irrigation starts at sunset. The float rises as the control dripper drips water into the evaporator. When the float reaches the high level the irrigation stops automatically. The cycle continues indefinitely.



Float at the low level

Float at the high level

Step 22. You may wish to protect the evaporator to prevent animals drinking the water, but make sure that you do not impede the evaporation (chicken wire is ideal). Replace the water and clean the evaporator regularly to remove algae and other contaminants.



Fully assembled kit

3. How to adjust the water usage for sprinklers and non pressure compensating drippers

If your plants are not getting enough water, turn the control dripper clockwise to reduce the flow rate of the control dripper.

If your plants are getting too much water, turn the control dripper anticlockwise to increase the flow rate of the control dripper.

Turn the control dripper clockwise to reduce the flow rate

Turn the control dripper anticlockwise to increase the flow rate

4. How to adjust the water usage for pressure compensating drippers

The water usage is directly proportional to the surface area of evaporation. You can increase the surface area of evaporation by choosing a supplementary evaporator with vertical sides. The total surface area of evaporation is the surface area of the supplementary evaporator plus the surface area of the original evaporator minus the surface area of the float. One way to connect the evaporators is to drill a hole in the side of each evaporator and to insert a rubber grommet into each hole. Insert a barbed connector or elbow into each grommet, and then use a length of flexible tube to connect the evaporators. The water level will be same in both evaporators.

You can decrease the surface area of evaporation by placing full bottles of water in the evaporator.

5. How to adjust the irrigation frequency

The DIY Universal Measured Irrigation Controller Kit includes 6 float rings that can slide over the cylindrical float to increase the outside diameter of the float (the bottom of the float ring should align with the bottom of the cylindrical float).

Cylindrical float and six float rings

A control screw inside the float shaft allows fine adjustment of the irrigation frequency. Remove the overflow tube and use a phillips head screw driver to gently turn the control screw clockwise until it stops turning. To adjust the irrigation frequency, turn the control screw anticlockwise the desired number of 360º turns. Note that the overflow can be reduced by removing the screw and wrapping a small amount of teflon tape around the screw.

To adjust the irrigation frequency turn the control screw anticlockwise the desired number of turns

The following table shows the irrigation frequency for various float rings and anticlockwise turns of the control screw. The irrigation frequency is determined by the net evaporation from the evaporator between irrigation events.

Table 1. Irrigation frequency for the DIY Universal Measured Irrigation Controller

Diameter of float	Number of float rings	Number of anticlockwise turns of control screw	Net evaporation between irrigation events
15 cm	1	0	2.4 mm
15 cm	1	2	3.3 mm
15 cm	1	4	4.8 mm
15 cm	1	6	6.9 mm
15 cm	1	8	9.1 mm
11 cm	1	0	7.3 mm
11 cm	1	2	8.7 mm
11 cm	1	4	9.9 mm
11 cm	1	6	11.2 mm
11 cm	1	8	12.2 mm
9 cm	2	0	14.7 mm
9 cm	2	2	15.2 mm
9 cm	2	4	15.8 mm
9 cm	2	6	16.9 mm
9 cm	2	8	18.1 mm
8 cm	2	0	19.2 mm
8 cm	2	2	20.2 mm
8 cm	2	4	21.1 mm
8 cm	2	6	21.7 mm
8 cm	1	0	22.6 mm
8 cm	1	4	24.0 mm
8 cm	1	8	25.3 mm
7 cm	0	0	28.0 mm
7 cm	0	4	29.9 mm

Decide the appropriate net evaporation between irrigation events for your plants and then use the table to select the float ring and the number of anticlockwise turns of the control screw.

8 cm diameter float with two float rings

Provided that the switch on the control box is in the ON position and the water level in the evaporator is below the high level, you can start the irrigation manually at any time by pressing the float down. For example, on a very hot dry day you may wish to irrigate in the middle of the day. Simply push the float down and the irrigation starts.

You can delay the next irrigation or stop the irrigation at any time by removing the float. The irrigation cannot start again until the float is replaced.

Push the float down to start irrigating

Remove the float to stop irrigating

6. Key features of the DIY Universal Measured Irrigation Controller Kit

1. Completely automatic
2. Can be used for any size plot
3. Smart irrigation controller – the irrigation is controlled by the prevailing weather conditions rather than a program
4. Use for gravity feed or pressurised irrigation
5. Use for sprinkler or drip irrigation
6. Use for pressure compensating drippers or non pressure compensating drippers
7. You can adjust the water usage by adjusting the control dripper
8. You can adjust the irrigation frequency by changing the float ring or adjusting the control screw
9. The water usage is directly proportional to the net evaporation rate
   (this is a unique feature of measured irrigation)
10. Responds appropriately to an unexpected heat wave
11. When it rains, water enters the evaporator and delays the start of the next irrigation
12. The water usage is independent of the water supply pressure
    (this is a unique feature of measured irrigation)
13. Uses much less water without affecting the yield
14. Simple and low tech and so easy to assemble and fewer things to go wrong
15. Provided you have a continuous water supply, you can leave your irrigation application unattended for weeks on end