Installation and Operation Manual: Evacuated Tube Solar Hot Water

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1 Important Information

1.1 Scope of Manual

This manual only applies to the installation and operation of Neopower ® solar hot water systems. Details of the installation, operation and maintenance of the Neopower ® system are described in this manual. This manual is primarily a reference document for the installer but not permitted to be installed for anyone who isn't authorized by Neopower ®.

WARNING: FOR CONTINUED SAFETY OF THIS APPLIANCE. IT MUST BE INSTALLED, OPERATED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

1.2 Local Standards

The installation must comply with the requirements of AS/NZS 3500.4, AS/NZS 3000, and all local codes and regulatory authority requirements. The installation shall conform to the Plumbing Code of Australia (PCA). New Zealand, the installation must comply with New Zealand Building Code G12.

WARNING: THIS APPLIANCE MAY DELIVER WATER AT HIGH TEMPERATURE. REFER TO THE PLUMBING CODE OF AUSTRALIA (PCA). LOCAL REQUIREMENTS AND INSTALLATION INSTRUCTIONS TO DETERMINE IF ADDITIONAL DELIVERY TEMPERATURE CONTROL IS REQUIRED.

1.3 Qualified Installer

Installation must be completed or check off by a licensed plumber.

Installer must also hold relevant industry licenses or certificates required for the work completed during installation process.

Unless otherwise specified in section 3, no part of Neopower solar collector may be checked off or repaired by any other person than an authorized person(s).

It is recommended that the collector be installed as close as practically possible to the storage tank and power supply.

The Neopower solar hot water system is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge. Children

should be supervised by a person responsible for their safety to ensure that they do not play with the appliance.

Working on roofs should always be considered a hazardous activity; by law you must observe certain minimum safety precautions. These safety precautions are outlined in the Work Cover Code of practice “Safe work on roofs” Part 1 and 2 and in the Occupation Health and Safety Act 2011.

1.4 Plumbing

- Ensure all parts used for connections are copper with no plastic
- Hot and cold copper pipes to and from the collectors must be completely insulated with a suitably temperature rated insulation that is UV rated (for solar) and weatherproof with minimum thickness of 19mm.
- The water pressure should not exceed 500Kpa.
- Valves and fittings supplied with this solar water heater form part of the installation and must be fitted in accordance with this manual.
- Non-return valves should be fitted to the outlet side on the pump.

1.5 Electrical works

- A single 240V / 10 Amp (50 Hz) power outlet required for pump and controller
- A single 240V / 15 Amp (50 Hz) power outlet required for 3.6kW heating element on electric boosted systems. Means for disconnection must be incorporated into the fixed wiring in accordance with AS/NZS 3000 wiring rules.

Heating element can be connected to either:

1) Continuous tariff – recommended for high hot water usage. Particularly where usage patterns are unpredictable. In most circumstances it is recommended that continuous tariff be installed in conjunction with a timer, sensors or both.

2) Off-peak tariff – recommended for low to moderate hot water usage.

Tank Capacity	Boost Capacity
250 Litre	175 Litre

315 Litre	220 Litre
400 Litre	280 Litre

Heating element is located approximately two thirds of the way down the tank. This provides approximately 70% of tank capacity for boosting.

System sizing is critical with electric boosted systems. Contact Neopower on 1300 062 788 for further advice around system sizing and tariff connection

CAUTION: In order to avoid a hazard due to inadvertent resetting of the thermal cut-out, this appliance must not be supplied through an external switching device, such as a timer, or connected to a circuit that is regularly switched on and off by the utility.

Tank Capacity	**Boost Capacity**	**Showers per boost cycle (40 Litres per shower)**
250 Litre	175 Litre	4.375
315 Litre	220 Litre	5.5
400 Litre	280 Litre	7

1.6 Pressure Limiting Valve and Tempering Valve

A 500kPa (maximum) pressure limiting valve must be fitted. This is because mains pressure exceeds 500kPa. The valve must be able to release the pressure increase that occurs when the manifold stagnates and should be rated to meet the maximum possible heat output of the solar collector. Hot water storage tank is protected by the pressure limiting valve. **Failure to install a pressure limiting valve will void warranty.**

All water heaters have the capacity to produce hot water very quickly. To reduce the risk of scalding injury a temperature control (tempering) valve must be fitted to the hot water supply pipe work. This valve should be checked at regular intervals to ensure its operation and settings remain correct.

WARNING: SCALDING OCCURS AT 50℃. THIS APPLIANCE IS CAPABLE OF PRODUCING HOT WATER AT WELL ABOVE 50℃. A TEMPERING VALVE MUST BE INSTALLED AS PER YOUR LOCAL GOVERNMENT AND REGULATORY REQUIREMENTS.

A SOLAR RATED TEMPERING VALVE IS REQUIRED

1.7 Pressure and Temperature Relief Valve (PTR valve)

A PTR valve rated to 850kPa and 99°C is supplied with the system, and is to be fitted on the Neopower storage tank. It is recommended that the lever on pressure & temperature relief valve (PTR) be operated once every 6 months to ensure reliable operation. **It is important to raise and lower the lever gently and be careful as the water released will be hot.**

The PTR valve is designed to allow for hot water expansion causing small quantities of hot water to discharge during heating.

DANGER: Failure to operate the relief valve easing gear at least once every six months may result in the water heater exploding. Continuous leakage of water from the valve may indicate a problem with the valve, or the water heater itself.

Also ensure that the PTR valve and discharge point is installed in line with local plumbing regulations. Ensure PTR line is not discharged where it can cause damage if hot.

1.8 Water Quality

Town water supplies are generally a controlled water source and should not cause any difficulty with the system. Some water may have elevated mineral content and require more frequent system maintenance.

Water in direct flow through the solar hot water system must firstly meet potable water regulatory requirements. It must also meet the following:

DESCRIPTION	Parts per Million (p.p.m)
Total dissolved solids	<600 p.p.m
Total hardness	<200 p.p.m
Total Chloride	<250 p.p.m
Free Chlorine	<5 p.p.m
Magnesium	<10 p.p.m
Calcium hardness	<200 p.p.m
Alkalinity	<150 p.p.m

If the water quality does not comply with the above table, Neopower solar hot water will not be covered under warranty.

In areas with hard water (Total hardness >200ppm), lime scale may form inside the solar collector. In such regions it is advisable to install a water softening device to ensure the long term efficient operation of the collector.

Your local water supply authority can supply a water analysis if required.

1.9 Corrosion

Both copper and stainless steel are susceptible to corrosion when high concentrations of chloride are present. If any damaged by corrosion directly or indirectly, the solar collector isn't covered by the warranty. The solar collector may be used for heating of spa or pool water but levels of free chlorine must not exceed 5ppm.

THIS UNIT IS NOT SUITABLE FOR USE AS A POOL OR SPA HEATER

1.10 Freeze protection

Evacuated tubes are not susceptible to damage in cold weather and Neopower heat pipes are protected against damage that could result from the freezing of the liquid inside.

Do not turn off mains power for extended periods. Mains power is required for pump and controller operation. These are required to prevent damage from stagnation and frost damage where pipework is not lagged.

Neopower system has been tested and meets the requirements of Clause 4.8d in AS/NZS 2712 (Level 2)

1.11 Wind Stress

When installing the collector, please consider the issue of wind resistance and the resultant stress on attachment points. The standard frame and frame kits are all designed to withstand wind speeds of up to 180km/h. It is the responsibility of the installer to ensure that the frame mounting is of suitable strength. For areas with the possibility of high winds, additional reinforcement of attachment points may be required and can easily be supplied by your local Neopower agent upon request.

Category 4 Cyclone rated fasteners and frames are available upon request

1.12 Hail Resistance

The evacuated glass tubes are very robust. They are designed to withstand significant impact stresses once installed. Testing and impact stress modeling proves that the tubes are able to withstand impact from hail up to 25mm in diameter.

In the areas known for hail storms with hail larger than 25mm, it is recommended the collector be mounted at an angle of 40+ degrees.

In the unlikely event that a tube becomes broken it can be easily replaced. The solar collector can still function properly with one or more broken tubes, only a small reduction in heat output will result. A broken tube should be replaced by authorized person only.

It is recommended that your household insurance policy cover the collector glass and/or damage to the water heater, especially in cyclonic areas and in locations where hail in excess of 25 mm diameter is likely to occur. Hail damage is not covered by warranty.

2 Installation

2.1 Storage Tank

2.1.1 Construction of hot water storage tank concrete base

External hot water storage tank concrete base is to be installed in accordance with AS/ANZ 3500.4 clause 4.5.3

The Neopower tank casing is corrosion proof. A base tray is optional and will provide uniform support. No extra weather protection is required for the Neopower hot water storage tank.

2.1.2 Operation Checking

Pressure & Temperature Relief valve (**PTR valve**) is designed to allow small quantities of hot water to purge during heating, allowing for hot water expansion.

Drip tray (+ appropriate valves, pipework and drainage) should be provided for internal installations and other applications where required to prevent flooding.

Flow Meter supplied in the pump station kit should be set to 1L/min on site with the appropriate speed setting to achieve this flow.

2.1.3 Clearance

Allow adequate room to work with tools. A minimum of 25mm clearance around the water heater is required. An additional 30mm is required for relief valve removal, 80mm for access cover removal and 400mm for element removal. You should be able to read the information on the rating plate and all informative labeling.

Adequate provision must be made to dispose of any water escaping from heater or adjacent plumbing that might result in damage to property. The water heater must be connected in such a way that:

- Space is allowed for the removal of the heating element.
- Space is allowed for the removal and replacement of the anode.

- The pump is accessible for servicing.
- Complete removal of the unit can be easily effected if necessary

2.1.4 Confined Space

If the thermostat fails the unit may produce excessive steam. It is strongly recommended that the heater should be installed in a well-ventilated space to avoid condensation build up. If installed in confined areas, make provision for Service Access. Vent safely to open air and carry hot water overflow pipework to drain.

2.1.5 Electric Connection

Neopower hot water storage tank is designed for Single Phase 220-240V A.C supply only.

The electric connection must comply with AS/NZS 3000. You can remove the heating element cover after reading and following the steps below.

Removal of heating element cover involves undoing six screws.

WARNING / DANGER:

a) Power supply must be shut off and the fuse removed from switch board before removing the electric cover.

b) Wire will be exposed after removing electric heating element cover. Only a licensed electrician is permitted to operate it.

c) Children and disabled person are not permitted to operate the water tank alone.

d) There must be some water in the water tank before turn on the power supply.

e) Dust and water Ingress Protection (IP) rating for Neopower hot water storage tank is IP34.

f) Electrical connection must comply with AS/NZS 3000.

2.1.6 Temperature Control

Factory Setting	Range (℃)	Factory Setting (℃)
Electric Boost (3.6kW)	60℃ - 75℃	75℃

Gas Boost	70℃	70℃

Please note: Only a licensed plumber or electrician is permitted to set the temperature

The end user is not permitted to adjust the thermostat settings on either gas or electric boosted systems. Adjustment of the booster should be carried out by a licensed service technician.

2.1.7 Pipework, Valves and Fittings

Valves and fittings for connecting the solar panels on the roof and the storage tank are supplied.
The temperature of the water at the outlet connection on the panels may reach 200°C or more and therefore only copper pipe can be used between the panels, storage tank and boosting heater.

Class B copper pipe should be used and the runs should be as short as possible to reduce heat losses. The pipes MUST be lagged using thick-walled foam of at least 19mm thickness, it should be weather proofed and UV stabilized.

Caleffi air-vent valve must be lagged

All lagging must be 19mm, UV stabilized, and solar rated.

2.1.8 Draining and Flushing

- Power must be turned off
- Cold water supply to the water tank is to be turned off
- The lever on the PTR valve should be opened
- Use caution to ensure PTR lever does not snap back, or it could damage the valve seat
- The pressure in the tank will be released when the PTR lever is opened
- The union at the tank drain outlet should be undone
- A hose should be attached to the tank side of the union
- The other end of the hose should go to a drain
- Opening the PTR valve allows air into the water tank
- Following complete draining of the water tank from the drain outlet, the closest hot water tap is to be opened fully and the PTR valve closed with caution
- The cold water inlet stop valve is now opened fully and the water tank is filled with cold water and flushed through to ensure the cylinder contains no sediment and is clean
- Finally the closest hot water tap is to be closed and power to be turned on again after thoroughly filling the water tank

2.2 Collector Unpack and Inspect

2.2.1 Component list

Please familiarize yourself with the components listed on the packing list which is included in the collector manifold packing box. If any components are missing or additional parts are required, please contact your supplier who will have spares in stock.

2.2.2 Evacuated Tube and Heat Pipes

Open the tube box which contains both evacuated tubes and heat pipes combined. Please check the evacuated tubes to make sure if they are intact and bottom of each tube is still silver

See below:

1) Intact tube on left
2) Damaged tube on right

If any tube has a white bottom, it is damaged and should be replaced.

Do not remove or expose the tubes to sunlight until you are ready to install them, otherwise the heat pipe tip / bulb and inner tube will become very hot and difficult (and potentially dangerous) to handle and install

WARNING: NEVER TOUCH THE INSIDE OF THE EVACUATED TUBE OR HEAT PIPE AFTER EXPOSURE TO SUNLIGHT. WEAR THICK LEATHER GLOVES IF HANDLING THE HEAT PIPE.

2.2.3 Frame

Unpack the frame that is included with the manifold.

If an adjustable angle flat-roof frame is also being used, it will be packed separately. Detail for frame installation information is shown as section 2.5 and 2.6.

2.3 Solar Collector

2.3.1 Collector Weight, Orientation and Angle

To achieve maximum solar performance, the solar collectors should be installed facing as close as practically possible to true North.

The following are guidelines for the installation of solar collectors:

- Solar collectors should be positioned to face the equator which is North facing in Australia. The further away from North, the greater the loss in solar efficiency.
- Neopower collectors are approved for use on East or West roof
- No orientation should be chosen that has *any* inclination towards South
- For optimum efficiency it is recommended that collector be installed within 10 degrees of local latitude, however:
- For a balance between optimum efficiency, practicality and aesthetics it is recommended that the collector be installed between 20 Degrees and 45 Degrees.
- Solar collectors should be free from shading by trees (should be checked regularly) or nearby buildings or other structures.
- Evacuated tube collectors are self-cleaning. Excessive bird droppings, leaves and dirt will hinder performance. Seasonal cleaning may be required in these circumstances

Note: the installation of the solar collector should not compromise the structural integrity of the building. The installer must consider the structural integrity on the building when installing the whole system.

2.3.2 Collector Gross Weights

Type	Length/ Width/ Height (mm)	Gross wet weights (Kg)
SA58/1800-15R	2020*1410*155	58.3
SA58/1800-20R	2020*1825*155	77.1
SA58/1800-25R	2020*2240*155	96.1
SA58/1800-30R	2020*2655*155	114.1

2.3.3 Avoid Shade

Collectors should be located so that shade does not occur for at least 3 hours either side of 12 noon standard time. Partial shading due to small objects such as antennas or a small flue is not of great concern however should be avoided where practically possible.

2.3.4 Location

The collector should be positioned as close as possible to the storage tank to avoid long flow & return runs.

Storage tank should be located as close as possible to the most commonly used hot water outlets within the house to prevent water waiting and wastage. This applies in particular to dead-leg systems which make up the vast majority of homes.

2.4 Mounting Frame

Neopower solar collectors are supplied with a standard frame, which is suitable to be mounted on a pitched roof (15 degrees minimum). For installation on low-pitched roofs/ flat roofs, additional frame kits are available.

2.4.1 Frame Material

All frame components are made up of 2.8mm thick marine grade extruded aluminium.

The frame is powder coated black for neutral aesthetic. The frame is also extremely robust and corrosion resistant.

It is important that frame attachment points and externally supplied fasteners are also of suitable

structural strength for any given application.

2.4.2 Roof Installation

Two types of roof installation are outlined in this guide.

a) Pitched roof installation refer to Section 2.5
b) Low pitched or flat roof installation refer to Section 2.6

Note: the installation of the solar collector should not compromise the structural integrity of the building. The installer must consider the structural integrity on the building when installing the whole system.

2.4.3 Customizing the Frame

The standard frame and flat roof frame components can be used creatively to suit a range of different installation situations.

Additional holes may be drilled in the frame as required (9mm fits the supplied bolts), but ensure that structural integrity of the frame is not compromised (i.e. drilling holes to close together).

The frame is set by default to achieve 45 degrees on a flat roof. By angling the rear legs a lower pitch can be achieved.

Rear legs can be cut to achieve lower pitch for aesthetically neutral installations on flat roof. For example legs can be cut down to 650mm to achieve 20 Degree pitch on flat roof

2.5 Pitched Roof Installation (Standard Frame)

2.5.1 Solar collector installation– pitched tile roof

1) Ensure tubes, manifold and components are ready to install	2) Double check all valves and fittings are on hand ready for collector install e.g. Caleffi air-vent, metal straps, roof sensor cable and fittings
	
3) Assemble frame on roof using T-bolts and clamps to hold in place	4) Attach metal straps to collector frame using tech screws
	

5) Attach metal straps to roof battens using tech screws	6) Check that collector frame is securely fixed to roof, and open first box of tubes. CAUTION: Ensure tubes are covered during installation and installers are wearing gloves
	
7) Check that evacuated airspace is intact. If not, bottom of tube will appear milky white. See below on right	8) Add heat transfer past to each bulb prior to insertion.
	

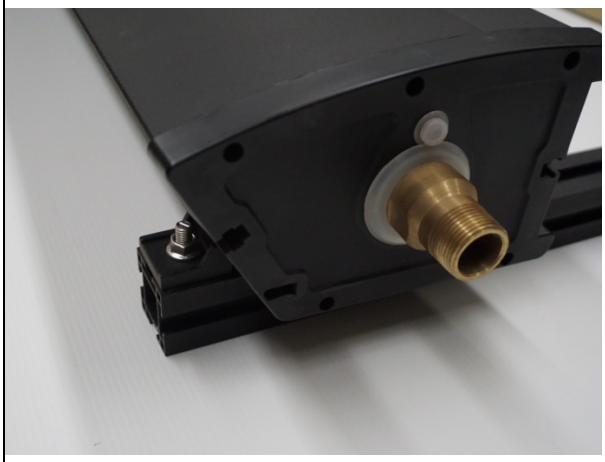
9) Spray soapy water on the end of each tube for easy insertion into manifold	10) Replace end caps and tighten after each tube has been insterted
	
11) a) Install Caleffi air-vent valve b) plug in sensor cable (fix with silicone) c) run flow and returns in ½" copper d) lag copper using 19mm solar rated lagging d) Penetrate roof using approved decktite	12) Clean collector with a rag and soapy water
	

Roof mounting – pitched sheet metal roof

1) Ensure tubes, manifold and components are ready to install

2) Double check all valves and fittings are on hand ready for collector install e.g. Caleffi air-vent, metal straps, roof sensor cable and fittings

3) Assemble collector frame on roof using T-bolts and clamps to hold in place



4) Using T-Bolts and nuts provided, fix L-Brackets to side of frame as pictured

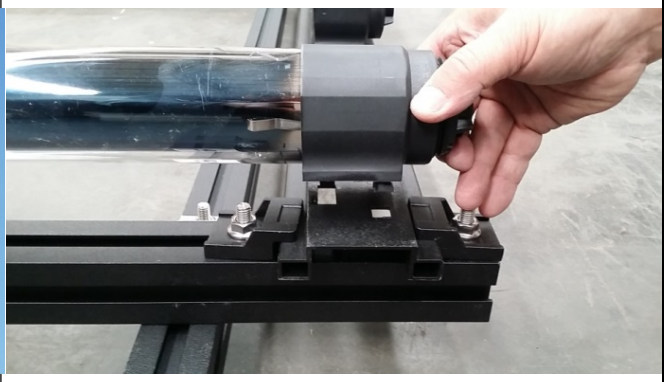
5) Attach L-Brackets to roof using appropriate fasteners

6) Check that collector frame is securely fixed to roof, and open first box of tubes.

CAUTION: Ensure tubes are covered during installation and installers are wearing gloves

7) Check that evacuated airspace is intact. If not, bottom of tube will appear milky white. See below on right

8) Add heat transfer past to each bulb prior to insertion.

9) Spray soapy water on the end of each tube for easy insertion into manifold	10) Replace end caps and tighten after each tube has been insterted
	
11) a) Install Caleffi air-vent valve b) plug in sensor cable (fix with silicone) c) run flow and returns in ½" copper d) lag copper using 19mm solar rated lagging d) Penetrate roof using approved decktite	12) Clean collector with a rag and soapy water
	

2.6 Low Pitched or Flat Roof Installation

2.6.1 Solar collector installation

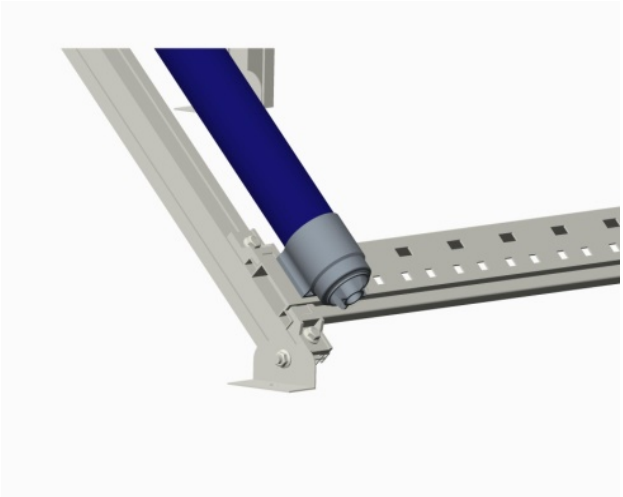
1) 	2) 
3) 	4) 

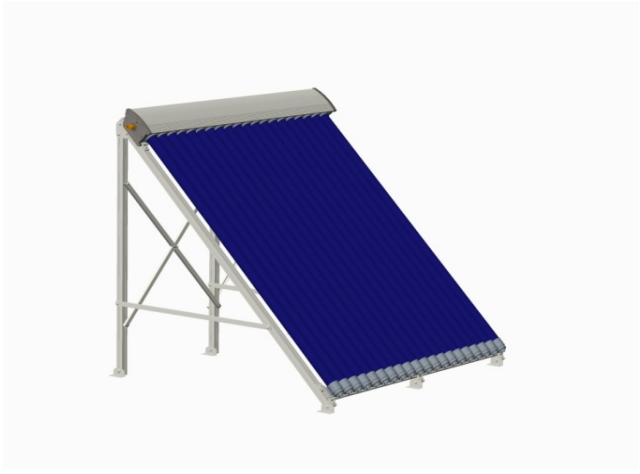
5)

6)

7)

8)



9) 	

2.7 Connection to Plumbing

If installing in stages, it is recommended that either:

1) Tubes are not inserted into manifold until stage two (fit-off & commissioning) *or*
2) Tubes are covered by a blanket or something similar to stop solar gain whilst collector not connected to water. Failure may result in scalding or damage the Caleffi air-vent valve

2.7.1 Temperature Sensor Insertion

The temperature sensor port is located beside the inlet and outlet ports. Generally the temperature sensor should be at the outlet of the manifold.

2.7.2 No Brazing Permitted

Do not braze copper pipe directly onto the manifold ports as the rubber seal could melt. Only use the supplied DR Brass compression fitting which provides 1/2” or 3/4” BSP thread. Always use two opposing spanners when tightening the fitting.

Do not twist the copper pipe as the header may be damaged.

2.7.3 Insulation

It is important to insulate the flow and return lines completely with high quality insulation. External

and internal piping that is subject to low temperatures should have an insulation thickness of at least 19mm.

Solar rated UV stabilized lagging is required

2.7.4 Details

AIR-VENT & ROOF SENSOR CONFIGURATION

TANK SENSOR PORT CONFIGURATION

PUMP STATION CONFIGURATION

2.8 Solar Controller and Pump Operation

2.8.1 Controller General Information

The Aestiva S5000 controller is a differential controller specifically designed for forced circulation solar hot water. It incorporates a microprocessor driven PCB board and a set of highly engineered thermal sensors. The roof sensor is capable of operating under extremely high temperature.

The controller is user programmable with an access code and features intelligent self-trouble shooting functions. Only authorized installers and technicians have access to the access code for reprogramming.

The circulation pump is activated when the roof sensor temperature reaches a predetermined temperature higher than that of the lower tank sensor port. The circulated water is then heated by the solar energy and then stored in the tank.
An antifreeze function is available when the roof temperature falls below a predetermined figure. A small amount of water is circulated to the roof and effectively prevents frost damage.

A manual pump operation is featured to allow user to temporarily turn on and off the devices by overriding the preset logic. However, the controller returns to auto mode after 2 hours in manual operation.

Each controller includes a built in self-diagnosis detection and runs error checks continuously. An error message will indicate the specific damaged sensor wire that needs replacing. All LED indicator lights will flash to alarm the users.

The controller outer enclosure can be attached to either storage water tank or nearby wall. 4 mounting brackets are inbuilt in the controller enclosure. The controller can be fit onto a specially designed pump station or nearby wall by fixing the mounting brackets onto 4 mounting studs or screws heads.
Do not run sensor cables parallel to mains power cable and any additional wiring shall be coiled and shortened by qualified electricians.

Warning: The appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children must be supervised to ensure that they do not play with the appliance.
This controller appliance is prewired with temperature sensor wires, power supply wire and output wires. During Installation, the power supply cord must not be allowed to connect with the main electricity supply, until the controller is securely in place and with all output connections already connected.

2.8.2 Controller Functions and Default Controller Setting

The controller has the following default functions/settings from factory.

- **Circulation pump differential control** – The circulation pump will only be activated when there is sufficient solar energy present on the roof to contribute to the heat gain in the water cylinder. This is achieved by sensing the temperature difference between the roof collector and inlet water temperature. The water circulation will stop when the roof collector temperature falls and not sufficiently higher than the water cylinder inlet temperature.

  "**Pump Differential On Temp**": 8^{o}C
  "**Pump Differential Off Temp**": 2^{o}C

- **Top out protection** – In good solar conditions, the solar collector could harvest the solar energy extremely sufficiently and quickly raise the storage water cylinder temperature. The storage water cylinder internal lining may be damaged by the high temperature water, which can exceed the designed operating temperature range by the tank manufacturer. The top out function

prevents the water cylinder reaching dangerously high temperature by stopping the pump circulation to the collector, so that the water is not heated further. A solar rated high temperature non-return valve must be used in the solar loop in conjunction for maximum protection.
"**Top Out Temp**": 70^{o}C
"**Top Out Reset Temp**": 68^{o}C

- **Anti-freeze protection** – In frost conditions, the risers in flat plate collector may freeze and cause damages. Anti-freeze protection can sense the roof temperature and activate the pump circulation for short period before the water may freeze inside.

  "**Anti-freeze on Temp**": 3^{o}C
  "**Anti-freeze on Temp**": 5^{o}C

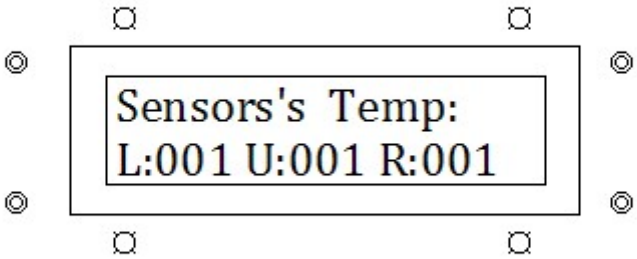
- **Manual pump function** – During installation of the solar systems, a manually operated soar loop circulation is needed to help bleed the air and test if the solar loop is working without blockage. Push the "manual pump" button and the controller will enter a manual mode. In this mode, the pump will pump disregarding other control functions. The manual pump mode can be turned off by pressing the "manual pump" button again and the controller re-enters the automatic mode. In case that the user forgets to exit manual mode, the controller will automatically re-engages automatic mode after maximum of 2 hours.

- **Auto cavitation recovery** – In case of drop of water pressure, air bubble may form and trapped inside the circulation pump chamber. This can cause cavitation and blocked solar loop. When the pump has continued working non-stop for 2 hours (a sign of cavitation forming), the auto cavitation recovery function will turn off the pump for 2 minutes and allow the air bubble to escape. When the pump is re-engaged, the cavitation should be recovered in most situations.

2.8.3 Controller Basic Operation

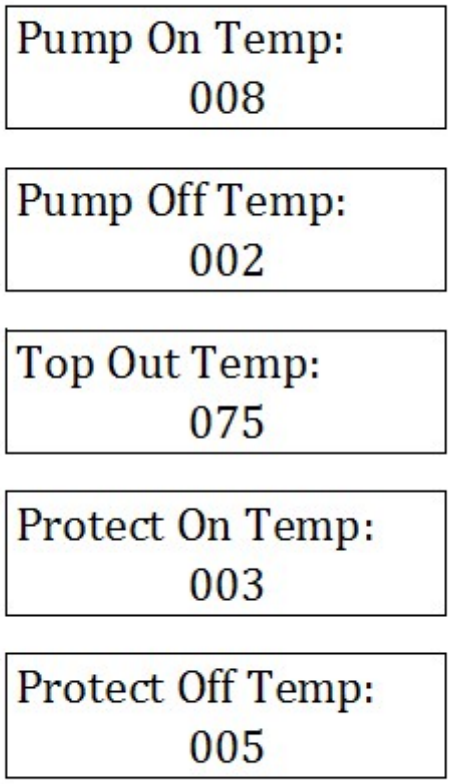
The controller control interface consists of 4 buttons and 4 indicator lights and a white back lit LCD screen.

The controller is in automatic mode with the factory settings when it is turned on first. The screen will display all 3 sensors' temperatures as below.

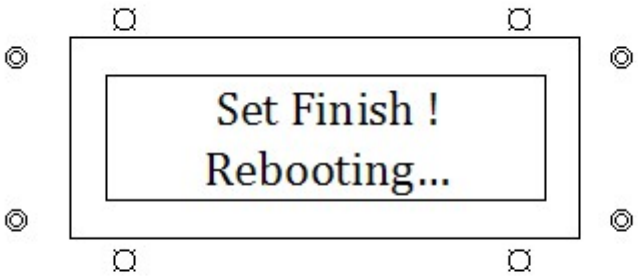


By pressing Manual pump button, the controller can be switched into manual mode.
Other 3 buttons are only used during program mode, which requires an excess code from authorized personnel.

During the program mode, using "Next" button, the controller will go through the following setting menus:



Using “+” and “—“ buttons, the setting parameters can be increased and decreased. By holding the “program” button, the programming will be finished and the controller will reboot itself with the following prompt:

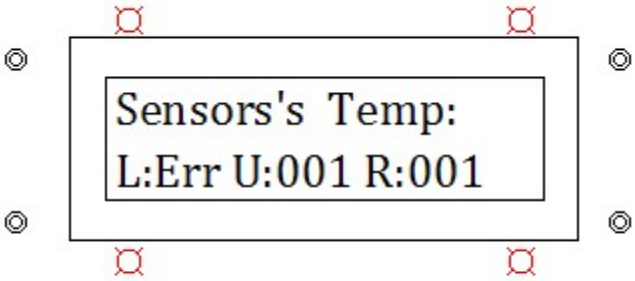


2.8.4 Error messages and trouble shooting

Faulty Sensors errors

Aestiva controller can check faults on faulty sensor itself. The solar loop operation will be stopped when a sensor error occurs.

When one or more sensors are faulty, all 4 LED lights flash. The lower sensor display window displays “Err”. If other sensors are faulty, the “Err” message will appear after the corresponding sensor on the screen.



Trouble shoot: Check the sensor cables casing condition or gently pull the cable from the controller to check for the connection with the terminals. If none works, please call up your installer for cable replacement. Do not run the sensor cable along any AC wires, as interference may be caused.

Manual pump not working

Trouble shoot: Check the top tank temperature first by reading the controller screen. If the top out temperature has been reached, the controller will not allow the pump to manually operate to protect the tank.

The screen is blacked out

Trouble shoot: Check for power supply first. Then the controller may be hit by a surge. The controller may be opened and the fuse should be replaced. This is best to be performed by an approved electrician.

2.8.5 Mounting of the controller

The back of the controller feature 4 bolt holders, in which the bolt's head can slide up and down into and out of the controller.

The location of these 4 holes is printed in the supplied paper, which can be used for bolt drilling reference.

Once the bolts are in place, the controller can be readily slide onto the bolts for mounting without any tools.

The instructions for mounting the controller into the pump station housing are given in section 1.6.

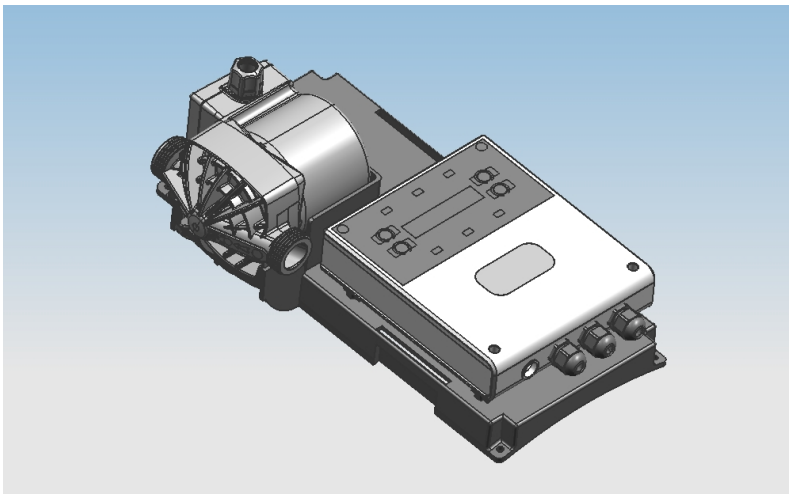
2.8.6 Sensor Mode Switch

Unless specified by customers prior, all solar controller will come equipped with two sensor wires, a tank sensor and a collector sensor

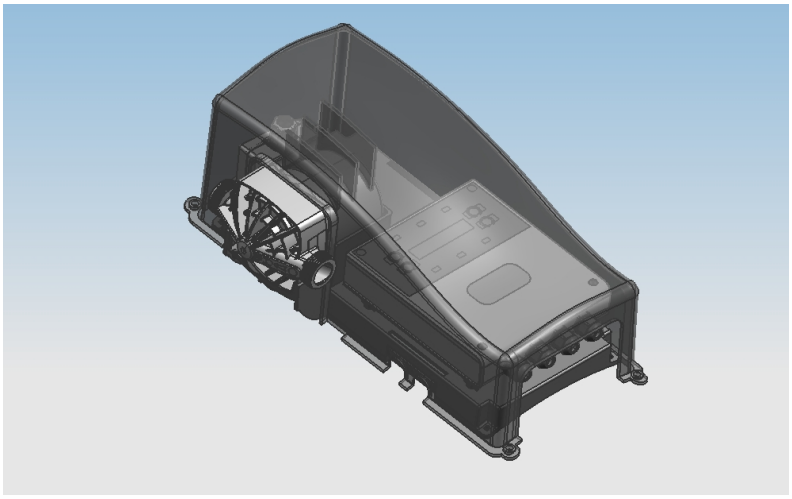
2.8.7 Pump Station

The pump station features fully Australian complied Watermarked brass wares, valves and fittings and a high quality Grundfos solar pump. The outer casing is injection molded with UV additives to withstand Australian Outdoor conditions.

The pump and controller can be mounted in pump station base as shown below.



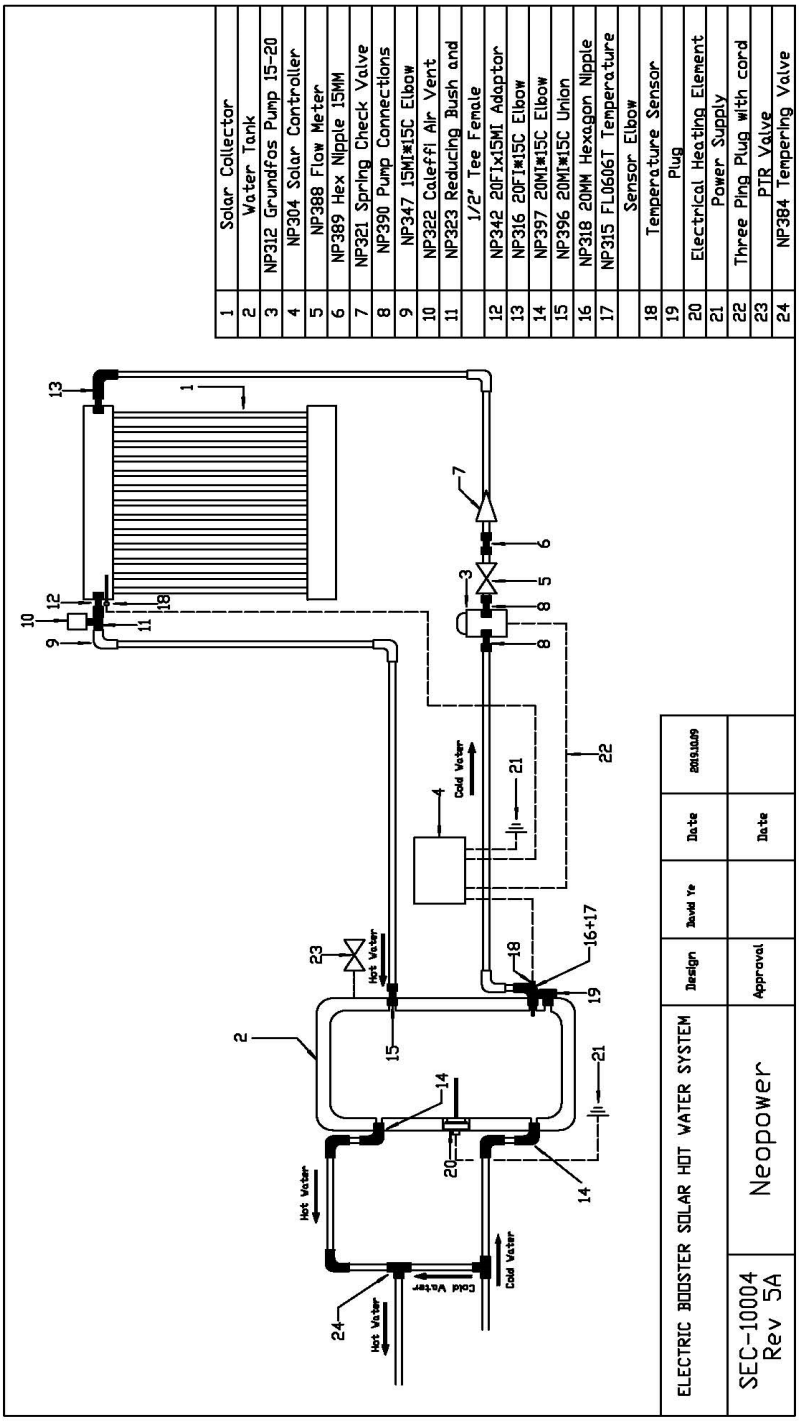
The pump is locked into place by the molded pump station cover.



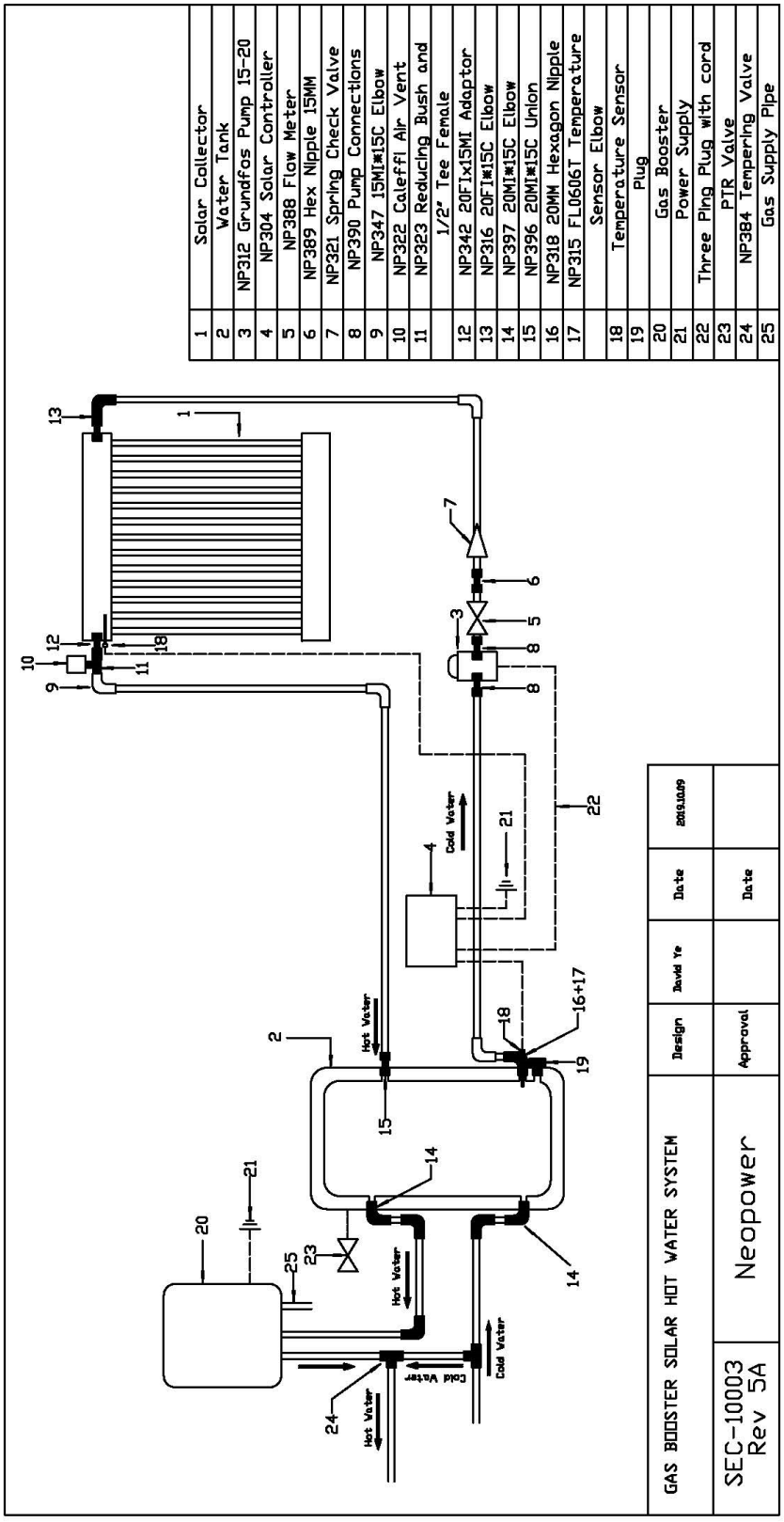
Using supplied screws and bolts, the pump station is readily bolted onto the water cylinder tank. Alternatively it can be installed on a wall adjacent to the rank. Only the pump station base is used during mounting. The holes on the top cover are reserved for occasions where added security is required to bolt down the top cover to the surface.

2.9 Neopower System Schematic

2.9.1 NEOPOWER - Electric boosted solar hot water system schematic



2.9.2 NEOPOWER - Gas boosted solar hot water system schematic



2.10 Gas Connection and Gas Piping

The Neopower gas booster solar hot water system incorporates a Booster. Please see the Installation Guide with the gas booster unit for detailed information such as material, safety requirements, gas piping, installation of gas piping, application installation and commissioning.

The gas booster can be mounted either on an adjacent wall or on the front of the Neopower gas storage tank using optional mounting brackets. These brackets bolt onto the front of the tank using four bolts. This allows the gas booster to hang on the bracket after the gas booster has had its top mounting bracket reversed.

2.11 Start-Up Procedure

1) Fill the water heater by opening all hot water taps and operating the cold water inlet to allow the heater to fill up and air in the system to be expelled. Close each hot water tap, as the flow becomes free of air.

2) Check the pipe connection for leaks.

Caleffi automatic air-vent is installed on the outlet of the collector, air will be automatically eliminated from the solar line.

3) After confirming the system has no leaks, turn the pump and controller on at the power outlet. Correct controller operation can be determined after the evacuated tubes have been installed, or by chilling tank sensor with ice blocks.

4) Gas supply and power to the gas booster may be turned on and the unit checked for the presence of leaks. The gas boosted operation of the solar water heater should be checked.

2.12 Precautions

2.12.1 Metallic Components

Always wear leather protective gloves when handling solar collector components. All efforts have been made to make the metal components safe to handle, but there may still be some sharp edge.

2.12.2 Evacuated Tubes

Take care when handling the evacuated tubes. They can easily break if knocked heavily or dropped.

- Take extra care of the pointy end of the tubes. This is where the air has been evacuated and is the weakest point
- Take extra care not to shake tubes, heat pipe bulb can knock and break glass
- Wear gloves if handling any broken glass.

2.12.3 High Temperature

With the heat pipe installed in the evacuated tube, the heat pipe condenser can reach temperatures in excess of 200℃ (392F) with good sunlight. At this temperature touching the heat pipe will result in serious burns.

So please be careful when “experimenting” with, or “demonstrating” the evacuated tubes and heat pipes. If the system is turned off for maintenance or due to power outage, the collector header and plumbing pipes close to the manifold will be extremely hot and will cause serious burns if touched.

If extended maintenance is planned it is advisable to cover the Neopower collector with blanket to prevent continuous heat production.

2.12.4 Broken Glass

If the evacuated tubes are stuck by a hard object with sufficient force, they may break. During installation consideration should be taken as to the possible path any broken glass may take. Where possible protection should be implemented to prevent broken glass from reaching ground level where somebody could walk on it.

The home owner should be made aware by the installer, the location of the solar collector and the possible vicinity of broken glass in the event of an extreme storm or failing object on the collector.

2.12.5 Health & Safety

Always wear safety glasses when handling evacuated tubes.
Wear leather gloves when handling metal components.
Wear thick weather gloves if handling hot heat pipes.
Adhere to safety regulations regarding working on roofs.

3 Maintenance

3.1 Pressure and Temperature Relief Valve (PTR valve)

An 850kPa and 99℃ PTR valve is used in Neopower hot water storage tank.

PTR valve is located on the side of the hot water storage tank. The PTR valve is essential for its safe operation. We recommend you operate the easing lever on the PTR valve once every 6 months. It is important you raise and lower the lever gently. The PTR valve is designed to allow small quantities of hot water to discharge during heating to allow for hot water expansion. The PTR valve discharge should be directed away by a downwards oriented discharge pipe which is protected from possible frost restriction. This pipe must be left open to air and properly located in case of being blocked. The diameter of this pipe should not be less than 15mm (1/2”).

Neopower recommends that a 500kPa pressure limiting valve to be fitted at time of installation. The valve should be installed in the cold water inlet piping.

This valve should be checked at regular intervals to ensure its operation and settings remain correct. Also ensure that the pressure & temperature relief valve and relief pipe is not located where it can cause damage if hot water is discharged.

3.2 Replace the anode

It is recommended that check and replace the anode to be carried out by your local Neopower service agent

Anode Replacement Procedure

1) Turn off the power supply
2) Turn off the cold water supply
3) Open PTR valve to release the pressure
4) Take off the anode cover at the top of tank
5) Unscrew the anode
6) Take off the anode bar
7) Reinstall anode

THE ANODE MUST BE REPLACED AT LEAST EVERY 5 YEARS. AREAS WITH BAD WATER QUALITY, THE

ANODE MAY NEED TO BE REPLACED MORE FREQUENTLTY.

WARNING:

IF THE HOT WATER SYSTEM IS NOT USED FOR TWO WEEKS OR MORE, A QUANTITY OF HIGHLY FLAMMABLE HYDROGEN GAS MAY ACCUMULATE IN THE WATER HEATER. TO DISSIPATE THIS GAS SAFELY, IT IS RECOMMENDED THAT A HOT TAP BE TURNED ON FOR SEVERAL MINUTES OR UNTIL DISCHARGE OF GAS CEASES. USE A SINK, BASIN, OR BATH OUTLET, BUT NOT A DISHWASHER, CLOTHES WASHER, OR OTHER APPLIANCE. DURING THIS PROCEDURE, THERE MUST BE NO SMOKING, OPEN FLAME, OR ANY ELECTRICAL APPLIANCE OPERATING NEARBY. IF HYDROGEN IS DISCHARGED THROUGH THE TAP, IT WILL PROBABLY MAKE AN UNUSUAL SOUND AS WITH AIR ESCAPING.

3.3 Cleaning

Regular rain should keep the evacuated tubes clean, but if particularly dirty remains then it may be washed with a soft cloth and warm soapy water or glass cleaning solution. If the tubes are not easily and safely accessible, high pressure water spray is also effective.

3.4 Leaves

During autumn leaves may accumulate between or beneath the tubes. Please remove these leaves regularly to ensure optimal performance and to prevent a fire hazard.

Note: The solar collector will not cause the ignition of flammable materials.

3.5 Broken Tube

If a tube is broken it should be replaced as soon as possible to maintain maximum collector performance. The system will still operate normally even with a tube broken. Any broken glass should be cleared away to prevent injury.

To replace a tube:

1) Open the locking cup at the base of the solar tube, slide existing tube out and carefully pick up any glass pieces. When removing the tube, the rubber ring in the manifold casing may pop out. Just return this ring into place before inserting the new tube.
2) Avoid touching the silicon wool plug at the top of the evacuated tube with bare hands, as it can cause mild skin irritation.

3) New tubes already have heat transfer fins inserted. When insert the heat pipe into the new tube, care should be taken to guide the heat pipe into the slot between the heat fins.

3.6 Insulation

The flow and return pipework insulation foam should be checked annually for damage. Solar rated, UV stabilized foam should be used, otherwise deterioration can occur overtime.

Note: Up to 60% heat loss can occur if the insulation is non-existent or sub-standard. Therefore please pay particular attention to making sure the system is properly insulated and any external insulation is UV protected.

3.7 Draining Collector

Draining of the manifold may be required if maintaining the system, or in preparation for extremely cold conditions (extended snow cover).

To drain the collector of water:

1) Turn off the mains water supply to the solar storage tank.
2) If the storage tank or other system components are being concurrently drained, refer to their instruction manuals for details. If storage tank is not being drained, isolate piping to and from the solar collector and open drain cocks on both lines. In good weather the water may be hot, please take care of high temperature
3) Open a drain cock or undo a fitting on the manifold outlet to allow air to enter the system
4) Allow the manifold to sit in a vented state for 5-10 minutes to allow the manifold to dry.
5) Turn off the drain cock or re-fasten fitting.

3.8 Tempering valve

The tempering valve controls the temperature of the hot water entering the residence form the storage tank to a maximum of 50°C. AS/NZS 3500.4:2003 details the requirements of the valve.

The reduce the risk of scalding, a tempering valve as detailed in AS/NZS 3500.4:2003 must be installed into the hot water supply line incorporating all sanitary household hot water outlets such as bathrooms, en-suites and washbasins. The tempering valve to be used for solar hot water systems must be a solar rated valve. These valves have been specifically designed to work with the higher temperatures that solar hot water systems can produce.

Note: Tempering valves should be checked every year for correct temperature delivery and they should be replaced every five years.

3.9 Flow meter (flow control valve)

The water flow meter (flow control valve) is an in-line valve that is mounted immediately after the pump and controls the flow rate of water to the collector. The valve has direction arrows showing the direction of water flow. Ensure the direction of flow of water for the water meter and the pump are matched.

The flow rate **must** be set using a screwdriver once the pump in on and the water flowing. Set the bottom of the red float as the flow rate level in below table.

3.10 Maintenance and Service summary

SIX MONTLY SERVICE (BY OWNER):

Operate the Pressure & Temperature Relief Valve for approximately 10 seconds by rotating the knob on top of the valve to ensure water is relieved to waste through the relief drainpipe. Check to ensure the valve closes correctly.

FIVE YEAR SERVICE (BY AUTHORISED PERSONNEL ONLY):

A five yearly service should be carried out by a licensed tradesperson. It is recommended that this service be carried out by your local plumber.

This service should include the following:

- Replace the Pressure & Temperature Relief Valve (PTR valve)
- Replace the anode (in areas of harsh or adverse water conditions it is recommended that you carry out a more frequent check of your anode conditions, refer Operating Instructions “Water Quality” (we suggest a 3 year service interval in poor quality water areas.)
- Clean and service the gas burner and pilot.
- Flush the cylinder

Failure to performance the above services will void the warranty.

If the system owner is going to be away for holiday
The power supply to the solar controller pump module must be left ON, the water supply to the

solar hot water system must be left ON, so that the system can monitor and control the solar collector temperature while you are away. Whilst the system is safe with the power turned OFF, the collector can reach very high temperatures, causing high stress to their internal components.

4 Troubleshooting

4.1 No Hot Water

If there is no water, it will generally be related to the gas or electric heating system but not the solar collector. (The solar collector pre-heats water, with final boosting completed by the electric element or gas booster system.) Please contact your local Neopower agent.

If the gas booster is not turned on before sending water through it then it will default to 40℃. To reset the system turn the gas booster off via the power point and wait two minutes before turning the system back on.

4.2 Reduced Solar Contribution

Solar contribution to your heating is directly related to the amount of solar radiation and the volume of hot water used. During the winter and the periods of rainy or particularly overcast weather, the amount of energy produced by the solar collector will be greatly reduced.

As a general rule, the solar collector will have been sized to provide close to 100% of your summer hot water needs, which depending on your location, angle of collector and hot water usage patterns, may result in up to 80% or more of your annual hot water energy needs. During the winter, due to increased cloud cover and reduced solar radiation levels, solar contribution may be as low as 50%. This is normal. If given similar environmental conditions, you feel that the solar contribution has considerably reduced there may be a problem with your solar heating system. This may be due to an incorrectly configured or damaged controller, pump malfunction or problem with the boosting system. In such cases please contact your Neopower agent.

1) Does the circulation pump appear to be operating? In good sunny weather the circulation pump should come on as can be seen by the “PUMP” light on the controller. The pump may run very quietly and so you may need to touch the pump or piping running to and from it to feel for motor running.
2) Are all the tubes intact? If a tube has been damaged it will reduce the systems overall performance only marginally but should be replaced. If a tube is damaged, do not attempt to remove it without wearing protective gloves.
3) Are there any apparent leaks in the plumbing to and from the collector? Any water trails down the roof or around the storage tank? Have installer tighten fittings when necessary.

4.3 Regular Releasing of Hot Water

If during normal daily hot water use, the PTR valve on the tank is regularly releasing hot water, it indicates there may be a problem. However releasing a few liters a day is normal.

Possible Causes

1) A problem exists with the electric heating thermostat.
   Solution: Contact your Neopower agent

2) Incorrect, faulty or missing Pressure Limiting Valve
   Solution: Contact your Neopower agent

Note: If the PTR valve is less than one year old then it is covered under warranty.

To test the system, run the hot water tap in the bathroom or kitchen for five minutes to release some heat form the system (the water will be hot so be careful). If after this period, the tank is still regularly releasing hot water it indicated a definite problem. Please contact your local Neopower agent.

4.4 Safety Precautions

For any problems that involve plumbing or electrical connections, a qualified professional must be employed.

Should you have any questions regarding the Neopower Solar Hot Water System, contact your local Neopower agent

5 Water Heater Manufacturer's Warranty

This warranty is provided by Imaca Pty Ltd (Neopower). It applies to Neopower Evacuated Tube Solar Hot Water Heaters installed in a single family dwelling only and is provided only to those acquiring the water heaters as consumers within the meaning of the Australian Consumer Law. The terms of the warranty are effective from the date the water heater is installed. Neopower may verify this date by requesting a copy of the compliance certificate that accompanied the installation. The compliance certificate is mandatory in all Australian states and territories.

Water in direct flow through the solar hot water system must firstly meet potable water requirements and in addition the following:

DESCRIPTION	**Parts per Million (p.p.m)**
Total dissolved solids	<600 p.p.m
Total hardness	<200 p.p.m
Total Chloride	<250 p.p.m
Free Chlorine	<5 p.p.m
Magnesium	<10 p.p.m
Calcium hardness	<200 p.p.m
Alkalinity	<150 p.p.m

If the water quality can't meet the above requirements, Neopower solar hot water will not be covered by the warranty.

Imaca Pty Ltd is responsible for reasonable costs associated with legitimate warranty claims, including call-out of an authorized Neopower service provider to inspect the faulty product. Imaca Pty Ltd is not responsible for:
(a) Costs for tradespeople that are not authorized Neopower service providers; or
(b) Any costs, including call-out costs for an authorized Neopower service provider, associated with a product which is determined upon inspection not to be covered by this warranty.

Any inspection, service, repair or replacement activities associated with warranty on Neopower products must be authorized by Imaca Pty Ltd before commencement.

Where the appliance has not been installed in accordance with the installation instructions or installed such that normal service access is difficult, a service charge will apply. If at the discretion of the attending service person, access is deemed dangerous, service will be refused. Any work

required to gain reasonable access to the appliance will be chargeable by the attending service person (for example, removal of cupboards, doors, walls, or the use of special equipment to move components to floor level, but not limited to these).

Where a failed component is replaced under warranty, the balance of the original appliance warranty will remain effective. The replacement part or appliance does not carry a new warranty.

Warranty periods

Neopower warrants that the following water heater components will remain free of defects for the specified periods from the date of installation:

Item	**Warranty Period –Parts Only (year)**	**Warranty Period –Parts and Labor (year)**
Storage Tank Cylinders (Enamel)	10	1
Storage Tank Cylinders (Stainless Steel)	15	1
Evacuated Tube Solar Collectors	15	1
Gas Booster (Heat Exchanger)	10	3
Gas Booster (Parts)	3	3
Electric Element	1	1
Grundfos Circulation Pump	2	1
Solar Controller	1	1
Parts	1	1

- To the extent a claim falls under the 'Parts Only' Warranty Period the Warranty covers the repair and/or replacement of such failed component in the Neopower Solar Hot Water Heating System free of charge. However, the transport, installation and labor costs of repairing the component or delivering the replacement component and removing and replacing the existing component will be the responsibility of the Customer of the existing Neopower Solar Hot Water Heating System.

- All other components supplied by Neopower, including valves, elements, thermostats and sacrificial anodes include 1 year parts & labor.

- Neopower gives no warranty in relation to components not supplied by Neopower, for example tempering valves and cold water valve assemblies used by installers.

Subject to the conditions and exclusions specified in this warranty, Neopower will at its own expense repair or replace any defective water heater component covered by this warranty as soon as reasonably practicable after the consumer has reported the defect to Neopower.

Procedure to make a claim under the warranty

Upon discovering a suspected defect, consumers should immediately report the suspected defect:

- To the installer or supplier, if the suspected defect arises as a result of the installation of the water heater or relates to any components not covered by this warranty.

- To Neopower on the phone number 1300 062 788 or email address: info@neopower.com.au during the relevant warranty period, if the suspected defect relates to any components covered by this warranty.

Specific exclusions

The above is subject to an area within a 50 kilometer radius of the Neopower Distributor or Branch from where the unit was purchased. Customers outside this area will be subject to any freight costs and any travelling charges incurred by the Neopower representative carrying out rectification work.

After hours service fee will apply to warranty calls made outside of normal business hours. For warranty purposes, typical business hours are classified as the hours from 8.00AM to 5.00PM Monday to Friday (excluding public holidays).

To the extent permitted by law Neopower does not accept liability under this warranty:

1. If any component of the water heater has been installed, repaired, repositioned or modified by a person other than an appropriately qualified person approved by Neopower in accordance with Neopower's installation and maintenance instructions and relevant local and statutory requirements;

2. For loss or damage caused by a fault or defect in the installation of the water heater;

3. If there is damage to the collector by hail or other means;

4. The services required in manual section 3.10 are not performed. Such as the anode has not been changed as the Five Year Service; the PTR valve has not been changed as the Five Year Service etc.

5. If a cold water expansion valve, check valve and strainer is not fitted in areas where mains pressure is likely to exceed 500 kPa;

6. For any damage arising as a result of an accident, act of god or other circumstances beyond Neopower's control;

7. For frost damage to Neopower solar water heaters due to temperatures below -12°c, Climate information on the Commonwealth Bureau of Meteorology website (http://www.bom.gov.au) contains historical minimum temperature data and will be used by Imaca Pty Ltd to confirm the cause of failure.;

8. For frost damage to Neopower solar water heaters where a failure of the pump, control system or power supply results in the in-built frost protection system being unable to operate when required;

9. For components not supplied by Neopower that are used in the installation of Neopower solar water heaters e.g. tempering valves, cold water valve assemblies, etc.
10. For extended or implied warranties not formally provided by Neopower;

11. For external labor or equipment costs (e.g. Cranes and lifting devices) required for repairs;

12. For costs incurred for rectifying faults (or perceived faults) not directly attributed to the Neopower solar water heater;

13. For travel costs of service agents that exceed 50 kilometers;

14. For all consequential loss or damage arising from defects that can lawfully be excluded;

15. For any other issues not directly attributable to defects in components supplied by Neopower including:

    a) damage caused by incorrect commissioning;
    b) leakage from valves not supplied by Neopower;
    c) leakage from the pressure temperature relief valve where the water pressure or temperature exceeds the limits specified in Neopower's installation and maintenance instructions;
    d) water hammer;
    e) external rust on the storage tank;
    f) insufficient hot water because:

        i. the consumer refuses to use the auxiliary booster;
        ii. of an incorrectly set or faulty tempering or mixing valve;
        iii. of faulty or incomplete installation;
        iv. the water heater is too small for its required purpose;
        v. of insufficient water flow as a result of "water saving" tap-ware or appliances (for gas water heaters only);
        vi. of undersized gas lines (for gas water heaters only);

vii. of blown fuses, “tripped” electrical switches or inadequate household electrical wiring;
viii. of incorrect selection of gas type (gas water heaters only); or
ix. insufficient water flow caused by debris accumulating in water strainer (gas water heaters only)

IMPORTANT NOTE

The benefits conferred by this warranty are in addition to any other rights and remedies available to the consumer under a law in relation to the goods or services to which the warranty relates.
Neopower’s goods come with guarantees that cannot be excluded under the Australian Consumer Law.
Consumers are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. Consumers are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.