

# *Owner's Guide and Installation Instructions*



## *Solar VS160 Storage Tank*



### **WARNING: Plumber – Be Aware**

**Use copper pipe ONLY. Plastic pipe MUST NOT be used.**

It is a requirement of a solar water heater installation that all pipe work be in copper and not plastic, due to the effects of high water temperatures and pressures.

*This water heater must be installed and serviced by a qualified person.  
Please leave this guide with the householder.*



## WARNING: Plumber – Be Aware

- The solar hot and solar cold pipes between the solar storage tank and the solar collectors **MUST BE** of copper. All compression fittings must use brass or copper olives.
- The full length of the solar hot and solar cold pipes **MUST BE** insulated.

The insulation must:

- be of a closed cell type or equivalent, suitable for a solar water heating application and capable of withstanding the temperature of the water generated by the solar collectors under stagnation conditions

The specification of the chosen insulation material should be checked with the insulation manufacturer prior to installation as different materials may vary in temperature tolerance.

- be at least 13 mm thick, however thicker insulation may be required to comply with the requirements of AS/NZS 3500.4
- be weatherproof and UV resistant if exposed
- extend through any penetrations in the eaves, ceiling and roof
- cover valves and fittings in the solar hot and solar cold pipe work
- be fitted up to and cover the connections on both the solar storage tank and the solar collectors.

**Note: Failure to observe these requirements increases the risk of freeze damage.**

Uninsulated pipe work, including concealed in cavities and roof spaces or where it may be in contact with a metal roof, may lead to freeze damage. The system has NO WARRANTY for freeze damage if the solar hot and solar cold pipes are not insulated in accordance with the installation instructions.

The insulation is essential to assist in providing freeze protection, will offer corrosion protection to a metal roof against water runoff over the copper pipe, assist in avoiding accidental contact with the solar pipe work as high temperature water can flow from the solar collectors to the solar storage tank and also reduce pipe heat losses.

- The insulated copper pipe work:
  - should be fixed at suitable locations to prevent or reduce the possibility of noise from water hammer and vibration from occurring
  - is not to be placed or installed in contact with plastic pipe work.

Likewise, plastic pipe work is not to be placed or installed in contact with the insulated copper pipe work after the solar circuit is installed.

- Plastic pipe **MUST NOT** be used, as it will not withstand the temperature and pressure of the water generated by the solar collector(s) under stagnation conditions. The solar collector(s) can generate extremely high water temperatures up to 150°C and high water pressure of 1000 kPa. Plastic pipe cannot withstand these temperatures and pressures and **MUST NOT** be used. Failure of plastic pipe can lead to the release of high temperature water and cause severe water damage and flooding.

**Plumber:** It is important to refer to and read in full the complete “Warning: Plumber – Be Aware” statement commencing on page 40.

### PATENTS

This water heater may be protected by one or more patents or registered designs.

### TRADE MARKS

© Registered trademark of Rheem Australia Pty Ltd.  
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**Note:** Every care has been taken to ensure accuracy in preparation of this publication. No liability can be accepted for any consequences, which may arise as a result of its application

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# CONTENTS

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**HOUSEHOLDER – We recommend you read pages 4 to 22.**  
The other pages are intended for the installer but may be of interest.

<b>About Your Water Heater .....</b>	<b>4</b>
<b>Regular Care .....</b>	<b>13</b>
<b>Water Supplies.....</b>	<b>16</b>
<b>Save A Service Call .....</b>	<b>19</b>
<b>Installation – Solar Storage Tank.....</b>	<b>23</b>
<b>Installation – Solar Control Unit.....</b>	<b>34</b>
<b>Installation – Solar Collector(s) .....</b>	<b>37</b>
<b>Connections – Plumbing .....</b>	<b>42</b>
<b>Connections – Electrical.....</b>	<b>46</b>
<b>Commissioning.....</b>	<b>48</b>
<b>Draining The Solar Collector(s) .....</b>	<b>52</b>
<b>Draining The Water Heater .....</b>	<b>52</b>
<b>Warranty .....</b>	<b>55</b>

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# ABOUT YOUR WATER HEATER

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## WATER HEATER APPLICATION

This water heater is designed for use in a single family domestic dwelling for the purpose of heating potable water. Its use in an application other than this may shorten its life.

## MODEL TYPE

Your Vulcan® solar VS160 water heater is designed for the solar collector(s) to be roof mounted and the vitreous enamel lined solar storage tank to be installed at ground or floor level, remotely from the solar collector(s). The solar storage tank is suitable for installation either outdoor or indoor and with 1 x TBT260 or 1 or 2 x HBT 200 solar collector(s). If an in-series gas booster is mounted to the solar storage tank, then it is suitable for outdoor installation only.

The system is not suitable for installation above 400 metres altitude.

The system has a level of freeze protection designed to guard the system against damage from freeze conditions (refer to “Freeze Protection” on page 9). The system must be installed with the full length of the solar hot and solar cold pipes insulated and power must be available at the solar control unit to offer protection against freeze damage (refer to “Pipe Work and Insulation” on page 8). Freeze conditions occur below 6°C.

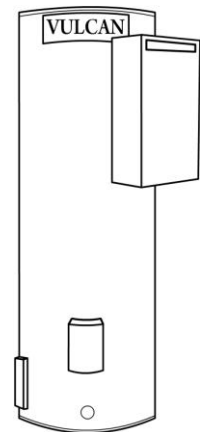
**Note:** The Vulcan warranty against freeze damage applies only to systems installed in Australia.

The system has NO WARRANTY for freeze damage when installed above 400 metres altitude or if the solar hot and solar cold pipes are not insulated in accordance with the installation instructions or if power is not available at the solar control unit (refer to “Terms of the Vulcan Warranty” on page 55).

This solar water heater is designed to be installed with a Rheem continuous flow 871 series 24 litre or a 874 series 18 litre in-series gas booster either mounted onto the storage tank or installed remotely, or a Rheem 874 series 27 litre in-series gas booster installed remotely.

The solar water heater may be installed with another suitable type of remotely installed in-series continuous flow or storage booster. If the in-series water heater is other than a Rheem continuous flow 871 series 24 litre or a 874 series 18 litre or 27 litre in-series gas booster, then the references to the in-series gas booster in this guide may not be applicable to the installation.

For information relating to the function and operation of the in-series water heater, refer to the Owner’s Guide and Installation Instructions supplied with the water heater.



## MAINS PRESSURE

The water heater is designed to operate at mains pressure by connecting directly to the mains water supply. If the mains supply pressure in your area exceeds that shown on page 25, a pressure limiting valve must be fitted. The supply pressure should be greater than 350 kPa for true mains pressure operation to be achieved. A minimum water supply pressure of 200 kPa is required to enable the solar circulator and solar circuit system to operate effectively.

## SOLAR OPERATION

The operation of the circulator is controlled by the combination of:

- the hot sensor located at the outlet of the solar collectors.  
The hot sensor measures the water temperature at the outlet of the solar collectors.
- the cold sensor located at the solar cold outlet at the base of the solar storage tank.  
The cold sensor measures the water temperature at the bottom of the solar storage tank.
- the differential controller located in the solar control unit.

### *Normal operation*

As the sun heats the water in the solar collectors, the increase in temperature activates the circulator. The circulator switches on whenever the water in the solar collectors is hotter than the water in the solar storage tank. The circulator moves the hotter water from the solar collectors through the solar hot pipe to the solar storage tank and the cooler water from the solar storage tank is circulated to the solar collectors via the solar cold pipe to be heated by the sun's energy.

This process continues whilst solar energy is available and the water in the solar storage tank requires heating. The circulator will deactivate when the water temperature in the solar storage tank is around 70°C to 75°C. The water heater will then enter Over-temperature operation.

During normal operation if the amount of solar energy available reduces, such as when the sky becomes very cloudy or the sun becomes lower in the sky in the late afternoon, and the water no longer gains useable heat from the solar collectors, the circulator will deactivate. The water heater will then enter standby mode.

### *Over-temperature operation*

The purpose of the Over-temperature operation is to reduce the amount of overheating or 'stagnation' of water in the solar collectors. When the water in the solar storage tank has reached 70°C to 75°C and the circulator has deactivated, the solar collectors will continue to gain heat while solar energy is still available.

If the water in the solar collectors stagnates and its temperature becomes very high, the circulator will activate for a short period to transfer this extra energy to the solar storage tank. The circulator will deactivate when the water temperature in the solar collectors decreases. This process will either repeat for a maximum of eight cycles or until the water temperature in the solar storage tank reaches around 75°C to 80°C or the hot sensor does not sense another increase in water temperature to a stagnation level after a cycle is completed, i.e. the solar energy available reduces.

### *Night Time Cooling operation*

The purpose of Night Time Cooling operation is to rid the solar storage tank of excess solar energy gained by Over-temperature operation during that day. The desired water temperature in the solar storage tank is to be between 60°C to 70°C.

If the solar control unit has entered Over-temperature operation during the day, then after the water temperature in the solar collectors reduces later in the day or early evening, the circulator will activate. Water from the solar storage tank will circulate through the solar collectors and excess heat in the water will radiate from the solar collectors reducing the temperature of the water. The water will circulate for a period of time and until the water temperature in the solar storage tank is around 60°C to 70°C. The water heater will then enter standby mode.

### *Freeze Protection operation*

The purpose of Freeze Protection operation is to prevent freezing of water in the solar collectors and solar pipe work in very cold conditions. The water in the solar collectors will cool during periods of no solar gain. In very cold conditions, such as overnight and very early in the morning before sunrise, the water temperature can approach freezing point.

If the hot sensor measures that the water temperature in the solar collectors is approaching freezing, the circulator will activate. Water from the solar storage tank, containing more energy than the water in the solar collectors, will circulate through the solar collectors keeping the water temperature above freezing point. The circulator will remain on for some minutes and until the hot sensor measures a water temperature at a safe level above freezing. When both of these conditions are met, the circulator will deactivate. The water heater will then enter standby mode.

This process will repeat whenever the hot sensor measures that the water temperature in the solar collectors is approaching freezing.

The anti-freeze heating unit in a frost element model will turn on when the circulator activates and the cold sensor measures a very low water temperature at the bottom of the solar storage tank. The purpose of the anti-freeze heating unit is to provide additional energy to the water to assist in the prevention of freezing in the solar pipe work and solar collectors. The anti-freeze heating unit will turn off when either the water temperature has risen by a few degrees or the circulator deactivates. The water heater will then enter standby mode.

Refer to "[Freeze Protection](#)" on page 9 and "[Pipe Work and Insulation](#)" on page 8.



**HOTTER WATER INCREASES THE RISK OF SCALD INJURY**

This water heater can deliver water at temperatures which can cause scalding. Check the water temperature before use, such as when entering a shower or filling a bath or basin, to ensure it is suitable for the application and will not cause scald injury.

We recommend and it may also be required by regulations that an approved temperature limiting device be fitted into the hot water pipe work to the bathroom and ensuite when this water heater is installed. This will keep the water temperature below 50°C at the bathroom and ensuite. The risk of scald injury will be reduced and still allow hotter water to the kitchen and laundry.

** WARNING**

This water heater is only intended to be operated by persons who have the experience or the knowledge and the capabilities to do so. This water heater is not intended to be operated by persons with reduced physical, sensory or mental capabilities i.e. the infirm, or by children. Children should be supervised to ensure they do not interfere with the water heater.

This water heater uses 240 V AC electrical power for operation of the control systems and the electrically operated components. The removal of the front cover or solar control unit cover will expose 240 V wiring. It must only be removed by a qualified person.

The power lead from the solar controller must be plugged into a weatherproof electrical outlet if installed outdoors. Take care not to touch the power plug with wet hands.

Care should be taken not to touch any exposed pipe work or fittings connecting the solar storage tank and the solar collector(s), as this may result in a burn injury. Very high temperature hot water and in some circumstances high temperature steam can be generated by the solar collector(s) under certain conditions and flow through the pipe work from the solar collector(s) to the solar storage tank.


**Note:** Any exposed pipe work or fittings in the solar circuit should be attended to and covered with insulation. Phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.

**SAFETY**

This water heater is supplied with a thermostat, an over temperature energy cut-out, temperature sensors and a combination temperature pressure relief valve. These devices must not be tampered with or removed. The water heater must not be operated unless each of these devices is fitted and is in working order.

The operation of the over-temperature cut-out on the thermostat indicates a possibly dangerous situation. If the over-temperature cut-out operates, it must not be reset and the water heater must be serviced by a qualified person.

If the power supply cord or plug to the solar control unit or the electrical conduit to the solar storage tank is damaged, it must be replaced by a qualified person in order to avoid a hazard. The power supply cord and plug must be replaced with a genuine replacement part available from Rheem. Phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.

** Warning:** For continued safety of this water heater it must be installed, operated and maintained in accordance with the Owner's Guide and Installation Instructions.

**The Vulcan warranty may not cover faults if relief valves or other safety devices are tampered with or if the installation is not in accordance with these instructions.**

## PRECAUTIONS

Where damage to property can occur in the event of the water heater leaking, the water heater must be installed in a safe tray. Construction, installation and draining of a safe tray must comply with AS/NZS 3500.4 and all local codes and regulatory authority requirements.

The water heater must be maintained in accordance with the Owner's Guide and Installation Instructions. Refer to "Regular Care" on page 13 and to "Anode Inspection and Replacement" on page 17.

If this water heater is to be used where an uninterrupted hot water supply is necessary for your application or business you should ensure that you have back up redundancy within the hot water system design. This should ensure the continuity of hot water supply in the event that this water heater were to become inoperable for any reason. We recommend you seek advice from your plumber or specifier about your needs and building back up redundancy into your hot water supply system.

## PIPE WORK AND INSULATION

The solar hot and solar cold pipe work between the solar storage tank and the solar collector(s) and between the solar storage tank and a remote in-series water heater (if one is installed) **MUST BE** of copper.

The full length of the solar hot and solar cold pipes **MUST BE** insulated. The insulation must:

- be of a closed cell type or equivalent, suitable for a solar water heating application and capable of withstanding the temperature of the water generated by the solar collectors under stagnation conditions
- be at least 13 mm thick, however thicker insulation may be required to comply with the requirements of AS/NZS 3500.4
- be weatherproof and UV resistant if exposed
- extend through any penetrations in the eaves, ceiling and roof
- cover valves and fittings in the solar hot and solar cold pipe work
- be fitted up to and cover the connections on both the solar storage tank and the solar collectors.

**Note: Failure of these requirements to be observed increases the risk of freeze damage.**

Uninsulated pipe work, including concealed in cavities and roof spaces or where it may be in contact with a metal roof, may lead to freeze damage. There is NO WARRANTY for freeze damage if the solar hot and solar cold pipes are not insulated in accordance with the installation instructions.

**Note:** Any exposed pipe work or fittings in the solar circuit should be attended to and covered with insulation. Phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.

The insulation is essential to assist in providing freeze protection, will offer corrosion protection to a metal roof against water runoff over the copper pipe, assist in avoiding accidental contact with the solar pipe work as high temperature water can flow from the solar collectors to the solar storage tank and also reduce pipe heat losses.

Plastic pipe **MUST NOT** be used, as it will not withstand the temperature and pressure of the water generated by the solar collectors under certain conditions (refer to Warning on page 40).



**FREEZE PROTECTION**

The system has a level of freeze protection designed to guard the system against damage from freeze conditions. The system must be installed with the full length of the solar hot and solar cold pipes insulated and power must be available at the solar control unit to offer protection against freeze damage (refer to “[Pipe Work and Insulation](#)” on page 8). Freeze conditions occur below 6°C.

**Note:** The Vulcan warranty against freeze damage applies only to systems installed in Australia.

The system has NO WARRANTY for freeze damage when installed above 400 metres altitude or if the solar hot and solar cold pipes are not insulated in accordance with the installation instructions or if power is not available at the solar control unit (refer to “[Terms of the Vulcan Warranty](#)” on page 55).

The anti freeze control is designed to recirculate a small amount of water from the solar storage tank through the solar pipe work and solar collector(s) during periods of low temperatures. This is to prevent the water inside the pipe work and solar collector(s) from freezing. It is essential the electrical circuit to the solar control unit is continually turned on if there is a risk of freezing. The Vulcan warranty does not cover damage caused by freeze conditions when the electrical circuit to the solar control unit is turned off or interrupted.

Additional freeze protection is provided by the anti-freeze heating unit. The anti-freeze heating unit is for heating the water at the bottom of the solar storage tank at times of low cold water temperature. The anti-freeze heating unit provides additional energy to the water to assist in the prevention of freezing in the solar pipe work and solar collector(s). The anti-freeze heating unit is controlled by the solar controller and will only be energised when the water temperature is very low and the circulator activates in the Freeze Protection operation mode. The water temperature is monitored by the cold sensor.

If the water temperature at the bottom of the solar storage tank is very low when the circulator activates in the Freeze Protection operation mode, the anti-freeze heating unit will be energised and will heat the water by a few degrees. The anti-freeze heating unit will be de-energised when either the frost mode is shut down or the water temperature has risen by a few degrees.

It is essential the electrical circuit to the solar control unit is continually turned on if there is a risk of freezing.

An over temperature energy cut out is incorporated in a thermostat which is mounted on the solar storage tank behind the front cover.

**Notes:**

- The system is not covered for freeze damage above 400 metres altitude.
- The freeze protection system will be rendered inoperable if electrical power is not available at the solar control unit. Damage caused by freezing due to no power at the solar control unit, is not covered by the Vulcan warranty.
- If it is necessary to switch the power off to the solar control unit and there is a risk of freezing, then it is necessary to have your plumber drain the solar collector(s) and solar flow and return pipe work.
- Refer to “[Terms of the Vulcan Warranty](#)” on page 55.

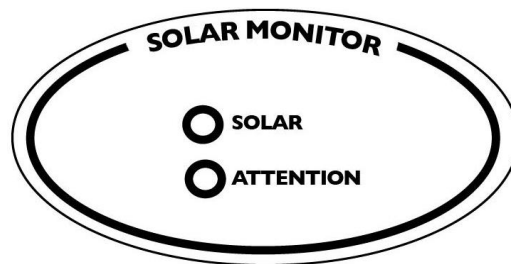
**SOLAR MONITOR**

A solar monitor is located on the side of the solar control unit and houses a green and a red LED.

The green LED, marked “Solar”, indicates the current operational mode of the solar water heater and the red LED, marked “Attention”, may indicate a potential fault mode.

The green LED will emit either a constant glow, a constant pulsing or a series of flashes, with a 2 second interval between each series.

The red LED will emit either a constant glow, a constant pulsing or a series of flashes with a 2 second interval between each series. A constant glow or pulsing does not necessarily mean there is a fault with the system. A series of flashes indicates there may be a particular fault condition with the system.



The modes are:

Flashes	Operational Modes	Flashes	Indicator or Fault Modes
solid green (remains on)	Standby mode	solid red (remains on)	Hot sensor temperature greater than 130°C
green slow pulse	Standby mode (power on for less than 48 hours)	red rapid pulse	Temperature rise across collector greater than 45°C (circulator at full speed)
green rapid pulse	Circulating water through collectors	3 x red	Hot sensor in collector – short circuit
3 x green	Circulating water through collectors (power on for less than 48 hours)	4 x red	Hot sensor in collector – open circuit
no green (remains off)	Power outage or call for service	5 x red	Cold sensor –short circuit
		6 x red	Cold sensor – open circuit

If the power supply to the solar control unit is on and the green LED is off or the red LED is flashing, this indicates there may be a fault with the water heater. The red LED may emit from three to six flashes in each series of flashes. A constant glow or pulsing of the red LED does not necessarily mean there is a fault with the system.

**Notes:**

- If the system is in standby mode with the green LED emitting either a constant glow or slow pulsing flashes (circulator is off) and the solar storage tank is full of hot water, the red LED may simultaneously emit a constant glow if solar radiation is still being received by the solar collectors. This does not indicate a fault. The red LED will go out when the temperature in the solar collectors decreases.
- During periods of high solar radiation and the circulator activates after having been off (the green LED will emit either a rapid pulse or a series of three flashes), it is possible the red LED may simultaneously emit a rapid pulse for a period of up to ten (10) minutes. This does not indicate a fault.

If the red LED continues to emit a rapid pulse for longer than ten (10) minutes, or emits a series of flashes, then count the number of flashes and phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.

**BLEEDING THE SOLAR COLLECTOR(S)**

It is necessary to purge air from the collector circuit:

- When the water heater is to be turned on and the solar collector(s) and solar hot and solar cold pipes have been drained.
- After maintenance has been conducted on the pipe work and air has entered the system.
- If the circulator appears not to be circulating water around the system.

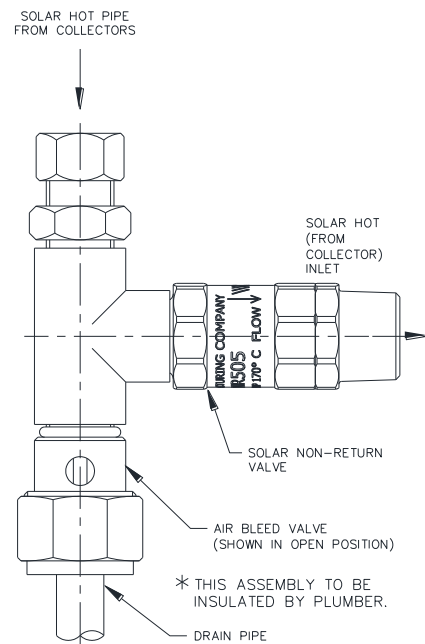
**⚠ Warning:** It is important bleeding of the collector circuit be conducted early in the morning, within three hours of sunrise, when the sun is low in the sky. The water temperature inside the solar collector(s) is lower as the solar collector(s) would not have had a chance to gain as much heat as later in the day. Bleeding the collector circuit at a time later than this can result in the discharge of high temperature water and in some circumstances, high temperature steam.

To purge air from the collector circuit:

- Ensure the water heater is full of water and all of the hot taps are turned off.
- Using a flat blade screwdriver, open the bleed valve fitted adjacent to the solar hot water (from collector) inlet of the solar storage tank (see diagram).
- The mains pressure will force water to flow from the tank and through the pipe work, expelling air from the collector circuit through the bleed valve. This is evidenced by spurtling of water from the drain line connected to the bleed valve.

**⚠ Warning:** Stand well aside of the air bleed valve drain pipe discharge point and exercise care to avoid any splashing of water, as water or in some circumstances steam discharged from the solar collector(s) may be of a very high temperature.

- Close the bleed valve when water runs freely from the drain line.



\* THIS ASSEMBLY TO BE INSULATED BY PLUMBER.

**TO TURN OFF THE WATER HEATER**

If you plan to be away from home for a few nights, we suggest you leave the water heater switched on.

If it is necessary to turn off the water heater:

- Switch off the electrical supply at the power outlet to the solar control unit (refer to note below).
- Close the cold water isolation valve at the inlet to the water heater.
- Refer to the Owner’s Guide and Installation Instructions supplied with the in-series water heater for the procedure to turn off the in-series water heater.

**Notes:**

- The freeze protection system will be rendered inoperable if electrical power is not available at the solar control unit. Damage caused by freezing due to no power at the solar control unit is not covered by the Vulcan warranty. Refer to “[Terms of the Vulcan Warranty](#)” on page 55.
- If there is a risk of freezing, the electrical supply to the solar control unit should not be switched off unless the solar collector(s) and solar flow and return pipe work are drained, otherwise damage could result (refer to “[Freeze Protection](#)” on page 9).

## TO TURN ON THE WATER HEATER

- Open the cold water isolation valve fully at the inlet to the water heater.
- If the solar collector(s) and solar hot and solar cold pipes have been drained, it will be necessary to bleed the collector circuit (refer to [“Bleeding the Solar Collector\(s\)”](#) on page 11).

If the electrical supply to the water heater has been switched off:

- Switch on the electrical supply at the power outlet to the solar control unit.

The power outlet must be switched on for the solar control unit to operate and solar gain to be achieved and for the anti-freeze heating unit to operate and offer additional freeze protection.

## GOING ON HOLIDAYS

It is not necessary to switch off the electrical supply at the power outlet to the solar control unit. Refer to [“To Turn Off The Water Heater”](#) on page 11. Also if the system is not used for a period in excess of 2 weeks it is recommended the solar collector(s) be covered.

## HOW DO I KNOW IF THE WATER HEATER IS INSTALLED CORRECTLY?

Installation requirements are [shown on pages 25 and 33](#). The water heater must be installed:

- by a qualified person, and
- in accordance with the installation instructions, and
- in compliance with Standards AS/NZS 3500.4, AS/NZS 3000, AS 5601 or AS/NZS 5601.1, as applicable under local regulations, and all local codes and regulatory authority requirements.

In New Zealand, the installation must also conform with NZS 5261, as applicable under local regulations, and Clause G12 of the New Zealand Building Code.

**⚠ Warning:** Temperature controllers **must not** be fitted to the in-series water heater as part of a solar water heater system because water at a temperature much higher than the controller setting can be delivered.

Refer also to [“Pipe Work and Insulation”](#) on page 8.

## VICTORIAN CUSTOMERS

Notice to Victorian Customers from the Victorian Plumbing Industry Commission. This water heater must be installed by a licensed person as required by the Victorian Building Act 1993.

Only a licensed person will give you a Compliance Certificate, showing that the work complies with all the relevant Standards. Only a licensed person will have insurance protecting their workmanship for 6 years. Make sure you use a licensed person to install this water heater and ask for your Compliance Certificate.

## DOES THE WATER CHEMISTRY AFFECT THE WATER HEATER?

The water heater is suitable for most public water supplies, however some water chemistries may have detrimental effects on the water heater, the solar collectors, components and fittings. Refer to [“Water Supplies”](#) on page 16.

If you are in a known harsh water area or you are not sure of your water chemistry, have your water checked against the conditions [described on pages 16 to 18](#).

## HOW LONG WILL THE WATER HEATER LAST?

The water heater is supported by a manufacturer’s warranty ([refer to page 55](#)). There are a number of factors that will affect the length of service the water heater will provide. These include but are not limited to the water chemistry, the water pressure, the water temperature (inlet and outlet) and the water usage pattern. Refer to [“Precautions”](#) on page 8.

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## REGULAR CARE

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### MINOR SIX MONTH MAINTENANCE

It is recommended minor maintenance be performed every six months by the dwelling occupant.

The minor maintenance includes:

- Operate the easing lever on the temperature pressure relief valve. It is very important you raise and lower the lever gently. Refer to [“Temperature Pressure Relief Valve”](#) on page 14.

**⚠ Warning:** Exercise care to avoid any splashing of water, as water discharged from the drain line will be hot. Stand clear of the drain line’s point of discharge when operating the valve’s lever.

- Operate the easing lever on the expansion control valve (if fitted). It is very important you raise and lower the lever gently. Refer to [“Expansion Control Valve”](#) on page 14.
- Check the drain line from the safe tray (if one is installed) is not blocked.
- Check the status of the LEDs. The green LED should be illuminated (either solid, pulsing or flashing). The red LED should be off. Refer to [“Solar Monitor”](#) on page 10 and [“Household Maintenance Around the Solar Storage Tank”](#) on page 15.

It is important to ensure the solar controller and circulator are operating correctly, particularly at the onset of the colder winter season. Solar gain will not be achieved and the freeze protection system will be rendered inoperative if the solar controller or circulator are not operating.

If this solar storage tank is installed with an integrated or remotely installed Rheem in-series continuous flow gas booster, it is recommended minor maintenance be performed every six months on the gas booster by the dwelling occupant. Another type of in-series booster may have its own recommended minor maintenance schedule. Refer to the Owner’s Guide and Installation Instructions supplied with the booster water heater for information regarding its recommended maintenance.

### MAJOR FIVE YEAR SERVICE

It is recommended a major five year service be conducted on the water heater.

**⚠ Warning:** Servicing of a water heater must only be carried out by a qualified person. Phone Rheem Service or their nearest Accredited Service Agent.

**Note:** The five year service and routine replacement of any components, such as the anode and relief valves, are not included in the Vulcan warranty. A charge will be made for this work. Only genuine replacement parts should be used on this water heater.

The major service includes the following actions:

- Replace the temperature pressure relief valve.
- Inspect and flush the expansion control valve (if fitted). If required, replace the valve.
- Inspect and if required, replace the anode.

If the anode is not replaced, it should be replaced within three years of this service (refer to [“Anode Inspection and Replacement”](#) on page 17).

- Check the electric heating unit for excessive calcium build up or corrosion and replace if necessary.
  - Check the solar control unit for correct operation.
  - Flush and bleed the solar collectors.
  - Clean the collector glass.
  - Check the insulation on the solar hot and solar cold pipes. If required, insulate exposed pipe work and repair or replace degraded insulation.
  - Visually check the unit for any potential problems.
  - Inspect all connections.
  - Check the drain line from the safe tray (if one is installed) is not blocked.
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**Note:** The solar storage tank may need to be drained during this service. After the completion of the service, the solar storage tank will take some time to reheat the water by solar gain.

If this solar storage tank is installed with an integrated or remotely installed Rheem in-series continuous flow gas booster, then for the booster's safe and efficient operation, it is recommended a five year service be conducted on the gas booster. Another type of in-series booster may have its own recommended service schedule. Refer to the Owner's Guide and Installation Instructions supplied with the booster water heater.

**TEMPERATURE PRESSURE RELIEF VALVE**

This valve is near the top of the water heater and is essential for its safe operation. It is possible for the valve to release a little water through the drain line during each heating period. This occurs as the water is heated and expands by approximately 1/50 of its volume.

Continuous leakage of water from the valve and its drain line may indicate a problem with the water heater (refer to "Temperature Pressure Relief Valve Running" on page 20).

**Warning:** Never block the outlet of this valve or its drain line for any reason.

Operate the easing lever on the temperature pressure relief valve once every six months. **It is very important you raise and lower the lever gently.**

**DANGER:** Failure to do this may result in the water heater cylinder failing, or under certain circumstances, exploding.

**Warning:** Exercise care to avoid any splashing of water, as water discharged from the drain line will be hot. Stand clear of the drain line's point of discharge when operating the valve's lever.

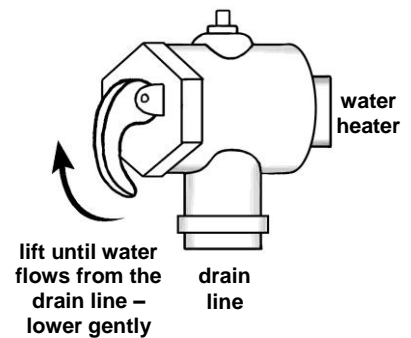
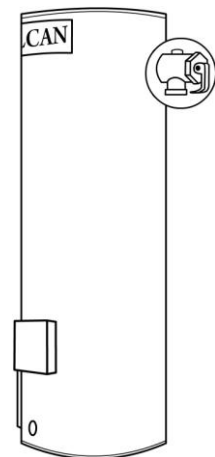
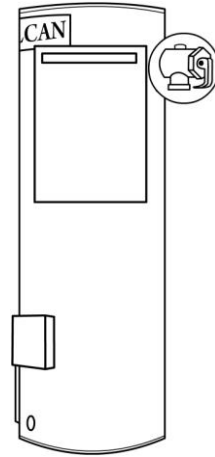
If water does not flow freely from the drain line when the lever is lifted, then the water heater must be checked. Phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.

The temperature pressure relief valve should be replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits (refer to "Water Supplies" on page 16).

**EXPANSION CONTROL VALVE**

In many areas, including South Australia, Western Australia and scaling water areas, an expansion control valve is fitted to the cold water line to the water heater. The expansion control valve may discharge a small quantity of water from its drain line during the heating period instead of the temperature pressure relief valve on the water heater.

Operate the easing lever on the expansion control valve once every six months. **It is very important you raise and lower the lever gently.** The expansion control valve should be checked for performance or replaced at intervals not exceeding 5 years, or more frequently in areas where there is a high incidence of water deposits.



### COLLECTOR GLASS

Ensure the glass on your solar collector(s) is free of dust, salt spray or any other matter, which may reduce the effectiveness of the solar collector(s). If the collector glass becomes dirty, hose down or if the solar collector(s) are accessible, wash the collector glass with water and a soft brush when the solar collector(s) are cool.

Have any trees trimmed which may shade the solar collector(s).

Rheem solar collectors have passed the AS/NZS 2712 requirements for resistance to hailstone damage, so it is not normally necessary to fit a guard to a collector. Stone Guards are available for the HBT200 solar collector to provide a level of protection to the collectors against vandalism or accidental damage. Refer to your local Solar Distributor for details.

### FLUSHING THE SOLAR COLLECTOR(S)

It may be necessary to flush the solar collector(s) if there is sediment in the water supply. This should be conducted in the morning, within three hours of sunrise.

**⚠ Warning:** It is important flushing of the solar collector(s) be conducted early in the morning, within three hours of sunrise, when the sun is low in the sky. The water temperature inside the solar collector(s) is lower as the solar collector(s) would not have had a chance to gain as much heat as later in the day. Flushing the solar collector(s) at a time later than this can result in the discharge of high temperature water and in some circumstances, high temperature steam.

To flush the solar collector(s):

- Open a hot water tap and allow the water to run for five (5) minutes prior to flushing the solar collector(s).
- Close the hot tap.
- Wait a further five (5) minutes before attempting to flush the solar collector(s).

This will assist in the transfer of any high temperature water in the solar collector(s) to the solar storage tank.

**⚠ Warning:** Exercise care, as water discharged from the solar collector(s) may be of a very high temperature.

- To flush the solar collector(s), follow the procedure [“Bleeding the Solar Collector\(s\)”](#) on page 11, allowing the water to flow from the bleed valve drain line for five minutes before closing the bleed valve.

It is recommended to flush the solar collector(s) every five years. This will assist in keeping the solar collector(s), solar cold pipe and solar hot pipe clear of sediment.

### HOUSEHOLD MAINTENANCE AROUND THE SOLAR STORAGE TANK

Care should be taken when conducting general household maintenance, such as lawn mowing and grass cutting, around the solar storage tank. Careless use of devices such as a whipper snipper could damage or cut a sensor lead, or electrical cable or conduit.

If a sensor lead, or electrical cable or conduit is damaged or cut, solar contribution may not be achieved and the freeze protection system may be rendered inoperative. In addition, if the electrical cable or conduit has been damaged or cut, wiring may be exposed leading to a dangerous situation.

# WATER SUPPLIES

**This water heater must be installed in accordance with this advice to be covered by the Vulcan warranty.**

This water heater is manufactured to suit the water conditions of most public reticulated water supplies. However, there are some known water chemistries which can have detrimental effects on the water heater and its operation and / or life expectancy. If you are unsure of your water chemistry, you may be able to obtain information from your local water supply authority. This water heater should only be connected to a water supply which complies with these guidelines for the Vulcan warranty to apply.

### CHANGE OF WATER SUPPLY

The changing or alternating from one water supply to another can have a detrimental effect on the operation and / or life expectation of a water heater cylinder, a temperature pressure relief valve, a heating unit and a solar collector in a direct solar water heater system.

Where there is a changeover from one water supply to another, e.g. a rainwater tank supply, bore water supply, desalinated water supply, public reticulated water supply or water brought in from another supply, then water chemistry information should be sought from the supplier or it should be tested to ensure the water supply meets the requirements given in these guidelines for the Vulcan warranty to apply.

### ANODE

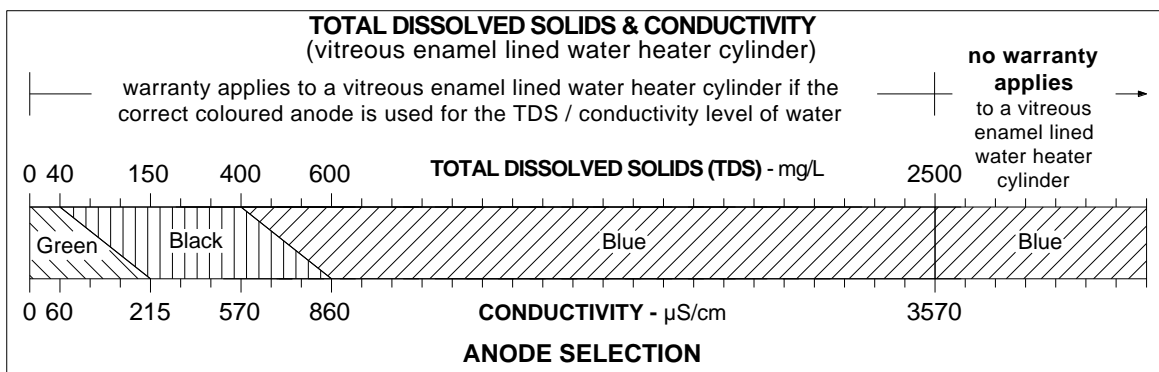
The vitreous enamel lined cylinder of the water heater is only covered by the Vulcan warranty when the total dissolved solids (TDS) content in the water is less than 2500 mg/L and when the correct colour coded anode is used. If an incorrect colour coded anode is used in the water heater, any resultant faults will not be covered by the Vulcan warranty. In addition, the use of an incorrect colour coded anode may shorten the life of the water heater cylinder.

The correct colour coded anode must be selected and fitted to the water heater in accordance with the following advice and the [Anode Selection chart](#) on page 16 for the Vulcan warranty to apply to the water heater cylinder.

Total Dissolved Solids	Anode colour code
0 – 40 mg/L	Green
40 – 150 mg/L	Green or Black
150 – 400 mg/L	Black
400 – 600 mg/L	Black or Blue
600 – 2500 mg/L	Blue
2500 mg/L +	Blue (no cylinder warranty)

The changing of an anode must be carried out by a qualified person.

**Note:** Some water analysis reports may state the conductivity of the water rather than the level of total dissolved solids. Conductivity, measured in microsiemens per centimetre ( $\mu\text{S} / \text{cm}$ ), is directly proportional to the TDS content of the water. TDS, in mg / L, is approximately 70% of the conductivity in  $\mu\text{S} / \text{cm}$ .





**ANODE INSPECTION AND REPLACEMENT**

The anode installed in a vitreous enamel lined steel water heater cylinder will slowly dissipate whilst protecting the cylinder. The life of the cylinder may be extended by replacing the anode.

If the anode is not replaced during a five year service (refer to [“Major Five Year Service”](#) on page 13) then the maximum time after installation when the anode should be replaced is 8 years.

For water supplies which are either softened, desalinated or where the water supply may alternate between a water tank and a reticulated public supply or another supply, it is recommended the anode be replaced within 5 years of installation.

**CAUTION**

If the water supply has a TDS greater than 150 mg/L and a green anode has not been changed to a black anode, or if the TDS is greater than 600 mg/L and the anode has not been changed to a blue anode, there is the possibility the anode may become overactive and hydrogen gas could accumulate in the top of the water heater during long periods of no use.

If, under these conditions, the water heater has not been used for two or more weeks the following procedure should be carried out before using any electrical appliances (automatic washing machines and dishwashers) which are connected to the hot water supply.

The hydrogen, which is highly flammable, should be vented safely by opening a hot tap and allowing the water to flow. There should be no smoking or naked flame near the tap whilst it is turned on. Any hydrogen gas will be dissipated. This is indicated by an unusual spurting of the water from the tap. Once the water runs freely, any hydrogen in the system will have been released.

**SATURATION INDEX**

The saturation index is used as a measure of the water's corrosive or scaling properties.

In a corrosive water supply, the water can attack copper parts and cause them to fail.

Where the saturation index is less than  $-1.0$ , the water is very corrosive and the Vulcan warranty does not apply to a copper sheathed heating unit or to a solar collector in a direct solar water heater system. A corrosion resistant heating unit must be used for the Vulcan warranty to apply to the heating unit.

In a scaling water supply calcium carbonate is deposited out of the water onto any hot metallic surface.

Where the saturation index exceeds  $+0.40$ , the water is very scaling. An expansion control valve must be fitted on the cold water line after the non-return valve to protect and for the Vulcan warranty to apply to the temperature pressure relief valve and water heater cylinder. Solar collectors in a direct solar water heater system should be covered when the water heater is not intended to be used for more than two weeks.

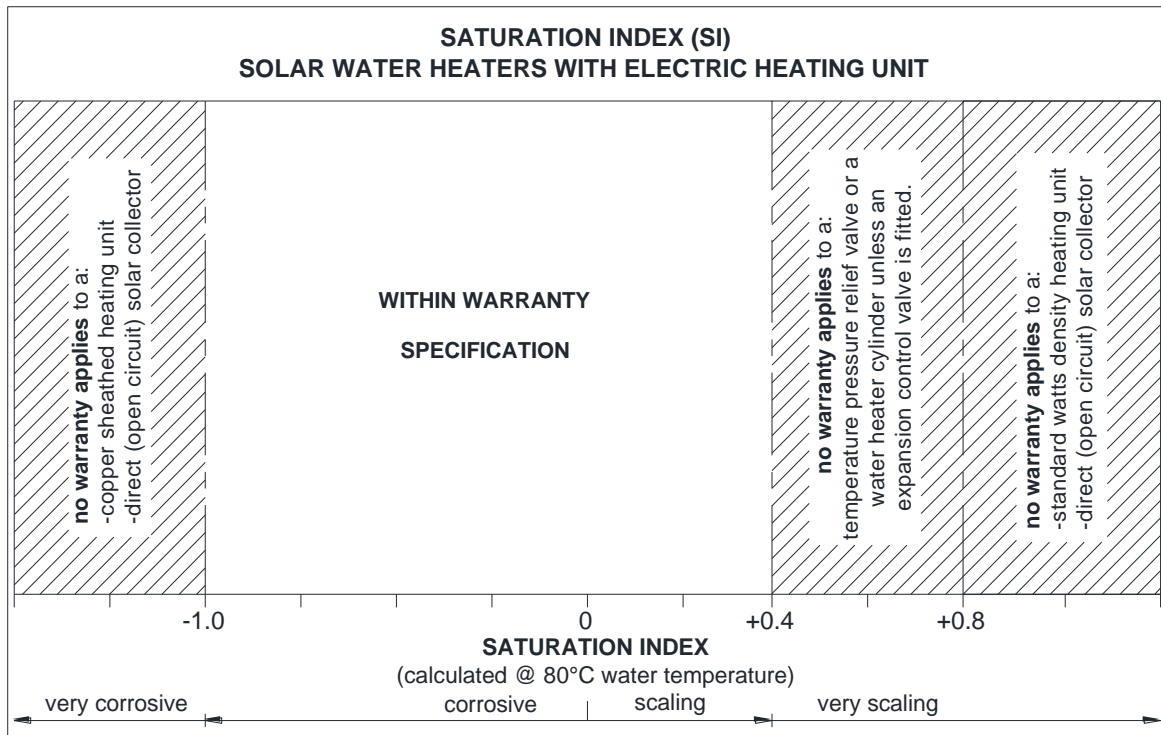
Where the saturation index exceeds  $+0.80$ , the Vulcan warranty does not apply to a standard watts density heating unit or to a solar collector in a direct solar water heater system. A low watts density heating unit must be used for the Vulcan warranty to apply to the heating unit.

Water which is scaling may be treated with a water softening device to reduce the saturation index of the water.

Refer to the [Saturation Index chart](#) on page 18.

Contact Rheem Service or their nearest Accredited Service Agent if a replacement heating unit is required.

Refer to the [cold water connection detail on page 42](#) for the position of the expansion control valve.



**SUMMARY OF WATER CHEMISTRY ADVICE AFFECTING WARRANTY**

The water heater, solar collectors and their components are not suitable for certain water chemistries. Those chemistries are listed below. If the water heater is connected at any time to a water supply with the following water chemistry, the Vulcan warranty will not cover any resultant faults on the components listed below:

**Water Chemistry**

- Total Dissolved Solids (TDS) > 2500 mg/L
- Total Dissolved Solids (TDS) not suitable for anode type
- Saturation Index (SI) < -1.0
- Saturation Index (SI) > +0.4  
(if an expansion control valve is not fitted)
- Saturation Index (SI) > +0.8

**Component**

- water heater cylinder
- water heater cylinder
- solar collector
- copper sheathed heating unit
- water heater cylinder
- temperature pressure relief valve
- solar collector
- standard watts density heating unit

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## SAVE A SERVICE CALL

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Check the items below before making a service call. You will be charged for attending to any condition or fault that is not related to manufacture or failure of a part.

### NOT ENOUGH HOT WATER (OR NO HOT WATER)

- **Insufficient sunlight**

Insufficient sunlight due to cloudy weather during hotter months or low solar energy contribution in colder months may mean the in-series water heater operates more often.

- **Solar Control Unit**

Check the power supply cord is plugged in and the power outlet switched on.

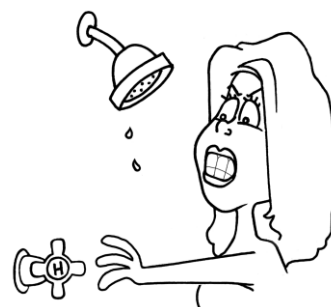
Is power available in the house? Try using another electrical appliance.

- **Green LED is off or red LED is flashing on Solar Monitor**

If the green LED is off or the red LED is flashing on the Solar Monitor label, there may be a problem with the solar water heater operation and solar gain is not being achieved. This will result in the in-series gas booster operating to provide all of the hot water required.

Switch off the electrical supply at the power outlet to the solar control unit for a few seconds, then switch on again.

If the green LED remains off or the red LED recommences to flash, then count the number of flashes and phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.



- **Collector(s) shaded**

If trees or other objects shade the solar collector(s) or if the glass is dirty, the effectiveness of the solar collector(s) will be greatly reduced.

Have the trees trimmed or the solar collector(s) relocated if the obstruction is permanent or clean the collector glass.

Refer to “[Collector Glass](#)” on page 15.

- **Collector area is too small**

For most installations, the number of solar collector(s) recommended in Vulcan literature has been proven to provide the required solar energy to meet the average family needs. However, in some circumstances, it may be necessary to install a second solar collector.

- **Air in collector(s) (no solar gain)**

It is possible under certain conditions, such as when the pipe work has been opened, that air may become trapped in the solar collector(s). This will prevent the circulator from moving water around the collector circuit. The air will need to be purged from the solar collector(s) (refer to “[Bleeding The Solar Collector\(s\)](#)” on page 11).

- **Are you using more hot water than you think?**

Is one outlet (especially the shower) using more hot water than you think?

Very often it is not realised the amount of hot water used, particularly when showering. Carefully review the family’s hot water usage. As you have installed an energy saving appliance, energy saving should also be practised in the home. Adjust your water usage pattern to take advantage of maximum solar gains.

Have your plumber install a flow control valve to each shower outlet to reduce water usage.

- **Temperature pressure relief valve running**

Is the relief valve discharging too much water?

Refer to “[Temperature Pressure Relief Valve Running](#)” on page 20.

### TEMPERATURE PRESSURE RELIEF VALVE RUNNING

- **Normal Operation**

It is normal and desirable this valve allows a small quantity of water to escape during the heating cycle. However, if it discharges more than a bucket full of water in 24 hours, there may be another problem.

- **Continuous dribble**

Try gently raising the easing lever on the relief valve for a few seconds (refer to “[Temperature Pressure Relief Valve](#)” on page 14). This may dislodge a small particle of foreign matter and clear the fault. Release the lever gently.

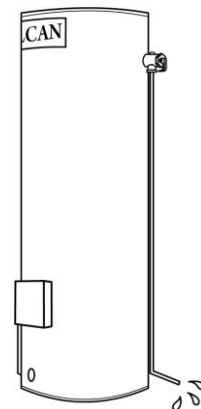
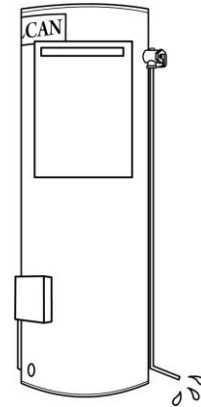
- **Steady flows for long period (often at night)**

This may indicate the mains water pressure sometimes rises above the designed pressure of the water heater. Ask your installing plumber to fit a pressure limiting valve.

**⚠ Warning:** Never replace the relief valve with one of a higher pressure rating.

- **Heavy flows of hot water until the water heater is cold - then stops until water reheats**

The water heater **must** be switched off at the isolating switch or switchboard. Phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.



### EXPANSION CONTROL VALVE RUNNING

If an expansion control valve is fitted in the cold water line to the water heater (refer to page 42) it may discharge a small quantity of water instead of the temperature pressure relief valve on the water heater. The benefit is that energy is conserved as the discharged water is cooler.

### IN-SERIES WATER HEATER OPERATING TOO FREQUENTLY

You may find that the in-series water heater operates more frequently than expected. This will occur when the solar heated water temperature is lower than the temperature setting of the in-series water heater. This may be experienced during periods of low solar energy gain or if there has been heavy hot water usage.

### COLLECTOR GLASS

The Vulcan warranty **DOES NOT** cover breakage of solar collector glass. Check your household insurance policy covers collector glass breakage.

**⚠ Warning:** No attempt should be made to remove or replace broken collector glass.

The collector glass is not offered as a replacement part. Should the solar collector require replacement, contact Rheem Service or their nearest Accredited Service Agent.

### NOISE FROM THE SOLAR COLLECTORS

This water heater is installed with higher performing selective surface solar collector(s). During periods of higher solar radiation or lower hot water usage and the solar storage tank is full of hot water, the water heater may undergo Over-temperature operation (refer to “[Over-temperature operation](#)” on page 5). If this mode of operation has occurred and the circulator has deactivated, the water in the solar collector(s) will continue to gain heat and increase in pressure when solar radiation is still available. This increase in heat and pressure is greater when higher performing selective surface solar collector(s) are installed compared to non-selective surface collector(s).

When a hot tap is opened, this pressure is released and the high temperature water may turn to steam creating a sudden and loud rumbling noise and even a rattling or banging noise of the solar collector(s) against the roof cladding material. This results from the higher level of solar radiation and the water in the solar storage tank being at its maximum temperature and is not caused by a fault with the solar water heater.

**GREEN LED IS NOT ILLUMINATED ON SOLAR MONITOR**

Check the power outlet for the solar control unit is switched on.

If the power outlet for the solar control unit is switched on, switch off for a few seconds and then switch on again. If the green LED remains off there may be a fault with the water heater. Phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.

**RED LED ILLUMINATED ON SOLAR MONITOR**

The illumination of the red LED does not necessarily mean there is a fault with the system. A constant glow or rapid pulsing of the red LED indicates an operational mode of the water heater.

**Constant Glow**

When the water heater has entered Over-temperature operation, the water in the solar collector(s) will continue to gain heat whilst solar energy is still available. The red LED will commence to emit a constant glow when sufficient solar energy has been received to activate the circulator. This indicates a build up in temperature of the water in the solar collector(s) and does not represent a fault. The red LED will stop glowing when the circulator has moved the excess energy from the solar collector(s) to the solar storage tank.

When eight Over-temperature cycles have been completed and if solar energy is still available, the red LED will emit a constant glow until either a reasonable quantity of hot water is drawn from a tap or the water in the solar collector(s) loses energy and cools as the available solar energy is reduced, such as when the sun becomes lower in the sky in the late afternoon / early evening or the sky becomes very cloudy.

Refer to "[Over-temperature operation](#)" on page 5.

**Rapid Pulsing**

During Normal operation the red LED will rapid pulse if the temperature difference between the hot sensor and cold sensor is high due to excess heat in the solar collector(s). This may not represent a fault. The rapid pulsing of the red LED will cease as the water circulates transferring the excess heat from the solar collector(s) to the solar storage tank and the temperature difference between the hot sensor and cold sensor reduces. This should be within four (4) to five (5) minutes, but may take up to ten (10) minutes.

If the red LED continues to emit a rapid pulse for longer than ten (10) minutes, switch off the electrical supply at the power outlet to the solar control unit for a few seconds, then switch on again. If the red LED continues to emit a rapid pulse for longer than ten (10) minutes, phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.

**Series of Flashes**

If the red LED is flashing this indicates there may be a fault with the water heater. The red LED may emit from three to six flashes in each series of flashes with a 2 second interval between each series.

If the red LED emits a series of flashes, switch off the electrical supply at the power outlet to the solar control unit for a few seconds, then switch on again. If the red LED illuminates again, then count the number of flashes and phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.

**CIRCULATOR OPERATES AT NIGHT**

The circulator can operate during periods of no solar energy, usually at night, under two operational modes of the water heater. This is by design and does not indicate a fault.

*Freeze Protection operation:* The circulator will activate (green LED rapid pulse or 3 flashes) if the water temperature in the solar collector(s) approaches freezing point. This occurs in very cold conditions, such as overnight and very early in the morning before sunrise. The purpose of the Freeze Protection operation is to prevent freezing of water in the solar collector(s) and solar pipe work. The circulator will remain on for some minutes and until the hot sensor measures a water temperature at a safe level above freezing from the storage tank. This process will repeat whenever the water temperature in the solar collector(s) approaches freezing point. Refer to "[Freeze Protection operation](#)" on page 5.

*Night Time Cooling operation:* The circulator will activate (green LED rapid pulse or 3 flashes) if the water heater has entered Over-temperature operation during that day. This can occur during periods of higher solar energy or lower hot water usage. Excess solar energy gained will be dissipated through the solar collector(s) until the water temperature in the solar storage tank decreases to a desired 60°C to 70°C. The circulator may remain on for some time. Refer to "[Night Time Cooling operation](#)" on page 5.

### HIGHER THAN EXPECTED GAS BILLS

With the installation of your new solar hot water system, maximum energy savings can be achieved with careful planning of hot water usage. Should you at any time feel your energy account is higher than expected, we suggest you check the following points:

- Is the relief valve running excessively?

Refer to [“Temperature Pressure Relief Valve Running”](#) on page 20).

- Is one outlet (especially the shower) using more hot water than you think?

Refer to [“Not Enough Hot Water”](#) on page 19.

- Is there a leaking hot water pipe, dripping hot water tap, etc?

Even a small leak will waste a surprising quantity of hot water and energy. Replace faulty tap washers, and have your plumber rectify any leaking pipe work.

- Is the in-series water heater operating too frequently?

Refer to [“In-Series Water Heater Operating Too Frequently”](#) on page 20.

- Has there been an increase in hot water usage?

An increase in hot water usage may result in an increase in booster operation.

- Has your water heating tariff rate been increased by your energy retailer since your previous account?



**IF YOU HAVE CHECKED ALL THE FOREGOING AND STILL BELIEVE YOU NEED ASSISTANCE, PHONE RHEEM SERVICE OR THEIR NEAREST ACCREDITED SERVICE AGENT.**

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## INSTALLATION – SYSTEM

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**THIS WATER HEATER IS FOR OUTDOOR INSTALLATION ONLY, IF AN IN-SERIES GAS BOOSTER IS MOUNTED ON THE STORAGE TANK.  
THIS WATER HEATER IS NOT SUITABLE FOR POOL HEATING.**

The system is suitable for installation with 1 x TBT260 or 1 or 2 x HBT 200 solar collector(s). The system is not suitable for installation above 400 metres altitude.

A single TBT260 solar collector may be installed up to 90° from the optimum orientation when installed as part of this system.

In Victoria, a 160 tank system with 1 x TBT260 solar collector installed within the Regulation Compliance Zone achieves compliance to new home legislation for water heating. Outside of the compliance zone 2 x HBT200 solar collectors should be used to achieve compliance.

In areas other than Victoria, 2 x HBT200 solar collectors should not be installed with this system.

### IMPORTANT NOTES

- Working on roofs is and should always be considered a hazardous activity, particularly early in the morning, late in the evening, when the roof is wet and during and after periods of rain.
- All work must be carried out in accordance with Local, State and Federal Occupational Safety, Health and Welfare Regulations. In particular, the requirements for safety whilst manual lifting, working at heights and on roofs.
- Installers must be competently trained in:
  - Height Hazard Assessment
  - Working at Height Procedures
  - Assessment / Use / Wearing of correct height safety equipment (harnesses etc.)
  - All other relevant safety factors specific to the installation and maintenance work to be compliant with suitable Occupational, Health and Safety Regulations / Codes.
- All relevant permits shall be obtained from the regulatory authorities before commencing work to install the solar hot water system.
- All work carried out must be performed by appropriately qualified tradespeople or be suitably supervised for trades assistant duties.
- Every care must be taken to protect and warn occupants of the building and the public from personal injury which may occur from falling tools, roof materials, fittings or any other hazards of a general nature.
- Advise the occupants of any inconvenience which may occur due to disconnection of existing water and electrical supplies.
- The connection, attachment, integration or general association of other equipment or parts which either directly or indirectly affect the operation or performance of this equipment could void the Vulcan warranty.
- All packaging materials must be removed from the solar storage tank prior to its installation. This includes the removal of the cardboard base of the carton from the underside of the solar storage tank.

### **FREEZE PROTECTION**

The system has a level of freeze protection designed to guard the system against damage from freeze conditions. The system must be installed with the full length of the solar hot and solar cold pipes insulated and power must be available at the solar control unit to offer protection against freeze damage (refer to “[Warning: Plumber Be Aware](#)” on page 40). Freeze conditions occur below 6°C. **Note:** The Vulcan warranty against freeze damage applies only to systems installed in Australia.

The system has NO WARRANTY for freeze damage when installed above 400 metres altitude or if the solar hot and solar cold pipes are not insulated in accordance with the installation instructions or if power is not available at the solar control unit (refer to “[Terms of the Vulcan Warranty](#)” on page 55).

### **INSTALLATION STANDARDS**

The water heater must be installed:

- by a qualified person, and
- in accordance with the installation instructions, and
- in compliance with Standards AS/NZS 3500.4, AS/NZS 3000, AS 5601 or AS/NZS 5601.1, as applicable under local regulations, and all local codes and regulatory authority requirements.

In New Zealand, the installation must also conform with NZS 5261, as applicable under local regulations, and Clause G12 of the New Zealand Building Code.

**⚠ Warning:** Temperature controllers **must not** be fitted to the in-series water heater as part of a solar water heater system because water at a temperature much higher than the controller setting can be delivered.

### **Victorian Installers**

Notice to Victorian Installers from the Victorian Plumbing Industry Commission if this solar water heater is installed in a new Class 1 dwelling in the State of Victoria. The system model number is to be recorded on the Certificate of Compliance. It is also a requirement to provide the householder with permanent documentation recording the system model number exactly as it is shown in the ‘List of systems capable of complying with the regulations’ published by Sustainability Victoria (see [www.sustainability.vic.gov.au](http://www.sustainability.vic.gov.au)). This documentation may be in the form of an indelible label adhered to the solar storage tank, or other suitable form placed in an accessible location, such as the meter box, for later inspection.

### **WATER HEATER APPLICATION**

This water heater is designed for use in a single family domestic dwelling for the purpose of heating potable water. Its use in an application other than this may shorten its life.

If this water heater is to be used where an uninterrupted hot water supply is necessary for the application or business, then there should be redundancy within the hot water system design. This should ensure the continuity of hot water supply in the event that this water heater was to become inoperable for any reason. We recommend you provide advice to the system owner about their needs and building backup redundancy into the hot water supply system.

This solar water heater is designed to be installed with a Rheem continuous flow 871 series 24 litre or a 874 series 18 litre in-series gas booster either mounted onto the storage tank or installed remotely, or a Rheem 874 series 27 litre in-series gas booster installed remotely. The solar water heater may be installed with another suitable type of remotely installed in-series continuous flow or storage booster. If the in-series water heater is other than a Rheem continuous flow 871 series 24 litre or a 874 series 18 litre or 27 litre in-series gas booster, then the references to the in-series gas booster in this guide may not be applicable to the installation.

For information relating to the function and operation of the in-series water heater, refer to the Owner’s Guide and Installation Instructions supplied with the water heater.

**Note:** AS 3498 requires that a water heater provides the means to inhibit the growth of Legionella bacteria in potable water. If this water heater is installed with an in-series continuous flow gas booster, then this requirement of AS 3498 can be satisfied provided the booster is energised, its preset outlet temperature setting is 70°C or higher and a remote temperature controller is not used.

If this water heater is installed with an in-series storage booster, then this requirement of AS 3498 can be satisfied provided the storage booster is energised and its thermostat setting is 60°C or higher.



# INSTALLATION – SOLAR STORAGE TANK

## SOLAR WATER HEATER STORAGE TANK LOCATION

The solar storage tank is suitable for either outdoor or indoor installation. If an in-series gas booster is mounted to the solar storage tank, then the installation must be outdoors. Whether located outdoor or indoor, the solar storage tank should be installed close to the most frequently used outlet and its position chosen with safety and service in mind.

Consideration must also be given to the position of the solar storage tank in relation to the solar collector(s). There are limitations on the maximum length of the solar hot and solar cold pipes between the solar storage tank and the solar collector(s). Refer to “Solar Collector Location” on page 37 and to “Pipe Lengths” on page 39.

Clearance must be allowed for servicing of the solar storage tank. The solar storage tank must be accessible without the use of a ladder or scaffold. Make sure the temperature pressure relief valve lever is accessible and the front cover, thermostat and booster heating unit can be removed for service.

You must be able to read the information on the rating plate. If possible leave headroom of one water heater height so the anode can be inspected or replaced. Remember you may have to remove the entire solar storage tank later for servicing.

It is recommended the solar storage tank be installed at ground or floor level and must stand vertically upright. The base of the water heater is made of corrosion resistant material, and it may be placed directly in contact with the supporting surface. It is not necessary to allow for free air circulation under the base of the water heater.

**Note:** The water heater should not be placed in direct contact with a concrete surface that is less than two months old and not fully cured as this may attack the metal coating of the water heater base. A moisture barrier should be used between the two surfaces in this instance.

Remember all local authorities have regulations about putting water heaters into roof spaces.

## SAFE TRAY

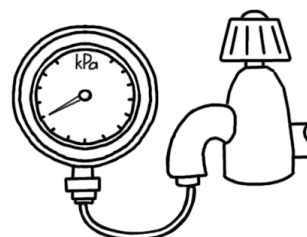
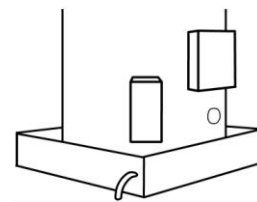
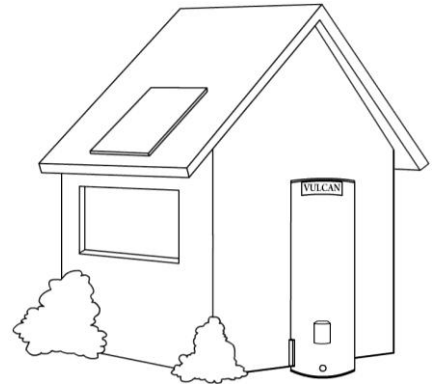
Where damage to property can occur in the event of the water heater leaking, the water heater must be installed in a safe tray. Construction, installation and draining of a safe tray must comply with AS/NZS 3500.4 and all local codes and regulatory authority requirements. AS/NZS 3500.4 also has particular requirements when a safe tray must be installed.

## MAINS WATER SUPPLY

Where the mains water supply pressure exceeds that shown in the table below, an approved pressure limiting valve is required and should be fitted as shown in the installation diagram (refer to diagram on page 42).

Model	160
Relief valve setting	1000 kPa
Expansion control valve setting *	850 kPa
Max. mains supply pressure	
With expansion control valve	680 kPa
Without expansion control valve	800 kPa
Min. mains supply pressure	200 kPa

\* Expansion control valve not supplied with the water heater.



### TANK WATER SUPPLY

If the water heater is supplied with water from a tank supply and a minimum water supply pressure of 200 kPa at the water heater cannot be achieved, then a pressure pump system must be installed to allow the solar circuit system to operate. Care must be taken to avoid air locks. The cold water line from the supply tank should be adequately sized and fitted with a full flow gate valve or ball valve. Consideration must be given to any minimum water supply pressure requirements of an in-series water heater.

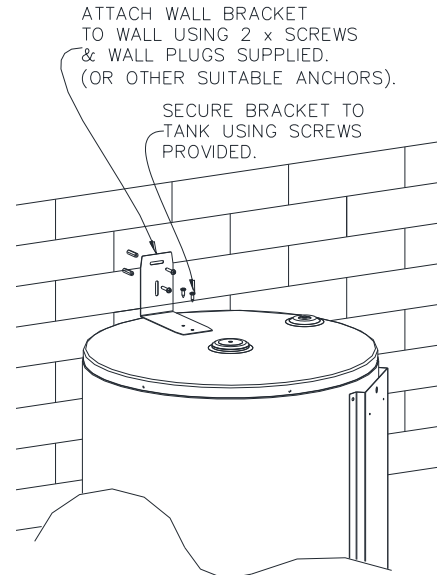
### WALL BRACKET

It is a requirement to secure the solar storage tank to the wall. Fit the wall bracket and secure the solar storage tank to the wall prior to the mounting of an in-series gas booster to the solar storage tank.

The top of the unit is to be secured to the wall with the wall bracket, wall plugs and screws provided. If the wall plugs and screws provided are not suitable for the wall construction, then other suitable anchors are to be used.

To fit the wall bracket:

- Position the bracket against the wall, ensuring the bracket is centered at the rear of the storage tank top, and mark the fixing points on the wall where the bracket is to be secured.
- Drill holes in the wall to receive the wall plugs supplied or other suitable anchors for the wall bracket.
- Fix the wall bracket to the wall using the screws provided or other suitable anchors.
- Secure the bracket to the top of the water heater using the self tapping screws provided.



### HOT WATER DELIVERY

This water heater can deliver water at temperatures which can cause scalding.

It is necessary and we recommend that a temperature limiting device be fitted between the water heater and the hot water outlets in any ablution and public areas such as a bathroom, ensuite or public amenities, to reduce the risk of scalding. The installing plumber may have a legal obligation to ensure the installation of this water heater meets the delivery water temperature requirements of AS/NZS 3500.4 so that scalding water temperatures are not delivered to a bathroom, ensuite or other ablution or public area.

The temperature limiting device should have a specified:

- 'minimum temperature differential' between the hot water inlet and the tempered water outlet of no greater than 10°C, when used with a solar water heater and continuous flow water heater
- 'maximum permitted pressure variation' in either supply between the hot water inlet and the cold water inlet of no less than 15% when used with a continuous flow water heater.

Refer to the specifications of the temperature limiting device.

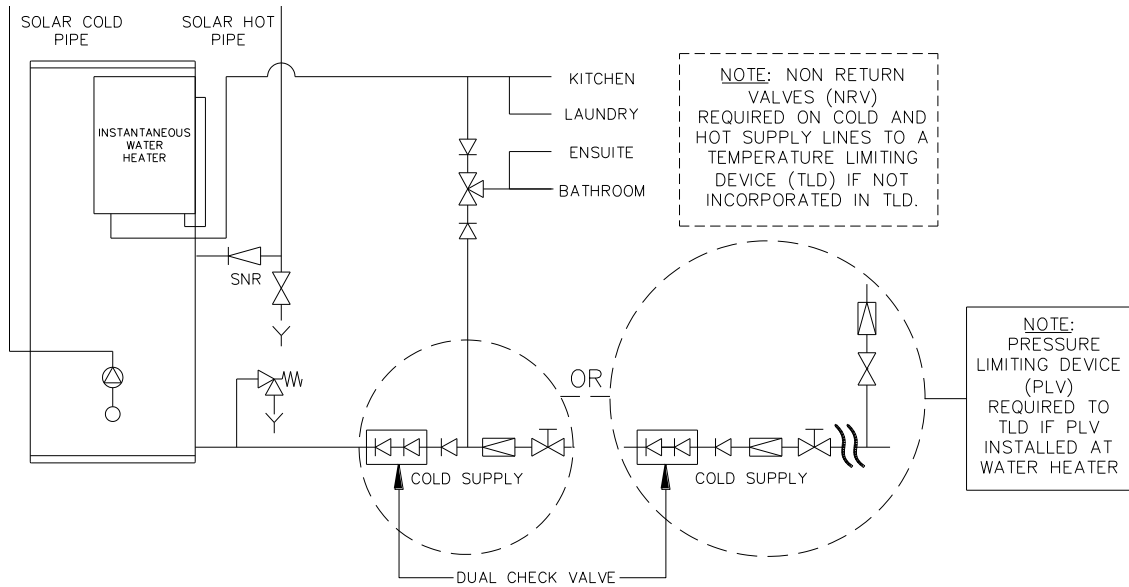
**⚠ Warning:** Temperature controllers **must not** be fitted to the in-series water heater as part of a solar water heater system because water at a temperature much higher than the controller setting can be delivered.

Where a temperature limiting device is installed adjacent to the in-series water heater, the cold water line to the temperature limiting device can be branched off the cold water line either before or after the isolation valve and pressure limiting valve to the solar storage tank, but it **MUST BE** before the non return valve. If an expansion control valve is required, it must always be installed **after** the non return valve and be the last valve prior to the solar storage tank.

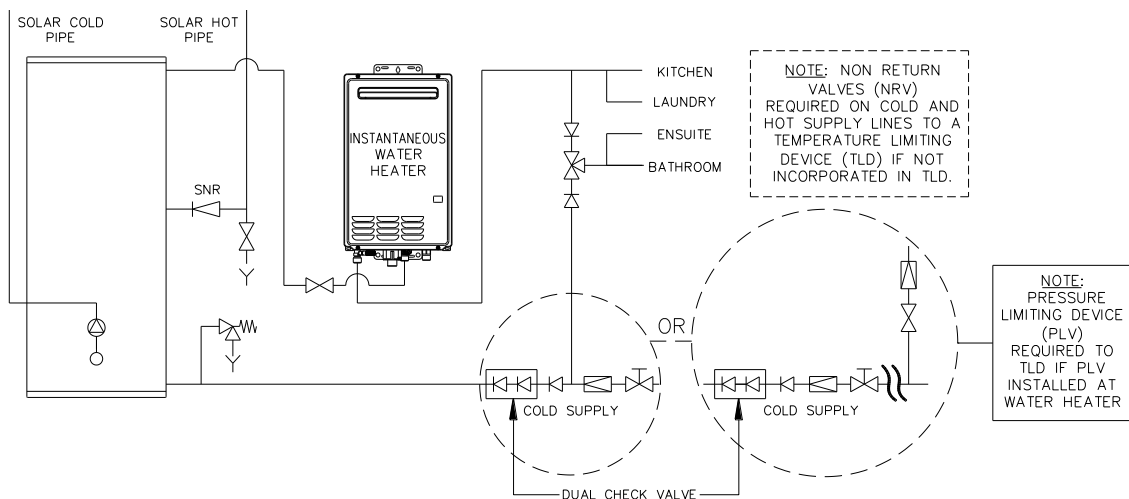
**⚠ Warning:** A non return valve **MUST BE** installed on the cold water line to the solar storage tank **AFTER** the cold water branch to a temperature limiting device. Due to the higher water temperatures generated under certain conditions in the solar collector(s) of this solar water heater, an additional effective back-flow prevention device also should be used as an extra safeguard. Valve manufacturer RMC recommends Dual Check Valve model N7150, as being suitable for this application.

If a combination isolation valve and non return valve (duo or trio valve) is installed on the cold water line to the solar water heater and the cold water line to the temperature limiting device branches off after this valve, then a second non return valve must be installed between the cold water branch and the solar storage tank. Due to the higher water temperatures generated under certain conditions in the solar collector(s) of this solar water heater, an effective back-flow prevention device should be used as the second non return valve as an extra safeguard. Valve manufacturer RMC recommends Dual Check Valve model N7150, as being suitable for this application.

If a pressure limiting valve is installed on the cold water line to the solar water heater and the cold water line to a temperature limiting device branches off before this valve or from another cold water line in the premises, then a pressure limiting valve of an equal pressure setting may be required prior to the temperature limiting device.



**Integrated In-series Gas Booster as part of a Direct VS160 Solar Water Heater Installation Two Temperature Zones Using a Temperature Limiting Device**



**Remote In-series Gas Booster as part of a Direct VS160 Solar Water Heater Installation Two Temperature Zones Using a Temperature Limiting Device**

### **CIRCULATED HOT WATER FLOW AND RETURN SYSTEM**

The solar storage tank of a solar water heater should not be installed as part of a circulated hot water flow and return system in a building. The benefits of solar gain will be significantly reduced and energy gained from the sun lost through the pipe work.

If a circulated flow and return system is required, it is necessary to connect the return line after the solar storage tank and prior to the in-series water heater supplied from the solar water heater.

If the in-series gas booster is mounted on the solar storage tank, then a suitable Tee must be installed at the inlet to the gas booster, after the flexible hose from the solar hot outlet on the tank. The circulated return line is to be connected to the Tee.

A Rheem 871 or 874 model in-series gas booster can be installed as part of a circulated hot water flow and return system in a building.

If the in-series water heater is a continuous flow water heater, its preset outlet temperature setting must be set to at least either 60°C, or to at least 70°C to meet the requirement of AS 3498, or at least 70°C if the water temperature decreases by more than 5°C through a circulated hot water flow and return system due to heat loss in the ring main.

If the in-series water heater is a storage water heater, its thermostat must always be set to at least 60°C.

#### **Notes:**

- Water should not be circulated from a water heater with a temperature setting of less than 60°C.

If the in-series booster is a continuous flow water heater, then the circulator must be:

- sized and set to provide a minimum flow rate of 3.0 L/min through the recirculated hot water flow and return system, and
- either thermostatically and / or timer controlled.

The circulator **must not** be set to operate continuously, i.e. 24 hours per day.

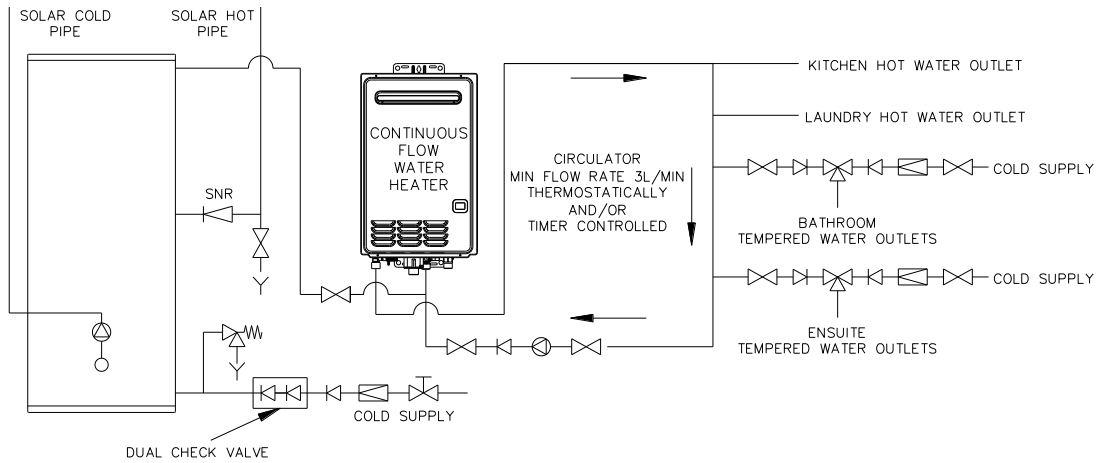
#### **Temperature Limiting Device**

A temperature limiting device cannot be installed in circulated hot water flow and return pipe work. The tempered water from a temperature limiting device cannot be circulated. Where a circulated hot water flow and return system is required in a building, a temperature limiting device can only be installed on a dead leg, branching off the circulated hot water flow and return pipe.

If circulated tempered water were to be returned back to the water heater, depending on the location of the return line connection on the water supply line to the water heater, then either:

- water will be supplied to the cold water inlet of the temperature limiting device at a temperature exceeding the maximum recommended water supply temperature, or
- when the hot taps are closed no water will be supplied to the cold water inlet of the temperature limiting device whilst hot water will continue to be supplied to the hot water inlet of the temperature limiting device.

These conditions may result in either water at a temperature exceeding the requirements of AS/NZS 3500.4 being delivered to the hot water outlets in the ablution areas, or the device closing completely and not delivering water at all, or the device failing. Under either condition, the operation and performance of the device cannot be guaranteed.



**Remote In-series Gas Booster as part of a Direct VS160 Solar Water Heater Installation  
Circulated Hot Water Flow and Return System**

**REDUCING HEAT LOSSES**

The cold water line to and the hot water line from the water heater must be insulated in accordance with the requirements of AS/NZS 3500.4. The insulation must be weatherproof and UV resistant if exposed.

The full length of the solar hot and solar cold pipes between the solar storage tank and the solar collector(s) **MUST BE** insulated. Refer to [“Warning: Plumber Be Aware”](#) on page 40.

**ANODE**

The vitreous enamel lined cylinder of the water heater is only covered by the Vulcan warranty when the total dissolved solids (TDS) content in the water is less than 2500 mg/L and when the correct colour coded anode is used. If an incorrect colour coded anode is used in the water heater, any resultant faults will not be covered by the Vulcan warranty. In addition, the use of an incorrect colour coded anode may shorten the life of the water heater cylinder.

The correct colour coded anode for the water supply being used must be selected and fitted to the water heater for the Vulcan warranty to apply to the water heater cylinder (refer to [“Water Supplies”](#) on page 16 and the [Anode Selection chart](#) on page 16). The black anode is typically fitted as standard.

Total Dissolved Solids	Anode colour code
0 – 40 mg/L	Green
40 – 150 mg/L	Green or Black
150 – 400 mg/L	Black
400 – 600 mg/L	Black or Blue
600 – 2500 mg/L	Blue
2500 mg/L +	Blue (no cylinder warranty)

If the water supply has a TDS greater than 150 mg/L and a green anode has not been changed to a black anode, or if the TDS is greater than 600 mg/L and the anode has not been changed to a blue anode, there is the possibility the anode may become overactive and hydrogen gas could accumulate in the top of the water heater during long periods of no use. In areas where this is likely to occur, the installer should instruct the householder on how to dissipate the gas safely (refer to [“Caution”](#) on page 17).

**SADDLING - PIPE WORK**

To prevent damage to the cylinder when attaching pipe clips or saddles to the water heater jacket, we recommend the use of self-drilling screws with a maximum length of 13 mm. Should pre drilling be required, extreme caution must be observed when penetrating the jacket of the water heater.

**Note: If the cylinder is damaged as a result of attaching pipe clips or saddles to the jacket, any resultant faults will not be covered by the Vulcan warranty.**

### ANTI-FREEZE HEATING UNIT

Additional freeze protection is provided by the anti-freeze heating unit. The anti-freeze heating unit is for heating the water at the bottom of the solar storage tank at times of very low cold water temperature. The anti-freeze heating unit provides additional energy to the water to assist in the prevention of freezing in the solar pipe work and solar collector(s). The anti-freeze heating unit is controlled by the solar controller and will only be energised when the water temperature is very low and the circulator activates in the frost mode. The water temperature is monitored by the cold sensor.

If the water temperature at the bottom of the solar storage tank is very low when the circulator activates in Freeze Protection operation mode, the anti-freeze heating unit will be energised and will heat the water by a few degrees. The anti-freeze heating unit will be de-energised when either the frost mode is shut down or the water temperature has risen by a few degrees.

The anti-freeze heating unit is supplied with power from the solar control unit. The power outlet to the solar control unit must be switched on for the anti-freeze heating unit to operate and offer additional freeze protection.

### BACKING PLATE

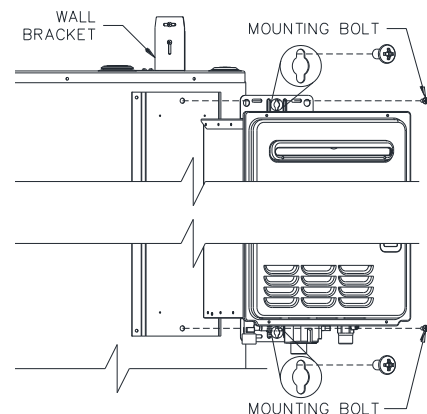
The backing plate has been provided to support an in-series gas booster. Fit the wall bracket and secure the solar storage tank to the wall prior to the mounting of an in-series gas booster to the solar storage tank. Refer to “[Wall Bracket](#)” on page 26.

It is recommended to install the fittings associated with the solar control unit prior to mounting the in-series gas booster. Refer to “[Installation – Solar Control Unit](#)” on page 34. The air bleed and solar non return valve assembly must be fitted prior to mounting the in-series gas booster. Refer to steps 12 and 13 on page 36.

#### To mount the 871 series gas booster:

- Remove the two mounting bolts from the centre top and centre bottom of the backing plate.
- Locate the in-series gas booster and line up the mounting holes at the top and bottom of the in-series gas booster with the holes on the backing plate.
- Fix the in-series gas booster to the backing plate using the two mounting bolts provided.

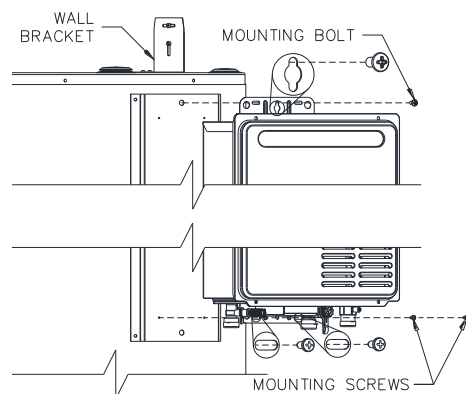
**Note:** The two screws provided in the ground kit (299158) can be discarded.



871 series gas booster mounting

#### To mount the 874 series gas booster:

- Remove the mounting bolt from the centre top of the backing plate.
- Locate the in-series gas booster and line up the mounting hole at the top of the in-series gas booster with the hole on the backing plate.
- Fix the top bracket of the in-series gas booster to the backing plate using the mounting bolt provided.
- Locate the two holes in the bottom bracket of the in-series gas booster over the two holes toward the bottom of the bracket.
- Fix the bottom bracket of the in-series gas booster to the backing plate using the two screws provided in the ground kit (299158).

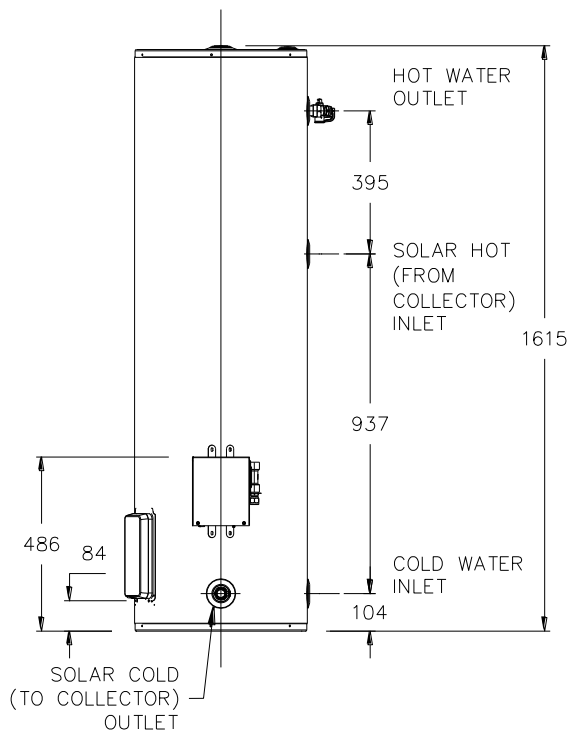
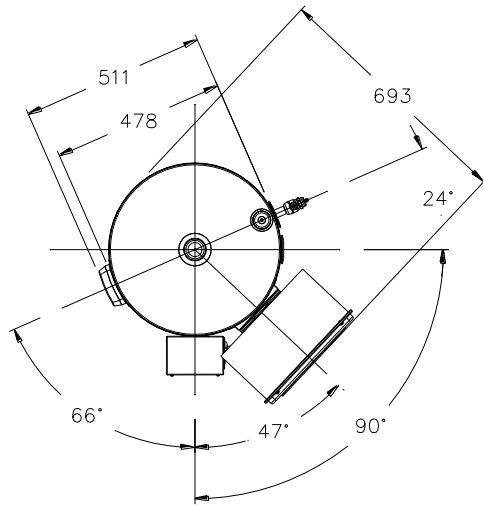
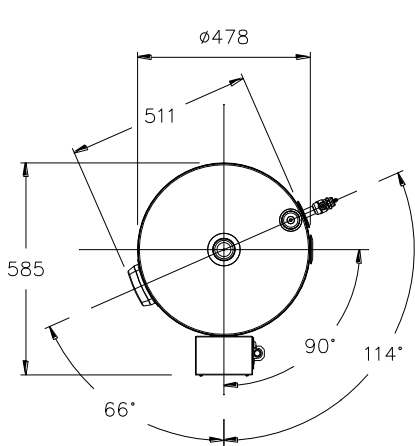


874 series gas booster mounting

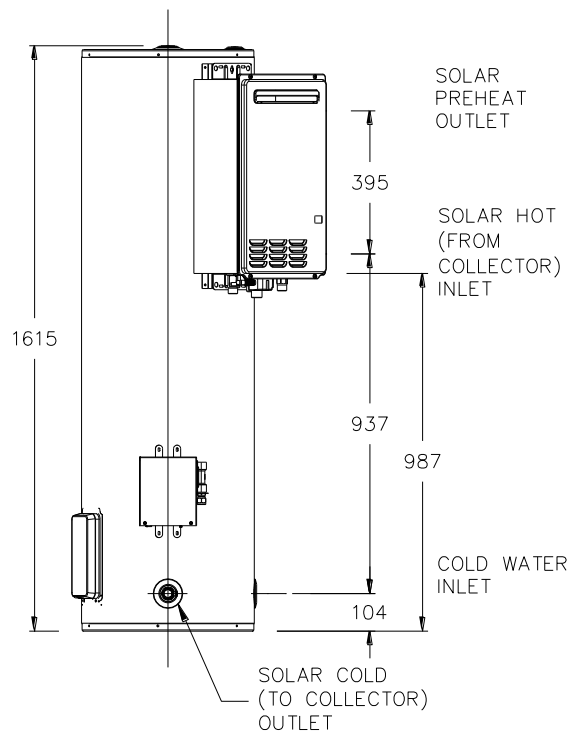
If an in-series gas booster is not to be mounted on the backing plate, the backing plate can be removed from the solar storage tank. To remove the backing plate:

- Remove the four mounting screws and two mounting bolts and remove the mounting plate.
- Refit the four mounting screws and two mounting bolts to the holes in the solar storage tank jacket.

**DIMENSIONS AND TECHNICAL DATA**



**storage tank only (remote boost)**

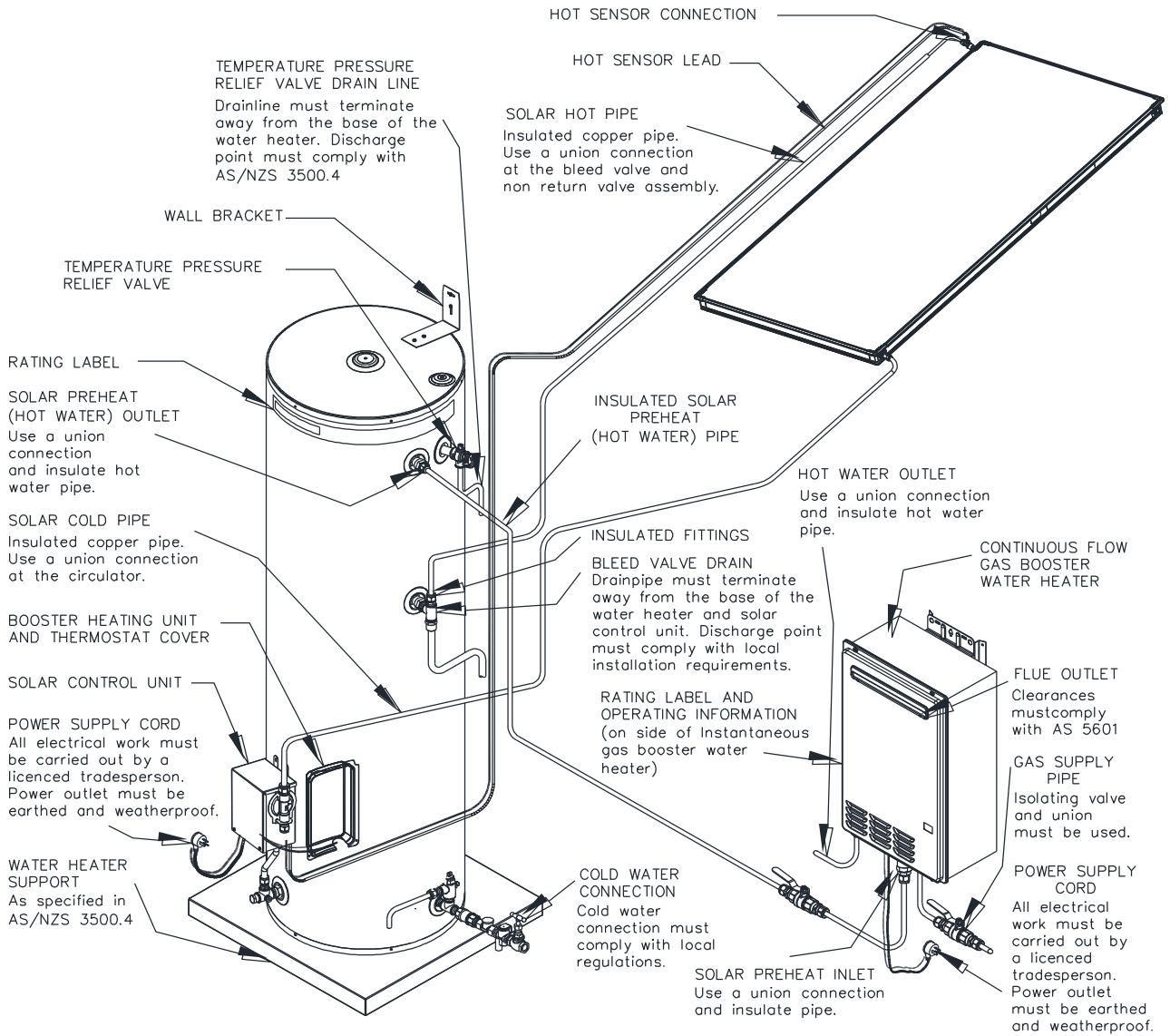


**storage tank with integrated boost**

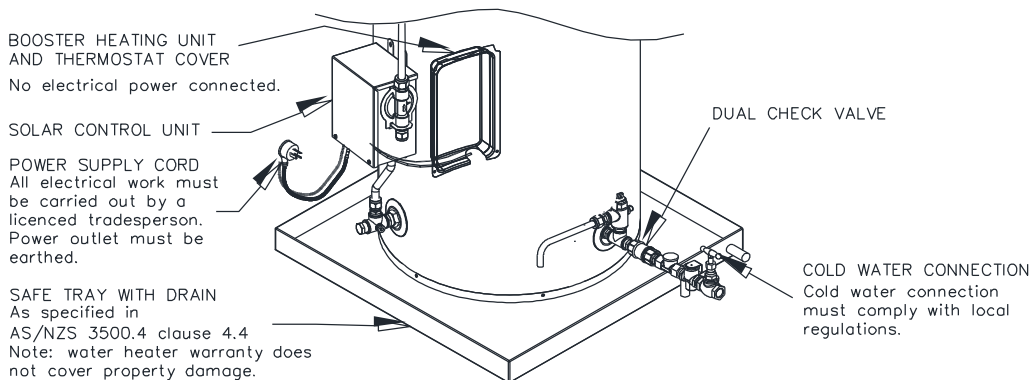
Model	Capacity	Tank Mass (kg) (without booster)		Tank Mass (kg) (with booster)	
		Empty	Full	Empty	Full
511 160	165 litres	52	217	73	239

Technical data is subject to change.

**TYPICAL INSTALLATION (REMOTE BOOST) – OUTDOOR LOCATION**

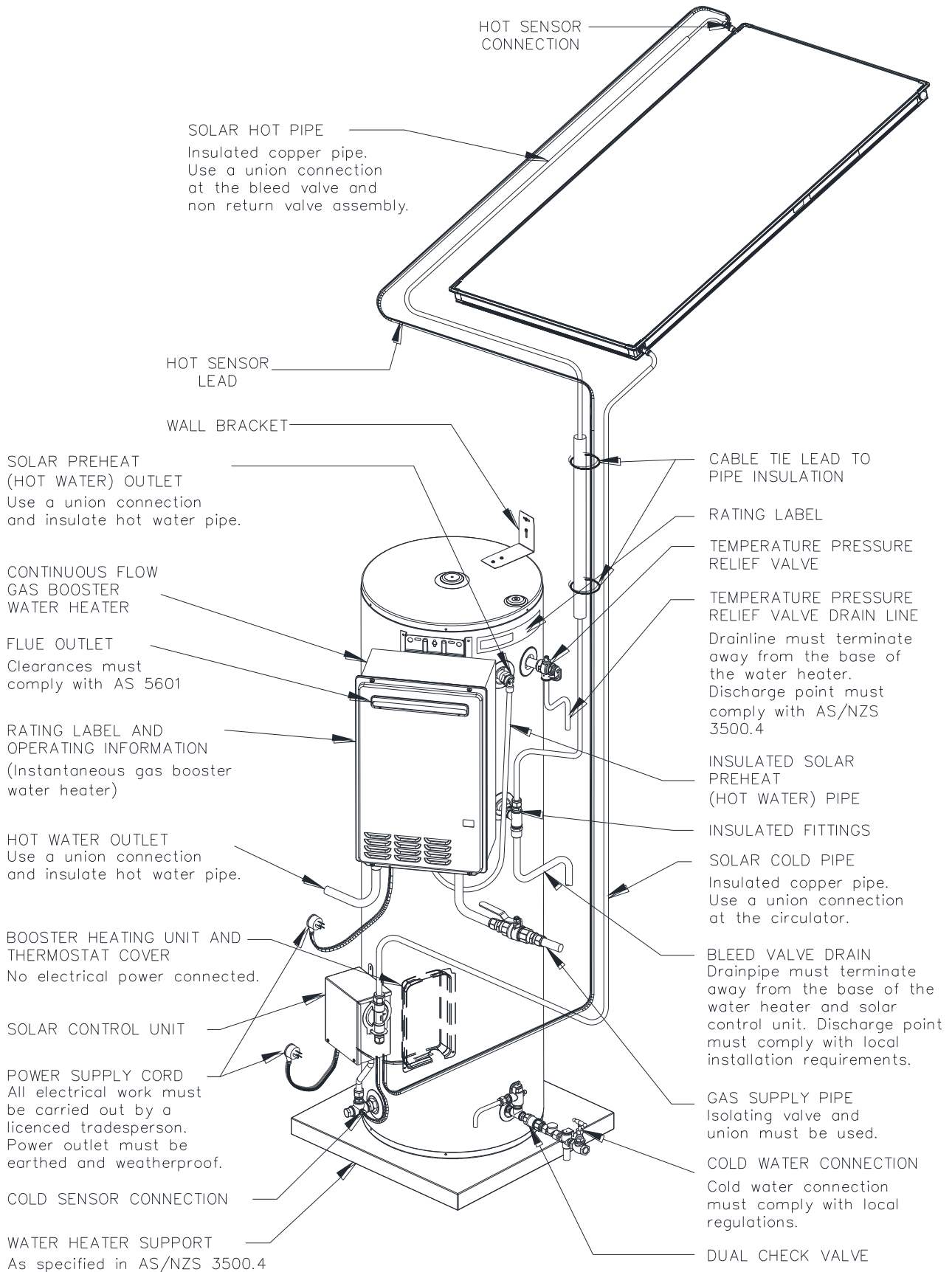


**TYPICAL INSTALLATION (REMOTE BOOST) – INDOOR LOCATION**





**TYPICAL INSTALLATION (INTEGRATED BOOST) – OUTDOOR LOCATION**



## INSTALLATION – SOLAR CONTROL UNIT

The solar control unit is supplied mounted on the side of the solar storage tank. A kit (299158) containing components to enable the connection of the solar circuit pipe work to the tank is supplied with the tank.

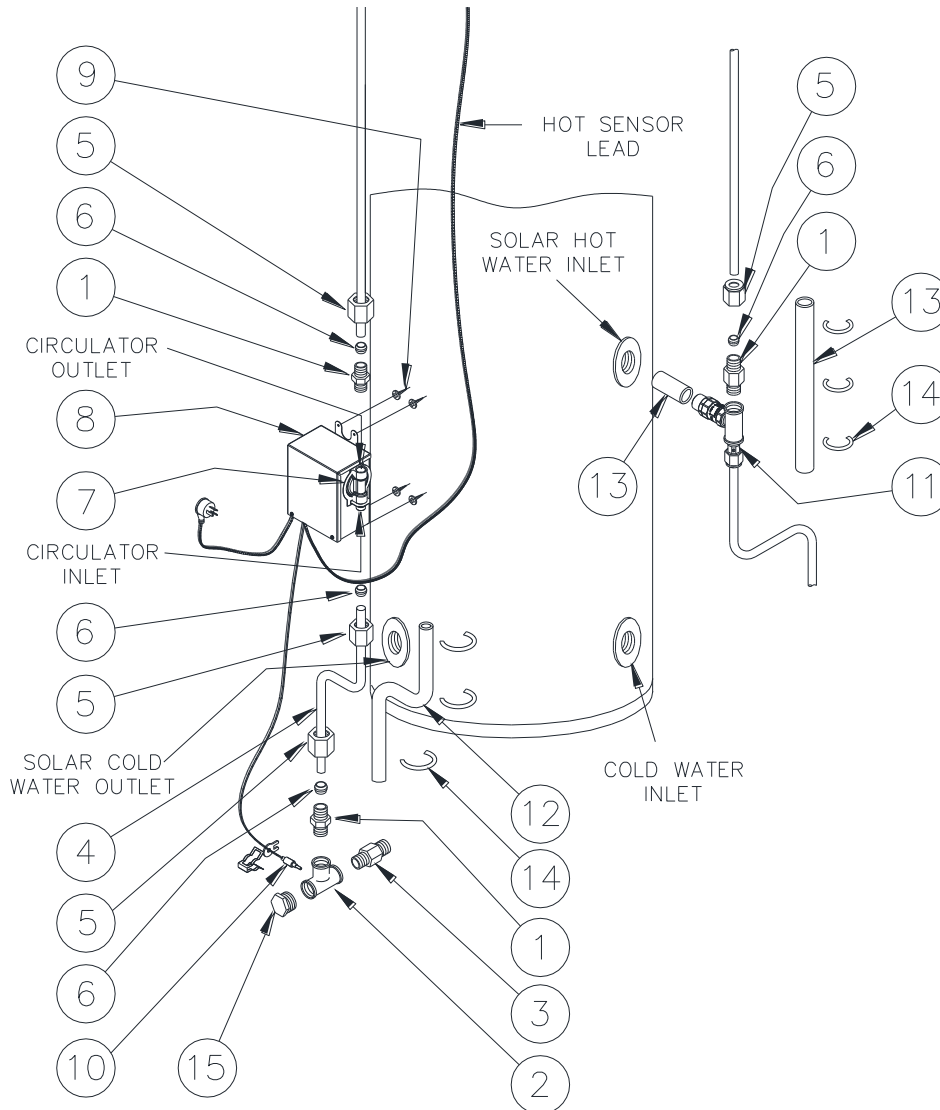
The solar control unit, supplied with a 1.8 metre power cord, requires a 240 V 50 Hz general purpose outlet (GPO) located within 1.2 metres of its installation. The GPO must have a continuous power supply originating from a circuit other than the water heater circuit. The GPO is required to be weatherproof if installed outdoors (refer to “Connections – Electrical” on page 46).

**Note:** The solar control unit automatically controls the flow rate through the collector circuit. This is achieved via the hot and cold sensors and differential controller programming providing control over the operation of the circulator. There is no provision for nor is adjustment to the solar control unit required.

Part No	Kit Components and Description - Ground Kit	299158
	Kit component contents drawing sheet (299158 drawing)	1
126564	Pictorial assembly instruction sheet	1
220345	Valve assembly air bleed and check, consisting of: 1 x 088058 fitting tee brass 1/2" screwed Rye 4203 1 x 088880 solar non return valve RMC 1/2" x 3/4" SNR503 1 x 088069 fitting adaptor brass 1" F x 1/2" M 1 x 220344 air bleed valve RMC 1/2" x 1" – solar high temp 1 x 087033 washer 30 OD x 20 ID x 2 EPDM 1 x 088119 fitting nut compression 1/2" Rye 10090 1 x 088027 fitting olive compression brass 1/2"	1
088064	Sensor tee / nipple assembly solar loline, consisting of: 1 x 088061 tee 3 way / cold sensor 1 x 088062 sensor nipple – solar loline 1 x 087026 O ring 5/16" ID x 1/16" BS011 silicone	1
223602	Pipe preformed tube 1/2" x 245 mm long	1
088063	Fitting union male 1/2" x 1/2" Rye 4910	3
088039	Fitting nipple brass 3/4" x 1/2"	1
080079	Plug 1/2" BSP brass	1
080228	Cable tie black 250 mm x 4.8 mm	6
180073	Insulation pipe 13 mm ID x 280 mm long	1
180072	Insulation pipe 35 mm ID x 150 mm long	1
180082	Insulation pipe 35 mm ID x 50 mm long	1
<b>Part No</b>	<b>Supplied for Bracket Connection (Tank to Wall)</b>	
106117	Wall bracket – L shape	1
080029	Wall plug plastic red 25 mm long (6 mm drill bit required)	2
080117	Screw button head 8G x 15 x 25	2
088031	Screws phillips pan head no 8 x 13	2
<b>Part No</b>	<b>Supplied for Mounting In-series Gas Booster</b>	
080031	Screws phillips pan head no 8 x 13	2
<b>Part No</b>	<b>Supplied for Connection to In-series Gas Booster</b>	
088172	Braided hose 750 mm long x 12 mm diam, 1/2" female cone	1
088039	Fitting hex nipple brass 3/4" x 1/2"	1
088173	Elbow brass 1/2" F x 1/2" M Rye 2503	1
088161	Adaptor reducing brass 3/4" F x 1/2" M	1
088174	Adaptor brass 1/2" F x 1/2" M Rye 4002	1
<b>Part No</b>	<b>Supplied for Solar Storage Tank</b>	
220641	Valve TPR 1/2" x 1000 kPa HTE523/507	1

**Notes:**

- All pipe work must be purged and cleared of foreign matter before connection and before attempting to operate the water heater.
- It is important to connect the solar cold and solar hot pipes to the correct connections at the solar collector and at the solar storage tank.
- Connect the solar pipes to the solar storage tank using only the fittings supplied.
- All olive compression fittings must use brass or copper olives.
- Use thread sealing tape or an approved thread sealant on all other fittings.



**SUPPLIED WITH VS160 SOLAR STORAGE TANK**

- |                           |  |
|---------------------------|--|
| 1. Hex nipple 1/2" X 1/2" | 9. Screws  |
| 2. 4 way tee              | 10. Cold sensor probe  |
| 3. Hex nipple 1/2" x 3/4" | 11. Air bleed valve and non return valve assembly                |
| 4. Preformed pipe DN15    | 12. Insulation 280 mm long x 13 mm ID                            |
| 5. Compression nut        | 13. Insulation 150 mm long x 35 mm ID &<br>50 mm long x 35 mm ID |
| 6. Olive                  | 14. Cable tie  |
| 7. Circulator             | 15. Plug 1/2"  |
| 8. Solar control unit     |  |

### SOLAR STORAGE TANK WITH RAISED SOLAR HOT INLET

Numbers in parentheses refer to items on diagram on page 35.

To connect the solar cold pipe to the solar control unit on a solar VS160 storage tank with a raised solar hot inlet and anti-freeze heating unit:

1. Assemble a ½" x ½" hex nipple (1) into the branch outlet of the 4 way tee (2) (ensure the compression end of the nipple is exposed) and the ½" x ¾" hex nipple (3) in the end of the 4 way tee, so that when the assembly is fitted to the cold water inlet of the solar storage tank, the compression nipple (1) is orientated vertically upwards and the cold sensor housing is orientated to the rear of the solar storage tank.
2. Fit the assembly to the solar cold water outlet of the solar storage tank.
3. Fit the ½" plug (15) to the end of the 4 way tee.
4. Loosen, but do not remove, the four screws which attach the solar control unit to the solar storage tank and slide the control unit upwards to the stops in the bracket slots.
5. Place a compression nut (5) and olive (6) over each end of the DN15 preformed pipe (4), pre-insulated with the 280 mm long x 13 mm ID insulation (12), and locate the pipe in the branch tee connection of the 4 way tee and in the inlet of the circulator, ensuring the longer straight end is orientated upwards.
6. Return the solar control unit to its original position, ensuring the DN15 preformed pipe is well seated in the branch tee connection of the 4 way tee and in the inlet of the circulator. Connect the preformed pipe using the compression nuts (5) and olives (6) provided.
7. Tighten the four screws attaching the solar control unit to the solar storage tank.
8. Fit a ½" x ½" hex nipple (1) to the **outlet** of the circulator (7) mounted in the solar control unit (8) (ensure the compression end of the nipple is exposed).
9. Connect the solar cold pipe (to the collector) to the nipple (1) on the outlet side of the circulator (7) using the compression nut (5) and olive (6) provided.
10. Insert the cold sensor probe (10) into the cold sensor housing on the 4 way tee (2), ensuring the 'O' ring is in position on the probe. Lock it into position with the locking washer and clip provided.
11. Connect the hot sensor lead (from the solar collector installation) to the hot sensor cable connector at the underside of the solar control unit (8).

**Note:** Ensure the hot sensor lead is not in direct contact with the solar hot or solar cold pipe work at any point of the solar circuit, otherwise damage to the sensor lead can occur due to the high temperatures which can be experienced within the pipe work. Damage to the hot sensor lead can result in solar gain not being achieved and the freeze protection system rendered inoperative. The hot sensor lead may be cable tied to the outside of the insulation on the solar pipe work.

To connect the solar hot pipe to the solar storage tank:

12. Insulate the solar non return valve of the air bleed valve and solar non return valve assembly (11) with a 50 mm long x 35 mm ID piece of insulation (13).
13. Fit the air bleed valve and solar non return valve assembly (11) to the solar hot water inlet of the solar storage tank. Ensure the bleed valve outlet is pointing vertically downwards.
14. Fit a ½" x ½" hex nipple (1) to the exposed end of the Tee (inlet) of the air bleed valve and solar non return valve assembly (11) (ensure the compression end of the nipple is exposed).
15. Connect the solar hot pipe (from the collector) to the nipple (1) on the air bleed valve and solar non return valve assembly (11) using the compression nut (5) and olive (6) provided.
16. Connect a DN15 copper drain line to the bleed valve to carry the discharge clear of the water heater and solar control unit (refer to "[Bleed Valve Drain](#)" on page 45), using the compression nut (5) and olive (6) provided.
17. Insulate the tee and bleed valve, from the solar hot pipe to the drain line of the bleed valve, with the 150 mm long x 35 mm ID insulation (13) and secure with the cable ties (14) provided.
18. Insulate the drain line from the bleed valve with closed cell type insulation or similar (minimum thickness 13 mm). The insulation must be weatherproof and UV resistant if exposed.

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## INSTALLATION – SOLAR COLLECTOR(S)

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### SOLAR COLLECTOR LOCATION

Consideration must be given to the position of the solar collector(s) in relation to the solar storage tank. There are limitations on the maximum length of the solar hot and solar cold pipes between the solar storage tank and the solar collector(s). Refer to “[Solar Storage Tank Location](#)” on page 25 and to “[Pipe Lengths](#)” on page 39.

The solar collector(s) must be installed in a shade free position. The surrounding vicinity should be checked for higher buildings or trees which may cause shade at other times of the year and for small trees which may grow and shade the solar collector(s) in the future.

Sufficient space should be left around the solar collector(s) to allow for safe service access.

The installation must comply with the requirements of AS/NZS 3500.4 and all local codes and regulatory authority requirements. Refer to the installation instructions supplied with the collector kit for details on the installation of the solar collector(s).

### ROOF STRENGTH

The installer must ensure the structural integrity of the building is not compromised by the solar water heater installation and the roof structure is suitable to carry the full weight of the solar collector(s) and frame (if one is installed). If in any doubt of the construction or the condition of the roof, the roof should be suitably strengthened. Consult a structural engineer. Each solar collector and its fittings weighs approximately 43 kg (HBT200 – 2.0 m<sup>2</sup> collector) or 55 kg (TBT260 – 2.6 m<sup>2</sup> collector) when full of water.

### ORIENTATION OF SOLAR COLLECTORS

To help maximise system performance, solar collectors should be installed with an optimum orientation facing true north (in the southern hemisphere) or true south (in the northern hemisphere). Always check for true north or true south using a compass or other suitable device.

The solar performance of a system reduces as the orientation of the collectors moves away from the optimum orientation, resulting in the need for increased boosting to supply the same hot water load. Solar collectors facing up to 45° from the optimum orientation will receive about 4% to 5% less total solar radiation.

However, the optimum orientation of solar collectors is not always practical or achievable. A single TBT260 solar collector may be installed up to 90° from the optimum orientation when installed as part of this system.

In Victoria, a 160 tank system with 1 x TBT260 solar collector installed within the Regulation Compliance Zone achieves compliance to new home legislation for water heating. Outside of the compliance zone 2 x HBT200 solar collectors should be used to achieve compliance.

In areas other than Victoria, 2 x HBT200 solar collectors should not be installed with this system.

### INCLINATION OF SOLAR COLLECTOR

To help maximise system performance, the solar collector should be installed with an optimum inclination. This is equal to 90% to 100% of the local latitude angle when the collector is oriented within 60° of true north or true south, and between 10° and 20° when the collector is oriented between 60° and 90° from the optimum orientation.

Generally, improved summer performance is obtained from an angle of inclination less than the optimum angle and improved winter performance is obtained by an angle of inclination greater than the optimum angle. If the angle of inclination varies by 20° from the optimum angle, the solar collector will receive about 10% less total annual solar radiation. The [latitude of some Australian cities](#) are listed on page 38.

However, the optimum inclination of the solar collector is not always practical or achievable. The solar collector may be installed at the roof angle for simplicity of installation and appearance, but must never be flat for a pumped solar direct water heater installation. Although the solar collectors can be installed with an inclination of less than 10°, this is not advised.

The risks include:

- the collector glass not 'self cleaning', leading to dirty collector glass reducing solar performance,
- condensation on the underside of the glass taking longer to clear,
- condensation droplets falling onto the absorber plate potentially causing discolouration.

The collector kit is suitable for installations with an inclination of up to 45°.

A Variable Pitch frame can be installed to increase the angle of inclination of the collector used in a pumped solar direct water heater installation. This type of frame should be used if the roof pitch either varies by more than 20° from the optimum angle or if the roof pitch is less than 10°.

Alternatively a Fixed Low-Pitch frame, for a single TBT260 solar collector installation, may be used where this meets local regulatory requirements. Refer to your local Solar Distributor for details.

The use of a Variable Pitch or Fixed Low-Pitch frame should be discussed with the system owner. If this option is neither possible nor acceptable to the system owner, then the system owner needs to be made aware of, understand and accept that increased boosting may be required to meet their hot water requirements.

The installation of the solar collector(s) on a suitable frame, subject to the frame's design criteria not being exceeded is suitable for installation in geographic locations up to and within Wind Region B (Variable Pitch or Fixed Low-Pitch frame), as defined in the Building Code of Australia, Australian / New Zealand Standard AS/NZS 1170.2:2002 and the Australian Standard AS 4055-2006, or equivalent location.

**LATITUDE OF SOME AUSTRALIAN CITIES**

Adelaide	35°S	Cairns	17°S	Hobart	42°S	Port Hedland	20°S
Alice Springs	24°S	Canberra	35°S	Mildura	34°S	Rockhampton	24°S
Brisbane	27°S	Darwin	12°S	Melbourne	38°S	Sydney	34°S
Broken Hill	31°S	Geraldton	28°S	Perth	32°S	Townsville	19°S

**MAXIMUM NUMBER OF COLLECTORS**

The maximum number of solar collectors which may be installed is:

Tank Model	HPT200 * selective surface	TBT260 selective surface
511160	2 *	1

\* Victoria only if installed greater than 60° off solar north.

**PIPE LENGTHS**

The solar hot and solar cold pipes between the solar storage tank and the solar collectors shall:

- be of bendable grade or hard drawn copper tube.  
 Annealed or soft copper shall not to be used.
- have a continuous fall from the solar collectors to the solar storage tank. Horizontal runs of pipe work are acceptable and may be installed.
- not exceed the maximum recommended combined lengths as specified in the table.

Maximum recommended total combined pipe length (solar cold + solar hot) and number of 90° bends		
Pipe Size	1 or 2 Collector(s)	
	Pipe Length	90° Bends
DN15	40 metres	20
DN20	NR	NR

For each additional 90° bend, reduce the maximum total pipe length by 0.5 metres.  
 For each additional metre of pipe length, reduce the number of 90° bends by two.  
 Note: One 90° elbow is equal to two 90° bends.  
 NR – not recommended.

**Notes:**

- It is important to connect the solar cold and solar hot pipes to the correct connections at the solar collector and at the solar storage tank.
- The solar cold pipe connects to the bottom of the solar collector and may connect to either the left or right hand side. The solar hot pipe must connect to the top of the solar collector diagonally opposite to the solar cold pipe connection.
- The hot sensor connection is at the top of the solar collector, directly above the solar cold water inlet connection. The solar hot outlet and hot sensor connection is to be the highest point of the system.
- Refer to “Warning: Plumber – Be Aware” on page 40.

It is essential for these requirements to be followed for the system to operate correctly and efficiently. Solar pipe work which is oversized, or is too long, or does not have a continuous fall can result in a reduction in performance or the system not operating effectively.

**Pressure Testing**

The solar water heater, including the collector circuit and solar collector(s), is to be isolated during the testing and commissioning of the heated water reticulation system in a building, in accordance with Clause 11.1 and 11.3 (a) of AS/NZS 3500.4.

It may be necessary to pressure test the collector circuit to comply with codes and regulatory authority requirements or on other occasions where the solar collector(s) and solar cold and solar hot pipe work are installed prior to the solar storage tank, such as on a building site.

*Direct Open Collector Circuit*

**⚠ Warning:** The pressure applied to the solar circuit and solar collector(s) during a pressure test of a direct open circuit system **MUST NOT** exceed 1000 kPa where a TBT260 or HBT200 solar collectors are installed, otherwise damage may result to the solar collector(s).

*Direct Open System*

If the solar collector(s), solar pipe work and solar storage tank are installed and commissioned together, then the flooding of the collector circuit with water under mains pressure and checking for leaks during the commissioning procedure can be substituted for the pressure testing of the collector circuit.



## WARNING: Plumber – Be Aware

- The solar hot and solar cold pipes between the solar storage tank and the solar collector(s) **MUST BE** of copper. All compression fittings must use brass or copper olives.
- The full length of the solar hot and solar cold pipes **MUST BE** insulated.

The insulation must:

- be of a closed cell type or equivalent, suitable for a solar water heating application and capable of withstanding the temperature of the water generated by the solar collector(s) under stagnation conditions

The specification of the chosen insulation material should be checked with the insulation manufacturer prior to installation as different materials may vary in temperature tolerance.

- be at least 13 mm thick, however thicker insulation may be required to comply with the requirements of AS/NZS 3500.4
- be weatherproof and UV resistant if exposed
- extend through any penetrations in the eaves, ceiling and roof
- cover valves and fittings in the solar hot and solar cold pipe work
- be fitted up to and cover the connections on both the solar storage tank and the solar collector(s).

**Note: Failure to observe these requirements increases the risk of freeze damage.**

Uninsulated pipe work, including concealed in cavities and roof spaces or where it may be in contact with a metal roof, may lead to freeze damage. The system has NO WARRANTY for freeze damage if the solar hot and solar cold pipes are not insulated in accordance with the installation instructions.

The insulation is essential to assist in providing freeze protection, will offer corrosion protection to a metal roof against water runoff over the copper pipe, assist in avoiding accidental contact with the solar pipe work as high temperature water can flow from the solar collector(s) to the solar storage tank and also reduce pipe heat losses.

- The insulated copper pipe work:
  - should be fixed at suitable locations to prevent or reduce the possibility of noise from water hammer and vibration from occurring
  - is not to be placed or installed in contact with plastic pipe work.

Likewise, plastic pipe work is not to be placed or installed in contact with the insulated copper pipe work after the solar circuit is installed.

- Plastic pipe **MUST NOT** be used, as it will not withstand the temperature and pressure of the water generated by the solar collector(s) under stagnation conditions. The solar collector(s) can generate extremely high water temperatures up to 150°C and high water pressure of 1000 kPa. Plastic pipe cannot withstand these temperatures and pressures and **MUST NOT** be used. Failure of plastic pipe can lead to the release of high temperature water and cause severe water damage and flooding.
- The solar hot outlet and hot sensor connection is to be the highest point of the system. The highest point of the solar cold pipe and solar hot pipe must be where they connect to the solar collector(s), to avoid the possibility of air locks occurring in the system. There **must be a continuous fall** in the pipe work between the solar collector(s) and solar storage tank. Horizontal runs of pipe work are acceptable and may be installed.





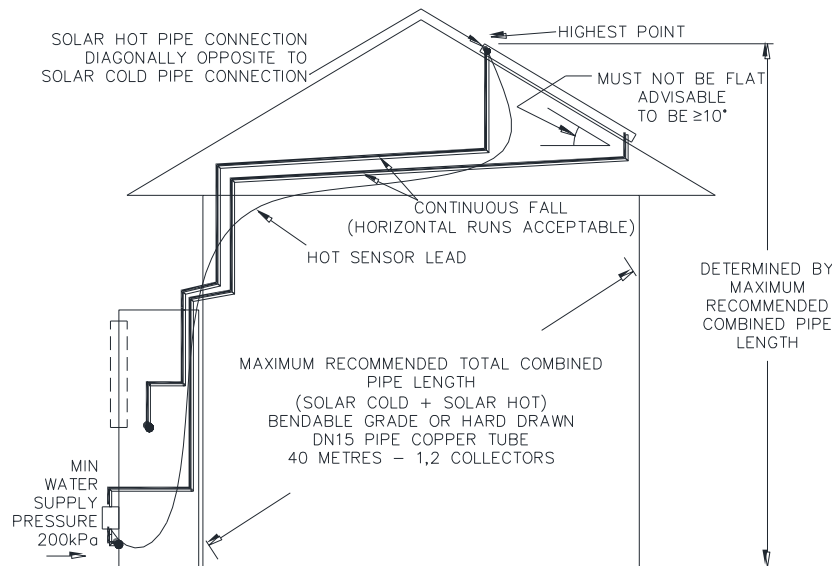
## WARNING: Plumber – Be Aware

- A non return valve **MUST BE** installed on the cold water line to the solar storage tank **AFTER** the cold water branch to a temperature limiting device. Due to the higher water temperatures generated under certain conditions in the solar collector(s) of this solar water heater, an additional effective back-flow prevention device also should be used as an extra safeguard. Valve manufacturer RMC recommends Dual Check Valve model N7150, as being suitable for this application.
- The pressure applied to the solar circuit and solar collector(s) during a pressure test of a direct open circuit system **MUST NOT** exceed 1000 kPa, otherwise damage may result to the solar collector(s). Refer to “Pressure Testing” on page 39.

### Maximum height to collector(s)

The maximum height of a solar VS160 installation, from the solar controller (circulator) to the top of the solar collector(s), is determined by the maximum recommended total pipe length for the system and the water supply pressure.

The maximum recommended total pipe length of the solar circuit should not be exceeded and a minimum water supply pressure of 200 kPa should be available at the inlet to the system, otherwise the system performance may be reduced or the solar circuit may not be purged of air during the commissioning of the system.



#### NOTES:

- PIPE WORK MUST HAVE A CONTINUOUS FALL BETWEEN SOLAR COLLECTORS AND SOLAR STORAGE TANK. HORIZONTAL PIPE RUNS ARE ACCEPTABLE.
- PIPE WORK MUST BE OF BENDABLE GRADE OR HARD DRAWN COPPER TUBE. ANNEALED OR SOFT COPPER SHALL NOT BE USED.
- MINIMUM WATER SUPPLY PRESSURE TO INSTALLATION MUST BE 200kPa,
- INSTALL HOT SENSOR LEAD WITH INSULATED SOLAR PIPES DURING CONSTRUCTION FOR NEW HOMES.
- PRESSURE TESTING OF SOLAR COLLECTORS AND SOLAR CIRCUIT MUST NOT EXCEED 1000KPa.

### Direct Open Circuit Solar – Pipe Work Installation Requirements

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## CONNECTIONS – PLUMBING

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All plumbing work must be carried out by a qualified person and in accordance with the requirements of the Standard AS/NZS 3500.4, and all local codes and regulatory authority requirements. In New Zealand, the installation must conform with Clause G12 of the New Zealand Building Code.

**⚠ Warning:** Certain types of plastic pipe, such as Poly-butylene pipe, are not suitable to be used as a hot water pipe between:

- this water heater and a temperature limiting device, and
- this water heater and a hot water outlet if a temperature limiting device is not installed.

This water heater can produce water at a temperature and pressure which can exceed the performance limits of these types of pipe. This may result in pipe failure leading to severe water damage to the property. If one of these types of plastic pipe is used as a hot water pipe in the property, then a temperature limiting device must be installed between the water heater and this pipe work.

**Note:** The solar storage tank of a solar water heater should not be installed as part of a circulated hot water flow and return system in a building. The benefits of solar gain will be significantly reduced and energy gained from the sun lost through the pipe work. If a circulated flow and return system is required, it is necessary to connect the return line after the solar storage tank and prior to the in-series water heater supplied from the solar water heater. Refer to “[Circulated Hot Water Flow and Return System](#)” on page 28.

### CONNECTION SIZES

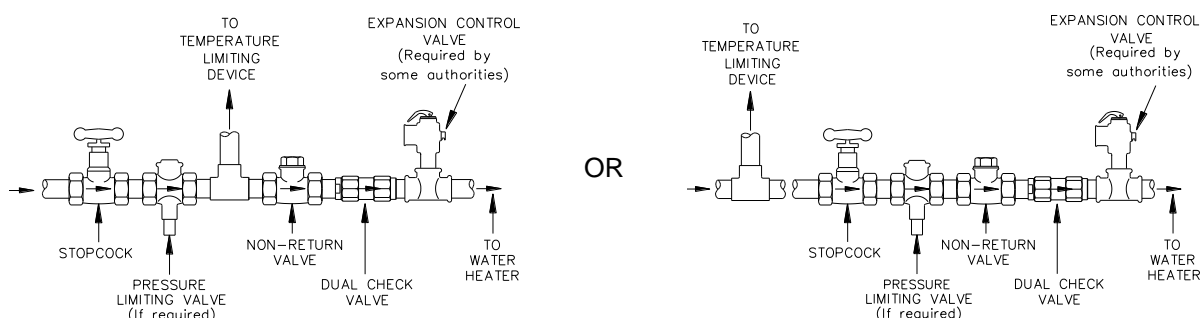
- Hot water connection: RP $\frac{3}{4}$ /20.
- Cold water connection: RP $\frac{3}{4}$ /20.
- Solar hot (from collector) connection: DN15 compression fitting. (solar hot inlet to tank: RP $\frac{3}{4}$ /20).
- Solar cold (to collector) connection: DN15 compression fitting. (solar cold outlet from tank: RP $\frac{3}{4}$ /20).
- Relief valve connection: RP $\frac{1}{2}$ /15.
- Bleed valve connection: G1.0B.

### WATER INLET AND OUTLET

All pipe work must be cleared of foreign matter before connection and purged before attempting to operate the water heater. All olive compression fittings must use brass or copper olives. Use thread sealing tape or approved thread sealant on all other fittings.

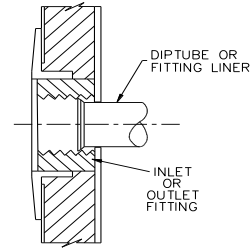
An isolation valve and non return valve must be installed on the cold water line to the water heater. A non-return valve must be fitted on the cold water supply to this water heater in compliance with Clause 5.9.1 of AS/NZS 3500.4. Due to the higher temperatures generated by solar water heaters, an additional effective back-flow prevention device also should be fitted as an extra safeguard. Valve manufacturer RMC recommends Dual Check Valve No N7150, as being suitable for this application.

An acceptable arrangement is shown in the [diagram](#) on page 42. Refer also to “[Hot Water Delivery](#)” on page 26 and to “[Mains Water Supply](#)” on page 25. The plumbing arrangements for the [cold water inlet and solar hot and solar cold pipes](#) are shown on page 35.



A disconnection union must always be provided at the cold water inlet, solar cold water outlet, solar hot water inlet and hot water outlet on the water heater to allow for disconnection of the water heater.

This water heater has either a plastic dip tube or fitting liner in the inlet and outlet fittings (see diagram). These must be in place for the water heater to function properly. Do not remove or damage them by using heat nearby. They will be pushed into the correct position as the fitting is screwed in.



**IN-SERIES BOOSTER – INTEGRATED**

A braided hose, 750 mm long 12 mm diameter, is supplied for connecting between the solar storage tank and a Rheem 871 series 24 litre or a 874 series 18 litre model in-series gas booster mounted onto the storage tank.

It is recommended to install the fittings associated with the solar control unit prior to mounting the in-series gas booster. Refer to “Installation – Solar Control Unit” on page 34. The air bleed and solar non return valve assembly must be fitted prior to mounting the in-series gas booster. Refer to steps 12 and 13 on page 36.

Fit the wall bracket and secure the solar storage tank to the wall prior to the mounting of an in-series gas booster to the solar storage tank. Refer to “Wall Bracket” on page 26. To integrate the in-series gas booster onto the solar storage tank, refer to “Backing Plate” on page 30.

**Notes**

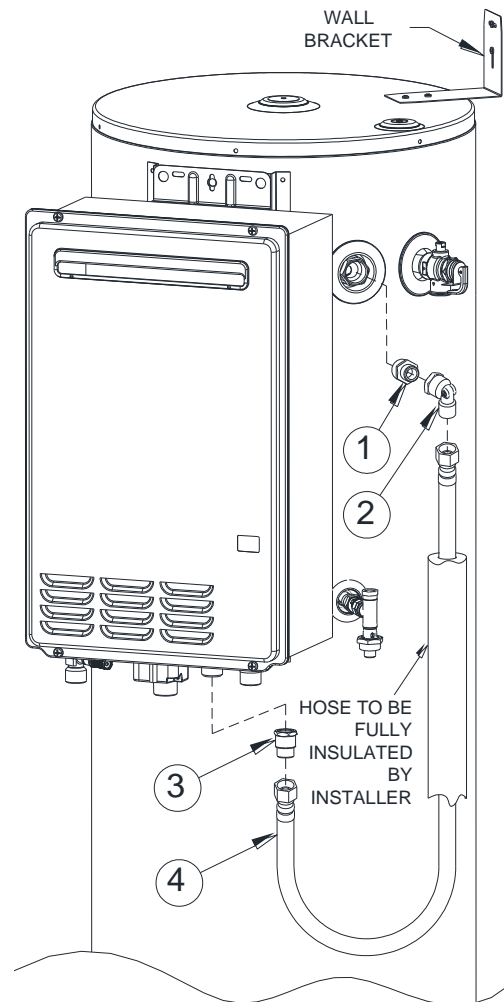
- Numbers in parentheses refer to items on diagram on page 43.
- The braided hose has compression fitting connections.
- Use thread sealing tape or an approved thread sealant on all fittings.

To connect the braided hose to the solar storage tank and in-series gas booster:

- Fit the 3/4" x 1/2" hex nipple (1) to the hot water outlet of the solar storage tank.
- Fit the 1/2" x 1/2" elbow (2) to the hex nipple (1), orientating the elbow downwards.
- Fit the 3/4" x 1/2" reducing adaptor (3) to the water inlet of the in-series gas booster.
- The spare 1/2" x 1/2" adaptor fitting can be discarded.
- Insulate the full length of the braided hose (4) with a closed cell type insulation or equivalent (installer to supply).

The insulation shall be at least 13 mm thick, however thicker insulation may be required to comply with the requirements of AS/NZS 3500.4.

- Connect one end of the braided hose (4) to the elbow (2) at the hot water outlet of the solar storage tank and the other end to the adaptor (3) at the water inlet to the in-series gas booster.



**SUPPLIED WITH VS160 SOLAR STORAGE TANK**

1. Hex nipple 3/4" x 1/2"
2. Elbow 1/2" x 1/2"
3. Adaptor – 3/4" x 1/2" or 1/2" x 1/2"
4. Braided hose

**IN-SERIES BOOSTER – REMOTE LOCATION**

The in-series booster water heater may be installed remotely from the solar storage tank.

If the in-series water heater is a continuous flow gas water heater, this may be located adjacent to the right hand side of the solar storage tank, subject to the location of the flue terminal complying with the requirements of AS 5601 or AS/NZS 5601.1. The in-series gas booster can be connected to the solar storage tank using the fittings and braided hose supplied with the solar storage tank and following the procedure outlined under [“In-Series Booster – Integrated”](#) on page 43. A full flow isolation valve need not be installed.

Otherwise, the pipe work between the solar storage tank and an in-series water heater has a minimum recommended pipe size of DN20, **MUST BE** of copper and be fully insulated with a closed cell type insulation or equivalent in accordance with the requirements of AS/NZS 3500.4. In Victoria, insulation with a minimum R-value of 0.6 (usually 25 mm thick) must be used to achieve compliance to local regulatory requirements.

The insulation must be weatherproof and UV resistant if exposed. The insulation must be fitted up to the connections on both the solar storage tank and the in-series water heater. A full flow isolation valve must be installed on the water line to the in-series water heater.

**PIPE SIZES**

To achieve true mains pressure operation, the cold water line to the water heater should be the same size or bigger than the hot water line from the water heater.

The pipe sizing for hot water supply systems should be carried out by persons competent to do so, choosing the most suitable pipe size for each individual application. Reference to the technical specifications of the water heater and local regulatory authority requirements must be made.

**TEMPERATURE PRESSURE RELIEF VALVE**

The temperature pressure relief valve is supplied in the plastic bag with the solar control unit ground kit components. The temperature pressure relief valve must be fitted before the water heater is operated. Before fitting the relief valve, make sure the probe has not been bent. Seal the thread with Teflon tape - never hemp. Make sure the tape does not hang over the end of the thread.

Screw the valve into the correct opening ([refer to the installation diagram on page 32](#)) leaving the valve outlet pointing downwards. Do not use a wrench on the valve body - use the spanner flats provided. A copper drain line must be fitted to the temperature pressure relief valve ([refer to "Relief Valve Drain" on page 45](#)).

The valve must be insulated with closed cell polymer insulation or similar (minimum thickness 9 mm) and the insulation installed so as not to impede the operation of the valve. The insulation must be weatherproof and UV resistant if exposed.

**EXPANSION CONTROL VALVE**

Local regulations may make it mandatory to install an expansion control valve (ECV) in the cold water line to the water heater. In other areas, an ECV is required if the saturation index is greater than +0.4 ([refer to "Water Supplies" on page 16](#)).

The expansion control valve must always be installed after the non return valve and be the last valve installed prior to the water heater ([refer to diagrams on page 42](#)). A copper drain line must be fitted to the expansion control valve ([refer to "Relief Valve Drain" on page 45](#)).

The valve must be insulated with closed cell polymer insulation or similar (minimum thickness 9 mm) and the insulation installed so as not to impede the operation of the valve. The insulation must be weatherproof and UV resistant if exposed.

**RELIEF VALVE DRAIN**

DN15 copper drain lines must be fitted to the temperature pressure relief valve and expansion control valve (if one is installed) to carry the discharge clear of the water heater. Connect the drain lines to the valves using disconnection unions. The drain line from the valve to the point of discharge should be as short as possible, have a continuous fall all the way from the water heater to the discharge outlet and have no tap, valves or other restrictions in the pipe work.

A drain line from a relief valve must comply with the requirements of AS/NZS 3500.4.

A drain line must be no longer than 9 metres with no more than three bends greater than 45° before discharging at an outlet or air break. The maximum length of 9 metres for a drain line is reduced by 1 metre for each additional bend required of greater than 45°, up to a maximum of three additional bends. Where the distance to the point of final discharge exceeds this length, the drain line can discharge into a tundish.

Subject to local regulatory authority approval, the drain lines from the temperature pressure relief valve and expansion control valve from an individual water heater may be interconnected.

The outlet of a drain line must be in such a position that flow out of the pipe can be easily seen, but arranged so discharge will not cause injury, damage or nuisance. The termination point of a drain line must comply with the requirements of AS/NZS 3500.4. Drain lines must not discharge into a safe tray.

In locations where water pipes are prone to freezing, drain lines must be insulated, must not exceed 300 mm in length and are to discharge into a tundish through an air gap of between 75 mm and 150 mm.

If a drain line discharges into a tundish, the drain line from the tundish must be not less than DN20. The drain line from a tundish must meet the same requirements as for a drain line from a relief valve.

**⚠ Warning:** As the function of the temperature pressure relief valve on this water heater is to discharge high temperature water under certain conditions, it is strongly recommended the pipe work downstream of the relief valve be capable of carrying water exceeding 93°C. Failure to observe this precaution may result in damage to pipe work and property.

**BLEED VALVE DRAIN**

A copper drain line must be fitted to the bleed valve to carry the discharge clear of the water heater and solar control unit. Connect the drain line to the bleed valve using a disconnection union. The pipe work from the bleed valve to the drain should be as short as possible and fall all the way from the valve with no restrictions. It should have no more than three right angle bends in it. Use DN15 pipe.

The outlet of the drain line must be in such a position that flow out of the pipe can be easily seen (refer to AS/NZS 3500.4) - but arranged so water discharge will not cause injury, damage, nuisance or splashing. The water discharged may be of a high temperature and even very high temperature steam can be generated under certain conditions. The drain line must be fully insulated with closed cell polymer insulation or similar (minimum thickness 13 mm). The insulation must be weatherproof and UV resistant if exposed.

**⚠ Warning:** The solar collector(s) can generate very high temperature water and even very high temperature steam can be generated under certain conditions when the bleed valve is opened. It is strongly recommended pipe work downstream of the bleed valve be capable of carrying water exceeding 93°C. Failure to observe this precaution may result in damage to pipe work and property.

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## CONNECTIONS – ELECTRICAL

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**The power supply to the water heater must not be switched on until the water heater is filled with water.**

All electrical work and permanent wiring must be carried out by a qualified person and in accordance with the Wiring Rules AS/NZS 3000 and all local codes and regulatory authority requirements.

The power consumption of the water heater is:

Component	Power consumption	Comments
Solar controls	4 Watts	Constant load - differential controller
Solar circulator	36 Watts	Maximum circulator load at solar heating cycle or anti-freeze cycle start up
	30 Watts	Average circulator load during the solar heating cycle or anti-freeze cycle
Heating unit	1200 Watts	Heating unit load when operating
Total	1240 Watts	Maximum load during anti-freeze cycle
	1234 Watts	Average load during anti-freeze cycle

The water heater will only operate on a sine wave at 50 Hz. Devices generating a square wave cannot be used to supply power to the water heater.

### SOLAR CONTROL UNIT

The solar control unit, supplied with a 1.8 metre power cord, requires a switched 240 V AC 50 Hz general purpose outlet (GPO) to be located within 1.2 metres of the installation. The GPO must have a continuous power supply originating from a circuit other than the water heater circuit. The GPO is required to be weatherproof if installed outdoors.

The anti-freeze heating unit is supplied with power from the power outlet via the solar control unit. A flexible 20 mm conduit is provided for the electrical cable from the solar control unit to the solar storage tank. The conduit is connected to the solar control unit and the solar storage tank with 20 mm terminators.

The power outlet to the solar storage tank must be switched on for the solar control unit to operate and solar gain to be achieved and for the anti-freeze heating unit to operate and offer additional freeze protection.

The anti-freeze heating unit is rated at 1200 watts.

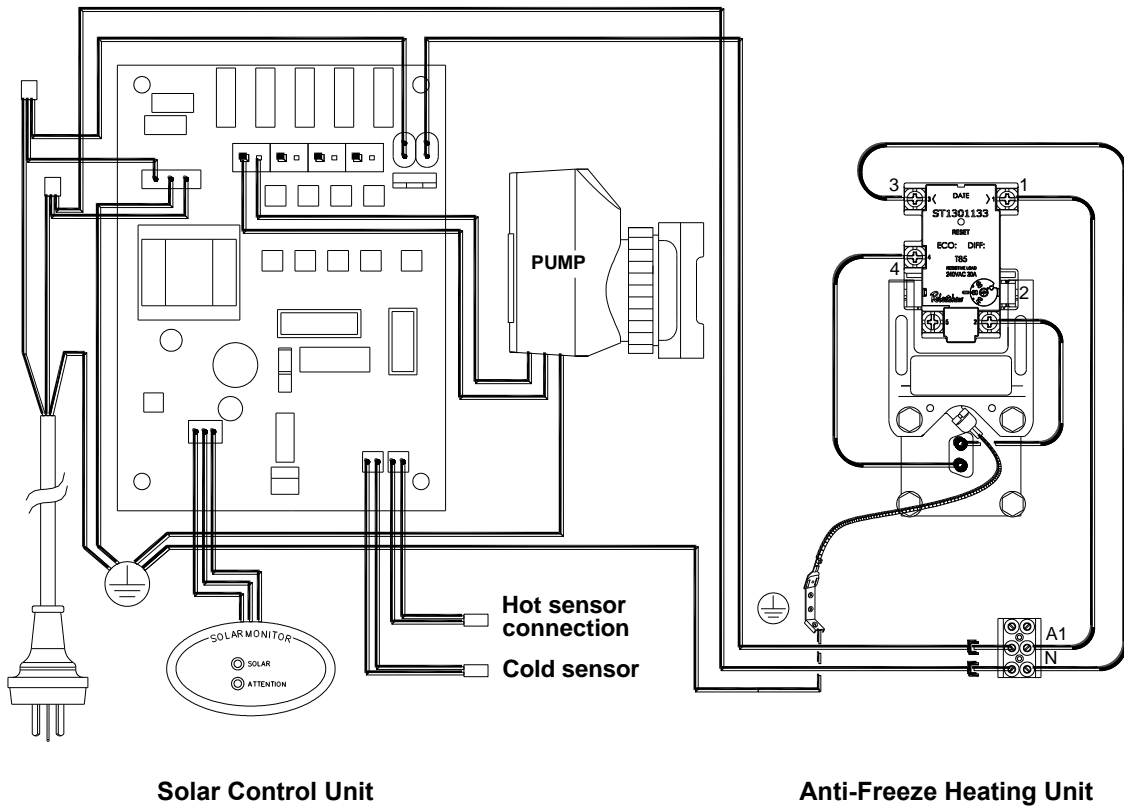
**⚠ Warning:** If at any stage the heating unit requires replacement, the replacement heating unit's rating must not exceed 1200 watts. Fitting a heating unit with a power rating greater than 1200 watts will damage the differential controller in the solar control unit.

The solar control unit automatically controls the flow rate through the collector circuit. This is achieved via the hot and cold sensors and differential controller programming providing control over the operation of the circulator. There is no provision for nor is adjustment to the solar control unit required.

### THERMOSTAT SETTING

The temperature setting on the thermostat connected to the anti-freeze heating unit does not need to be adjusted as this thermostat does not provide temperature control. Its primary function is to provide an energy cut-out in the event the solar controller fails to turn off power to the anti-freeze heating unit. Temperature control for the freeze protection function is provided by the differential controller in the solar control unit.

WIRING DIAGRAM – SOLAR STORAGE TANK



Solar Control Unit

Anti-Freeze Heating Unit

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# COMMISSIONING

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## TO FILL AND TURN ON THE WATER HEATER

The power supply to the solar control unit must not be switched on until the water heater is filled with water.

- Open all of the hot water taps in the house (don't forget the shower).
- Open the cold water isolation valve fully on the cold water line to the water heater.  
Air will be forced out of the taps.
- Close each tap as water flows freely from it.
- Check the pipe work for leaks.
- Bleed the solar collector(s) (refer to [“Bleeding the Solar Collector\(s\)”](#) on page 49).
- Plug in the solar control unit at the power outlet and switch on the electrical supply.

The power outlet must be switched on for the solar control unit to operate and solar gain to be achieved and for the anti-freeze heating unit to operate and offer additional freeze protection.

Refer to [“Solar Controller Operation at Start-Up”](#) on page 50.

**Note:** The solar control unit automatically controls the flow rate through the collector circuit. This is achieved via the hot and cold sensors and differential controller programming providing control over the operation of the circulator. There is no provision for nor is adjustment to the solar control unit required.

- Remove the packaging / covers from the solar collector(s).

Explain to the householder or a responsible officer the functions and operation of the solar water heater. Upon completion of the installation and commissioning of the water heater, leave this guide with the householder or a responsible officer.

## TO TURN OFF THE WATER HEATER

If it is necessary to turn off the water heater on completion of the installation, such as on a building site or where the premises is vacant, then:

- Switch off the electrical supply at the power outlet to the solar control unit (refer to note below).
- Close the cold water isolation valve at the inlet to the water heater.
- Refer to the Owner's Guide and Installation Instructions supplied with the in-series water heater for the procedure to turn off the in-series water heater.

### Notes:

- The freeze protection system will be rendered inoperable if electrical power is not available at the solar control unit. Damage caused by freezing due to no power at the solar control unit is not covered by the Vulcan warranty.
- If there is a risk of freezing, then it is necessary to drain the solar collector(s) and solar flow and return pipe work (refer to [“Draining the Solar Collector\(s\)”](#) on page 52).
- Refer to [“Terms of the Vulcan Warranty”](#) on page 55.



**IN-SERIES BOOSTER**

Refer to the Owner’s Guide and Installation Instructions supplied with the in-series water heater for the commissioning procedure of the in-series water heater.

If a continuous flow gas water heater has been installed as an in-series gas booster to the solar water heater, then to complete the installation, it is necessary to check the gas supply pressure at the inlet to the in-series gas booster, and also the minimum test point pressure and the maximum test point pressure of the in-series gas booster. Refer to “Gas Inlet Pressure” and to “Burner Gas Pressure” in the Owner’s Guide and Installation Instructions supplied with the in-series gas booster.

**PRESET OUTLET TEMPERATURE**

**Note:** AS 3498 requires that a water heater provides the means to inhibit the growth of Legionella bacteria in potable water. If this water heater is installed with an in-series continuous flow gas booster, then this requirement of AS 3498 can be satisfied provided the booster is energised, its preset outlet temperature setting is 70°C or higher and a remote temperature controller is not used.

If this water heater is installed with an in-series storage booster, then this requirement of AS 3498 can be satisfied provided the storage booster is energised and its thermostat setting is 60°C or higher.

It will be necessary to check and if required to adjust the preset outlet temperature setting of the continuous flow water heater or the thermostat setting of a storage water heater when it is installed as an in-series booster to a solar water heater or if it is an existing water heater and a solar water heater is then installed.

Refer to the Owner’s Guide and Installation Instructions supplied with the in-series continuous flow gas booster for the procedure to check and adjust the preset outlet temperature if required.

Refer to the Owner’s Guide and Installation Instructions supplied with the in-series storage booster for the procedure to check and adjust the thermostat setting if required.

**Note:** Consideration must be given to the delivery temperature to any ablution and public areas such as a bathroom, ensuite or public amenities. Refer to “Hot Water Delivery” on page 26 and to the schematics of “Two Temperature Zones Using A Temperature Limiting Device” on page 27.

**BLEEDING THE SOLAR COLLECTOR(S)**

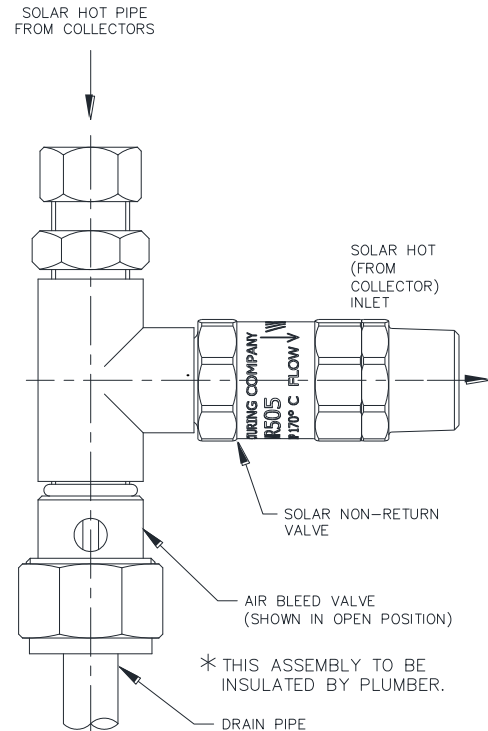
Upon completion of the installation, it is necessary to purge the air from the collector circuit.

To purge air from the collector circuit:

- Ensure the water heater is full of water and all of the hot taps are turned off.
- Using a flat blade screwdriver, open the bleed valve fitted adjacent to the solar hot water inlet of the solar storage tank (see diagram).
- The mains pressure will force water to flow from the tank and through the pipe work, forcing air from the collector circuit through the bleed valve. This is evidenced by spurtling of water from the drain line connected to the bleed valve.

**⚠ Warning:** Stand well aside of the air bleed valve drain pipe discharge point and exercise care to avoid any splashing of water, as water or in some circumstances steam discharged from the solar collector(s) may be of a very high temperature.

- Close the bleed valve when water runs freely from the drain line.



### **SOLAR CONTROLLER OPERATION AT START-UP**

When the electrical supply is switched on to the solar control unit at start up:

- If there is no solar gain, the circulator will not activate and the green LED will emit a slow pulse.

The slow pulse indicates the circulator is not activated and the power to the solar control unit has been on for less than 48 hours.

- If there is solar gain, the circulator activates and the green LED will emit a series of three (3) flashes.

The three (3) flashes indicate the circulator is operating and power to the solar control unit has been on for less than 48 hours.

- The circulator will operate at full speed for approximately fifteen (15) seconds.

After fifteen (15) seconds, the solar controller will commence to pulse the circulator to reduce the flow rate through the collector circuit. This will increase the temperature rise across the solar collector(s) and assist in maximising the system efficiency for the available solar energy. It is normal operation for the circulator to experience a pulsing effect.

- The red LED may emit a rapid pulse for a short period (whilst the green LED is emitting a series of three (3) flashes), particularly if the solar collector(s) were left uncovered during the final stages of the installation and commissioning procedure.

This indicates a temperature difference between the hot sensor and cold sensor of greater than 45°C and does not represent a fault code. This is the result of a build-up of heat and increase in water temperature in the solar collector(s) prior to the switching on of the electrical supply to the solar control unit.

The rapid pulsing of the red LED will cease as the water circulates and the heat is dissipated from the solar collector(s). This should be within four (4) to five (5) minutes of start up, but may take up to ten (10) minutes.

Whilst the red LED is emitting a rapid pulse, the circulator will operate at full speed. After the red LED has extinguished, the solar controller will commence to pulse the circulator to reduce the flow rate through the collector circuit.

If the red LED does continue to emit a rapid pulse for longer than ten (10) minutes, this may indicate water is not circulating through the solar collector(s) and solar circuit:

- switch off the electrical supply at the power outlet to the solar control unit
- repeat the procedure to bleed the solar collector(s)
- switch on the electrical supply at the power outlet to the solar control unit.

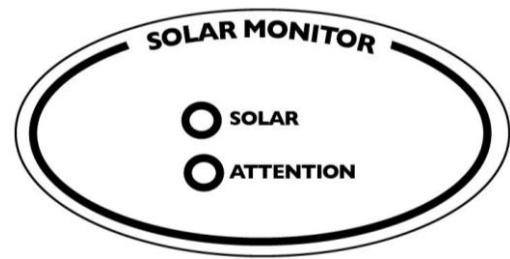
## DIAGNOSTIC FEATURES OF THE SOLAR CONTROLLER

A solar monitor is located on the side of the solar control unit and houses both a green and a red LED.

The green LED, marked “Solar”, indicates the current operational mode of the solar water heater and the red LED, marked “Attention”, may indicate a potential fault mode.

The green LED will emit either a constant glow, a constant pulsing or a series of flashes, with a 2 second interval between each series.

The red LED will emit either a constant glow, a constant pulsing or a series of flashes with a 2 second interval between each series. A constant glow or pulsing does not necessarily mean there is a fault with the system. A series of flashes indicates there may be a particular fault condition with the system.



The modes are:

Flashes	Operational Modes	Flashes	Indicator or Fault Modes
solid green (remains on)	Standby mode	solid red (remains on)	Hot sensor temperature greater than 130°C
green slow pulse	Standby mode (power on for less than 48 hours)	red rapid pulse	Temperature rise across collector greater than 45°C (circulator at full speed)
green rapid pulse	Circulating water through collector(s)	3 x red	Hot sensor in collector – short circuit
3 x green	Circulating water through collector(s) (power on for less than 48 hours)	4 x red	Hot sensor in collector – open circuit
no green (remains off)	Power outage or call for service	5 x red	Cold sensor –short circuit
		6 x red	Cold sensor – open circuit

If the power supply to the solar control unit is on and the green LED is off or the red LED is flashing, this indicates there may be a fault with the water heater. The red LED may emit from three to six flashes in each series of flashes. A constant glow or pulsing of the red LED does not necessarily mean there is a fault with the system.

**Note:** During periods of high solar radiation and if the circulator activates after having been off, such as during start up if the solar collector(s) have not been covered, it is possible the red LED may emit a rapid pulse for a period of up to ten (10) minutes. This does not indicate a fault. Refer to [“Solar Controller Operation at Start-Up”](#) on page 50 for the possible green and red LED pulsing sequence during start up procedure.

If the red LED continues to emit a rapid pulse for longer than ten (10) minutes, or emits a series of flashes, then count the number of flashes and phone Rheem Service or their nearest Accredited Service Agent to arrange for an inspection.

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## DRAINING THE SOLAR COLLECTOR(S)

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To drain the solar collector(s) and the solar hot and solar cold pipes:

- Cover the solar collector(s) with an opaque material.
- Open a hot water tap and allow the water to run for five minutes immediately prior to draining the solar collector(s).

This will assist in the transfer of any high temperature water in the solar collector(s) to the solar storage tank.

- Close the hot water tap.
- Turn off the water heater (refer to [“To Turn Off The Water Heater”](#) on page 48).

**⚠ Warning:** Exercise care, as water discharged from the solar collector(s) may be of a very high temperature.

- Using a flat bladed screw driver, open the bleed valve fitted adjacent to the solar hot water inlet of the solar storage tank ([refer to diagram on page 49](#)).
- Undo the compression fitting at the top of the circulator (located at the side of the solar control unit) and disconnect the solar cold pipe.

Water will now drain from the solar collector(s) and the solar hot and solar cold pipes.

- When water stops flowing from the solar hot and solar cold pipes, reconnect the solar cold pipe to the circulator and tighten the compression fitting.
- Close the bleed valve.

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## DRAINING THE WATER HEATER

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To drain the water heater:

- Cover the solar collector(s) with an opaque material.
- Open a hot water tap and allow the water to run for five minutes immediately prior to draining the solar storage tank.

This will assist in the transfer of any high temperature water in the solar collector(s) to the solar storage tank.

- Close the hot water tap.
- Turn off the water heater (refer to [“To Turn Off The Water Heater”](#) on page 48).

**⚠ Warning:** Exercise care, as water discharged from the solar storage tank may be of a very high temperature.

- Operate the relief valve release lever - do not let the lever snap back or you will damage the valve seat.  
Operating the lever will release the pressure in the water heater.
- Undo the union at the cold water inlet and attach a hose.

Let the other end of the hose go to a drain.

- Operate the relief valve again.  
This will let air into the water heater and allow the water to drain through the hose.

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# VULCAN SOLAR WATER HEATER WARRANTY

## – AUSTRALIA ONLY –

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### SOLAR WATER HEATER MODEL 511160

#### 1. THE VULCAN WARRANTY – GENERAL

- 1.1 This warranty is given by Rheem Australia Pty Limited ABN 21 098 823 511 of 1 Alan Street, Rydalmere New South Wales, the manufacturer of Vulcan mains pressure water heaters.
- 1.2 Rheem offer a trained and qualified national service network who will repair or replace components at the address of the water heater subject to the terms of the Vulcan warranty. Rheem Service, in addition can provide preventative maintenance and advice on the operation of your water heater. The Rheem Service contact number is available 7 days a week on 131031 with Service personnel available to take your call from 8am to 8pm daily (hours subject to change).
- 1.3 For details about this warranty, you can contact us on 131031 or by email at [warrantyenquiry@rheem.com.au](mailto:warrantyenquiry@rheem.com.au) (not for service bookings).
- 1.4 The terms of this warranty are set out in section 2 and apply to water heaters manufactured after 1<sup>st</sup> January 2012.
- 1.5 If a subsequent version of this warranty is published, the terms of that warranty will apply to water heaters manufactured after the date specified in the subsequent version.

#### 2. TERMS OF THE VULCAN WARRANTY AND EXCLUSIONS TO IT

- 2.1 The decision of whether to repair or replace a faulty component is at Rheem's sole discretion.
  - 2.2 If you require a call out and we find that the fault is not covered by the Vulcan warranty, you are responsible for our standard call out charge. If you wish to have the relevant component repaired or replaced by Rheem, that service will be at your cost.
  - 2.3 Where a failed component or cylinder is replaced under this warranty, the balance of the original warranty period will remain effective. The replacement does not carry a new Vulcan warranty.
  - 2.4 Where the water heater is installed outside the boundaries of a metropolitan area as defined by Rheem or further than 25 km from either a regional Rheem branch office or an Accredited Rheem Service Agent's office, the cost of transport, insurance and travelling between the nearest branch office or Rheem Accredited Service Agent's office and the installed site shall be the owner's responsibility.
  - 2.5 Where the water heater is installed in a position that does not allow safe or ready access, the cost of that access, including the cost of additional materials handling and/or safety equipment, shall be the owner's responsibility. In other words, the cost of dismantling or removing cupboards, doors or walls and the cost of any special equipment to bring the water heater to floor or ground level or to a serviceable position is not covered by this warranty.
  - 2.6 This warranty only applies to the original and genuine Vulcan water heater in its original installed location and any genuine Vulcan replacement parts.
  - 2.7 The Vulcan warranty does not cover faults that are a result of:
    - a) Accidental damage to the water heater or any component (for example: (i) Acts of God such as floods, storms, fires, lightning strikes and the like; and (ii) third party acts or omissions).
    - b) Misuse or abnormal use of the water heater.
    - c) Installation not in accordance with the Owner's Guide and Installation Instructions or with relevant statutory and local requirements in the State or Territory in which the water heater is installed.
    - d) Connection at any time to a water supply that does not comply with the water supply guidelines as outlined in the Owner's Guide and Installation Instructions.
    - e) Repairs, attempts to repair or modifications to the water heater by a person other than Rheem Service or a Rheem Accredited Service Agent.
    - f) Faulty plumbing or faulty gas or power supply.
    - g) Failure to maintain the water heater in accordance with the Owner's Guide and Installation Instructions.
    - h) Transport damage.
    - i) Fair wear and tear from adverse conditions (for example, corrosion).
    - j) Cosmetic defects.
    - k) Breakage of collector glass for any reason including hail damage (we suggest that the collector glass be covered by your home insurance policy).
    - l) Ice formation in the waterways of a water heater system incorporating a freeze protection system where the electricity supply has been switched off or has failed or where it is installed at an altitude more than 400 metres above sea level.
  - 2.8 Subject to any statutory provisions to the contrary, this warranty excludes any and all claims for damage to furniture, carpet, walls, foundations or any other consequential loss either directly or indirectly due to leakage from the water heater, or due to leakage from fittings and/ or pipe work of metal, plastic or other materials caused by water temperature, workmanship or other modes of failure.
  - 2.9 If the water heater is not sized to supply the hot water demand in accordance with the guidelines in the Vulcan water heater literature, any resultant fault will not be covered by the Vulcan warranty.
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# VULCAN SOLAR WATER HEATER WARRANTY

## – AUSTRALIA ONLY –

### SOLAR WATER HEATER MODEL 511160

#### 3. WHAT IS COVERED BY THE VULCAN WARRANTY FOR THE WATER HEATERS DETAILED IN THIS DOCUMENT

- 3.1 Rheem will repair or replace a faulty component of your water heater if it fails to operate in accordance with its specifications as follows:

What components are covered	The period from the date of installation in which the fault must appear in order to be covered	What coverage you receive
<b>All components</b>	Year 1	Repair and/or replacement of the faulty component, free of charge, including labour.
<b>The cylinder</b> (if the water heater is installed in a single-family domestic dwelling)	Years 2 & 3	Repair and / or replacement of the cylinder, free of charge, including labour.
	Years 4 & 5	Replacement cylinder, free of charge. Installation and repair labour costs are the responsibility of the owner.
<b>The cylinder</b> (if the water heater is <u>not</u> installed in a single-family domestic dwelling)	Years 2 & 3	Replacement cylinder, free of charge. Installation and repair labour costs are the responsibility of the owner.
<b>The solar collector</b> (all installations)	Years 2 to 5	Replacement solar collector, free of charge. Installation and repair labour costs are the responsibility of the owner.

- 3.2 If a government rebate has been received for the water heater, the duration of the protection afforded by this warranty may be greater than what is set out above. Please call 131031 for details.

#### 4. ENTITLEMENT TO MAKE A CLAIM UNDER THIS WARRANTY

- 4.1 To be entitled to make a claim under this warranty you need to:
- a) Be the owner of the water heater or have consent of the owner to act on their behalf
  - b) Contact Rheem Service without undue delay after detection of the defect and, in any event, within the applicable warranty period.
- 4.2 You are **not** entitled to make a claim under this warranty if your water heater:
- a) Does not have its original serial numbers or rating labels.
  - b) Is not installed in Australia.

#### 5. HOW TO MAKE A CLAIM UNDER THIS WARRANTY

- 5.1 If you wish to make a claim under this warranty, you need to:
- a) Contact Rheem on 131031 and provide owner's details, address of the water heater, a contact number and date of installation of the water heater or if that's unavailable, the date of manufacture and serial number (from the rating label on the water heater)
  - b) Rheem will arrange for the water heater to be tested and assessed on-site.
  - c) If Rheem determines that you have a valid warranty claim, Rheem will repair or replace the water heater in accordance with this warranty
- 5.2 Any expenses incurred in the making of a claim under this warranty will be borne by you.

#### 6. THE AUSTRALIAN CONSUMER LAW

- 6.1 Our goods come with guarantees that cannot be excluded under the *Australian Consumer Law*. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You 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.
- 6.2 The Vulcan warranty (set out above) is in addition to any rights and remedies that you may have under the *Australian Consumer Law*.

**RHEEM AUSTRALIA PTY LTD**, A.B.N. 21 098 823 511, [www.rheem.com.au](http://www.rheem.com.au)  
For Service Telephone 131 031 AUSTRALIA or 0800 657 335 NEW ZEALAND