Solar Hot Water

Installation & Maintenance Manual

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GAS

SUPPLY BY THE MANUFACTURER

The following Standard items are supplier to the Installer with each Our Solar Hot Water System

1. Storage tank
2. Flat plate solar collector (s)
3. Roof mounting system for Standard pitched roof installations
4. Roof mounting brass fittings kit including temperature well and air valve
5. Flow restrictor to suit either 1 collector or 2 collector system
6. Gas Booster. Either LPG or Natural Gas
7. System controller
8. Circulation Pump
9. Housing for system controller and pump assembly
10. Pressure / Temperature Relief (P / T) valve
11. Additional valves may be provided by the manufacturer – Specific to client
12. Polyslab base.
13. Watermarked flexible braided connector (600ml)
14. 2 x Watermarked Brass Elbow

SUPPLY BY THE INSTALLER

The following items are to be supplied by the installer

1. All labour required to fully install, test and commission the system
2. Copper piping (DN15) to complete the installation
3. Thermal UV resistant insulation for all copper piping 13mm
4. Brass fittings including joiners, copper olives, elbows etc to complete the installation
5. Any additional valves or fittings required under local regulations
6. Electrical conduit, wiring, labels, sealants, screws and washers
7. Any other non Standard items required to complete the installation

NOTE: ALL VALVES SUPPLIED MUST BE INSTALLED

INSTRUCTIONS FOR INSTALLERS

Installation of Solar Hot Water Systems must be in accordance with:
1. AS/NZS 3500.4 - National Plumbing and Drainage Code
2. AS/NZS 3000 – Wiring Rules
3. Local plumbing regulations

INDEX

SAFETY INFORMATION

WARNING – OCCUPATIONAL HEALTH & SAFETY INFORMATION

Solar hot water systems can be heavy so always use approved lifting devices when installing a solar system. You MUST adhere to all Occupational Health and Safety requirements

WARNING – ONLY USE COPPER PIPES AND APPROVED COPPER FITTINGS. PLASTIC PIPES MUST NOT BE USED IN THE INSTALLATION OF THE SOLAR HOT WATER SYSTEM

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

WARNING – HOT WATER BURNS

Solar water heaters can generate water temperatures > 85°C, therefore, a tempering valve, or approved 'mixing valve' MUST be fitted to prevent water temperatures going to the home exceeding a preset safe maximum. As a safety precaution, young children should always be supervised around hot water fixtures as water temperatures over 50 degrees Celcius can cause scalding. Liquid from the solar panels can be hot enough to create pressurized steam which can cause severe scalding. NO MODIFICATIONS SHOULD BE ATTEMPTED by the homeowner. All work on the solar collectors, tank or associated pipe work MUST be carried out by a licensed, authorized person

WARNING – INSTALLERS MUST exercise extreme care when installing or working on solar systems. Our recommend solar panels are ALWAYS covered during installation

WARNING – It is a mandatory requirement of Australian Standard AS/NZS3500.4.2 that a suitably approved temperature control device be fitted to the hot water supply for outlets used primarily for personal hygiene. This valve should be checked regularly to ensure its operation and settings remain correct. ALL systems must be installed with a Tempering valve

WARNING – DANGEROUS HYDROGEN GAS BUILD UP

If the hot water system is not used for a week or more, an amount of very flammable hydrogen gas may accumulate in the tank. To dissipate this gas in a safe manner, it is recommended that a hot water tap is turned on for a few minutes or until discharge of the gas stops. A sink or bath MUST be used for this procedure, not an appliance such as a washing machine or a dishwasher. During this procedure there should be no open flames, no smoking and no operation of an electrical appliance nearby.

WARNING – TPR VALVE MUST BE FITTED

The temperature/pressure relief safety valve (1000 kPa) supplied MUST be fitted to the top of each storage cylinder with a permanently open copper discharge pipe angled downwards in a frost free environment. The valve MUST be operated every 6 months to remove any lime deposits and verify there are no blockages. NOTE water may drip from this pipe during normal operation.

PRE INSPECTION

• Are there tall trees or buildings that would shade the unit for all or part of the year? If so, the unit will not function properly or perhaps even at all. The solar panels should be located in an unshaded position on the roof at an angle which is as close as possible to the latitude position of the installation.

• Are there young trees or planned buildings that will shade a unit in the future? The homeowner should be made aware that future shading of the panels will reduce the efficiency of the system.

• Is it possible to have the unit facing north or close to north? The panels should be located on a North facing roof.

C. SYSTEM SIZING
C1. SOLAR HOT WATER SYSTEMS

	OZS251G	OZS252G	OZS301G	OZS302G	OZS402G	OZS403G
Water Tank	250 Litre	250 Litre	300 Litre	300 Litre	400 Litre	400 Litre
Solar Collectors	1	2	1	2	2	3
Booster	LPG/NG	LPG/NG	LPG/NG	LPG/NG	LPG/NG	LPG/NG

C1. STORAGE TANKS
The size of the system involves the sizing of two components:
- hot water storage tank
- number of collectors

The number of litres of hot water used daily is the first calculation that needs to be made. This will vary enormously from family to family, a good estimate is 60 to 80 litres of hot water per person per day.

HOUSE SIZE	NUMBER PEOPLE	SUGGESTED TANK SIZE	SUGGESTED TANK P/N
1–2 bedrooms	1–2	250 litres	31.100.100
3 bedrooms	3–4	300 litres	31.100.101
4–6 bedrooms	up to 6	400 litres	31.100.102

C2. COLLECTORS
Our Collectors have been specifically designed for optimal performance. Our Collectors are manufactured using high quality materials. Each Collector has 8 x 10mm copper tube risers. Each Riser tube is welded to a high efficiency TINOX coated fin to maximize absorption of heat from the sun and transmission of heat into the water. The risers are welded to 22mm copper header pipes at the top and bottom to make a copper tube grid which is encased in thick rockwool insulation. A special 4mm thick high impact glass is fitted to the front of the Collector, an aluminium plate is fitted to the back and the Collector is fitted with a durable corrosion resistant aluminium frame.

The very rough rule of thumb is that a $1m^2$ area of collector is required per person plus $1m^2$ for each major appliance (e.g. dishwasher, washing machine) using hot water from the solar system. Our solar collectors are approximately $2m^2$ in area.

The area of collectors required will be affected by shade particularly between 9am and 3pm, whether the col-

D. TYPES OF SYSTEMS – OPEN LOOP vs CLOSED LOOP

OPEN LOOP SYSTEM
In areas of frost, water may freeze in the collectors causing the collectors to rupture, The OPEN LOOP system provides an AUTOMATIC FREEZE PROTECTION SYSTEM to prevent freezing and damage to the collectors. The pump control system is automatically activated when the temperature gets too low. The system has been tested and assessed against the freeze protection requirements Level 2, of AS2712, section 4.8. The activated pump pumps hot water from the tank into the collectors when they are in danger of freezing therefore, ensuring the collectors are not damaged.

CLOSED LOOP or indirect systems do not heat potable water directly. Instead, an anti-freeze solution circulates through the collectors, and then through a heat exchanger which transfers the heat to mains water. This provides freeze protection and is also suited for use in poor water quality areas and frost prone areas. Closed loop systems are more complex in design, more expensive and more difficult and time consuming to install. In Australia, most systems sold to consumers are open loop as climatic conditions are favourable

E. HOT WATER USAGE PATTERNS
The time of use of the hot water from such a tank becomes significant. If the hot water is used at night the Gas Booster will bring the entire contents of the tank up to temperature.

If the hot water is used in the morning or during the day, and it is a sunny day, the solar input is likely to heat the water so that little or no night boosting is required. This maximizes the efficiency of the system and minimizes the requirement of additional heating from the booster.

F. TANKS

F1 – TANK TYPES
Basically there are 2 types of hot water tanks, Stainless steel and Vitreous enamel tanks

We only use Vitreous enamel tanks. We consider vitreous enamel to be the most appropriate lining of solar hot water tanks under Australian conditions. The vitreous coating provides excellent corrosion protection by separating the steel tank lining from the water and it also insulates the tank. Vitreous tanks can withstand extremes of temperature and are suitable for most water qualities with the Magnesium anodes providing additional protection to the effects of corrosion.

Vitreous enamel lined water heaters are suitable for water with a Total Dissolved Solids (TDS) rating of 2500mg/L or less. TDS (measured in mg / litre) = Conductivity (measured in Microsiemens) x 0.7

F2 – TANK SIZES
Our tanks come in 3 sizes, depending on the number of collectors required and volume of water required to be stored. The tank sizes are 250 litres, 300 litres, 400 litres capacity

STORAGE TANK P/N	CAPACITY	HEIGHT (TANK ONLY)	DIAMETER
31.100.100	250 litres	1353mm	620mm
31.100.101	300 litres	1572mm	620mm
31.100.102	400 litres	1629mm	710mm

F3. TANK ANODES

TWO cast magnesium sacrificial anodes are connected to the inside of a storage tank from the top of the tank. Magnesium is used because it is a more active metal than steel. The magnesium rod therefore acts as an anode, by supplying electrons, and therefore sacrificing itself to protect the steel from corrosion. Therefore, over time, the Magnesium anode corrodes and requires replacement.

STORAGE TANK P/N	ANODE 1	ANODE 2
31.100.100	680mm	1045 mm
31.100.101	680mm	1275mm
31.100.102	680mm	1315mm

F4. ANODE REPLACEMENT

Replacement of the anode should be carried out at every few years. As a guide, the more dissolved solids in the water, the faster the anode corrodes and the shorter the intervals should be between replacement. If the Total Dissolved Solids (TDS, ppm) is > 1000, recommended anode replacement should be at 5 years. If the Total Dissolved Solids (TDS, ppm) is < 1000 then replacement should be at 7 years.

F5. TANKS – HOW DO THEY WORK ?

Water is stored at MAINS PRESSURE which varies depending on the location of the installation. A minimum of 500 kPa cold water pressure is required otherwise mains pressure performance cannot be expected.

Cold water enters at the bottom of the tank, is stored until required. Hot water is drawn off from the top of the tank. As this happens, more cold water enters to replace it. A non-return valve in the mains cold water connection prevents water returning to the mains water supply. To prevent damage to the cylinder, storage water heaters are fitted with a combination Temperature Pressure Relief (TPR) valve mounted at the top of the cylinder. The relief pressure of the valve is the maximum pressure the heater is designed to withstand, and is known as the working pressure or operating pressure. If the working pressure is reached (eg due to thermal expansion), the valve releases some water to maintain the pressure at acceptable levels.

F6. CYLINDER - POSITION

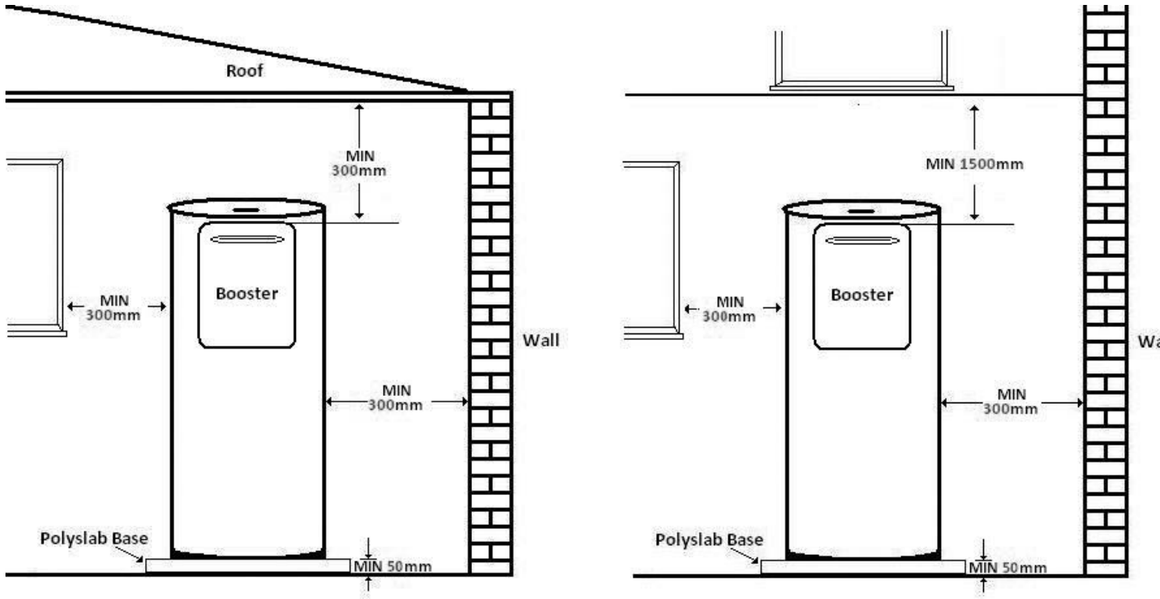
By locating the cylinder as close as possible to points of use, you can minimize heat loss and hot water wasted. Choose a position close to the most often used tap if possible. In most cases this position would be close to the kitchen primarily followed by the bathroom. A site midway between these rooms would be ideal. The location should be accessible for maintenance. The cylinders should be positioned so that the rating label can be read and parts can be removed for service.

F7. HEATER BOOSTER UNIT

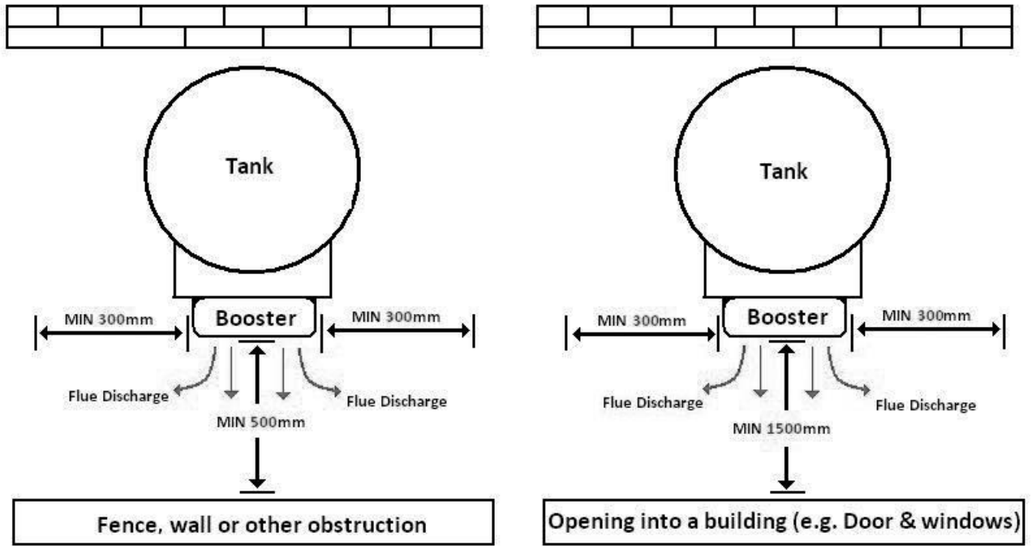
Our booster unit uses an instantaneous Hot Water System as a booster only. The Hot Water from the tank passes through the instantaneous unit and if the temperature is below 55°Celcius the Gas Booster unit heats the water to 70°Celcius.

WARNING: The cover from the Gas Booster must only be removed by a licensed plumber/gas fitter. The electrical power supply/GPO must be isolated and lead removed before commencement of removing the booster cover.

F8. LOCATION



1) At least 300 mm between the top of the gas booster and the eaves
2) At least 300 mm between the gas booster and the edge of any opening into the building, measured horizontally along the wall.
3) At least 300 mm between the gas booster and a return wall or external corner, measured horizontally along the wall.
4) At least 1500 mm below any openable window.



1) At least 1500mm between the gas booster and any opening into a building, in the direction of the flue discharge
2) At least 500mm between the gas booster and a fence, wall or other obstruction, in the direction of the flue discharge

G. HOT WATER STORAGE CYLINDER CONNECTION

G1 . SYSTEM CONNECTION REQUIREMENTS

The plumbing connection to the mains pressure supply line MUST include the following:

- Isolating valve
- Non return valve

OR a duo isolating non-return valve in lieu of two individual valves

- Pressure limiting or pressure reduction valve
- Expansion control valve
- Drain cock (some areas only)
- Disconnecting union
- Solar Non Return Valve (SNR 502)
- Correct pipe size and specifications. Note that only dezincification resistant (DR) brass fittings can be used for potable water plumbing.

Note for some States and local council areas: It is a local requirement that an expansion control valve be fitted on the cold water supply line between the non return valve and the water heater. Check with your local authorities to see if this is required and fit according to local or State regulations.

G2. ISOLATING / NON RETURN VALVES (OR DUO VALVES)

As water is heated it expands, and a mains pressure cylinder must have a NON RETURN valve fitted to prevent water being forced into the cold inlet supply line. This is because when the water in the cylinder is heated it expands and this increases the pressure inside the cylinder. It is IMPORTANT that this water does not flow back into the mains water supply. The NON RETURN VALVE is located to the mains water line adjacent to the mains water inlet to the cylinder.

An ISOLATION valve, also called a stopcock, is required to the cold water supply so the hot water system can be isolated for maintenance and servicing.

A separate isolating valve is not required if a duo valve is employed.

Duo valves are used on the majority of mains pressure systems installed nowadays. This valve combines the functions of an isolating valve when the handle is screwed down and a non-return valve when the handle is screwed up. The washer section of the valve is spring loaded so that water pressure entering from the left of the valve lifts the valve off its seat. When screwed down the valve cannot lift off its seat. Back flow (water entering the valve from the right) is prevented. The spring holds the valve on its seat and the pressure of water forces it to stay there.

The isolating valve effectively turns off the hot water system. It is installed on the cold supply therefore, will prevent hot water from leaving the storage cylinder of a mains pressure hot water system: no cold in, no hot out

G3. TPR VALVE

A TEMPERATURE PRESSURE RELIEF (TPR) valve MUST be fitted in all cases to the top of the cylinder to prevent excessive pressure and Temperature build up. The TPR valve must be fitted with a permanently open copper discharge pipe positioned facing downwards.

SAFETY WARNING: Manual operation of the TPR valve at least once every six (6) months is required to remove lime deposits, ensure it's continued correct operation and make sure there are no blockages. The valve and the drain outlet pipe must not be sealed or blocked and must be permanently vented to the atmosphere

SAFETY WARNING: A 1000 kPa TPR safety valve MUST be fitted on ALL installations. NOTE that if an ECV valve (Expansion Control Valve) is NOT fitted, then the TPR valve may drip during normal operation of the system

G4. PRESSURE LIMITING VALVE

A pressure limiting valve MUST be fitted on ALL INSTALLATIONS
The pressure limiting valve remains open until the upstream pressure approaches the valve pressure setting. When the inlet pressure is above this, the valve acts as a reducing valve to keep the outlet pressure around this level.

G5. EXPANSION CONTROL VALVE (ECV)
Scale deposits in water can cause TPR valves to become blocked with carbonate deposits as the scaling water passes through the hot valve body. To prevent failure of the TPR valve, cylinders installed in areas of high scale must have an expansion control valve (ECV) fitted on the cold supply to the water heater. The ECV must have a pressure relief setting lower than the TPR pressure relief setting but higher than the supplied water pressure. In this way pressure is released through the ECV valve in preference to the TPR valve. As the ECV is fitted in the cold mains water supply line, water is cold therefore, has less chance of forming scale and becoming blocked. The ECV should be fitted after the non return valve
Note that AS 3500.4 lists the allowable pressure ratings of the valves.

An expansion control valve IS RECOMMENDED TO BE FITTED on ALL installations with a permanently open copper discharge pipe angled downwards towards a suitable drainage point. Water will drip from this discharge pipe during normal operation due to expansion of water in the system.

G6. TEMPERING VALVE
The Australian Standard AS NZS 3500 requires that water from a storage hot water cylinder at some stage reach a minimum of 60°C in order to kill and prevent the further growth of Legionella bacteria. A solar hot water system will not always reach 60°C without some form of boost heating.

Having heated the water to 60°C it is too hot to be safe for bathrooms etc., so it must be reduced in temperature using a tempering (thermal mixing) valve. The location of the tempering valve is an issue. It is probably easiest to install it right at the hot water storage cylinder (or continuous unit). This has the distinct disadvantage that water to all points of the house will be tempered

For many people, water in the kitchen for washing dishes or in the laundry for washing clothes needs to be hotter than the maximum 50°C to which the tempering valve is set. Two pipe lines are now required, one for hot water (at least 60°C) and one for tempered hot water (50°C). For supply to points a long way from the hot water store, it is best to have the tempering valve close to the point of use. If tempered water has to travel a long distance it will continue to lose heat and be too cool by the time it reaches its destination.

The pressure must be the same for hot and cold water on each side of a tempering valve. There are different tempering valves available for different operating pressures and of course different sizes for different flow rates. Make sure that the tempering valve to be installed is suitable.

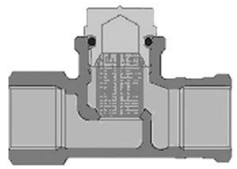
Figure1. A tempering valve attached directly to the cylinder. A second line is required if water in excess of 50 ºC is required in the kitchen or laundry.

SAFETY WARNING: A tempering valve MUST be fitted on ALL installations

G7. DRAIN COCK
A drain cock assists draining of the cylinder to remove sludge. Some areas of Australia require a drain cock to be fitted in the cold water supply. Check with your local authorities

G8. LINE STRAINER
The line strainer filters out small particles. It is not a filter designed to hold back fine particles. A line strainer is important where the water supply might have grit in it, but not all systems incorporate a line strainer.

Water enters from the left, through the bottom of the cylindrical stainless steel mesh screen, and passes through the screen leaving behind particles that are too large to pass through the mesh. A line strainer is important with systems that have a pressure limiting valve. The close fitting moving parts of the pressure limiting valve would be damaged by grit and prevented from functioning.



G9. GAS CONNECTION

All connections must be in accordance with AS 5061 and AG 601

G 10. INSULATION OF PIPES
Insulation to pipework is required to reduce heat loss from hot pipes and in some localities cold pipes must be well insulated, too, to prevent them from freezing.

The plastic insulation that comes on pre-lagged pipe does not provide adequate insulation for pipes that have hot water in them for much of the day. The lagging, however, is satisfactory for pipes that are reburied in concrete or attached to a wall with saddles, permitting movement of the pipe within the lagging.

For pipes that have hot water flowing through them all day, such as those connecting solar collectors with a storage cylinder, additional insulation is required. A functional and suited for purpose lagging must be used on all hot water pipe work including flow and return lines.

INSTALLATION

H1. COLLECTORS – INSTALLATION REQUIREMENTS

All plumbing and other work must be carried out by a qualified person and in accordance with the National Plumbing Standard AS/NZS 3500.4 and local authority requirements. If these instructions conflict with local regulations then local regulations shall take priority

WARNING · Do not commence installation until all Safety issues related to the installation requirements including lifting of modules onto the roof have been addressed.

1. The solar collectors should be installed facing North. If this cannot be achieved, orientation of the panels up to 45 degrees from North is possible. However, it must be understood the efficiency of the system may be reduced.

2. The collectors must be installed in a shade free position particularly between 9am and 3pm – the highest solar input times. For maximum efficiency the collectors should be installed at a similar angle to the latitude of the installation location. This will vary from place to place around Australia. Ideally, the collectors should be at no more than 10 % more or less than the latitude angle for optimum performance. Collectors may be installed at the roof angle for simplicity of installation and appearance, but must never be horizontal, as liquid shall not circulate effectively and the collector glass will not self clean during rainy periods. As a guide, the collectors should be installed with a minimum inclination of 10 degrees and a maximum inclination of 45 degrees

3. The solar hot and solar cold pipes between the solar storage cylinder and the solar collectors should be a minimum of DN15.

4. The panel cold supply pipe connects from the storage cylinder cold inlet supply to the bottom of one of the collectors via the circulating pump and the hot outlet pipe from the collectors connects to the cylinder's solar connection. The hot water sensor is connected at the outlet from the panel. All pipes must have a continuous fall to their connections with the storage cylinder.

5. All pipes MUST be copper and fully insulated with appropriate insulation up to edge of the collectors. Insulation must be UV and weatherproof if exposed. All compression fittings must be brass or copper olives.

6. The collectors should be located as close as possible to the storage cylinder to reduce energy losses. For optimum performance the collectors should be no more than 20 m of pipe run from the cylinder, a total of 40 metres including return pipes.

7. The roof must be structurally able to support the weight of the collectors. Each collector weighs approximately 40 kg when full of water. If the roof cannot support the load, additional bracing must be installed before the system is installed.

H2 – PIPE LENGTHS AND BENDS

Maximum recommended pipe length and number of 90° bends				
Pipe Size	1 or 2 Collectors		3 Collectors	
	Pipe Length	90° Bends	Pipe Length	90° Bends
DN15	40 metres	20	30 metres	20
DN20	Not recommended	NR	40 metres	20

Note: For each extra metre of pipe length, reduce the number of 90° bends by two. For each additional 90° bend, reduce the maximum total pipe length by 0.5 metres. One 90° elbow equivalent to two 90° bends.

H3. ROOF AREA REQUIRED AND APPROXIMATE WEIGHT OF COLLECTORS

1 Collector	1.3 m wide x 2.0 m deep.	Weight approximately 40 kg
2 Collectors	2.4 m wide x 2.0 m deep.	Weight approximately 80 kg.

H4. COLLECTOR SIZE AND PACKAGING

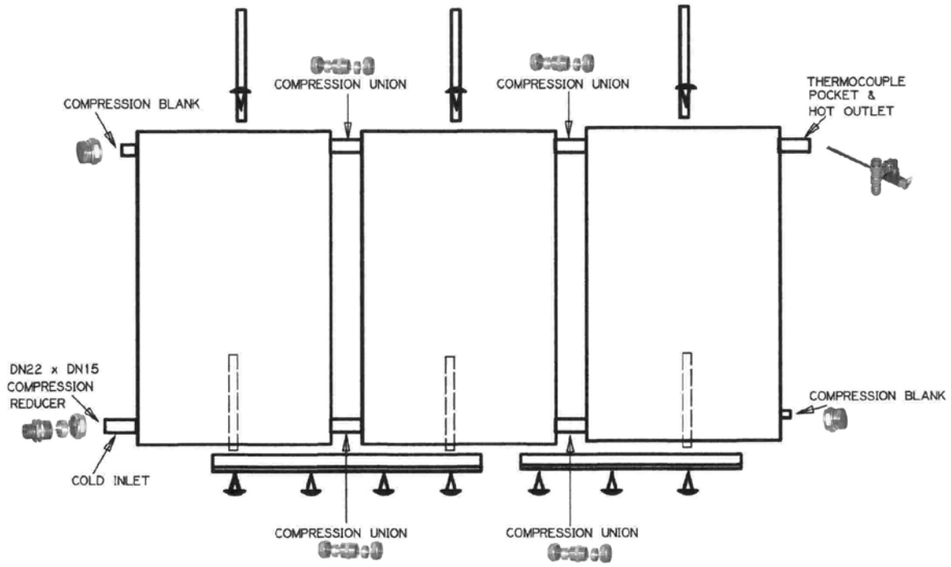
Our Collectors are approximately 2 metres x 1 metre in size. In order to reduce damage and danger, the collector must be covered until it is filled with fluid and ready for use.

Each Collector is packaged in an individual cardboard carton.

It is recommended that the packaging on the front surface of each collector surface is left on the collector until the system is filled with water. This shall prevent premature heating and possible danger of scalding of persons adjacent to the collector part way through installation.

H5. INSTALLATION OF THE COLLECTORS

The procedure for solar collector installation is as follows:



1. Corrugated Iron Roof

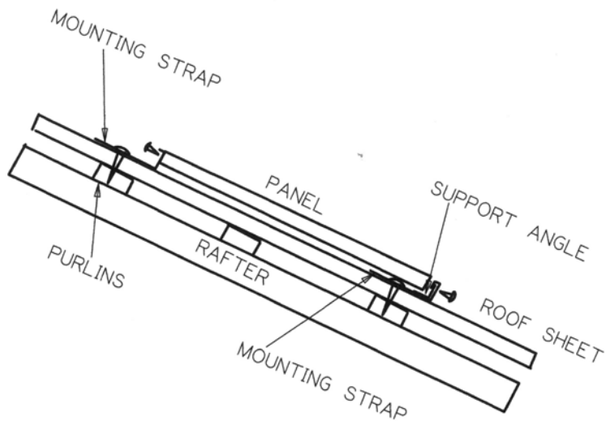


Diagram of a Corrugated Iron roof

For a single panel system – Corrugated Iron Roof

Attach the mounting straps onto the ends of the support angle.

Lay the angle on the roof in the selected position and attach the straps to the roof purlins.

Position the panel centrally on the angle and then attach a strap to the top edge of the panel and fasten it to the roof.

For a two panel system – Corrugated Iron Roof

Select the most advantageous position for the panels on the roof.

Mark a point to represent the bottom left corner of the left hand panel at a position approx. 50mm below a purlin.

Slide a mounting strap approx. 50mm onto left end of the angle and lay the support angle across the roof from the marked point with a 15mm rise up to the right.

Adjust the strap along the angle so that it can be fastened down through the top of a sheet ridge into the purlins.

Slide the angle through the mounting strap to leave 50mm projecting on the left of the mounting strap.

Slide a mounting strap 50mm onto right end of the angle, and, maintaining a 15mm rise along the angle, fasten the mounting strap down through top of a sheet ridge into the purlin.

Locate the left hand panel into its selected position. Slide the second panel along the support angle from the right until its compression fittings register with those on the first panel. Tighten the compression fittings. Make any required adjustment to the panel's position and then attach them to the support angle with the supplied screws.

Fasten a mounting strap to the middle of top edge of each panel with the supplied screws and then fasten the mounting strap down through the top of a sheet ridge into the purlin.

For a three panel system – Corrugated Iron Roof

Attach the additional support angle to the right hand end of the second panel and then slide a mounting strap 50mm onto the right hand end of the angle.
Fasten the mounting strap down through top of a sheet ridge into the purlin.
Install the third panel as per the second.

2. Tile Roof

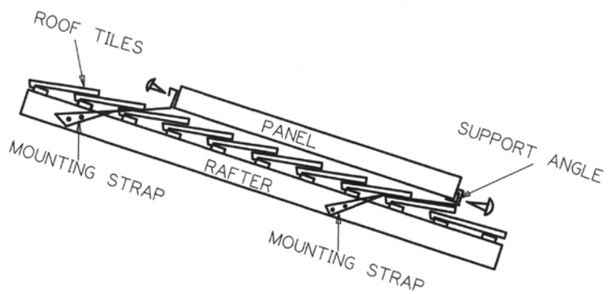


Diagram of a Tile roof

Select the most advantageous position for the panels on the roof that spaces the panels equally about roof rafters. Mark a point on the nose of a tile in line with the left hand rafter to represent the bottom of the left hand panel

For single panel system.
Select a position for the panel which spans 3 rafters and mark a spot on a tile, just above its nose, which represents the bottom left corner of the panel.

Remove two tiles above the one which was marked over the left hand rafter. Repeat this at the right hand rafter.

Slide a Mounting strap onto each end of the support angle and attach the left hand one to the rafter.

Set the angle to a 10mm rise and attach the right hand strap to the rafter. Refit the tiles.

Sit the panel onto the support angle and centralize it. Attach the panel to the angle with the screws provided.

Attach a mounting strap to the centre of the top of the panel.

Remove two tiles from beneath the strap and fasten the strap to the rafter.

Refit the tiles.

For two panel system – Tile Roof
Remove two tiles above the one that has been marked. Remove another two tiles, at the same height as the first two, from above the rafter which is 1800mm to the right

Slide a mounting strap onto each end of the support angle and attach them to the exposed rafters so that there is a 15mm rise along the angle. Note that the straps may need to be twisted below the level of the tiles and be attached to the side of the rafter if there is insufficient room on top of the rafter.

Refit the tiles. Set the panels onto the support angle, centralize them, and tighten up the compression unions between them.

Using the screws provided, attach the support angle to the panels.

Remove two tiles from above the rafter at the top of each panel.

Attach a mounting strap to the panel in line with the rafter and then attach the straps to the rafters.

Refit the tiles.

For three panel system – Tile Roof
Duplicate the above procedure for the first two panels and then attach the support angle extension to the bottom of the second panel with a 100mm overlap.

Remove two tiles from above the rafter which the extension crosses. Slide the mounting strap onto the support angle and attach it to the rafter as above, maintaining the upward slope of the support rail.

Refit the tiles and slide the third panel along the rail into contact with No. 2 panel and tighten the compression unions.

Attach the panel to the support rail.

Repeat the tile removal and strap attachment at the top of the panel.

Note that on all installations the excess strap above the panels should be removed for a neat and professional appearance

H6. INLET / OUTLET CONNECTIONS TO COLLECTORS
Slide a 22 mm Compression Plug assembly to the top left and bottom right header tube projections of the panel array. Tighten the assembly taking care not to twist the copper tubes of the collector. Make sure you use correctly sized spanners and that the plug is held steady whilst the compression plug is tightened.

Inlet (cold water) Connections to Collector Array

Slide the DN 22 to DN 15 Compression Union Assembly onto the bottom left header tube projection of the collector array. Tighten the assembly taking care not to twist the copper tubes of the collector.

Outlet (hot water) Connections to Collector Array

Assemble and install the Hot Connection Thermocouple Well assembly to the hot water outlet of the last panel in the array as follows:

(FOR ILLUSTRATION PURPOSE ONLY)

Hot Thermocouple Well Assembly with Air Bleed valve

a. Take the temperature well and slide it onto the copper spigot at the top right of the collector array with its tee pointing upwards. Screw nipple into the tee and then another tee facing out with another nipple. Screw the Reducing Brush into the top of the tee and then fit the air bleed valve into the top of the tee. Tighten the assembly taking care not to twist the copper tubes of the collector. Make sure you use correctly sized spanners and that the outlet assembly and blanking plugs are held steady whilst the compression nut is tightened.

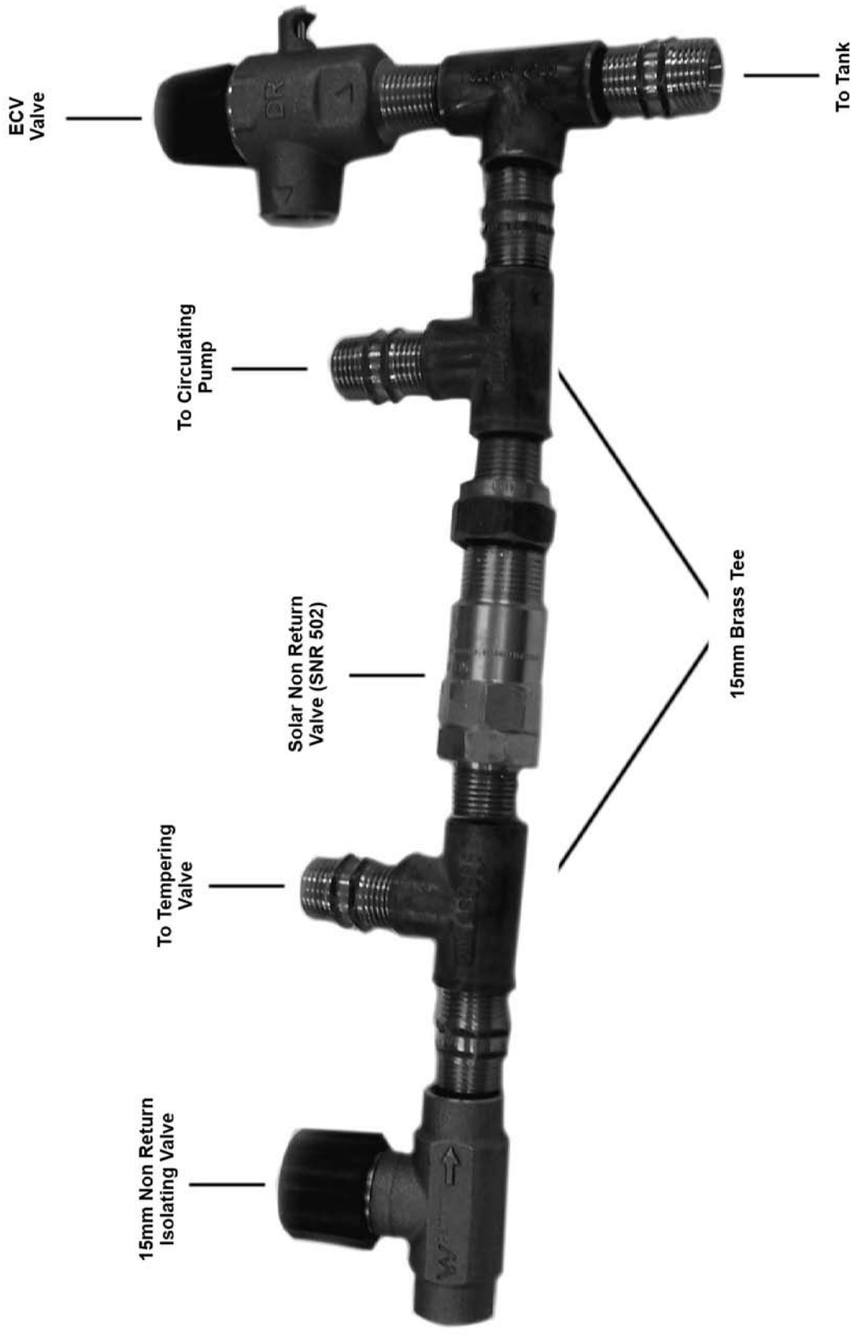
b. Apply thread tape or suitable sealant onto the 1/2” BSP thread of the Temperature Well.

c. Insert the Temperature Well into the 1/2” BSP socket at the end of the Hot Connection Union and tighten normally. Take care not to over tighten.

The collector array is now completed and ready for connection to the water heater system

‘Cold Water Valve Train Connections to Storage Tank’

(FOR ILLUSTRATION PURPOSE ONLY)



H7. STORAGE TANK INSTALLATION

IMPORTANT: Refer to Diagram – “Cold Water Valve Train Connections to Storage Tank”

Select the location of the storage cylinder to suit the panel and most frequently used hot water taps.

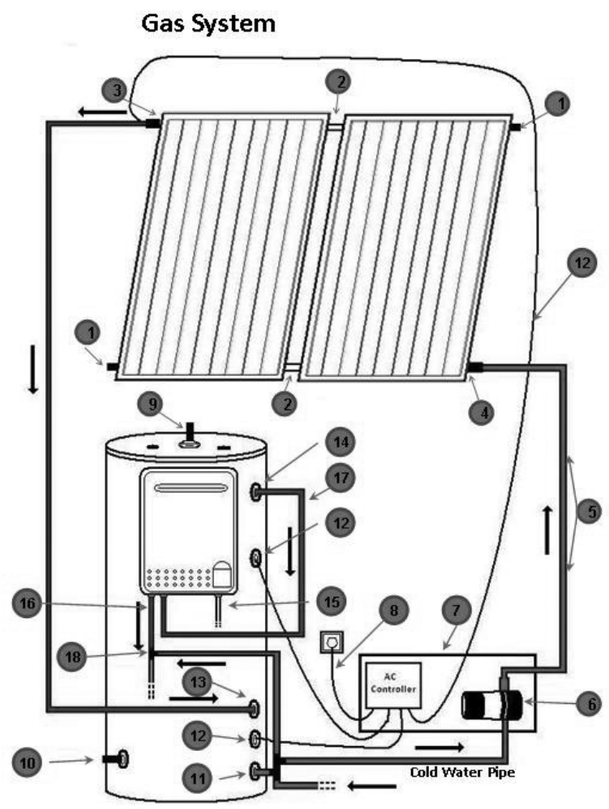
Connect the cold water supply to the cylinder inlet utilising a stop valve, non-return valve, pressure reducing valve and, if required (listed in AS 3500.4 and local regulations), a cold water expansion valve.

Connect the hot outlet of the panels to the solar inlet on the cylinder.

Install the Pressure Relief (P & T) valve into the fitting on the top of the cylinder and run a ½˝ copper drain line from the valve to a safe discharge point angled downwards. The drain line MUST be permanently open to the atmosphere and MUST be unobstructed at all times. The Pressure relief valve MUST be operated every 6 months to remove lime deposits and verify no blockages. NOTE that water may drip from the pipe during normal operation if an ECV (Expansion Control Valve) is not fitted to the system.

Open the discharge of the valve to prevent any premature pressure build up in the cylinder.

Connect the cylinder’s hot water outlet to the hot connection on a tempering valve and the tempering valve’s outlet to the property’s hot water piping. Connect a cold water line from the cold valve train to the cold connection of the tempering valve.



Number	Part Name
1	Compression Blank
2	Compression Union
3	Thermocouple Pocket (Hot outlet)
4	DN22 x DN15 Compression reducer (Cold Inlet)
5	Cold Water Pipe
6	Pump
7	Controller Box
8	Power Supply Cord
9	T/P Valve
10	Drain Valve (also can be used as Cold Water Inlet)
11	Cold Water Outlet
12	Temperature Probe Connection & Sensor Lead
13	Solar Hot Water Inlet
14	Hot Water Outlet
15	Gas Input
16	Hot Water Outlet (Main Hot Water Pipe)
17	Hot Water Pipe
18	Tempering Valve

H8. ATTACHING THE GAS BOOSTING UNIT

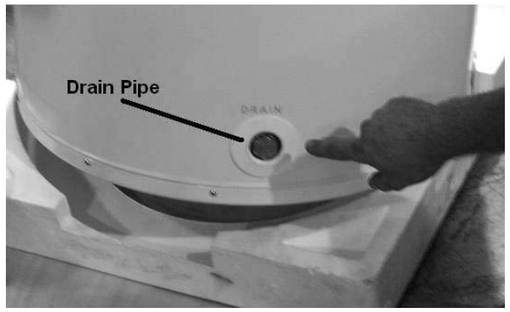
WARNING: Please ensure installation of the Bosch 21 E Gas Boosting unit is done in accordance with the appropriate Bosch Installation Manual.

Step 1:

Remove the Tank Carton and inspect for any damage on tank.

Step 2:

Make sure drain pipe is fitted

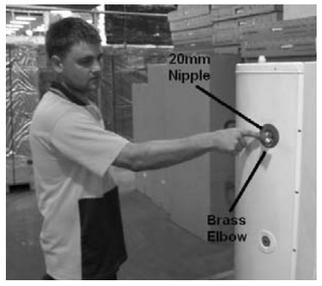


Step 3:

Attach mounting bracket

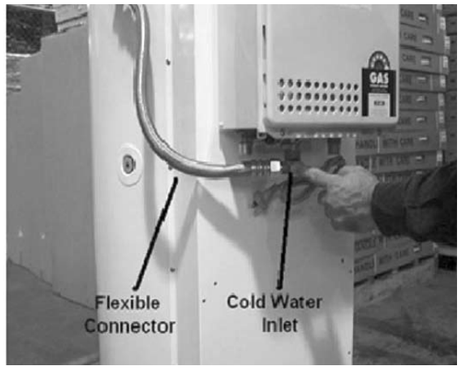
Step 4:

Insert 20mm Nipple & Brass Elbow to Hot Water outlet of tank



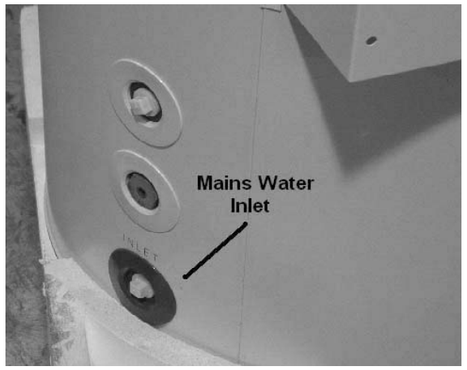
Step 5:

Attach elbow to cold water inlet. Attach Flexible Connector to Elbow



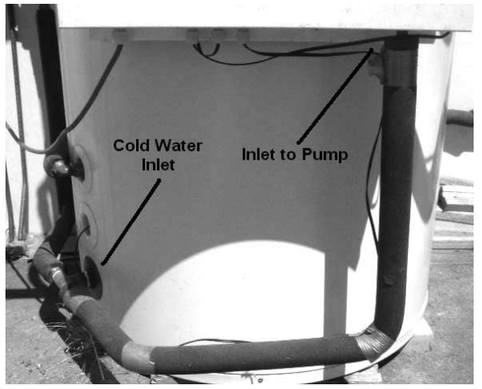
Step 6:

Connect mains Water Inlet from valve train to Inlet of Tank. (See valve diagram for installation procedure p18)



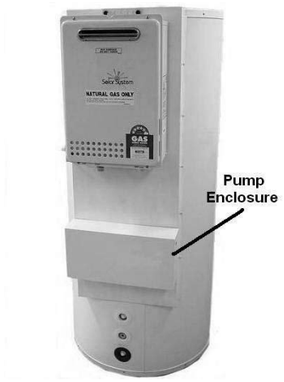
Step 7:

Connect cold water from inlet to inlet of pump



Step 8:

Fit the Pump/Controller enclosure

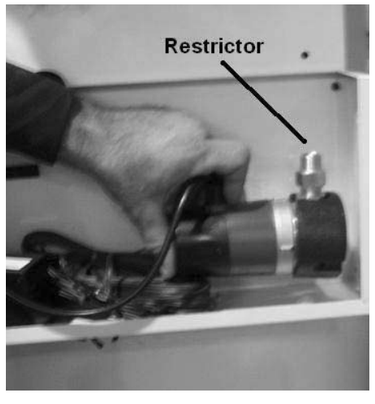


Step 9:

Install circulation pump (Note direction flow should be facing up)

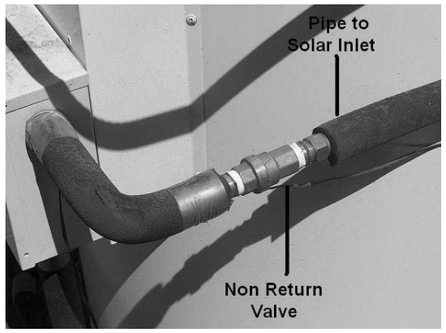
Step 10:

Install restrictor to top of pump



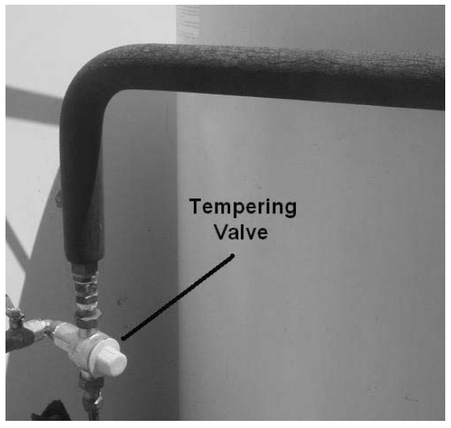
Step 11:

Install Non Return Valve to the inlet of the solar panels above the pump. (Non Return Valve operates best vertical)



Step 12:

Connect outlet to top of Tempering Valve



Step 13:

Connect Gas to Booster unit

H9. SYSTEM CONTROLLER / PUMP INSTALLATION

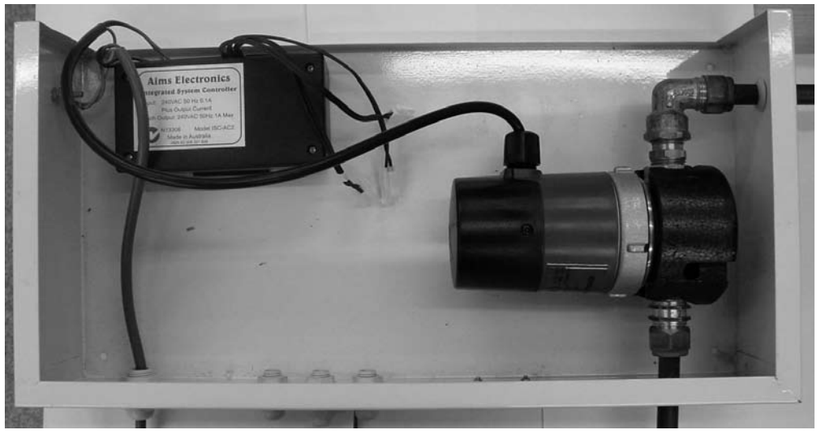


Diagram – System Controller / Pump Assembly for Open Loop System – 1 or 2 solar collectors

The use of a pump and system controller requires that the pump, controller electrical inputs and outputs including the temperature sensors are all correctly installed. There are a few general principles to be followed when installing a pump-circulation solar system

• The pump must be mounted the correct way with water input on the input flow side of the pump and water output on the output flow side of the pump. An arrow on the pump shows the direction of water flow. The pump and pump assembly MUST be mounted with the discharge upwards, making it easier for air to escape from inside the pump.

• The pump should be on the flow line to the collectors so that it pushes the water through the collectors, not on the return line where it would be pulling (sucking) the water from the collectors. On the return line it would be likely to cavitate causing noise and damaging the pump.

• The rate of circulation should not be too high (Approx. 0.2 l/min/m²), otherwise there will be excessive turbulence (stirring up of the hot and cold layers of water) within the storage cylinder. This reduces the efficiency of the solar collectors. A restriction valve is required to be fitted to reduce flow rates on some systems. These must be correctly fitted on the outlet side of the pump assembly

The wire to the sensor in the collector header should be covered to protect it from physical damage and damage from UV light where it is exposed. Flexible electrical conduit serves this purpose well.

• The ‘hot’ sensor must be situated at the hottest water in the collectors and the ‘cold’ sensor at the bottom of the storage cylinder, on or near the cold supply line. Another temperature sensor is provided which is fitted part way up the tank which shows the temperature of the hot water in the tank.

H10. Mount Pump Box Assembly

Mount the Controller/Pump box on a wall at a convenient position for piping and wiring. Ensure 4 plastic spacers are installed behind the box so that it sits away from the wall and allows the lid to be fitted.

Place the pump inside the box and attach copper pipes to both connections so that they project through the grommets.

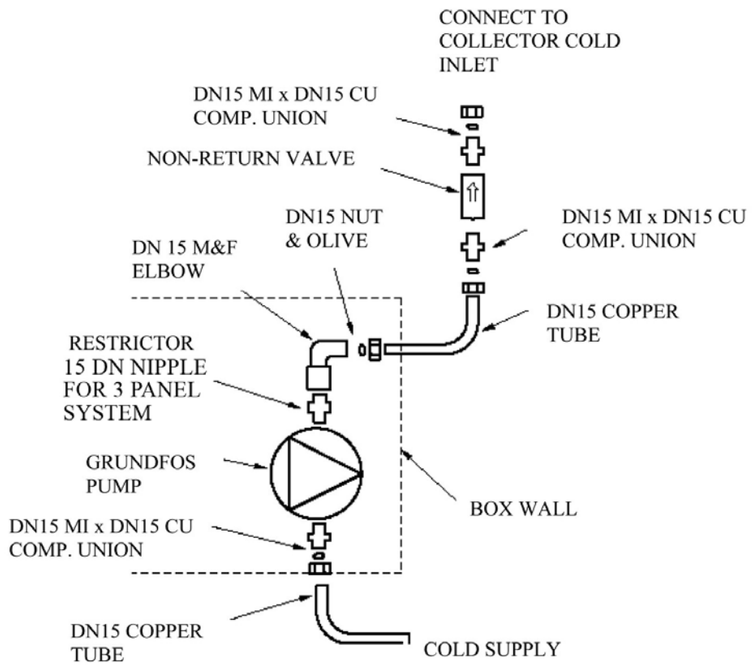


Diagram – System Piping and Fittings

H11. SYSTEM PIPING CONNECTIONS
Connect the piping and fittings as shown in the diagram. Run DN 15 copper tube up to the collector's cold inlet from the pump outlet. Run DN 15 copper pipe from the panel's hot outlet to the cylinder's solar return connection.

IMPORTANT NOTE: Copper pipes MUST slope upwards to the collectors. If the pipes do not continuously run on an upwards slope towards the collectors then this will prevent the system evacuating all the air and will therefore prevent the water from circulating.

H12. Temperature Sensor Fitment

The System Controller is supplied with three sensor leads, one long and two short. Unroll each lead in turn and pass it through a small cable gland from the inside of the housing to the outside.

Connect the sensor leads to the System Controller – ensure that the short lead with the white end uses the connector with the white band.

The long sensor lead is used to sense the temperature at the top of the collector. The short lead with the black end is used to sense the temperature at the bottom of the storage tank. The short lead with the white end is used to sense the temperature at the middle of the tank. Install all sensor leads carefully so as to avoid damage to the cable or the sensor.

Install the thermocouple sensors into their respective sockets on the cylinder and panels. Do not seal the sockets at this stage.

The sensor leads may be extended if required using suitable cable. Ensure that wires are properly insulated. Connections should be made using solder and insulated with heatshrink to provide good mechanical support and waterproofing.

H13. Preliminary System Test
When all connections have been tightened the system can be tested for pressure tightness.
Check for leaks.

A preliminary test may now be performed.

Disconnect the long sensor lead at the system controller. Apply power to the system. After 10 to 12 seconds the control output relay should click and switch the pump on. It can be difficult to detect if the pump is running, it can run quietly and with little vibration. There is a green light on the pump that illuminates when the pump is powered, but this is difficult to see.

If there is sufficient sun, hot water will be circulated back to the tank when the pump is running, check the return line from the collector with caution, it may be very hot.

Remove power and reconnect long sensor lead after test.

Seal sensors in their sockets and secure wiring. The installation is now complete.

Show the customer the control system and then replace the control box cover. Secure the cover with self tapping screws with star washers.

Connect the wiring after confirming that the electrical circuit is isolated.

WARNING – ENSURE ELECTRICAL CIRCUIT IS ISOLATED BEFORE CONNECTING ANY ELECTRICAL WIRING

Open some convenient hot taps in the house and then open the cold water valve to allow the cylinder to fill.

When air free water is discharging from the taps and NRV then close them and allow the pressure in the cylinder to stabilise.

Check for leaks throughout the system and correct as required

H14. COMMISSIONING THE SYSTEM

• Follow the procedures for installation of the storage tank, the solar collectors and the system controller / pump assembly

• Ensure all valves and connections in the system are secure.

• Turn the cold water ON so that the storage cylinder fills and ensure the cap on the automatic air vent is OPEN (approx. 1½ turns) during the filling process to ensure the panels are completely vented of air. Ensure there is no air

• When no more air is escaping from the vent then the system is full. The cap on the air valve should then be CLOSED.

• the TPR (temperature pressure relief) valve should be checked and operated to release air.

• hot water taps within the house should be turned on until water free of air bubbles is delivered.

• any taps with strainers or aerators on their outlets should have the strainers/aerators taken off and cleaned to remove any swarf or other debris that has got into the system during installation.

• the whole system should be checked for leaks.

• the storage cylinder and collectors should be checked to ensure that they sit properly in place

• Once these checks have been carried out and there appears to be no reason to drain the storage cylinder, the cardboard cover(s) can be removed from the collectors.

• if it is a sunny day, the hot pipe leading from the collectors to the storage cylinder should be checked (by hand) to ensure that it is heating up; it should be hotter than the cold line from the storage cylinder to the collectors.

• The operation of the pump can be tested by partially immersing the thermocouple sensor that goes into the top header of the collector into hot water to see if it causes the pump to switch on. If it is cooled, the pump should switch off. If the sensor is placed under very cold conditions (an ice block might be cold enough to simulate frosty conditions) the pump should again come on to provide frost protection. Frost protection commences through operation of the pump at 4 degrees celcius.

• the sensor associated with the bottom of the storage cylinder can similarly be tested; if it is heated it should turn the pump off.

• the manual override knobs on the TPR (temperature pressure relief) on the storage cylinder and ECR (pressure relief) valve on the cold supply of a mains pressure unit should be SLOWLY checked to see that each discharges normally and does not drip at the completion of the test.

• Check that the element operates. The power indicated by the meter, when comparing the element turned on and turned off, shall confirm this.

• Ensure the thermocouple leads are fully inserted (maximum distance in) into the receptacles in the tank and the collector. Seal the thermocouple sensors into the tank and the collector array using a suitable waterproof sealant.

• The system should now be operational and fully functional.

I. System Maintenance / Periodic Inspections

I1. Valves / Fittings & Draining the tank

· The Pressure / Temperature (P / T) safety relief valve is mounted on the top of the storage tank. This valve should be opened and checked every 6 months by releasing the valve (see Caution information below). This flushes any lime deposits out of the valve which can clog it and make it not function correctly. Allow hot water to flow through the valve briefly to ensure correct operation and clean the valve. It is recommended that the valve is replaced every 5 years

CAUTION – HOT WATER will flow out of the discharge pipe connected to the valve when released. Ensure that you avoid any contact with the hot water to prevent scalding

NOTE : If a Expansion Control Valve (ECV) has not been fitted then it is normal from time to time for a small amount of water to drip from the discharge pipe connected to the P / T valve

· Check all other valves and copper fittings to ensure there are no leaks. NOTE : It is normal for water to drip from time to time from the discharge pipe connected to the Expansion Control Valve (ECV). This drip is due to expansion of hot water in the system which may exceed the setting on the ECV

Draining the tank

The tank may need to be drained from time to time for maintenance reasons

CAUTION: The tank MUST be completely electrically isolated from the Mains power supply PRIOR to draining water. HOT WATER will flow out of the drain nut when it is removed. Ensure that you avoid any contact with the hot water to prevent scalding

CAUTION: Draining of the tank MUST be done by a qualified person only. The homeowner should NOT ATTEMPT to drain the tank

Each tank is equipped with a drain hole at the bottom of the tank marked “Drain” The brass fitting should be slowly opened to release water from the tank – CAUTION HOT WATER BURNS. A tap should be opened inside the home to release the pressure in the system to ensure that the water drains properly from the tank.

I2. Tank Anode replacement (Refer Section F4)

CAUTION : Tank anode replacement MUST be done by a qualified person only. The homeowner should NOT ATTEMPT to replace the anodes

Sacrificial magnesium anodes are inserted in all Our storage tanks and these preferentially corrode to increase the lifespan of the tank. Eventually these anodes can wear away and require replacement

Replacement of the anode should be carried out approximately every 5 years. There are 2 anodes, both anodes should be replaced at the same time. The anodes are located under 2 plastic covers on either side of the T / P valve located on the top of the tank.

CAUTION : The tank MUST be completely drained empty of water and completely electrically isolated from the Mains power supply PRIOR to replacing the anodes

The anodes can be carefully drawn out by unscrewing the 2 nuts which are part of the anodes at the top of the tank and lifting them out through the top of the tank. Depending on the location of the installation, it may be possible to remove the anodes without moving the tank. If there is insufficient height above the tank to safely remove the anodes then the tank may need to be moved so there is sufficient room to carry out the process

I3. Replacement of the Collector Glazing

CAUTION : Extreme caution should be taken when replacing the glazing of collectors. This presents a significant hazard and collectors must only be replaced by one of our authorized technicians.

I4. General Maintenance Tasks

The SOLAR COLLECTORS generally do not require maintenance. However, they do need to be kept clean to maximize performance. It is recommended that periodically, depending on dust / dirt which may have settled on the collectors, the collectors should be wiped down with a cloth and warm soapy water followed by rinsing with water.

I5. Contact / Service information

Ozroll Industries
174 Cavan Road
Dry Creek SA 5094
Ph: (08) 8368 0263
www.ozroll.com.au

We recommend the appearance to be of a neat and tidy installation shown above.

THE INSTALLATION IS COMPLETE

INSTALLER – PLEASE EXPLAIN TO THE CUSTOMER HOW THE HOT WATER SYSTEM WORKS AND ANSWER ANY QUESTIONS THEY HAVE ABOUT THE OPERATION OR MAINTENANCE OF THEIR NEW PRODUCT

THANK YOU

WARRANTY / GUARANTEE

TERMS AND CONDITIONS

A SOLAR HOT WATER SYSTEM INCLUDES A COMPREHENSIVE 1 YEAR PARTS AND LABOUR WARRANTY ON THE SOLAR HOT WATER SYSTEM. IN ADDITION, OUR GUARANTEE TO REPLACE YOUR HOT WATER TANK IF THE INNER CYLINDER FAILS OR YOUR SOLAR COLLECTORS FAILS WITHIN A 5 YEAR PERIOD FROM THE DATE OF INSTALLATION.

- VITREOUS ENAMEL TANK
- COLLECTORS
- CONTROLLER
- SOLAR PUMP
- VALVES & FITTINGS

WARRANTY – 1 YEAR

1. All Our solar hot water systems including components are covered by a 1 year warranty against defective factory parts or workmanship from the date of installation.

2. We will repair or replace the failed components free of charge unless the place of installation is more than 50 km from a our office in which case a transport fee shall apply

3. The warranty applies only to defects or damage which have arisen solely due to faulty materials or workmanship, including installation

4. The warranty covers either repair AND / OR replacement of failed components and the decision is made entirely at our discretion.

GUARANTEE – 5 YEARS

5. If the inner cylinder of the storage tank fails after the 1 year warranty period but within 5 years of the installation date then we will provide a replacement storage tank. All costs associated with removal of the failed tank, pick up of the new tank from a our office and installation including all labour costs and material costs shall be entirely at the expense and responsibility of the owner of the hot water system

6. If a Collector fails after the 1 year warranty period but within 5 years of the installation date then we will provide a replacement Collector. All costs associated with removal of the failed Collector, pick up of the new Collector from a our office and installation including all labour costs and material costs shall be entirely at the expense and responsibility of the owner of the hot water system

WARRANTY / GUARANTEE

TERMS AND CONDITIONS

SCOPE OF WARRANTY AND GUARANTEE

7. The warranty and guarantee ONLY APPLY to defects or damage as a direct result of faulty factory parts or workmanship

8. The warranty and guarantee DO NOT APPLY to Collector glass

9. The warranty and guarantee DO NOT APPLY to defects or damage caused by or resulting from:

a) Accidental damage,
b) Misuse or abnormal use of the system including neglect of any kind to the system
c) Poor water quality including water contamination
d) Excessive water pressure
e) Over temperature
f) Alteration or repair of the system other than by an approved qualified repairer
g) Faulty or improper installation
h) If a cold water temperature and pressure relief valve, expansion valve, check valve and strainer is not fitted in areas where mains pressure is likely to exceed 1100 kPa.

10. The guarantee does not cover any removal or disassembly costs, transport costs, installation costs, plumbing costs or any other associated part costs

11. If a failed component is replaced or repaired under the warranty or guarantee period, the balance of any original warranty or guarantee period shall apply.

12. We will not be liable for any loss or damage to furniture, carpets, walls, foundations or any other consequential loss of any kind caused by a defect in the hot water unit and solar collector or any component.

13. Any claim under the warranty or guarantee must include full details of the defect and/or damage and must be made within one month of the detection of the defect.

14. Legislation implies certain warranties and consumer protection which cannot be excluded or restricted by this warranty and guarantee.

WARRANTY / SERVICE CARD

Refer to Our Warranty and Guarantee Terms & Conditions

Please fill in the details on this warranty card and keep it in a secure place along with your original invoice as proof of purchase and installation date.

OWNER'S DETAILS:

Surname: ..... Given Name(s): .....

Address: .....

State: ..... Postcode: .....

Date of Purchase: .....

Model: ..... Serial Number: .....

Date of Manufacture: ..... (see plate on storage tank)

INSTALLER'S DETAILS:

Date of Installation: ..... Installer's Name: .....

Installer's Signature: .....

SERVICE DETAILS

Date of Service : .....

Service carried out by : .....

Details of work carried out : .....

.....

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Date of Service : .....

Service carried out by : .....

Details of work carried out : .....

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WARRANTY / SERVICE CARD

Refer to Our Warranty and Guarantee Terms & Conditions

SERVICE DETAILS

Date of Service : .....

Service carried out by : .....

Details of work carried out : .....

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WARRANTY / SERVICE CARD

Refer to Our Warranty and Guarantee Terms & Conditions

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