DIY Unpowered Measured Irrigation Controller Kit

User Manual

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1. Introduction to the DIY Unpowered Measured Irrigation Controller

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.

The DIY Unpowered Measured Irrigation Controller 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 Unpowered Measured Irrigation Controller is directly proportional to the net evaporation rate experience by you plants. This is a unique feature of measured irrigation.

The DIY Unpowered Measured Irrigation Controller KIY can be purchased online from the Measured Irrigation website: https://www.measuredirrigation.com/product-page/diy-unpowered-measured-irrigation-kit

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

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

The Kit includes everything that you need except for an evaporator. The components in the kit are as follows:

- Valve assembly with inlet pipe
- Cylindrical float
- 7 float rings
- Outlet pipe (15mm BSP)
- 2 round plastic nuts (15mm BSP)
- Inlet adaptor 15mm x 20mm
- Adjustable control dripper assembly
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Components in the DIY UMIC Kit

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.

Drill 2 holes in opposite sides 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

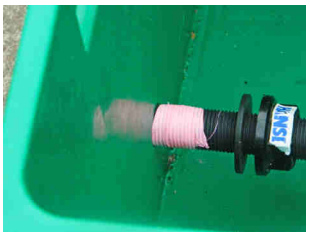
Step 4. Insert the outlet pipe through the other hole in the evaporator so that the washer is inside the evaporator. Attach the other round plastic nut.

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 adaptor to the inlet pipe (use teflon tape). Note that the inlet side of the valve extends farther than the outlet side.

Attach the inlet adaptor to the inlet pipe

Step 8. Attach the adjustable control dripper assembly to the outlet pipe (use teflon tape).

Attach the adjustable control dripper assembly to the outlet pipe

Step 9. Connect the water supply to the inlet side of the evaporator.

Step 10, Connect the irrigation system to the outlet side of the evaporator.

Connect the water supply to the inlet side of the evaporator

Connect the irrigation system to the outlet side of the evaporator

Step 11. 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 12. Slide the cylindrical float shaft over the float shaft.

Slide the cylindrical float over the float shaft

Step 13. Turn on the water supply and the irrigation should start. Check that there are no leaks into the evaporator.

Step 14. Adjust the control dripper so that water drips into the evaporator.

Adjust the control dripper so that water drips into the evaporator

Step 15. Fill the evaporator with water until the float jumps up and the irrigation stops.

Step 16. The float falls as water slowly evaporates from the evaporator. When the float reaches the low level, the irrigation starts automatically. 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.

Step 17. 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.

The DIY Unpowered Measured Irrigation Controller is completely automatic and does not need any electricity. Furthermore, it is a smart controller because the water usage for each dripper is controlled by the prevailing weather conditions. In fact, the water usage (litres per week for example) is directly proportional to the net evaporation rate (that is, evaporation minus rainfall). You can adjust the water usage by adjusting the control dripper. You can adjust the irrigation frequency by adjusting the float or the surface area of the evaporator.

Many irrigation controllers are programmed and cannot respond to an unexpected heat wave. The DIY Unpowered Measured Irrigation Controller responds appropriately to an unexpected heat wave. If the evaporation rate doubles then so does the water usage.

When it rains water enters the evaporator and delays the start of the next irrigation.

3. How to adjust the irrigation frequency

To increase the options for the irrigation frequency, the DIY Unpowered Measured Irrigation Controller Kit is provided with an adjustable float consisting of a 7 cm diameter cylindrical float and 7 float rings that can slide over the cylinder 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 seven float rings

Slide the float ring over the cylindrical float

The following table shows the irrigation frequency for various float rings. The irrigation frequency is determined by the net evaporation from the evaporator between irrigation events.

Table 1. Irrigation frequency for the Unpowered Measured Irrigation Controller

Outside diameter of float	Number of float rings	Net evaporation between irrigation events
7 cm	0	29.3 mm
8 cm	1	24.6 mm
8 cm	2	20.3 mm
9 cm	1	16 mm
10 cm	1	11.6 mm
11 cm	1	9.3 mm
13 cm	1	6 mm
15 cm	1	4 mm

Provided that 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.

You can delay the next irrigation by removing the float. The irrigation cannot start again until the float is replaced.

When you adjust the irrigation frequency the water usage (litres per week for example) does not change. Both the irrigation frequency and the water usage are directly proportional to the net evaporation rate.

4. 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

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

To adjust the water usage for pressure compensating drippers, you need to replace the adjustable control dripper with a pressure compensating dripper.

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.

Connecting two evaporators

6. Key features of the DIY Unpowered Measured Irrigation Controller

1. Completely automatic
2. No electricity is needed (no batteries, no solar panels, no solenoids, and no electronics)
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 (water supply pressure at least 10 kPa)
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 adjusting the float
9. Adjusting the water usage does not change the irrigation frequency
10. Adjusting the irrigation frequency does not change the water usage
11. The water usage is directly proportional to the net evaporation rate (this is a unique feature of measured irrigation)
12. Responds appropriately to an unexpected heat wave
13. When it rains, water enters the evaporator and delays the start of the next irrigation
14. Provided the emitter discharge exponent of the control dripper is the same as the emitter discharge exponent of the other emitters, then the water usage is independent of the water supply pressure (this is a unique feature of measured irrigation)
15. Uses much less water without affecting the yield
16. Simple and low tech and so easy to assemble and fewer things to go wrong
17. Provided you have a continuous water supply, you can leave your irrigation application unattended for weeks on end