

Unpowered Evaporative Valve

User Manual



Unpowered Evaporative Valve

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February 2022

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1. Introduction to Unpowered Evaporative Valve

It is assumed that a smallholder is using drip irrigation (either pressurised or gravity feed) on a garden or a small plot of land. Using the Unpowered Evaporative Valve, you can upgrade your drip irrigation system so that all your plants are irrigated automatically. The water supply pressure should be at least 10 kPa (1 metre head). Provided you have a continuous water supply, you can leave your garden unattended for weeks on end. This will allow you to become involved in other activities away from the garden; for example, travelling to the market to sell your produce.

It is recommended that you watch the YouTube video [Unpowered Measured Irrigation Controller](#).

The Unpowered Evaporative Valve can be used for gravity feed or pressurized systems, sprinkler or drip irrigation, porous hose irrigation (weeper hose or soaker hose), pressure compensating drippers or non pressure compensating drippers.

The water usage rate for the Unpowered Evaporative Valve is directly proportional to the prevailing net evaporation experienced by your plants. This is a unique feature of measured irrigation.

The Unpowered Evaporative Valve can be purchased online from the Measured Irrigation website: <https://www.measuredirrigation.com/product-page/unpowered-measured-irrigation-controller>.

The Unpowered Evaporative Valve is also available as a DIY Kit that can also be purchased online from the Measured Irrigation website: <https://www.measuredirrigation.com/product-page/diy-unpowered-measured-irrigation-kit>



Unpowered Evaporative Valve



DIY Unpowered Evaporative Valve Kit

How large can the plot be?

The valve in the Unpowered Evaporative Valve has a 15mm inlet and outlet and hence the flow rate is limited by the size of the valve. It is assumed that the smallholder has already established a drip irrigation system. Provided that the drip irrigation system is already working effectively, you may need to use a number of Unpowered Evaporative Valves to automate the irrigation system depending on the size of the plot.

2. Instructions for installing the Unpowered Evaporative Valve

Installing the Unpowered Evaporative Valve is incredibly simple. Start with any drip irrigation application, either pressurised or gravity feed. Before installing the valve, it is assumed that the irrigation is operated manually by opening and closing a valve.

Step 1. Remove the Unpowered Evaporative Valve from the shipping carton. Connect the adjustable control dripper by screwing it onto the thread provided. Adjust the float shaft so that it is pointing up (be very careful when adjusting the float shaft to avoid placing any stress on the fragile plastic float shaft). Tighten



Remove the Unpowered MI Valve from the shipping carton



Connect the adjustable control dripper



Tighten the two back-nuts



Tighten the two back-nuts

Step 2. Position the evaporator in a suitable location so that the evaporation matches the evaporation in your garden.

Step 3. Connect the water supply to the inlet of the Unpowered Evaporative Valve (the inlet is on the opposite side to the adjustable control dripper). The water supply pressure should be between 10 kPa and 800 kPa.

Step 4. Connect the Unpowered Evaporative Valve outlet (next to the adjustable control dripper) to the irrigation zone.



Connect the water supply

Step 5. Readjust the float shaft so that it points vertically up. Be very careful when adjusting the float shaft to avoid placing any stress on the fragile plastic float shaft. Position the adjustable control dripper so that it will drip water into the evaporator during the irrigation. If your irrigation drippers are PC (pressure compensating), the control dripper should also be PC. For porous hose irrigation (weeper hose or soaker hose), replace the control dripper by a short length of porous hose.

Step 6. For gravity feed application you may need to adjust the height of the evaporator so that the control dripper is at the same level as the irrigation drippers.

Step 7. Slide the float over the float shaft

Step 8. Turn on the water supply and the irrigation should start. The adjustable control dripper drips water into the evaporator.



Float shaft must be vertical



Slide the float over the float shaft

Step 9. Adjust the control dripper so that flow rate is about the same as the flow rate of the irrigation drippers.



Adjust the control dripper

Step 10. Fill the evaporator with water until the float jumps up and the irrigation stops.



Fill the evaporator with water until the irrigation stops

Step 11. 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. Adjust the float to control the irrigation frequency (see Section 3.3).



The irrigation starts when the float reaches the low level



The irrigation stops when the float reaches the high level

Step 12. The control dripper can be adjusted to suit the water requirements of your plants (see Section 3.4). If you are using pressure compensating drippers, you can adjust water usage by adjusting the surface area of evaporation.

Step 13. 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 Unpowered Evaporative Valve is completely automatic and does not need any electricity. Furthermore, it is a valve because the water usage rate is controlled by the prevailing weather conditions. In fact, the water usage rate (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 Unpowered Evaporative Valve responds appropriately to an unexpected heat wave. If the evaporation rate doubles then so does the water usage rate.

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

If your plants need more water, rotate the control dripper clockwise to reduce the flow rate of the control dripper. If your plants need less water, rotate the control dripper anticlockwise to increase the flow rate of the control dripper.

3. How to adjust irrigation frequency for the Unpowered Evaporative Valve

To increase the options for the irrigation frequency, the Unpowered Evaporative Valve 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 Evaporative Valve

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.

For example, you may wish to irrigate at sunset each day assuming that the water level is below the high level at sunset. Simply push the float down at sunset to start irrigating.

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

It is important to realise that when you adjust the irrigation frequency by adjusting the outside diameter of the float, the water usage rate (litres per week for example) does not change. Both the irrigation frequency and the water usage rate are directly proportional to the net evaporation rate.

4. How to adjust water usage for the Unpowered Evaporative Valve

Adjusting water usage by adjusting the control dripper

Position an empty measuring container under one of the irrigation drippers so that water drips into the container during the irrigation event.



At the end of the irrigation event check the amount of water in the measuring container. You may also wish to check the moisture in the soil.



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.



If the irrigation drippers are PC (pressure compensating), you can adjust the water usage by replacing the PC control dripper by a different combination of PC drippers.

Adjusting water usage by adjusting the surface area of evaporation

This technique is particularly useful when you are using 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.



How to connect two evaporators



A full bottle of water decreases the surface area of evaporation

5. Key features of the Unpowered Evaporative Valve

1. Completely automatic
2. No electricity is needed (no batteries, no solar panels, no computers, and no electronics)
3. Smart irrigation valve – the irrigation is controlled by the prevailing weather conditions rather than a program
4. Use for both gravity feed and pressurised irrigation
5. Use for sprinkler or drip irrigation
6. Use for porous hose irrigation (weeper hose or soaker hose)
7. Use for pressure compensating drippers or non pressure compensating drippers
8. You can adjust the water usage by adjusting the control dripper
9. You can adjust the irrigation frequency by adjusting the float
10. Adjusting the control dripper does not change the irrigation frequency
11. Adjusting the float does not change the water usage
12. The water usage rate is directly proportional to the net evaporation rate (this is a unique feature of measured irrigation)
13. Respond appropriately when there is an unexpected heat wave
14. When it rains, water enters the evaporator and delays the start of the next irrigation
15. Uses much less water without affecting the yield
16. Simple and low tech and so there are fewer things to go wrong
17. Provided you have a continuous water supply, you can leave your irrigation application unattended for weeks on end