



GREEN HEAT

intelligent energy control

PV System

installers guide

Models: 100L to 200L Hot water cylinders

Before operating and installation, carefully read all instructions. Do not discard this manual.

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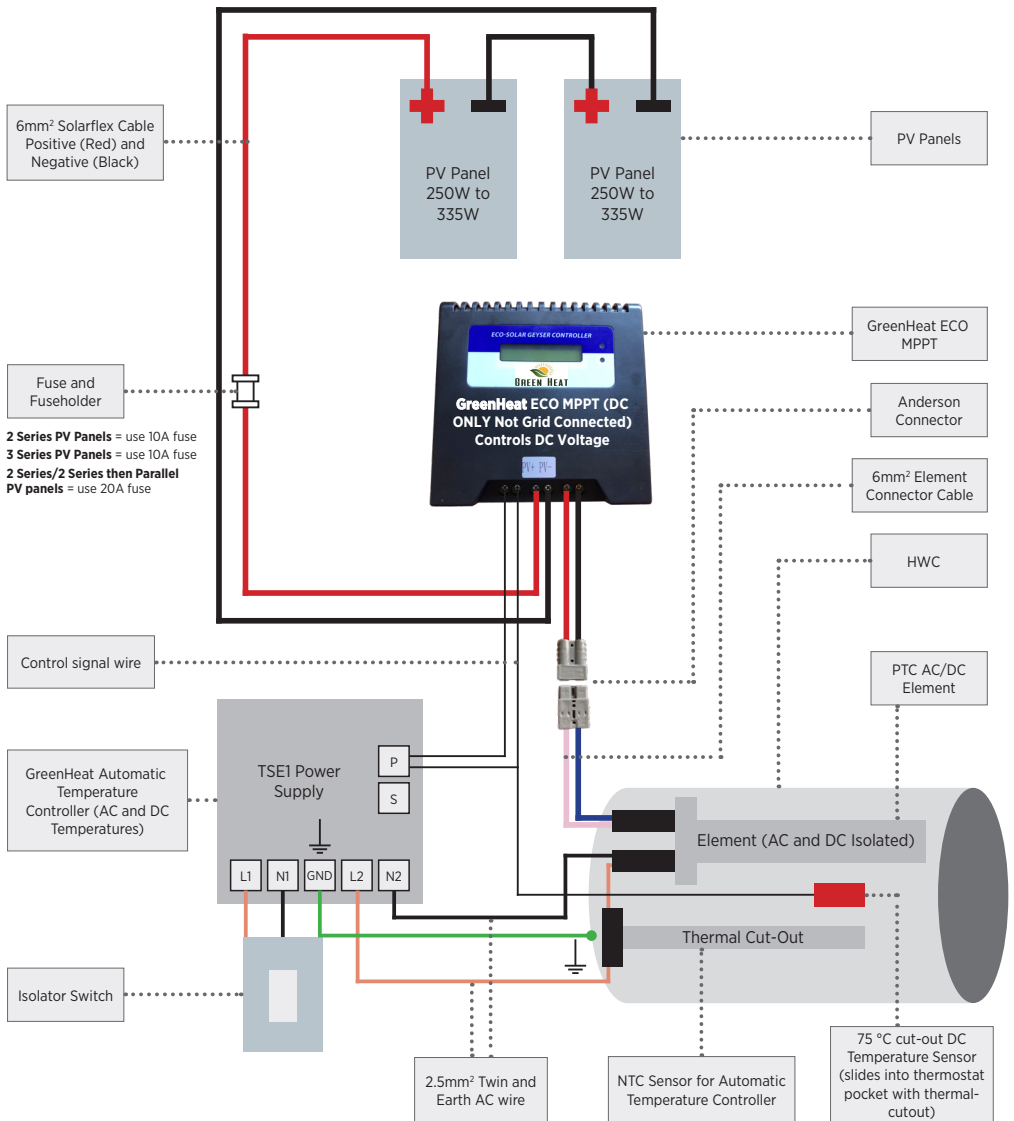
INTRODUCTION

The system makes use of photovoltaic technology and a unique PTC AC/DC element to heat the water in the hwc. This differs from traditional thermal hot water systems where water is cycled from a collector through pipes to the hwc by either making use of a 220V Pump, 12V Pump or natural convection.

Advantages over thermal hot water systems are as follows:

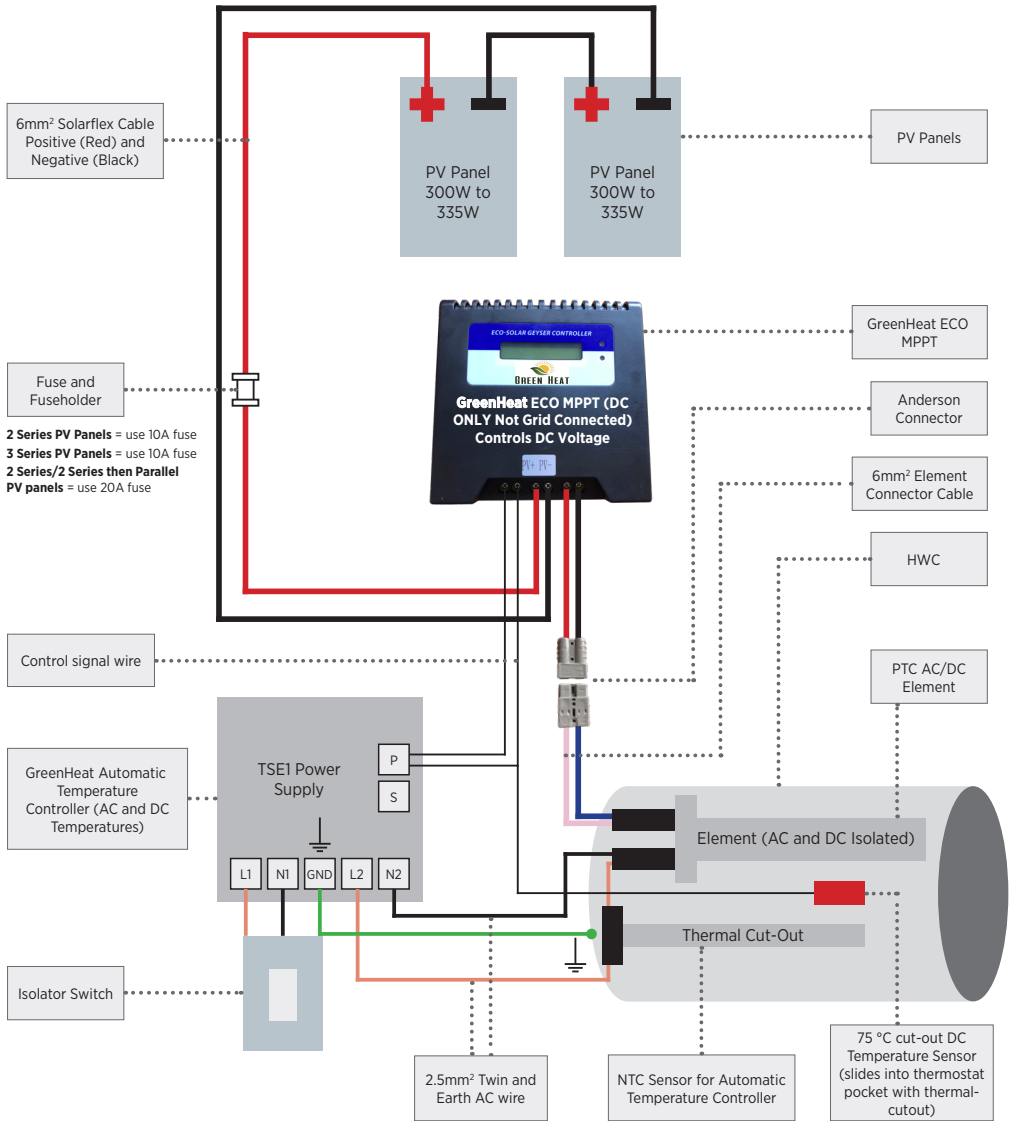
- Any existing hwc can be converted
- No Additional plumbing is required
- No pumps necessary to circulate water
- No risk of damaged panels in frost prone areas
- The water temperature can be controlled on very hot summer days - reduced risk of overheating problems
- Suitable in all water conditions
- Suitable in areas where the **HWC** is not situated near the panels
- Modular system – can be expanded to build an off-grid power system for the home

System overview - 100L for high irradiation areas



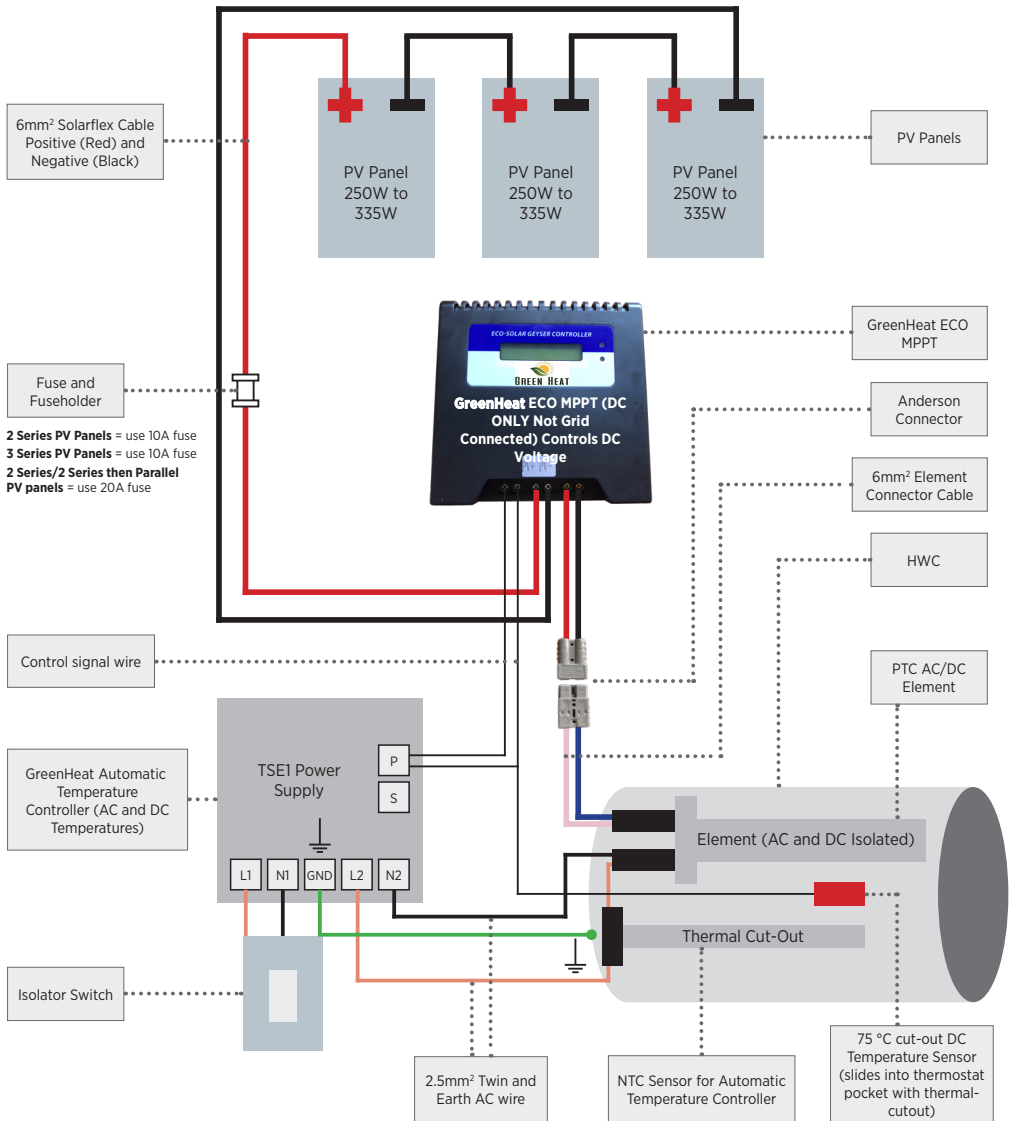
See table on page 9

System overview - 100L for low irradiation areas



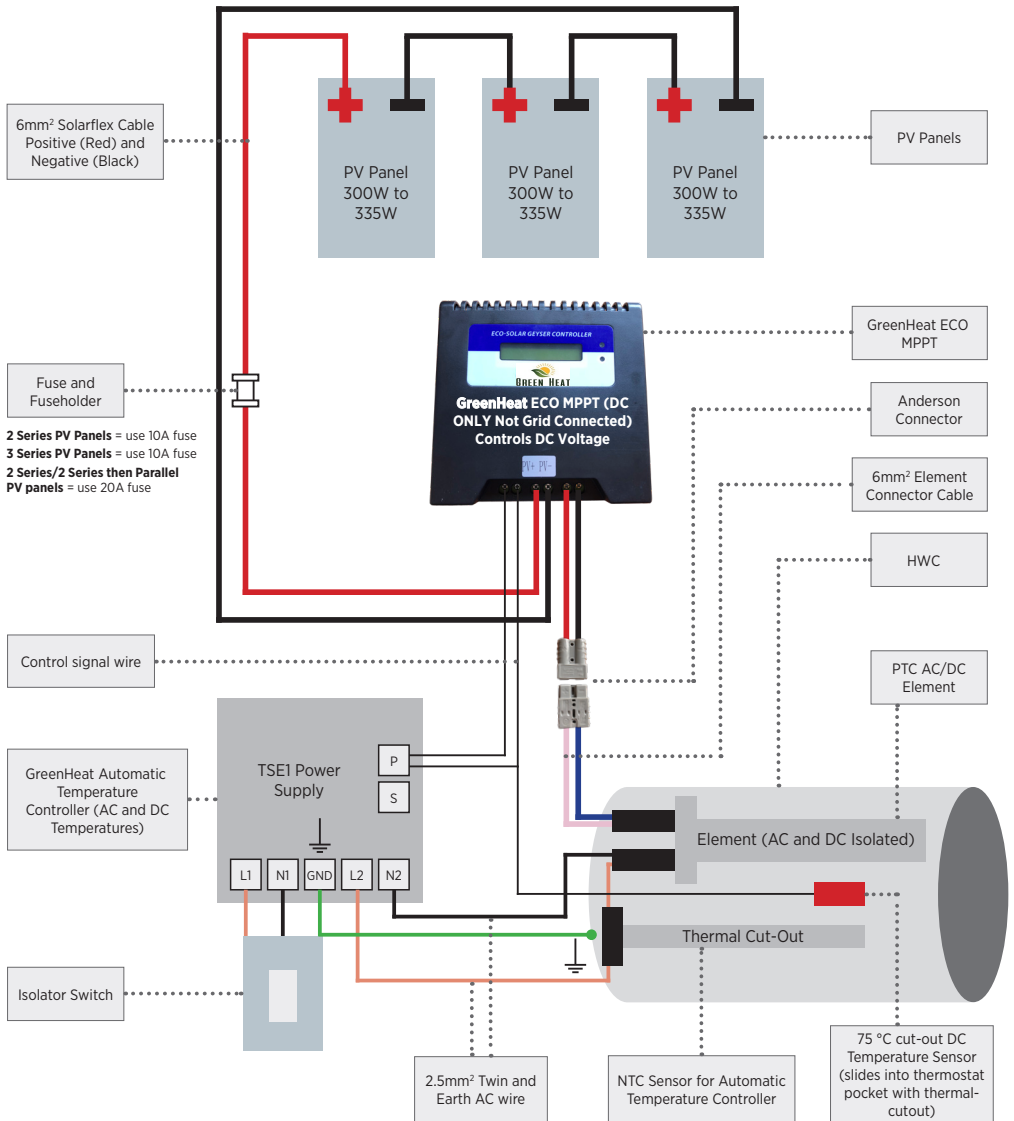
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System overview - 150L for high irradiation areas



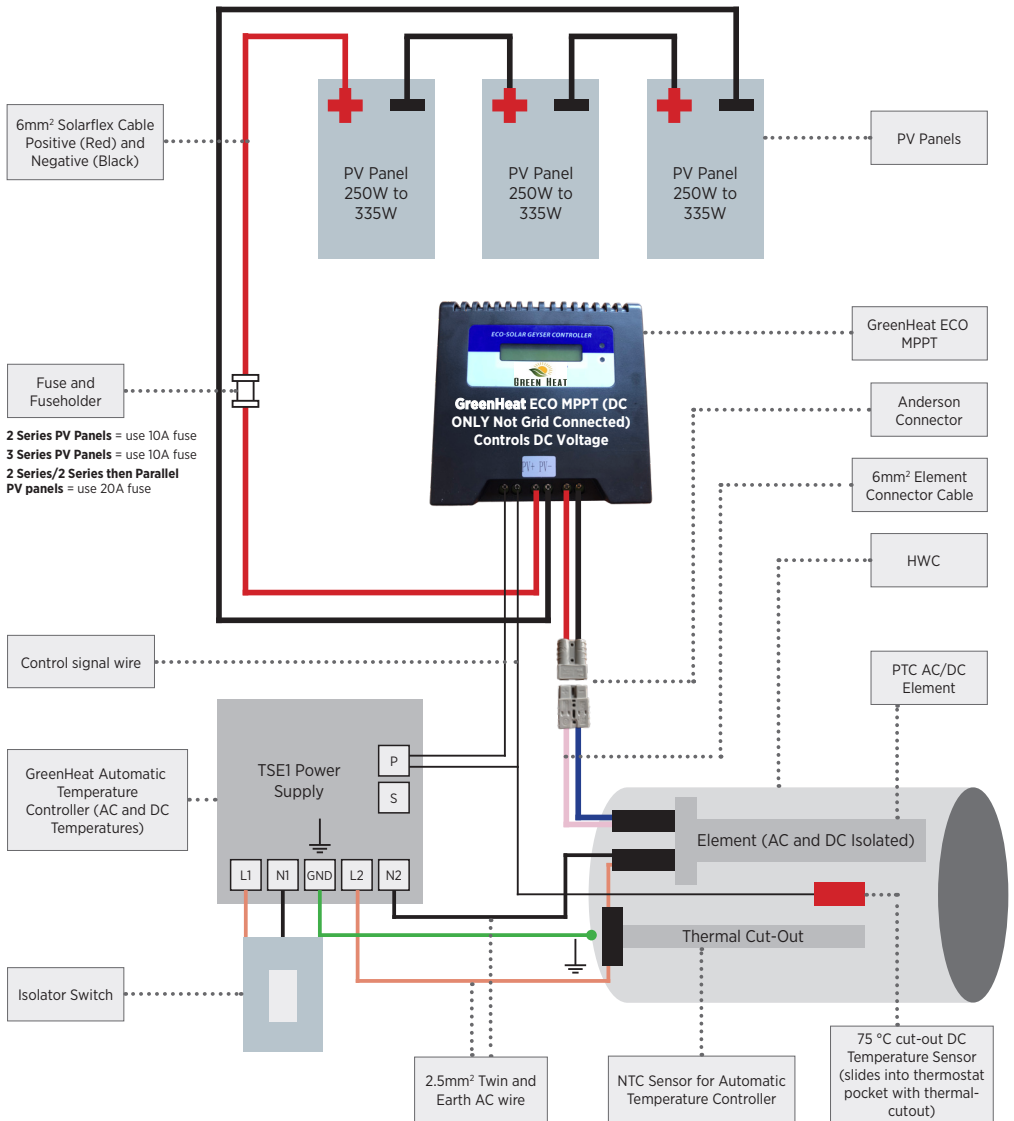
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System overview - 150L for low irradiation areas



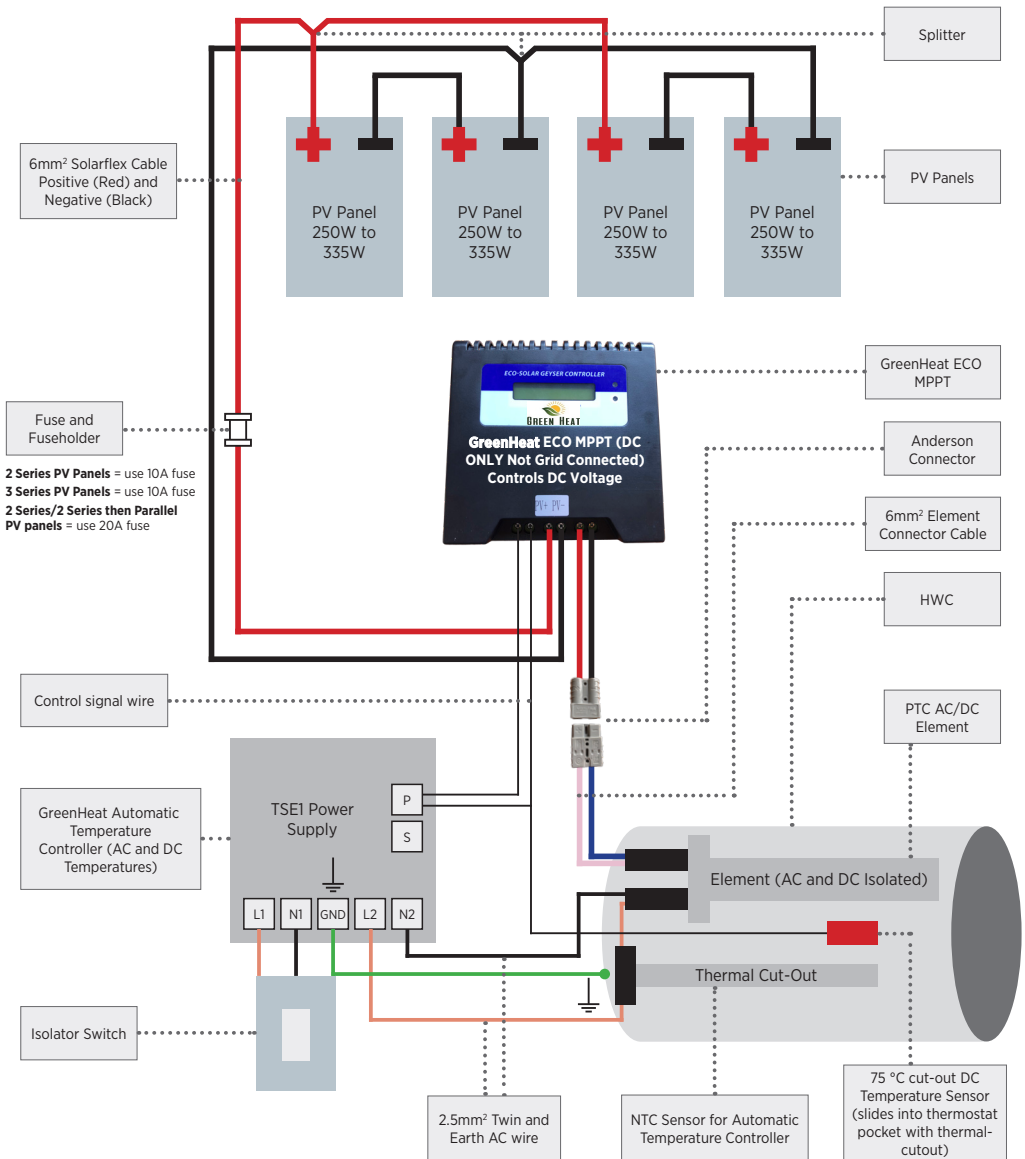
See table on page 9

System overview - 200L for high irradiation areas



See table on page 9

System overview - 200L for low irradiation areas



See table on page 9

Connection to your phone application



Connecting to Tuya or Smart Life APPs

All Green Heat Units are Smart Units


Step 1: Using your mobile phone, scan the QR code below or via Google Play or Apple iStore search for the app called 'Tuya' or smart Life - install the app.



Step 2: Open the App and Create an account. Enter email address and then request a verification code and create your password.

Step 3: Activate Bluetooth on your phone.

Step 4: In settings on your phone ALLOW PERMISSIONS for the specific application

Step 5: On Green Heat display press the up button for 3-5 seconds the WIFI icon  will flash in top right corner.

Step 6: Add device Tap "+" on the top right corner of the APP.

Step 7: Confirm your phone is connected to your Wi-Fi network to which the device will be added, enter your Wi-Fi password, and confirm. Note 2.4Ghz Wi-Fi networks ONLY.

When connected the Wi-Fi icon in the top right of display turns to a solid state the unit is connected.

System components



PV Panels

Number and Size of PV panels depend on the size of the HWC and region (high or low irradiation) in which the PV Waterheating system will be installed.



PTC Element

1500W AC, 900W DC or 2000W AC, 900W DC. Screwboss or Flangemount available.



GreenHeat TSE1 Display Unit



GreenHeat ECO MPPT



1.5m element connector cable



6m Black 6mm2 PV Cable



6m Red 6mm2 PV Cable



Pre-Galvanised Solar Strut

The length of strut required depends on the number of PV Panels used in the system. Each panel requires 1m strut at the bottom and 1m strut at the top.



PV Panel Mounting Clip



Flange – flange if required



Stainless Steel temperature pocket
– only if a flange is required



Remote control cable between TSE and MPPT and DC thermostat



30A Fuse and Fuseholder

Components' Technical Specifications

PV Panels

It is important to note that the maximum size of the system is limited to 138 VOC (Open Circuit Voltage).

It is important to configure the PV panels in such a way that this open circuit voltage is not exceeded.

250W PV Panels technical specifications

Dimensions: 1,640 X 990 X 40 mm	Vmp	30.43 V
VOC: 38.04 V	Imp	8.22 A
ISC 8.56 A	Weight	18 kg

The maximum number of 250W PV Panels that can be connected in series **three**:
 $3 \times 38.04 = 114.12V$

If the installation requires four 250W PV panels, the panels must be connected as follows:

1. 2 Panels in series ($2 \times 38.04 = 76.08V$)	3. Then connect the 2 series sets in parallel $V_{oc} = 76.08V, I_{oc} = 2 \times 8.56 = 17.12 A$
2. 2 Panels in series ($2 \times 38.04 = 76.08V$)	

300W PV Panels technical specifications

Dimensions: 1,957 X 990 X 40 mm	Vmp	36.52 V
VOC: 45.65 V	Imp	8.22 A
ISC 8.56 A	Weight	21.50 kg

The maximum number of 300W PV Panels that can be connected in series is **three**:
 $3 \times 45.65 = 136.95V$

If the installation requires four 300W PV panels, the panels must be connected as follows:

1. 2 Panels in series ($2 \times 45.65 = 91.30V$)	3. Then connect the 2 series sets in parallel $V_{oc} = 91.30V, I_{oc} = 2 \times 8.56 = 17.12 A$
2. 2 Panels in series ($2 \times 45.65 = 91.30V$)	

Components' Technical Specifications

PTC Elements

Flangemount and screwboss types available (all 1 ¼")

1500W AC, 900 DC

DC: Resistance at 25°C (Ω)	5-15 Ω	Inrush Current (A)	≤20A
AC: Resistance at 25°C (Ω)	30-200 Ω	Surface Temp. (°C)	240±10 °C
Material	Stainless Steel	Power (W)(AC)	1500±10% W
Rated Voltage	48 V (DC)/220 V (AC)	Power (W)(DC)	900±10% W
Max Voltage	72 V (DC) /265 V (AC)	Length (mm)	350±2mm
Withstanding Voltage (V)	270V/15min (220V)	Diameter (mm)	φ35±0.5mm
Insulating withstanding voltage	Leak current ≤ 10mA		

2000W AC, 900 DC

DC Resistance at 25°C (Ω)	5-15 Ω	Surface Temp. (°C)	240±10 °C
AC Resistance at 25°C (Ω)	30-200 Ω	Power (W)	2000±10% W
Material	Stainless Steel	Power (W)	900±10% W
Rated Voltage	48V (DC)/220 V (AC)	Length (mm)	425±2mm
Max Voltage	72V (DC)/265V (AC)	Diameter (mm)	φ35±0.5mm
Inrush Current (A)	≤20A		

GreenHeat ECO MPPT Technical Specifications

- Maximum input voltage 46—138 VOC, 36—108 VMP
- Peak efficiency 98%
- Maximum output amps 25A
- Ambient temperature Up to 70°C but de-rated at 1A per degree at temperatures above 50°C. Do not expose to direct sunlight.
- Environmental IP43
- Indications 2 LED's
- Heating (input command from thermostat)
- Tracking (PV active)
- Power (device turned on)
- Inputs/Outputs - potential free

GreenHeat TSE1 controller Technical specification

- Operating voltage 230VAC / 50HZ.
- Main relay contact rating 30A (max 4kW element).
- Operating voltage range 160V - 250V AC.
- Recommended ambient temperatures: -7 - 50°C; max 75°C
- Temperature display range 0 - 99°C.
- Temperature setting ranges 30 - 65°C (AC Settings)
- Temperature setting ranges 50 - 75°C (DC Settings)
- Change over switch to heat secondary **HWC** from PV array
- Heat failure - when increase at a rate of 4°C or less per hour, AC only.
- Mechanical thermal cut-out 90°C (300 manual resets) on AC only.
- Mechanical thermal cut-out 75°C on DC thermostat, 10 000 cycles.
- Thermal cut-out - Isolate live.
- Dry heat detection - empty cylinder.
- Temperature tolerance $\pm 5^\circ\text{C}$ and manufacturing drift is less than 6°C.
- Temperature differential setting 1°C.
- Switching differential for element - 6°C
- Temperature probe failure detection for the tank.
- Temperature probe range for HWC is -30 to +130°C.
- Control box insulated - Class 1.
- Operating life - 50 000 cycles.

INSTALLATION TOOLS REQUIRED

- AC/DC Clamp meter
- Screwdriver set
- Socket Set
- Crimping Tool
- 4mm or 6mm (depending on distances) Black and Red Solar Flex Cable (No other cable may be used on DC Connections)
- Twin and Earth wire for AC Connection on **GreenHeat** TSE Controller

INSTALLATION STEPS SUMMARY

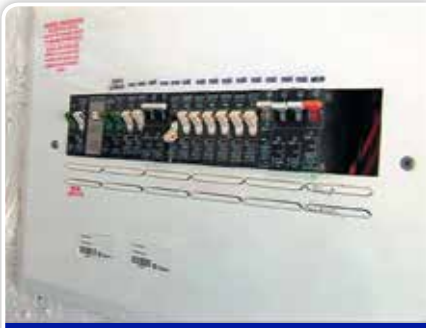
- Step 1** Read this manual thoroughly. In case of any ambiguities, contact our office for further advice.
- Step 2** Always ensure familiarity with all local safety procedures.
- Step 3** Mount the PV Panels.
- Step 4** Install element.
- Step 5** Install **GreenHeat** TSE Controller.
- Step 6** Install **GreenHeat** ECO MPPT Controller.
- Step 7** Recheck all connections.
- Step 9** Connect DC live onto the fuse connection.

SAFETY PRECAUTIONS

Observe all precautions as set out in the **NZ Building code** when working with electricity.

Electricity on the HWC

An installer should always take precautions when working with electricity. The most important precautions to perform **before** doing maintenance on a HWC are:



Switch off the circuit breaker of the HWC at the main DB. This is done to ensure that there is no power supply to the HWC



Switch off the isolator switch in the roof.

The isolator switch acts as a switch to isolate both the live and neutral from the main supply should someone accidentally switch on the main supply or the circuit breaker fails



Test with a MULTIMETER to ensure that there is no current on the wires. **IMPORTANT** Make sure that there is no reading on the multimeter.

Electricity on PV Panels

PV modules can produce current and voltage when exposed to light of any intensity. Electrical current increases with higher light intensity. DC voltage of 30 Volts or higher is potentially lethal. Contacting the live circuitry of a PV system operating under light can result in lethal electric shock. De-energize PV modules by removing them entirely from light or by covering the front surface with an opaque material. Regard the safety regulations for live electrical equipment when working with modules that are exposed to any light. Use insulated tools and do not wear metallic jewellery while working with PV modules.

In order to avoid arcing and electrical shock, do not disconnect electrical connections under load. Faulty connections can also result in arcing and electrical shock. Keep connectors dry and clean, and ensure that they are in proper working condition. Never insert metallic objects into the connectors, or modify them in any way in order to secure an electrical connection.

Do not touch or handle PV modules with broken glass, separated frames or a damaged backsheet unless the PV modules are first disconnected and you are wearing proper protective clothing. Avoid handling PV modules when they are wet. Never touch electrical connections that are wet without protecting yourself with insulated gloves.

Make sure that the fuse on the live side of the DC connection from the PV panels is not connected until all other connections are completed. Also only turn on AC power once all connections are completed and checked.

Mounting of PV Panels

Rooftop PV systems should only be installed on dwellings that have been formally analysed for structural integrity, and confirmed to be capable of handling the additional weighted load of PV system components, including PV modules, by a certified building specialist or engineer.

For your safety, do not attempt to work on a rooftop until safety precautions have been identified and taken, including without limitation fall protection measures, ladders or stairways, and personal protective equipment.

For your safety, do not install or handle PV modules under adverse conditions, including without limitation strong or gusty winds, and wet or frosted roof surfaces.

INSTALLATION OF THE PV PANELS

Each manufacturer of PV panels will make available instructions on how to best install its PV panels. Be sure to read and follow instructions on the specific brand of PV panels used in the system. The below information is based on information as contained in the guidance notes of Renesola PV panels.

General

- Do not dismantle the Modules or tear up any labels.
- Installation should be done by qualified professionals only.
- Ensure that the correct connector pairs are used.
- Do not touch the exposed cables or connectors.
- De-energize PV modules by removing it entirely from light or by covering the front surface with an opaque material.
- System designers shall design an appropriate bracket and follow the instructions to fix the PV module to the bracket.
- Installation and maintenance shall be performed in accordance to all electrical safety regulations.
- Do not stand on the modules.
- Do not paint the modules or spray any material on the modules.
- Always transport the modules carefully and according to the manufacturer's instructions. Take care that the modules are not scratched, as scratches may influence the efficiency of the modules.

Installation

STEP1

Choose the location of the PV panels - be sure to choose a location where the panels will be fully exposed to the sun and that the areas are not shaded. Look out for shade produced by trees or other buildings. In the Southern Hemisphere the panels should face north at an angle calculated according to your location

Optimal angle for fixed solar panels depending on installation position

45°

37° – 45°

26° – 37°

13° – 26°

0° – 13°

13° – 26°

26° – 37°

37° – 45°



- for a latitude up to 25° take your latitude and multiply it by 0,87
- for a latitude between 25° to 50° take your latitude multiply by 0,87. After that you will add 3,1 degrees
- for a latitude over 50° the ideal angle is approximately 45° degrees.

You will need to know your current latitude to count out the ideal angle to position your solar panels in. The easiest way to do this is to do a search for your location on Google maps and then right click on the location and choose "what is here". A green arrow will then appear. If you click on that arrow you will get the GPS coordinates for that location on the map. The first numbers is the latitude of the location. Use this number in your calculations. For example GPS coordinates for **Auckland, New Zealand** is given below.

 **80 Victoria St W**
Auckland 1010
 -36.848053, 174.762005

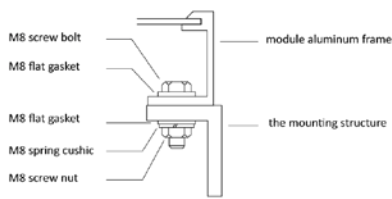
$36.8 \times 0.87 = 32.2$
 Then add 3.1 degrees
 $32.2 + 3.1 = 35.3$ degrees

STEP 2

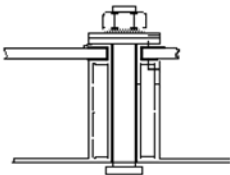
Use a bracket structure that can withstand high winds. The bracket structure must be made of durable, corrosion resistant and UV resistant materials

STEP 3

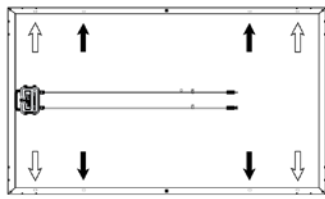
Choose a fixing method:



Installed by nut and bolt



Installed by fixture

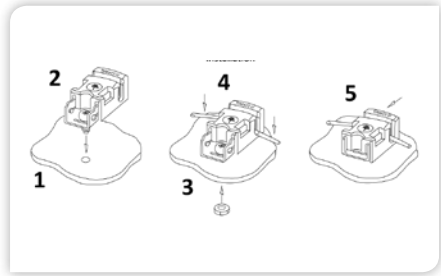


Fix the module to the structure using the pre-fabricated holes

STEP 4

Grounding

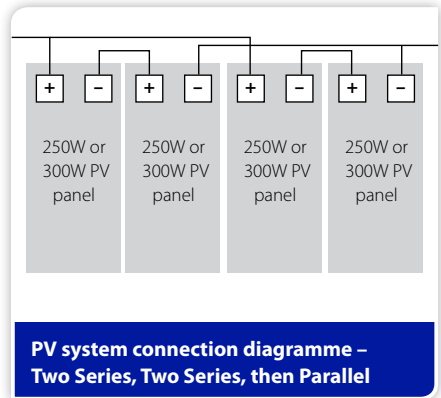
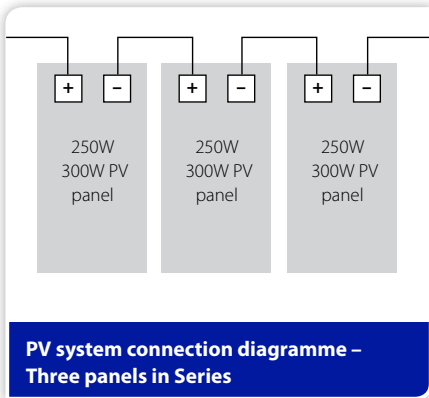
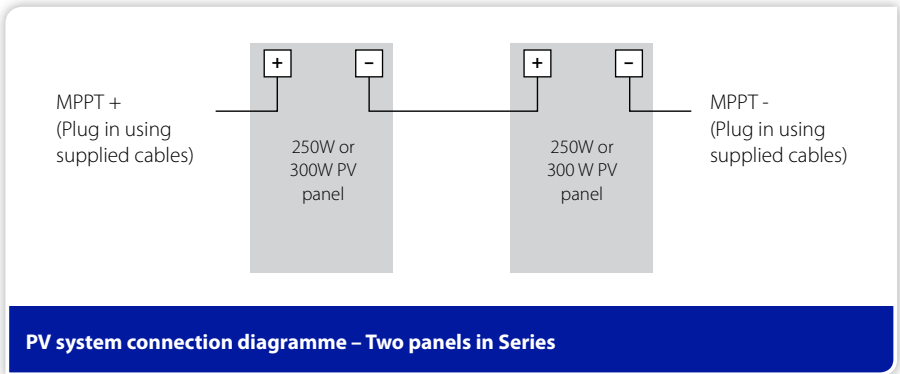
Negative system grounding is recommended
 The ground wire shall be bare copper wire with no insulation sleeve. Wire cable with cross sectional area of 4mm² to 6mm² is recommended and ground clamp is recommended (See picture)



STEP 5

Wiring and connection

- Use 6mm cable depending on the distance of the panels from the MPPT. 6mm cable for up to 20m. For longer distances use 10mm Cable
- Ensure that the correct connectors are used (At least 40 A)



INSTALLATION OF THE ELEMENT

The element is a universal screwboss element suitable for HWC's that are fitted with a screw-in element or flange mount element. Please note that a separate flange must be purchased for flange mount elements. Each brand of HWC has its own unique flange.



Flangemount type element

Please specify the type of HWC the element will be fitted on. Different flanges available for all kinds of HWC's. Please use the existing screws to mount the flange.

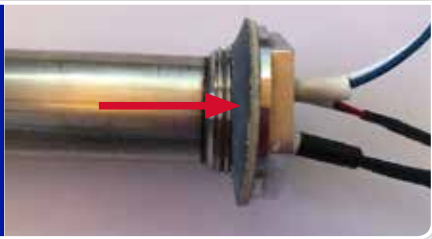


Screw in type PTC AC/DC Element

Typically used on most HWC in New Zealand and Australia.

Gasket on element

Never remove as it seals in any water between element and the HWC.



Screw in elements

Tools needed:

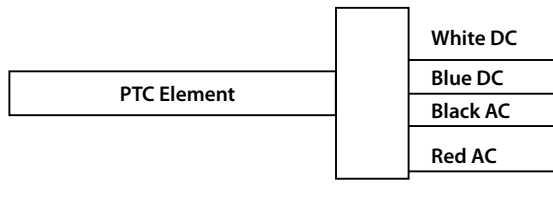
- Phillips screwdriver
- Screw-in element wrench
- Your new element
- Garden hose
- Multi meter or circuit tester (to make sure power is off)

Installation steps

Be sure to use the same wattage, voltage, and flange style as your previous element.

1	Shut OFF electric power to water heater. See safety steps on page 16	
2	Shut OFF cold water supply to the HWC , open the hot water faucet, attach a hose to the drain valve, open the drain valve on the HWC and drain the water.	
3	Remove access cover and fold back insulation.	
4	Remove plastic terminal protector.	
5	Check wires with a Multi Meter before attempting to remove the wires.	
6	Disconnect electric wires from element	
7	Remove element using screw-in element wrench	
8	Clean gasket area and threads	
9	Install gasket on element	
10	Install element	
11	Close drain valve and turn ON cold water supply.	
12	Allow all trapped air to escape from open hot water faucet until water has a constant flow, then close hot water faucet. If leakage occurs, shut OFF cold water supply and tighten element or reposition gasket.	
13	Inspect wiring. If corrosion is present on wiring, cut and strip wire 1/2" (only if wire is long enough). If corrosion is still present, or wire is not long enough consult electrician for wire replacement and wire gauge selection. Loose, corroded or faulty wiring connections can cause heat build-up or fire at wiring terminals.	

- 14 Connect electric wires to element. Tighten screws.
- 15 Replace plastic terminal protector.
- 16 Replace insulation and access cover. Tank must be properly filled with water and free of air before applying electric power to prevent element damage.



Flange Type Elements

Tools needed:

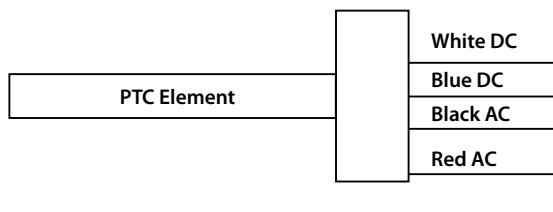
- Phillips screwdriver
- Socket wrench
- Your new element
- Garden hose
- Volt meter or circuit tester (to make sure power is off)

Be sure to use the same wattage, voltage, and flange style as your previous element.

- 1 Shut OFF electric power to water heater. See safety steps on page 16
- 2 Shut OFF cold water supply to the HWC, open the hot water faucet, attach a hose to the drain valve, open the drain valve on the HWC and drain the water.
- 3 Remove access cover and fold back insulation.
- 4 Check wires with a Multi Meter before attempting to remove the wires.
- 5 Disconnect electric wires from element



- 6 Remove element mounting bolts using socket wrench. Note position of thermostat bracket to be reinstalled later. **The positioning of the thermostat pocket in relation to the HWC is very important. The thermostat pocket should never be directly below the element or directly above the element when installed into the HWC. A thermostat position of 10 O'clock (see page 27) on a clock is the best position for the thermostat to ensure a correct water temperature reading.**
- 7 Clean gasket area in tank
- 8 Install gasket into recess in tank.
- 9 Install element and thermostat pocket. Tighten bolts in diagonal pattern.
- 10 Close drain valve and turn ON cold water supply.
- 11 Allow all trapped air to escape from open hot water faucet until water has a constant flow. Close hot water faucet.
- 12 Inspect wiring. If corrosion is present on wiring, cut and strip wire 1/2" (Only if wire is long enough). If corrosion is still present, or wire is not long enough consult electrician for wire replacement and wire gauge selection. Loose, corroded or faulty wiring connections can cause heat buildup or fire at wiring terminals.
- 13 Connect electric wires to element. Tighten screws
- 14 Replace plastic terminal protector
- 15 Replace insulation and access cover
- 16 Tank must be properly filled with water and free of air before applying electric power to prevent element damage.



Simply Plug in the Anderson plug fitted on the White and Blue cables into the element connector cable.

INSTALLATION OF TSE1 CONTROLLER

Installation procedure steps

A summary of the installation steps as follows:

1. Apply all safety measures.
2. Install the control box.
3. Install the display unit.
4. Remove existing thermostat and replace with new supplied thermostat.
5. Plug in link wire.
6. Complete all electrical connections.
7. Set up the controller and all settings.

STEP 1: Apply all safety measures

An installer should always take precautions when working with electricity.

The most important safety precautions to perform BEFORE doing any maintenance on a HWC are:

1

Switch off circuit breaker of HWC at main DB. This is done to ensure that there is no power supply to the HWC



2

Switch off isolator switch in the roof. The isolator switch acts as a switch to isolate both live and neutral from the main supply should someone accidentally switch on the main supply or the circuit breaker fails.



3

Test with a MULTIMETER to ensure that there is no current on the wires. **IMPORTANT!** Make sure that there is no reading on the multimeter.



STEP 2: Install control box

Find a dry place near the isolator switch. **The control box must not be exposed to the elements or installed outside.**

STEP 3: Install the display unit

The display unit must be installed in a location that is accessible to the end user, but not in reach of children that might want to play with it.

The display unit provides valuable information on the functionality and status of your hot water system.

Draw the display unit cable from the unit to the control box. Plug it into the three pin plug as provided on the control box. It can only fit into one plug.

The standard display cable of 5m is supplied. Extension cables are available on request from our offices. A maximum extension of 20m is recommended.

Only use GreenHeat extention cables for extensions!!!



STEP 4: Remove thermostat and replace with supplied HWC temperature probe

The HWC's thermostat needs to be removed. The HWC temperature probe provided by GreenHeat has a built in probe that measures the temperature in the HWC. It also supplies information to the element whether it should switch on or not.

The GreenHeat HWC temperature probe incorporates a thermal cut out to prevent electrical overheating. The live feed to the element will be broken at temperatures above 90°C. When the cut out switches off, it needs to be reset manually by pressing the red button on the thermal cut out.

1

Remove the existing thermostat by disconnecting all the wires on the connector terminal block of the thermostat.

2

Replace the conventional element with the GreenHeat AC/DC element as per the AC/DC element instruction manual and the wiring diagram on page 2-7.

3



Insert DC thermostat into the thermostat pocket before inserting the AC thermostat. The DC thermostat is connected to the control wire that links the MPPT to the TSE1.

4



Insert the AC thermostat after the DC thermostat into the thermostat pocket

5

Ensure that you insert the HWC temperature probe into the correct pocket.



6

Insert the new HWC temperature probe and connect the live wires once again on the connector terminal block.



7

Plug the DC part of the element into the MPPT Connector Cable as supplied



8

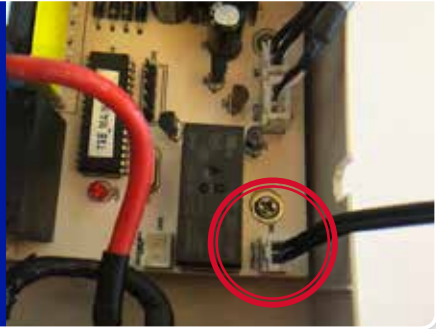
Push the plug connected to the HWC temperature probe through the hole as provided on the HWC.

Plug it into the dedicated plug as provided on the control unit.



STEP 5: Install the MPPT signal wire

Plug in the black signal wire (as supplied with the TSE) into the "primary" connection point as indicated).



STEP 6: Complete all electrical connections

The hard wiring of a controller is critical.

Main power supply

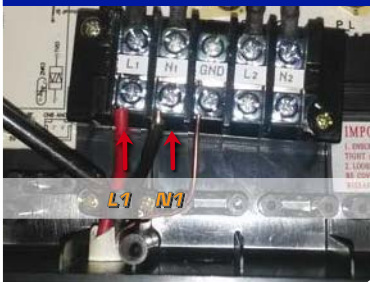
The main power supply is provided from the isolator switch.

- The **Red** wire is your **Live** wire.
- The **Black** wire is your **Neutral**.
- The other wire provided is your **Earth**.

Each control box has knock outs at the bottom of the unit. To make an entry into the control box, just remove the knock out.

1

Connect Live and Neutral as indicated. Ensure that the wires are properly fastened as they are drawing a large current. Loose connections can damage the connector block.



2

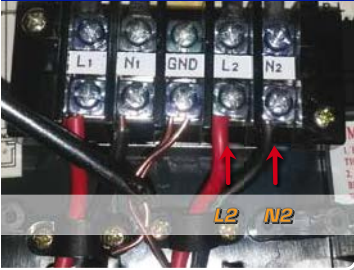
Connect Earth wire as indicated



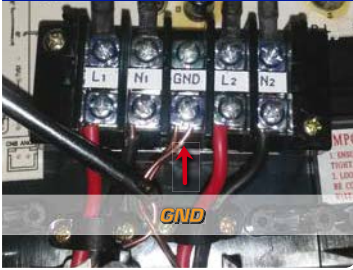
Connect wire between controller and HWC

Note: Ensure that a wire is used that complies with the requirements of the NZ Building code.

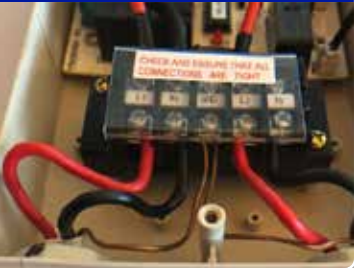
1 Connect Live and Neutral as indicated. Ensure that the wires are properly fastened as they are drawing a large current. Loose connections can damage the connector block.



2 Connect Earth wire as indicated.

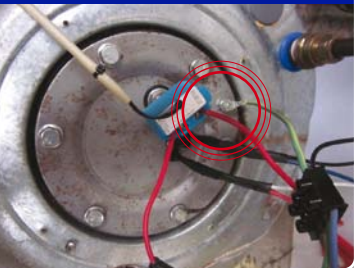


3 Fasten all wires with cordgrips as supplied



4 Connect wires to HWC's connector block.

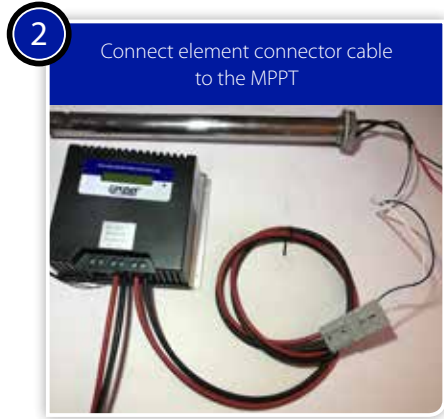
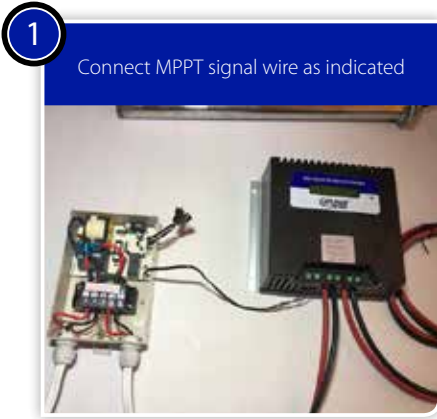
5 Ensure the HWC is earthed as indicated (in case the HWC needs to be earthed).



6 Replace cover of HWC to protect the electrics.



MPPT CONNECTION



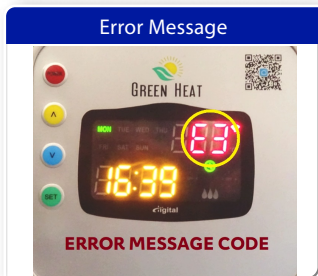
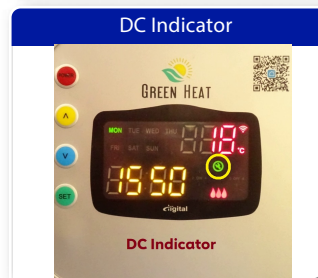
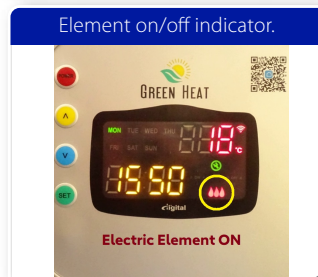
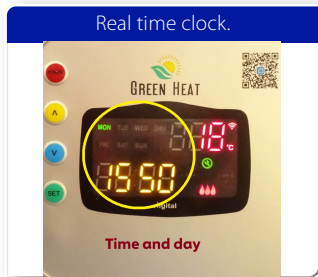
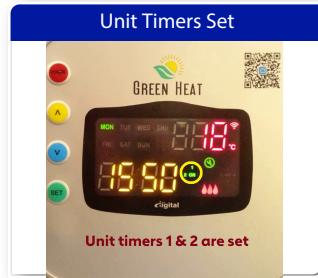
Replace lid on control box and fasten properly.

Before you replace the lid it is important to do a final check on the electrics by comparing it to the wiring as indicated on the lid. Insert the DC thermal cut-out in the HWC temperature pocket.

DISPLAY

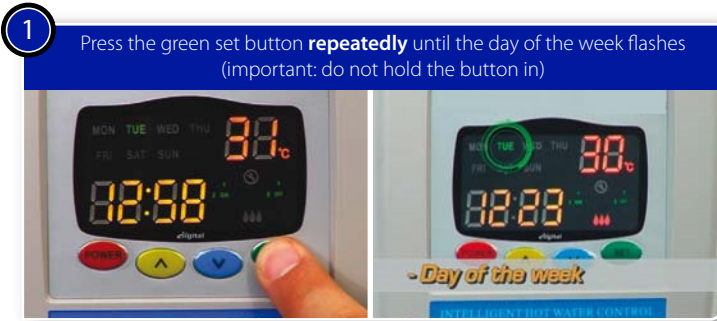
The display is the feedback mechanism to the user and displays important information about the solar system or electric HWC.

It displays the following:



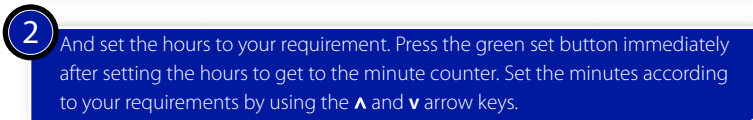
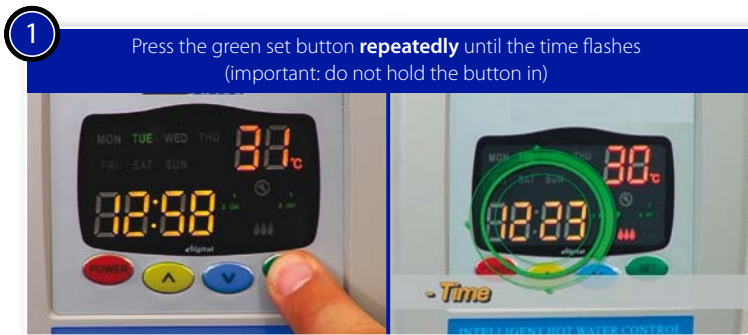
Adjusting the day of the week

To adjust the day of the week, follow the steps below:



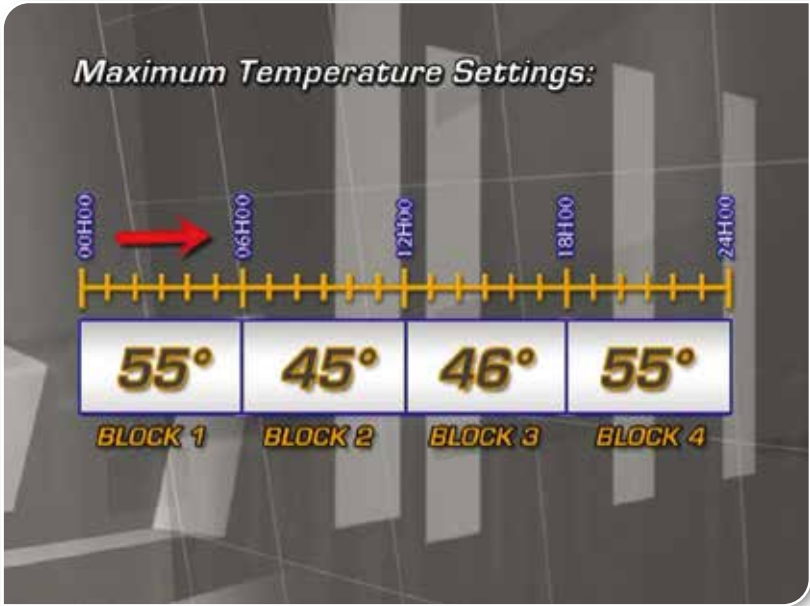
Adjusting the real time clock

To adjust the real time clock follow the steps below:



Maximum temperature settings

There are four maximum temperature settings. It is important to note that these settings apply to the four quarters of the day and not to the set times that the elements must come on.



1 To adjust the maximum temperature settings, press the green button **repeatedly** until the first block temperature setting is displayed. The temperature will be flashing and the number of the block will be displayed in the timer indicator block. The below screens show the temperature flashing in block number 1.



2 Set the temperature per block to user requirements by using **▲** and **▼** arrow keys.

Setting DC temperature

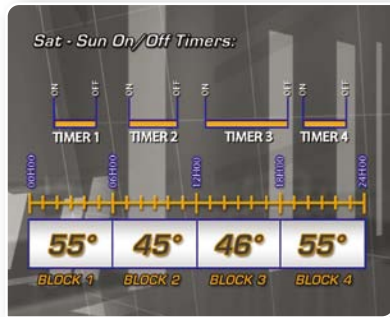
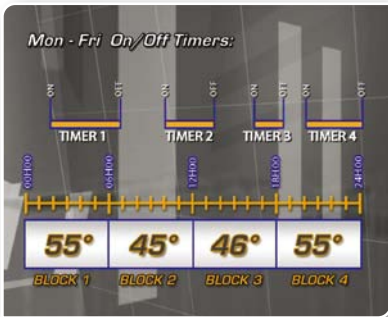
1

To adjust the DC maximum temperature setting, press the green set button five times. The DC temperature and word "on" will flash on the screen. Use the **▲** and **▼** buttons to adjust the temperature.



Setting HWC element timers

There are four on/off timers that can be set with the **GreenHeat**. Note that you can set different timers for the weekend.



To set timer number one, follow the steps as indicated below:

1 Press the green button **repeatedly** until the timer indicators and Monday to Friday flashes. The below picture shows that you are at the Monday to Friday setting for timer number 1 on.

2 Adjust the hours you require by using the **▲** and **▼** buttons. Immediately press the green set button again to get to the minutes and use the **▲** and **▼** buttons to adjust the minutes.

3 To set the number 1 off timer, press the green button **repeatedly** until the timer indicators and Monday to Friday flashes. The below picture shows that you are at the Monday to Friday setting for timer number 1 off.

To get to the weekend timer setting press the green set button until the timer indicators and Saturday and Sunday flashes.

4 Adjust the hours you require by using the **▲** and **▼** buttons. Immediately press the green set button again to get to the minutes and use the **▲** and **▼** buttons to adjust the minutes.

Follow the same steps as above for timer 2, 3 and 4.

Eliminating a timer

It is possible to eliminate a timer setting. To eliminate a setting follow the below steps:

Follow the steps above with on and off setting.

- Press the down arrow button until the timer setting reaches 00:00.
- Press the down arrow once more to eliminate until ---:-- is displayed.

Element indicator

The element indicator shows the user when the element is switched on.

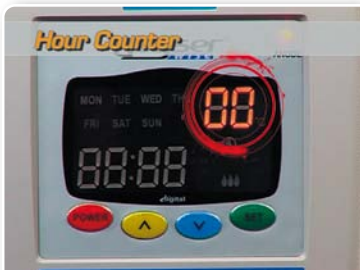
When the element indicator is on, it means that the element is switched on.

When the element indicator is flashing, it means the water has reached the maximum temperature setting and the water will be allowed to cool down 6°C at which time the element switches back again.



Hour counter

The number of hours that the element was on can be counted. If the user pushes the up and down arrows simultaneously and keep them in for 6 seconds, the number of hours will be displayed.



For example: Let's say the hour indicator indicates 30 hours. You then multiply the number of hours with your HWC element rating, e.g. 4 kW. This then means that the user consumed 120 kWh since the last time the unit was reset.



To reset the hour counter, keep the up and down arrow buttons in simultaneously until the main time settings reappear.

ERROR CODES - SUMMARY

The error codes indicate various problems and warnings. Therefore these require actions from the installer.

Error code: E2 - Dry burn protection

Possible cause:

- Empty cylinder
- Thermal pocket too close to element

Action(s):

Check all water connections to the HWC

Error code: E3 - Sensor failure water HWC

Possible cause:

The sensor could be damaged or there is a connection problem.

Action(s):

- Replace sensor
- Check electrical connections and/or plug in control unit

Error cod: E4 - Heating loss

Possible causes:

- Leaking hot water pipe
- Faulty valve
- Scale build up
- No power supply to the element
- Reversed thermosiphoning
- Faulty heating element

Action(s):

Check all of the above

Error code: E5 - Over temperature protection

Possible cause:

HWC temperature exceeds 85°C

Action(s):

Open hot water tap to reduce temperature in geyser

Error code: E7 - Communications failure

Possible cause:

Poor contact or damaged cable

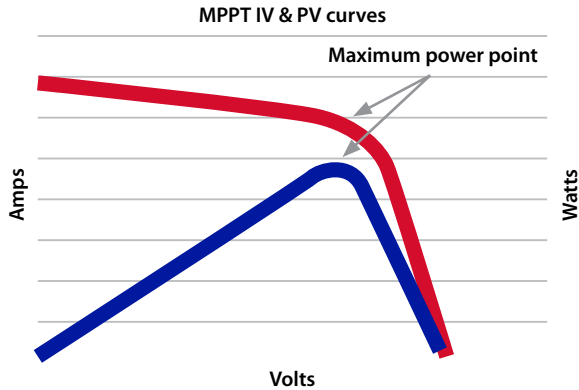
Action(s):

Check communications wire between control box and display unit

CONNECTION OF MPPT CONTROLLER

What is MPPT and how does it work?

MPPT stands for Maximum Power Point Tracking, and it relates to the solar cell itself. Each solar cell has a point at which the current (I) and voltage (V) output from the cell result in the maximum power output of the cell. In the diagram below the curve is an example of the standard output expected from a solar cell, the Maximum Power Point is at the position marked on the diagram.



How is this done?

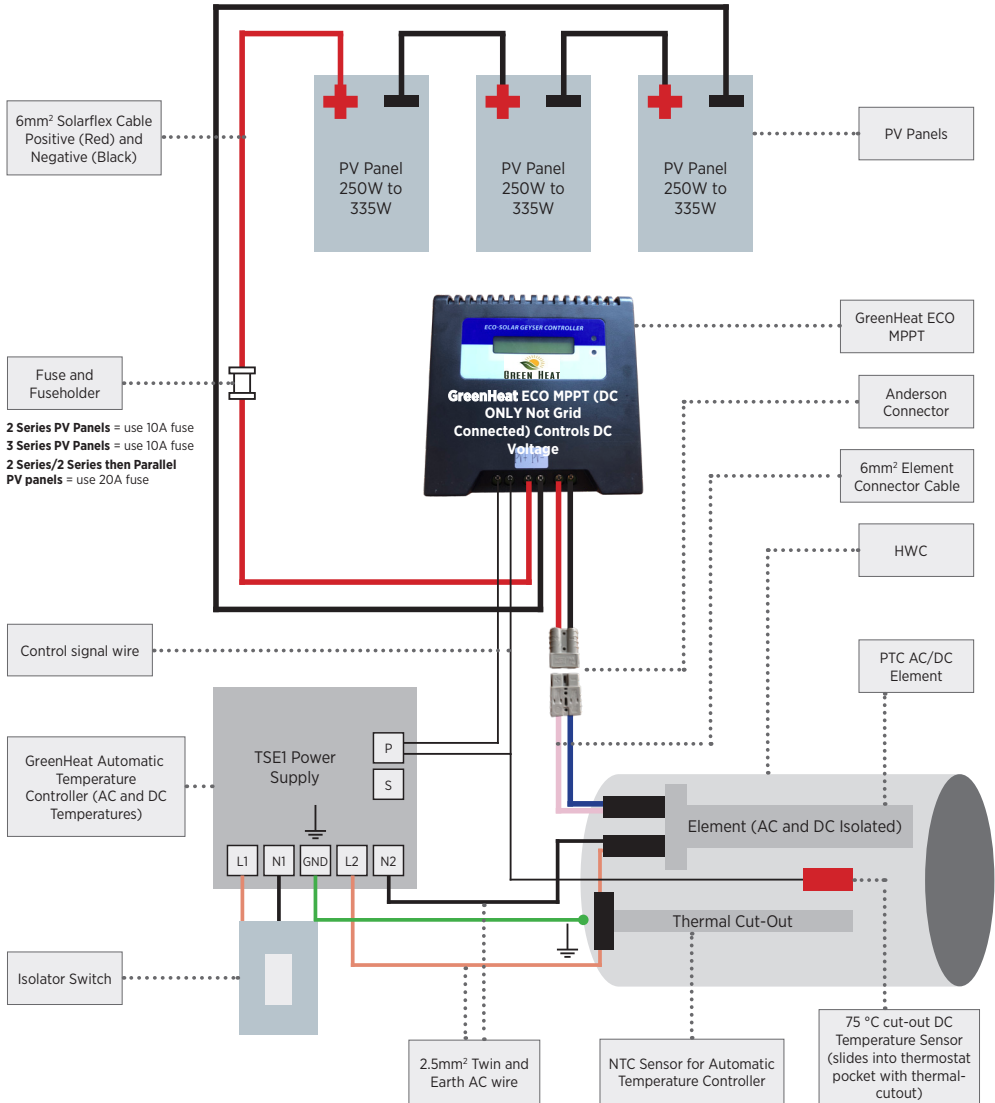
A Maximum Power Point Tracking solar regulator will simulate the load required by the solar panel to achieve the maximum power from the cell. The regulator will work out at which point the cell will output the maximum power and derive from this the voltage and current outputs required for maximum power to be achieved. It will then calculate the load that it must simulate based on these voltage and current levels $R=V/I$. The regulator, now receiving the maximum amount of power in, will then regulate the output according to what it is designed for.

So in layman's terms, how does MPPT benefit me?

MPPT ensures that you get the most power possible from your solar panels at any point in time. It is particularly effective during low light level conditions. These calculations result in an output that delivers maximum current at the required voltage at any point in time. During low light level situations it will compensate for the low light level and find the new point at which the solar cell delivers its maximum power output.

Connection Diagramme

GreenHeat MPPT Controller (Ensure that 6zmm Solar Cable is used) (Use Cables as Supplied)



IMPORTANT:

Ensure that the circuit breaker is off or the fuse is disconnected when making connections.



Circuit breaker



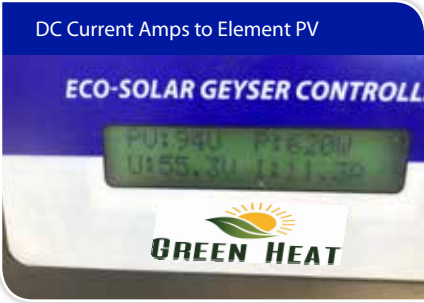
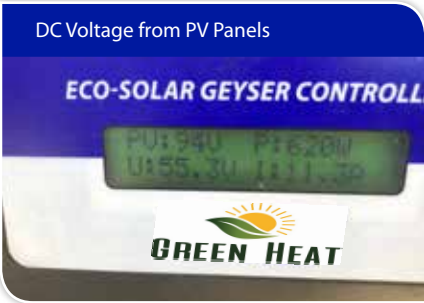
30A Fuse

Connection of MPPT

- *The MPPT must be mounted in a vertical position against a solid surface*
 - Do not install the MPPT near water and damp areas
 - Do not install in direct sunlight
 - Ensure the cables are PV solar flex cable of adequate thickness
- Double check all connections before connecting the 30A fuse or switching on the circuit breaker. Also check all AC connections before switching on the isolator switch and power at the DB board.



Expected multi-meter Readings



Once the AC and DC is connected, the MPPT screen should show all the relevant readings. Voltage in from Panels, Voltage and current out to element and the power produced.

The green LED light indicates that the MPPT is switched on and busy tracking.



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