

Frost/Over Temp Drain Down System Installation Manual



metrosolar

Installation Manual

How it works	2	Drain Down Controller Installation	5
Drain Down Valve positioning options	3	Drain Down Controller Maintenance.....	6
Roof Sensor installation	3	Safety instructions	7
Cylinder Sensor Installation.....	4	Warranty Details	8

⚠️ WARNING! Important Information

- A solar rated check valve must be fitted at the solar return to the cylinder
- A strainer must be fitted immediately prior to this solar rated check valve
- Failure to correctly install these components can cause the system to malfunction
- An automatic high point vent valve must be fitted at the highest point of the solar circuit and ensure mounting is perfectly vertical as this is critical to ensure drain down

How it works

The Metro Solar drain down controller has two important functions. The first is to protect your solar collector panels from frost conditions, the second is to protect your cylinder from over heating. It does this by monitoring temperatures via two sensors, one mounted at the top of the cylinder and the other attached to the collector panel.

The controller is set at factory defaults to drain water from the solar collectors when the outside temperature reaches 5°C or if the cylinder reaches 75°C by cutting power to the 3 port motorized valve.

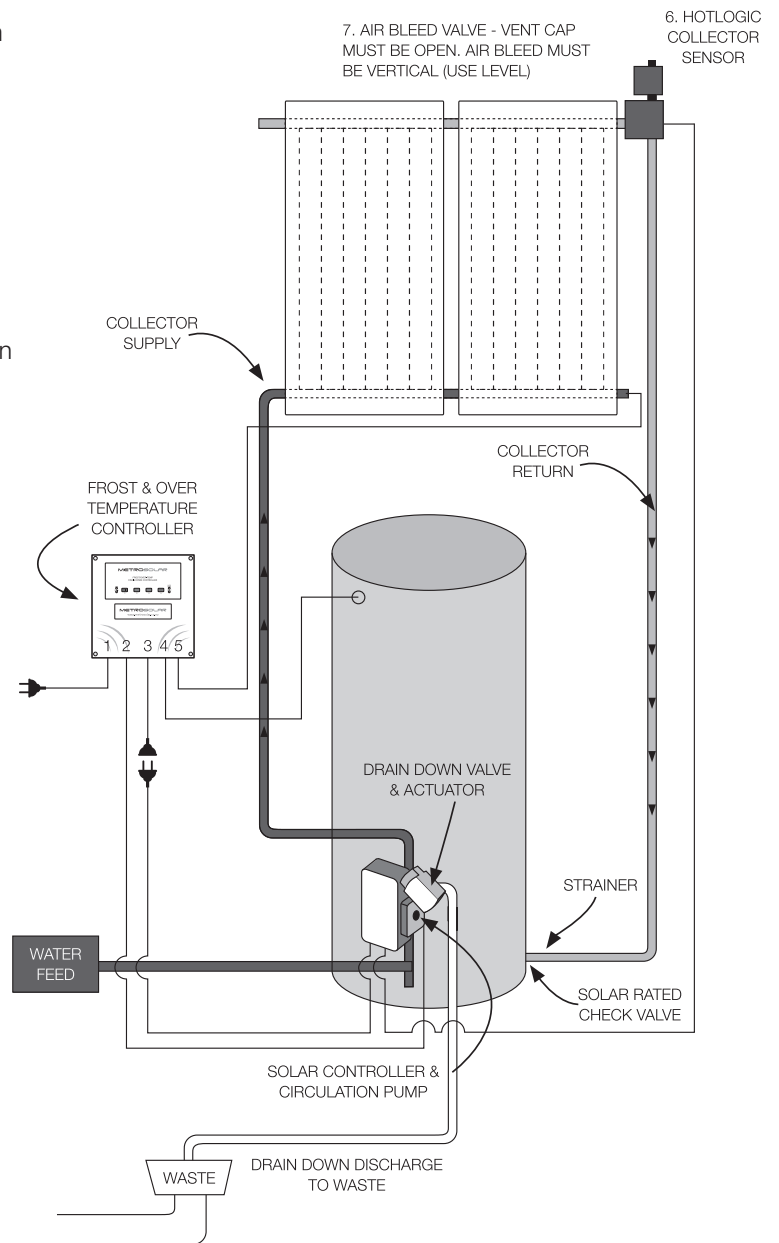
In the event of power failure the 3 port motorised valve will open and the solar collectors will be emptied.

Frost & over temperature controller connections

1. 230v supply
2. 230v output to drain down
3. 230v output to solar controller
4. Over temperature sensor (S3)
5. Frost sensor
6. Solar controller sensor

Features

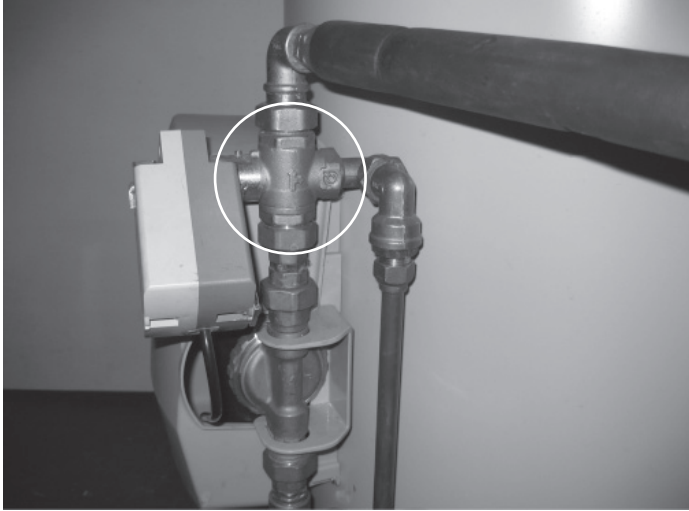
- High quality, efficiency, reliability and +/-1C accuracy.
- Stainless steel, water resistant temperature sensor.
- Pre-wired with mains plugs and sockets.
- Frost and over temperature values installer adjustable.
- Access code protected front panel programming.
- Sensor diagnostics and smart shutdown.
- Frost protection prevents collector panels freezing.
- Easy to install with external mounting holes.
- Complies with safety & EMC standards.
- Enclosure and cables UV resistant.
- Water resistant and rear cable entry options.



Positioning Options Drain Down Valve

⚠ CAUTION! Important Information

- If the drain-down valve has to be mounted below the pump, as shown in Option 2, it is critical to remove the non-return valve fitted in the pump outlet fitting.



OPTION 1

For ease of installation fit the drain down valve directly above the solar pump as illustrated above.



OPTION 2

In special circumstances due to height restriction (such as when mounting the storage cylinder in a ceiling cavity) it may be necessary to mount the drain down valve below the solar pump to ensure that the collectors and pipe work are able to empty completely.

Note. If connecting the Drain Down waste into a shared open vented waste line, make sure the high pressure drain down waste does not overflow during the drain down sequence. We recommend maximising the volume and height of the open vented waste pipe.

Roof Sensor Installation for frost protection

The top collector sensor comes pre-wired to the controller with 10 metres of lead, if you need more than 10 metres see "Sensor Wire Lengthening" section on page 6.

Install the thermowell fitting to the lower manifold below the Five port hot water outlet assembly. Fully insert the frost sensor into the thermowell and seal the opening with silicon. Secure the lead along the collector and run with other solar sensor through roof penetration. Do not allow sensor to come into direct contact with copper pipe or any sharp edges of roof penetration.

Failure to correctly mount the roof sensor as described can result in failure to detect frost conditions.



INSTALLING THE ROOF SENSOR

Installation S3™ Cylinder Sensor for over temperature protection

WARNING! Important Information

- The S3™ Cylinder Sensor is not compatible with cylinders made of aluminium as this will cause corrosion to the cylinder.

Features

- Quick and straightforward Sensor Installation.
- Universal fit for a wide range of insulation thicknesses.
- Improved reliability of sensor installation.
- High sensor accuracy vs water temperature (0.5°C).
- Pre-wired with Metro Solar controllers.
- No need for fitted pockets on hot water tanks.
- Installer can choose best position for sensor.

Introduction

The S3™ sensor uses a purpose designed heat transferring copper foot to improve thermal contact. The sensor together with attachable split rings also acts as a low tension spring, holding the sensor foot against the cylinder and is self adjusting for expansion and contraction. An outer flange attaches to the cylinder casing to secure the assembly and provide a surface for the spring to act against.

Note. There are an exceedingly wide range of insulation thicknesses on hot water cylinders. The recommended minimum wall thickness for the S3™ sensor is 40mm. To install on a cylinder with insulation thinner than this some other adaptation will be required.

Installation instructions



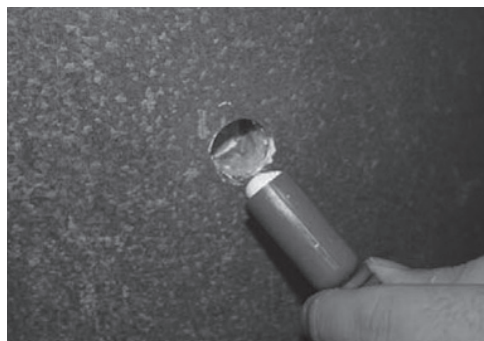
DRILLING 18MM HOLE

1. Locate the best sensor position on the tank approximately 150mm from top.
Drill a 18mm hole through the outer cladding being careful not to puncture the inner cylinder wall.
Remove the insulation material within that hole. Ensure that no residual insulation material remains on the exposed inner cylinder (this is critical to achieve an accurate temperature reading).



PLACING SENSOR

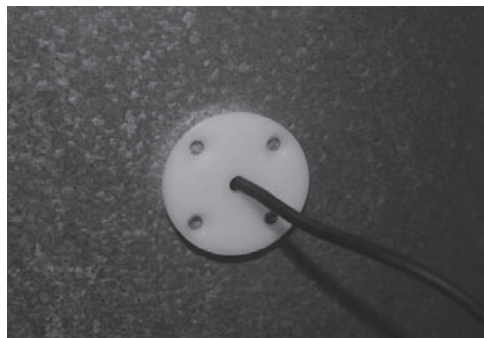
2. Place the sensor assembly in the hole. Add spacers until a millimetre or so of the last ring is protruding beyond the outer cladding. Spacers can be added by gently opening the split in the ring and pushing them over the sensor cable.



PLACING SENSOR

3. Remove assembly and apply a liberal amount of heat transfer compound to the exposed copper foot of the S3™ assembly.

Re-insert the sensor assembly.



SECURING SENSOR

4. Fix in place by securing the flange to the outer cladding with the 4 screws provided.

Dimensions.

Sensor Diameter: 18mm
Sensor Length: 40mm
Sensor Packer Width: 5mm

Note. S3™ is a trademark of Senztek NZ Ltd.

Installation Metro Solar Drain Down Controller

Metro Solar Controller Mounting

The Metro Solar Drain Down Controller can be mounted anywhere that is convenient for the installer/customer, allow for cable runs, location of power outlets and lengths of leads.

Wiring

An electrician will be required to wire the Drain Down Actuator to the output terminal connection inside the controller. Both the Actuator and the Solar Controller/Pump share the common output terminal connection. Under no circumstances attempt to open the Drain Down Actuator.

Power Up

Before you connect the power;

1. Read safety instructions, warnings and limit of liability before proceeding.
2. Complete all the installation and securely mount the Metro Solar Drain Down Controller.
3. Power outlet socket must be installed by a registered electrician and ensure an over-current protection and RCD protection for the Metro Drain Down Controller and pump is in place.
4. Unplug the existing solar controller and plug it into the Metro Drain Down Controller.

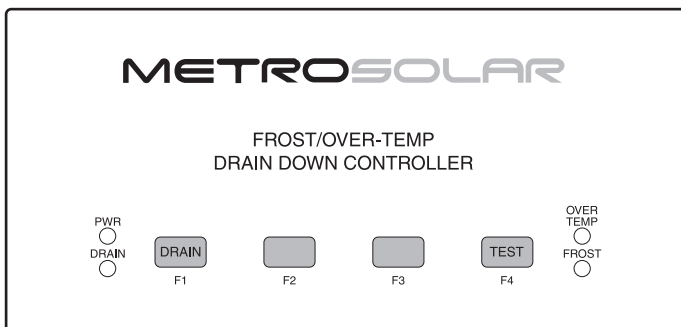
Only then connect power to the Metro Drain Down Controller and turn it on.

What You Should See

The first thing you should see after power up is:

1. Top left 'PWR' light should be on.
2. Other lights will be on depending on how the solar hot water system is operating.

The DRAIN DOWN operation can be tested by pressing the 'DRAIN' button. This will cut power to the drain valve as long as the button is held down.



DRAIN DOWN CONTROLLER DISPLAY PANEL

Sensor Diagnostic Chart

Light Indicator	Status	Cause
Frost led	Slow flash	Collector sensor or lead short circuited or temperature > 150°
Over temp led	Rapid flash	Cylinder sensor or lead severed or temperature < -40°
Power & drain	On steady	Normal operation

Smart Shutdown (SSd)

In Smart Shutdown mode, the 'Over Temp' and or 'Frost' light is flashing and the output is disabled to both the solar controller and the drain down valve actuator.

DRAIN

Power on holds the drain valve in "solar gain" operation and supplies power to the solar controller. By holding the DRAIN button down power will be cut causing the solar circuit to drain

TEST

This button will check the system during which, all the lights should flash on for 5 seconds and then return to normal. ie: power and drain lights on, frost and over temp off.

PWR

This light on indicates that power is being applied to the unit.

OVER TEMP

This light will be on when the value stored for the Over Temp condition has been reached. To stop the cylinder from getting any hotter, the output will be turned off to both the solar controller and the drain down actuator allowing the solar collectors to empty.

FROST

This light comes on when the value stored for the onset of a frost condition has been detected on the solar collector. To stop the collector freezing and bursting, the output will be turned off to both the solar controller and the drain down actuator allowing the solar collectors to empty.

F2

If pressed this flashes the Over Temp light but this button has no effect on unit operation.

F3

If pressed this flashes the Frost light but this button has no effect on unit operation.

Maintenance Metro Solar Drain Down Controller Sensor

Lengthening Sensor Wire

The sensor wire can be lengthened within certain guidelines. Poor connections or induced interference can cause false temperature readings.

1. The sensor is not polarized- it can be connected either way around.
2. The wire normally used for sensor lengthening is twin core stranded speaker wire.
3. Firmly attach wires to each other by either soldering (heatshrink over each joint) or by quality screw terminals. Joins must be kept dry.
4. It is recommended that sensor leads be kept 300mm away from mains and comms cables.
5. Over 20 metres; extra care must be taken to avoid electrical interference being picked up.
6. In 'noisier' electrical environments screened cable may be required.

Replacing a Metro Solar Controller Sensor

Remove the mains power supply, preferably remove the plug from the wall socket. Make sure no other power source is feeding back through other connections, replace the faulty sensor then reconnect the Metro Drain Down Controller and turn on the power.

Check sensor is reading correctly and check Metro Drain Down Controller operation as per "What You Should See" section of this manual.

The table below has the correct resistance values of the sensor at different temperatures. The sensor must be removed from the Metro Drain Down Controller to measure these values correctly. Follow the above procedure for removal of the sensor.

CAUTION! Important Information

- **Dangerous Voltages may be present. The Metro Drain Down Controller has no user serviceable parts. Protective enclosure only to be opened by qualified personnel**

Sensor Resistances

Temperature	Resistance in kΩ
0°C	27.25
25°C	10.00
50°C	4.162
75°C	1.925
100°C	0.973
Above 150°C or 'short'. Sensor Light Slow Flash	<0.300
Below -40°C or 'open'. Sensor Light Fast Flash	>200

A short circuit can be caused by the sensor wires being connected together. Check the wires are not partially cut. (eg Sharp roofing iron.) or moisture is not getting into the sensor causing corrosion.

An open circuit can be caused by the sensor wires being broken. Check the wires are not cut. (eg Sharp roofing iron.) or moisture is getting into the sensor causing corrosion.

Metro Solar Drain Down Controller Specifications

Power Supply Voltage:

Supply Voltage: 230Vac ±10% (207~264Vac) 50/60Hz.
Max power usage: 2VA + external loads.

Sensors

Control range: -40° ~ +150°C
Stainless steel tip: -40° ~ +150°C; 6mm diameter x 30mm
PVC Sensor cable: -40° ~ +105°C; 4mm diameter, UV resistant. (Standard Units)
Silicon Sensor Cable: -40° ~ +150°C; 4mm diameter, UV resistant. (Special Order)
Accuracy: +/-1°C @ 25°C

Adjustable Values Range (selectable in programming mode)

Top Out Protection 4 ranges:

70°C/60°C, 75°C/65°C, 80°C/65°C, 85°C/65°C

Frost Protection 4 ranges:

2°C/6°C, 4°C/9°C, 6°C/10°C, 8°C/12°C

Defaults underlined

Dimensions: L=167, W=142, H=40mm excluding glands and cables

Safety Instructions Metro Solar Drain Down Controller

Read safety instructions and limit of liability before proceeding with the installation.

General Safety Instructions

1. This installation guide is for the installation of Metro Solar hot water controllers only and is not an installation guide for any other part.
2. The complete installation should be checked at least annually for damage or malfunction.
3. All servicing to be carried out by an authorised service agent only.
4. All aspects of the installation must comply with local electrical and plumbing regulations (and any special solar hot water regulations).

Installation Precautions

1. Must be installed away from water sources such as rain, leaking pipes, or wet floors and must not be installed in damp areas like bathrooms.
2. Must be installed away from direct sunlight, flammable liquids or radiant heat sources.
3. Power leads must be facing directly down, not sideways or upwards.
4. Must be in a safe environment for users to inspect.
5. Failure to mount sensors correctly can lead to a poorly controlled solar hot water system with safety issues like overheating and over pressure damage to the plumbing and hot water cylinder or freezing damage to the solar collector.
6. Alteration of installer level program values outside those recommended values by Metro Solar and other suppliers (especially hot water cylinder manufacturer's maximum recommended temperature) can lead to dangerous conditions and/ or damage to parts of the solar hot water system.

Electrical Precautions

1. All mains voltage electrical work to be carried out by a registered electrician, especially external power outlet socket installation.
2. A readily accessible disconnect device, overcurrent device and RCD Protection rated to suit the size of the pump plus 5VA must be incorporated in the power supply wiring. The overcurrent device for a 1500W, 240Vac pump must not exceed 10Amps.
3. It is recommended that sensor leads be kept 300mm away from mains and comms cables.
4. Do not use mains power extension cords unless approved by the manufacturer. Water resistant plugs and sockets should be used.
5. The Metro Solar Controller, controlled outputs (PUMP/ Actuator) are connected to the input power supply wiring and are not isolated from it. Supply voltages will be output through these outlets during activation.
6. Always use within specified voltage and load ranges. Never use with damaged leads, plugs or sockets.
7. Do not allow the sensor cables to come within 10mm of the high voltage connectors or components inside the enclosure.



CAUTION! Important Information

- **Dangerous Voltages may be present. The Metro Solar Frost and Over temperature Drain Down Controller has no user serviceable parts.**
- **Protective enclosure only to be opened by qualified personnel.**
- **Remove ALL power sources before removing protective cover.**

Warranty Details Metro Solar Drain Down System

The Metro Solar Drain Down Frost/Over temperature protection system has a one year parts and labour warranty from date of installation.

Warranty Conditions

- The Metro Solar Drain Down System must be installed, operated and maintained strictly in accordance with the building code, Plumbing & Drainage standard AS/NZS 3500 and the manufacturers "Installation Manual"
- Attachment of any parts or accessories other than those approved by Metro Solar. may void this warranty.
- This warranty only applies to equipment supplied by Metro Solar and not associated parts as supplied by agents or installers.
- This warranty excludes any building modification that may be required to access or replace equipment.
- This warranty covers the replacement or repair at the manufacturer's discretion, but excludes freight and /or travel costs.
- The manufacturer or their agent are not liable for any loss or expense directly or indirectly arising from the failure of any part or operation of the heating and/or control system.

A claim under this warranty should be directed to the retailer who supplied the Metro Solar equipment, or if this is not possible, write direct to Metro Solar at Pioneer Manufacturing stating details of the fault, retailer where purchased and when installed.

Warranty information & checklist

Information for Owner

Retailer purchased from.....

.....

Installer.....

Date Installed.....

Your decision to purchase Metro Solar products will reward you for many years to come. We appreciate your feedback and encourage you to forward your comments to us by submitting on our web page or write to Metro Solar at Pioneer Manufacturing.

Advice, repairs and service

Firstly Call your supplier

Secondly Metro Solar
www.metrosolar.co.nz
Phone 06 756 6520
Fax 06 756 6540

