



HOT WATER SYSTEM

The Solar Water Heater of New Generation

Installation Manual

- Installation
- Operation
- Maintenance
- Owners Guide
- Warranty



Solar Lord Hot Water

Instructions for installation

Please forward the manual to the owners

E-mail: info@solarlord.com.au

Website: <http://www.solarlord.com.au>

Sales: 1300 133 782

Service: 1300 133 782

Thank you for choosing a Solar Lord hot water system. You may look forward to many years of monetary savings as well as knowing that you are helping provide a sustainable future for generations to come.

**THIS SOLAR WATER HEATER MUST BE INSTALLED BY
A LICENSED PLUMBER & ELECTRICIAN**

IMPORTANT

Please read these instructions carefully and make sure you understand them before the installation; it will ensure a successful and trouble-free installation.

THIS APPLIANCE SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, LOCAL AND AS3500.4 NATIONAL PLUMBING REGULATIONS, MUNICIPAL BUILDING CODES AND ANY OTHER RELEVANT STATUTORY REGULATIONS.

All work carried out must be performed by the appropriate qualified tradespeople or be suitably supervised for trade assistant duties.

This is a water heating apparatus only and the final fitness of water delivered is dependent upon the quality of water supplied to this system. Solar Lord does not accept liability or responsibility for the final fitness of water for consumption from this system.

This appliance is not suitable for pools.

Materials and specifications are subject to change due to ongoing production improvement. The products as outlined in this manual may differ slightly from systems purchased.

SAFEGUARDS

Scalding occurs at 50°C. This appliance is capable of providing hot water above this temperature. Under stagnation conditions the solar collectors have the ability to generate temperatures of up to and exceeding 270°C. Care must be taken when handling or other activities where skin contact could occur and scalding would result.

Water may drip from the discharge pipe of the pressure relief valve device. This pipe must be left open to the atmosphere. Children should be supervised to ensure that they do not play with the appliance and nearby drainage.

This appliance is not intended for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the appliance safely.

Solar Lord water heaters are designed for the supply of hot water to a domestic household premises which have been constructed to and complied with the appropriate local, national codes and regulations and has been maintained in good condition.

Where braces, bracket, frames etc are secured to roof timbers all fittings must be of an appropriate type to suit the type of timber. Where the collector is mounted on a metal roof, the braces, frames etc must be fastened to the rafter underneath the metal sheet. Inadequate or inappropriate fixings may result in braces becoming unsecured and the installation of the solar collectors becoming dangerous.

Solar hot water collectors can be heavy and fragile so always use approved lifting devices to assist installing. 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 manufacturing, working at heights

SOLAR LORD DOES NOT ACCEPT LIABILITY OR RESPONSIBILITY FOR ANY ACCIDENT OR PERSONAL INJURY DURING THE INSTALLATION OF THIS SYSTEM

Installers must be qualified the training in:

- 1. Height Hazard Assessment**
- 2. Working at Height Procedures**
- 3. Assessment/Use/Wearing of correct height safety equipment (harnesses etc.)**
- 4. All other relevant safety factors specific to the work to be suitable to Occupational, Health and Safety Regulations/Codes.**

WARNING

If cold water pressure likely exceeds 550 kPa a pressure reduction valve must be fitted. Failure to install a pressure reduction valve where required will void the warranty (*refer to pg.42*). In some locations regulations require a pressure relief valve to be fitted to the cold water supply.

This installation must comply with requirement of AS3500.4 and manufacturer's installation instructions, local water regulations and national plumbing regulations, municipal building codes and any other relevant statutory regulations.

Observation of these instructions is most important and failure to do so could void the benefits of SOLAR LORD warranty protection.

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 as supplied by Solar Lord could void the warranty.

Other such equipment or parts not supplied by Solar Lord to this installation which may affect its operation/performance must first be authorised by Solar Lord in writing if the full benefits of this warranty are to remain valid.

Safety

In addition to the normal conventions for safety, when installing or working on the system, please take note of the following;

- Isolate electrical supply to controller, pump and electric water heater booster**
- Wait for the system to cool down**
- Wear protective clothing due to sharp edges and hot components.**
- Turn off the water supply**
- Release the water pressure using the relief valves**
- Cover the collectors with cardboard or sheets to limit heat gain from the sun**

TABLE OF CONTENTS

General	6
The Principal of Operation	6
Contractor's Responsibilities	9
Installation	10
SYSTEM LOCATION	10
INSTALLATION INFORMATION	11
OPEN (DIRECT) CIRCUIT	12
HEAT PIPE SYSTEM OPEN (DIRECT) CIRCUIT	12
U TUBE SYSTEM OPEN (DIRECT) CIRCUIT	13
Installation Diagrams	14
CLOSED (INDIRECT) CIRCUIT	16
Installation Diagrams	16
General Installation	17
Piping	17
SOLAR COLLECTOR CONNECTIONS	17
TANK CONNECTIONS	18
SOLAR CONTROLLER	18
Electrical Connections	19
Gas Connections	20
The Solar Collector Installation	21
Set-up Circuits & Commissioning	26
Checking the System Operation	27
Maintenance and Service	28
Owner's Manual	30
Appendices	35
Warranty Conditions	39

GENERAL

This instruction is the manual for installation and use of Solar Lord water Heaters. It states how to install, set-up and check the system. It also provides necessary technical data and knowledge of solar hot water system.

THE PRINCIPAL OF OPERATION

Since evacuated glass tube technology was invented, solar energy can be changed to heat energy efficiently in four seasons. Solar exposure can be turned to heat regardless ambient temperature of the collectors. Solar Lord collectors using German design for the tubing and Sydney University coating technology for the absorbing surface.

The inside and outside tubes are made from extremely strong borosilicate glass which are evacuated and fused together. The vacuum space between two glass layers forms excellent insulation to stop the heat loss from the inside to the outside. The outside of the inner tube is coated a surface to absorb maximum solar energy.

When sunlight strikes the collector, the solar radiation goes through the clear glass of the outside tubes and is absorbed by the coating on the outside of the inner tubes. The solar energy is changed into heat energy by the coating surface and heats the inner tube.

Either a heat-transfer fluid or the actual potable water to be used flows through tubes attached to the absorber and transfers the heat from it. The heated water is stored in a storage tank until needed. If additional heat is needed, it is provided by electricity or gas energy.

The Solar Lord hot water system you are installing is a 'pump' solar system that has circulation of water (direct loop) or glycol mixture (indirect loop) around the solar collector.

The small circulating pump circulates the water between the collectors and the hot water cylinder. The pump is usually operated by a solar controller that only turns the pump on when the water in the collector is warmer than the water in the tank. These pumps are very quiet, offering no noise disturbance and only draw around 23 watts.

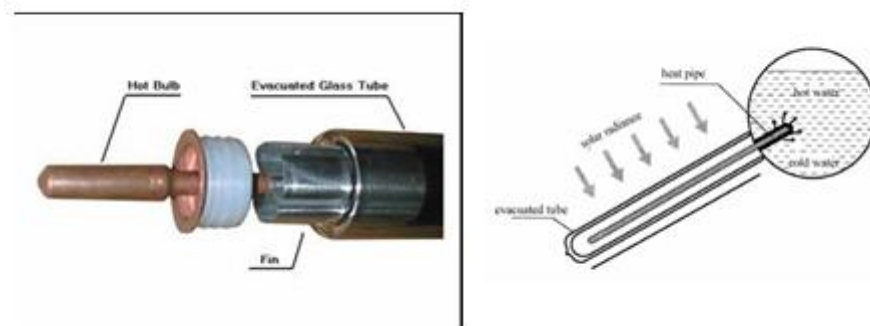
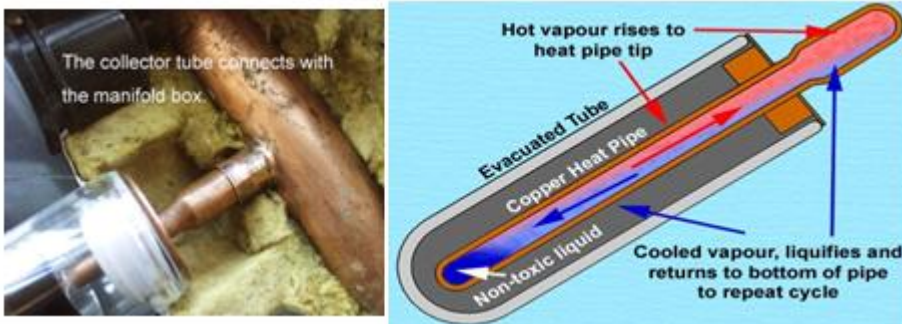
We can also offer 12 volt pumps which are coupled to a photovoltaic cell of approximately up to 20 watts depending upon system characteristics. These systems offer automatic control, i.e. when there is solar gain, the collector warms up and also the pump operates. These systems are often installed in remote sites where thermosyphon systems are not suitable.

In a **Heat Pipe collector**, the Sun's energy that is absorbed by the tubes is then transferred to your water via special heat pipes located inside each tube. A small amount of non-toxic liquid is inside each heat pipe. This liquid is turned to gas by the Sun. This gas rises to the tips of the pipes which are inserted into a heat transfer manifold located on your roof. Water is then pumped through this manifold absorbing the heat and stored in a water storage tank located below.

In a **U Tube collector**, the copper tube is bent into a U Shape (called U tube) and inlaid into heat transferring fins. Both copper tubes and a pair of fins sit inside of the evacuated glass tube. When sunlight strikes the collector the solar radiation goes through the clear glass of the outside tubes is absorbed by the coating on the outside of the inner tubes. The solar energy is changed into heat energy by the coating surface and heats the inner tube. Encircled by the inner glass tube the fins transfer the heat from the absorbing surface of the inner tube to the copper U tube. Water flows inside the U copper tube and is heated and piped to the storage tank where it is kept until needed.

The result is an incredibly efficient system to harness the heat of the Sun even in extremely cold areas. Because the system is so efficient it does not require full sun and can work in cloudy or even rainy days.

Heat Pipe



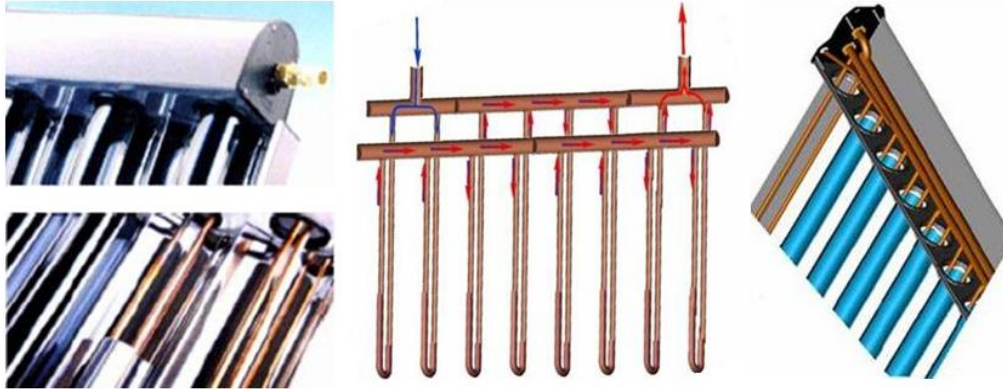
Inside of the copper heat pipe has been evacuated and filled with not-toxic heat transfer liquid. When sun rays strike the evacuated tube, the liquid will be heated and melt to a hot vapour. The hot vapour rises up to condenser at top of the heat pipe and heats up the manifold where the heat pipe is plugged in. When water flows through inside of the manifold, the water is heated and flows into storage tank. Once the vapour release the heat to manifold it turns into liquid again, then flows down to the base of the heat pipe. This cycle continuously repeats when solar radiation is being absorbed by the heat pipe. Every circulation of liquid-gas will complete the heat transfer.

In this way the solar energy is transferred from the heat pipe to the manifold where the cold water is heated. During the day, water is circulated through the manifold header, via intermittent pump cycling. Each time the water circulates through the header the temperatures is raised by 5-10°C. Throughout the day, the water in the storage tank is gradually heated.

The evacuated tubular collector with heat pipes can be quasi-tracking in four seasons, the collector will be in operation as long as the sun shines. Within the heat pipe collector the heat transfers is in one direction only. Heat pipe water heaters can be in service all year round even in cold climate areas where experience below to -9°C in winter.

Copper U Tube

The inside and outside tubes are made from extremely strong borosilicate glass which are evacuated and fused together. The vacuum space between two glass layers forms excellent insulation to stop the heat loss from inside to the outside. The outside of the inner tube is coated with the "*Novel Sputtering*" coating to absorb maximum solar energy. This coating was developed and patented at Sydney University.



The copper tube is bent into a U Shape (called U tube) and inlaid into heat transferring fins. Both copper tubes and a pair of fins sit inside of the evacuated glass tube. When sunlight strikes the collector the solar radiation goes through the clear glass of the outside tubes is absorbed by the coating on the outside of the inner tubes. The solar energy is changed into heat energy by the coating surface and heats the inner tube. Encircled by the inner glass tube the fins transfer the heat from the absorbing surface of the inner tube to the copper U tube. Water flows inside the U copper tube and is heated and piped to the storage tank where it is kept until needed.

The U tube collectors maximize solar heat gain and minimize heat loss. It has been tested and proven to be the highest efficiency collector available globally. The testing was performed by German laboratory **Fraunhofer** - the top laboratory of solar energy in the world.

DIRECT HEATING SYSTEM (OPEN LOOP):

E450U45-O, E450U30-O, E340U15-O, E270U15-O, E450SH48-O, E450SH40-O, E340SH32-O, E270SH24-O & E180SH16

G450U45-O, G450U30-O, G340U15-O and G270U15-O, G450SH48-O, G450SH40-O, G340SH32-O, G270SH24-O, G2001-O and G180SH16-O

In the open loop system the potable water is directly heated as it circulates by a pump through solar collectors mounted on the roof. The heated water is then stored in a ground-mounted storage cylinder and rises up the cylinder by natural convection to the top of the tank where the hot let is.

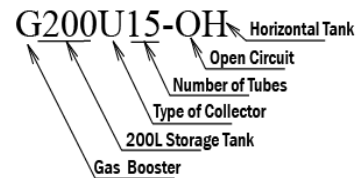
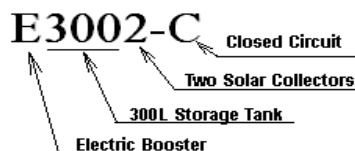
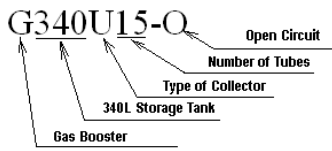
INDIRECT HEATING SYSTEM (CLOSED LOOP):

E3002-C, E3001-C, G3002-C & G3002-C

Indirect heating systems use a heat exchanger in the storage tank to complete heat transfer. By using an indirect solar circuit that contains a glycol mixture circulated to solar collectors by a pump, the heat energy produced from the absorbing surface of the collector is transferred to the potable water in the storage tank as the glycol passes through the heat exchanger. The indirect (closed) circuit protects the collectors from freezing and is recommended for areas that are susceptible to frost below -7°C or harsh water conditions.

An auxiliary heater is also included in the system to boost water temperature during periods of continuous rain or low sun radiation days. Boosters may run on continuous/off-peak electricity or post gas.

The system model represents source of booster, storage capacity, type of collector, number of evacuated glass tubes and kind of system indicated in order as follows,



CONTRACTOR'S RESPONSIBILITIES

1. STANDARDS

All Solar Lord Hot Water systems must be installed by an authorised Plumber and electricity supplied by a registered electrician. The entire works will need to meet local authority standards, Australia Standard (AS 3500.4) and the National Plumbing Code along with local Electrical regulations.

2. PREPARATIONS

- (a) Installers must have been completely trained in the correct safety procedures for working at heights of roofs and make sure that all work is 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.
- (b) Use an approved lifting device as the solar tanks and collectors can be very heavy (ref to specification). The evacuated glass tubes are fragile. Take care when lifting and installing the collector(s). Wear gloves to avoid cut by broken glass and scalded hot components.
- (c) Take all considerations to protect and warn occupants of the building and the public from personal injury which may occur from falling tools, broken glass, roof materials, fittings or any other hazards of a general nature.
- (d) Advise the occupants of the property about any inconvenience cause by temperate disconnection of existing water, electrical and gas supplies during the installation.

3. COMMISSIONING

The commissioning of the installation and its handing over to the client shall be the responsibility of the contractor. The contractor shall instruct in the method operation and hand the client a copy of this manual. It is the contractor's responsibility to advise owners of the potential hazard scalding in accordance with AS3500.4 and other related standards.

Call the client and check if system functions well and supplies enough hot water three days after the installation.

INSTALLATION

SYSTEM LOCATION

Solar collectors

Orientation

The solar collector must be mounted on the roof and orientated to geographic north for optimum solar gain. Geographic north is between 17 and 24 degrees west of magnetic north as shown by a compass. For optimum performance, the solar collector/s should be positioned on a north-facing roof (no more than 45° east or west of north) at an angle between 15° and 50°. Use a compass to check orientation. Variation greater than 60° East/West will require an additional collector, while between 45° - 60° can be acceptable under certain circumstances of less than average hot water usage.

The collector should be in a shadow free position all year round. Carefully check for high buildings or trees in the vicinity for WINTER shade. A deviation of 45° to east/west has little effect on annual solar gain.

Inclination

Inclination of the solar collector should be approximately equal to the local latitude angle for receiving max annual solar gain. If the roof angle varies by $\pm 15^\circ$ from the correct angle, annual efficiency will be reduced by 5%. In general variation about $\pm 10^\circ$ is acceptable. Traditional flat collectors request the ideal inclination of the solar collector at an angle equal to the latitude of the site due to its significant loss on the annual solar gains if collector deviations greater than 20° .

Solar Lord **U tube** Collector can be installed on any roof pitch from 10° - 90° due to its high efficiency. Solar Lord **Heat Pipe** collector needs a roof pitch greater than 20° to achieve the best performance. Standard roof pitch is usually sufficient.

An inclination less than the latitude will result in increased summer performance and inclinations greater than the latitude of the site will increase solar gain during winter. Because the lowest Sun rays, shortest sunshine duration and coldest water temperature from the mains in winter, we encourage you to install collectors inclination as high as possible to capture max solar energy in winter. The latitudes of the main cities of Australia are listed below;

CITY	LATITUDE	CITY	LATITUDE	CITY	LATITUDE	CITY	LATITUDE
Adelaide	35°	Cairns	17°	Hobart	42°	Port Hedland	20°
Alice springs	24°	Canberra	35°	Mildura	34°	Rockhampton	24°
Brisbane	27°	Darwin	12°	Melbourne	38°	Sydney	34°

Location

Solar collector should be installed as close as possible to the storage tank. The piping length between solar collector/s and tank will affect the system efficiency. Longer pipe will increase heat loss of the solar hot water unit. The solar collector must be no more than 15 metres away from the storage tank. The solar water storage tank should be installed close to the most frequently used outlet and its position chosen with safety and efficiency.

Roof structure

The solar collectors need to install on the roof where chosen is well structurally capable of supporting the

weight and size (*refer to SOLAR COLLECTOR LOCATION PG.17*). The building shall be complied with national building regulations and associated Australian Standards or equivalent. It is the installer's responsibility to ensure that the necessary structural assessments have been made.

Special condition areas

a) CYCLONIC AREAS

The cylindrical shape of the evacuated glass tubes and the gaps between the tubes let wind easily get through. The collector/s can stand up to Beaufort Wind Force 11. Solar Lord mounting frame has completed the test and past to the test of Australia Standards (AS 4040.03:1992 and AS 1170.2:2002). This test includes the collector and installation kits for Wind Resistance. It is strongly recommended that the system is fitted onto the mounting frame and to be secured and fastened enough to resist these conditions.

b) FROST AND POOR WATER QUALITY AREAS

(E3001-C, E3002-C, G3001-C & G3002-C)

The Closed Loop (indirect circuit) should apply to these areas. The closed solar circuit system is designed for frost-prone and poor quality areas. Anti-freeze control is incorporated in the design by using a glycol mixture in the solar circuit. The heat transfer fluid is 'Glycol' which has specific properties that prevent it from freezing and therefore eliminating the risk of frost damage to the collectors. Solar Lord Glycol is a food-grade fluid. Depending upon its concentration, it enables the system to operate at environment temperatures down to -40°C. Please contact Solar Lord for further details.

Storage Tank

To obtain maximum performance the solar tank should be positioned as close as possible to the most used outlets and to solar collectors as well. The tank can be installed internally on an approved spill tray with drain or externally on a level concrete plinth.

Make sure Pressure and Temperature Relief valve is accessible. It is recommended the solar storage tank be installed at ground or floor level and shall be placed vertical upright. No blockage above the tank and electric element bush (electric back up models) for easy access for maintain and service purposes.

Boosting

Systems that use electrical boosting should be connected to day tariff (power) or off peak tariff (if applicable) accordingly in respect of the model to claim the ORER rebates.

When using gas boosting, the continuous gas unit should be installed as close as possible to the most use outlets and tank as well to reduce the heat loss from the pipe.

Electric connection

Local codes must be adhered to for all electrical work and be undertaken by a qualified electrician. All pumped solar hot water system require a power outlet to run the pump. When using the gas booster an additional waterproof power outlet will be needed. A 15AMP power connection will be needed for electric backup system.

Pre-approved by owner

Please advise the owner of the optimum location to approve and confirm prior to the installation.

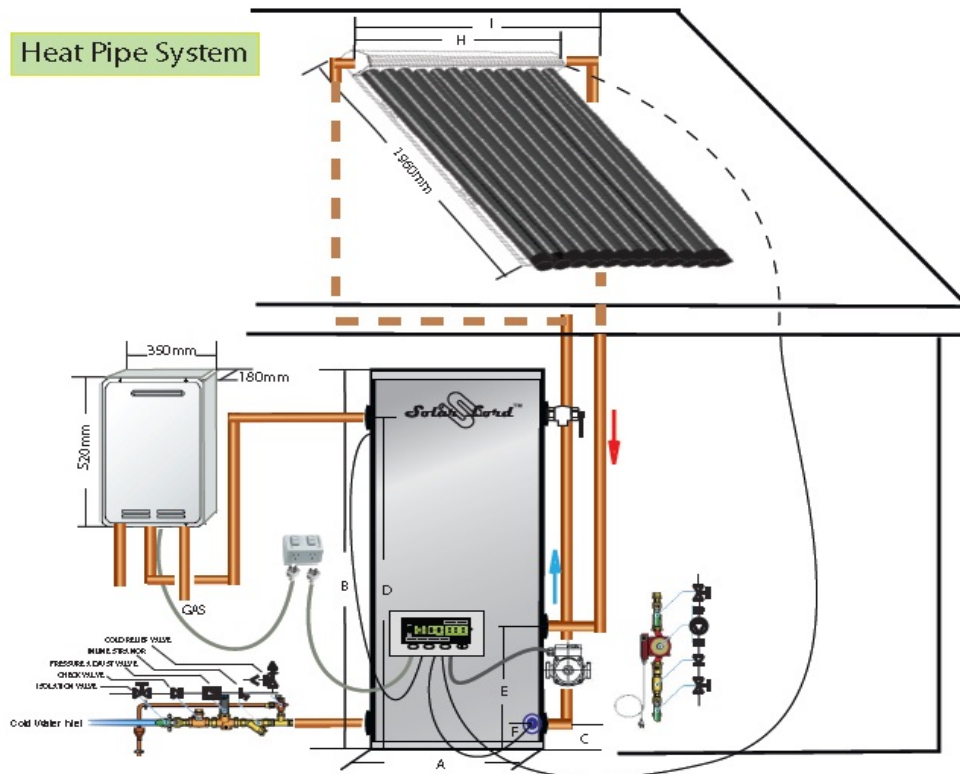
INSTALLATION KIT

An installation Kit should be delivered with the system. Check with the packing list if you have the necessary components before the installation.

INSTALLATION INFORMATION OPEN (DIRECT) CIRCUIT

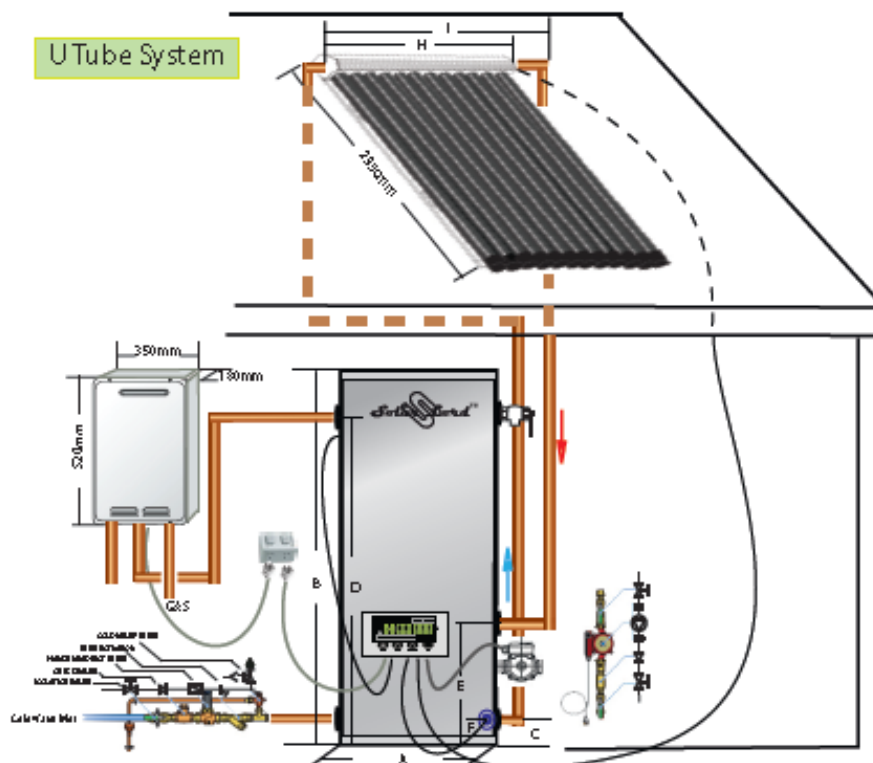
HEAT PIPE SYSTEM OPEN (DIRECT) CIRCUIT

MODEL (Heat Pipe)	E180SH16-O	E270SH24-O	E340SH32-O	E450SH40-O	E450SH48-O	G180SH16-O	G270SH24-O	G340SH32-O	G450SH40-O	G450SH48-O
TANK										
Storage Capacity(litres)	180	270	340	450	450	180	270	340	450	450
Hot Water Delivery(litres)	166	250	315	400	400	166	250	315	400	400
Booster	Electric					Gas				
Dimensions(mm)										
Diameter A	540	648	648	730	730	540	648	648	730	730
Height B	1341	1387	1690	1703	1703	1341	1387	1690	1703	1703
Cold water inlet C	82	82	82	82	82	82	82	82	82	82
Hot water outlet D	1148	1175	1478	1482	1482	1148	1175	1478	1482	1482
Collector hot return E	462	582	582	582	582	462	582	582	582	582
Collector cold flow F	82	82	82	82	82	82	82	82	82	82
Connection space G	652	760	760	842	842	652	760	760	842	842
Net Weight empty (Kg)	56	84	102	150	150	56	84	102	150	150
Net Weight full (Kg)	236	354	442	600	600	236	354	442	600	600
Cold/to collector	3/4" BSP					3/4" BSP				
Hot/solar return	3/4" BSP					3/4" BSP				
COLLECTOR										
No. of Tubes	16	24	32	40	48	16	24	32	40	48
Dimensions(mm)										
Manifold Length H	1280	1920	1280	1280+1920	1280	1280	1920	1280	1280+1920	1280
Collector Height	1960	1960	1960	1960	1960	1960	1960	1960	1960	1960
Connection space I	1280	1920	2710	3350	4140	1280	1920	2710	3350	4140
Net Weight empty(Kg)	51	70	102	121	153	51	70	102	121	153
Pipe connection	3/4" BSP					3/4" BSP				
Flow Rate (L/min)	0.75	0.75	1	1.3	2.2	0.75	0.75	1	1.3	2.2



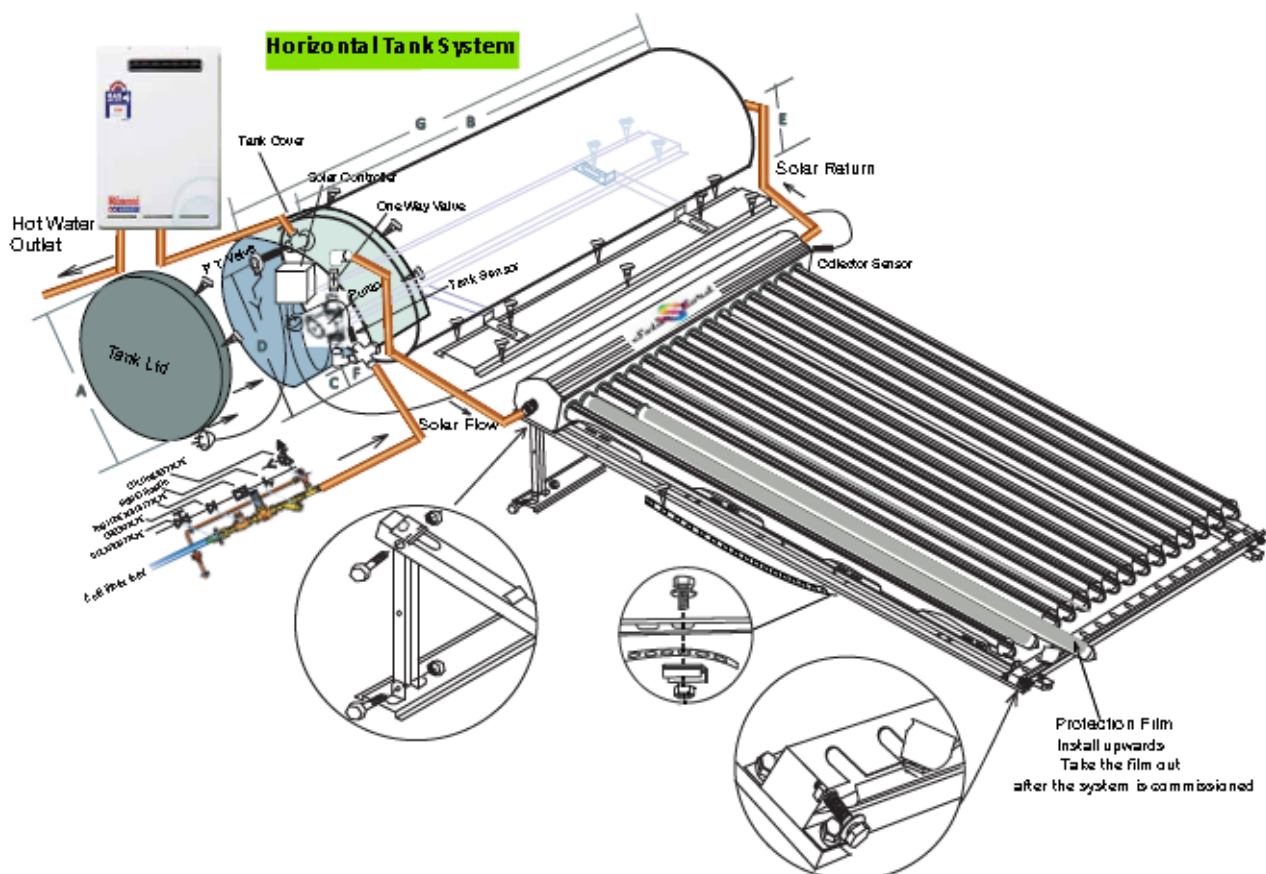
U TUBE SYSTEM OPEN (DIRECT) CIRCUIT

MODEL (U tube)	E270U15-O	E340U15-O	E450U30-O	E450U45-O	G270U15-O	G340U15-O	G450U30-O	G450U45-O
TANK								
Storage Capacity(litres)	270	340	450	450	270	340	450	450
Hot Water Delivery(litres)	250	315	400	400	250	315	400	400
Booster	Electric				Gas			
Dimensions(mm)								
Diameter A	648	648	730	730	648	648	730	730
Height B	1387	1690	1703	1703	1387	1690	1703	1703
Cold water inlet C	74	74	82	82	74	74	82	82
Hot water outlet D	1175	1478	1482	1482	1175	1478	1482	1482
Collector hot return E	574	574	582	582	574	574	582	582
Collector cold flow F	74	74	82	82	74	74	82	82
Connection space G	760	760	842	842	760	760	842	842
Net Weight empty (Kg)	84	102	150	150	84	102	150	150
Net Weight full (Kg)	354	442	600	600	354	442	600	600
Cold/to collector	3/4" BSP				3/4" BSP			
Hot/solar return	3/4" BSP				3/4" BSP			
COLLETOR								
No. of Tubes	15	15	30	45	15	15	30	45
Dimensions(mm)								
Manifold Leigh H	1128	1128	1128x2	1128x3	1128	1128	1128x2	1128x3
Collector Height	2230	2230	2230	2230	2230	2230	2230	2230
Connection space I	1250	1250	2650	4050	1250	1250	2650	4050
Net Weight empty(Kg)	67	67	134	201	67	67	134	201
Pipe connection	DN15				DN15			
Flow Rate (L/min)	0.75	0.75	1.30	2.0	0.75	0.75	1.30	2.0



HORIZONTAL TANK SYSTEM

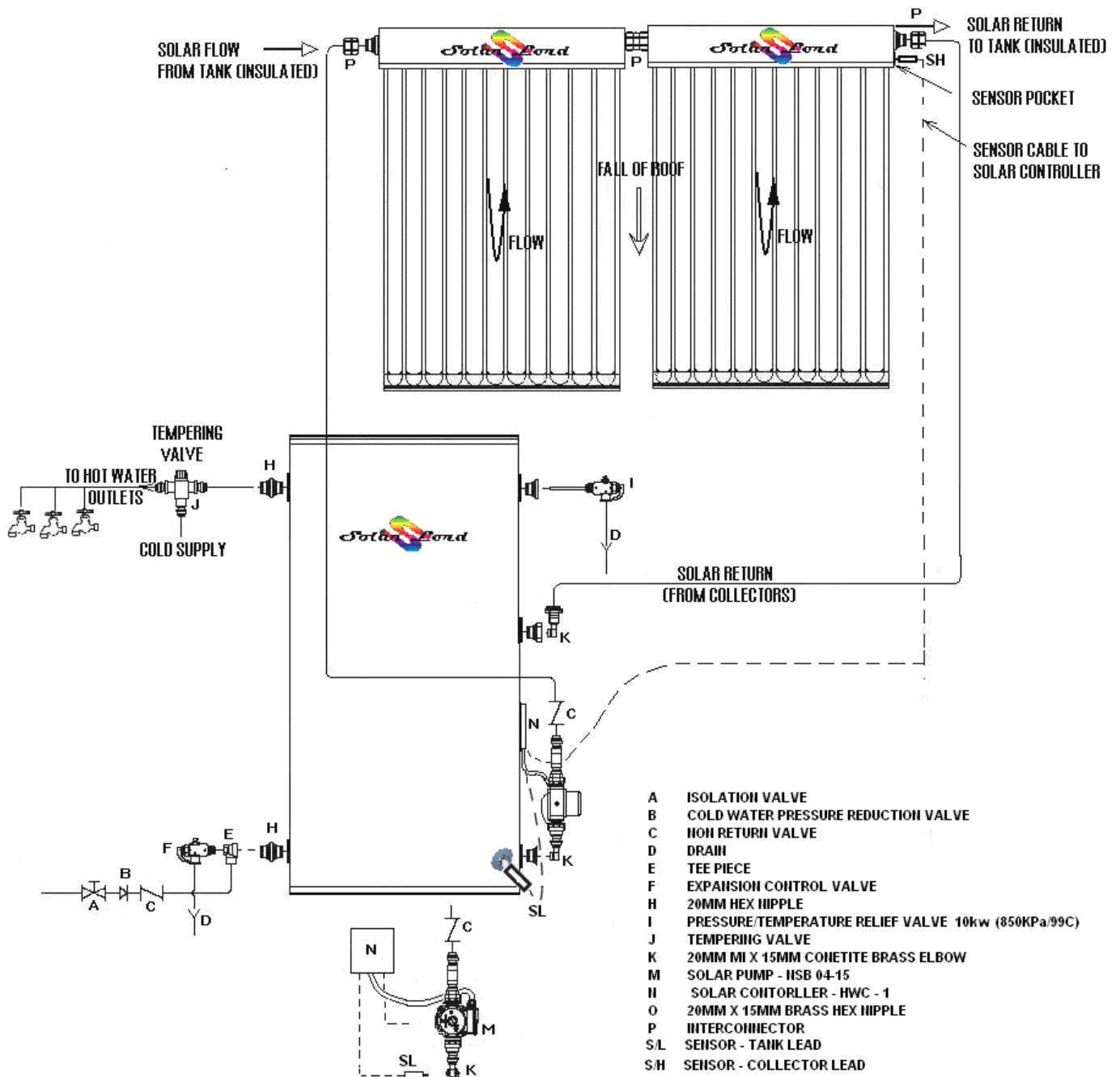
MODEL (U tube) TANK (Horizontal)	E200U15-OH	E300U15-OH	G200U15-OH	G300U15-OH
Storage Capacity(litres)	200	300	200	300
Hot Water Delivery(litres)	199	295	199	295
Booster	Electric		Gas	
Dimensions(mm)				
Diameter A	568	568	568	568
Leigh B	1534	2186	1534	2186
Cold water inlet C	137	137	137	137
Hot water outlet D	442	442	442	442
Collector hot return E	291	291	291	291
Collector cold flow F	137	137	137	137
Connection space G	1734	2386	1734	2386
Net Weight empty (Kg)	64	85	64	85
Net Weight full (Kg)	264	385	264	385
Cold/to collector	3/4" BSP		3/4" BSP	
Hot/solar return	3/4" BSP		3/4" BSP	
COLLECTOR				
No. of Tubes	15	15	15	15
Dimensions(mm)				
Manifold Leigh H	1128	1128	1128	1128
Collector Height	2230	2230	2230	2230
Connection space I	1250	1250	1250	1250
Net Weight empty(Kg)	67	67	67	67
Pipe connection	DN15		DN15	
Flow Rate (L/min)	0.75	1	0.75	1



INSTALLATION DIAGRAMS

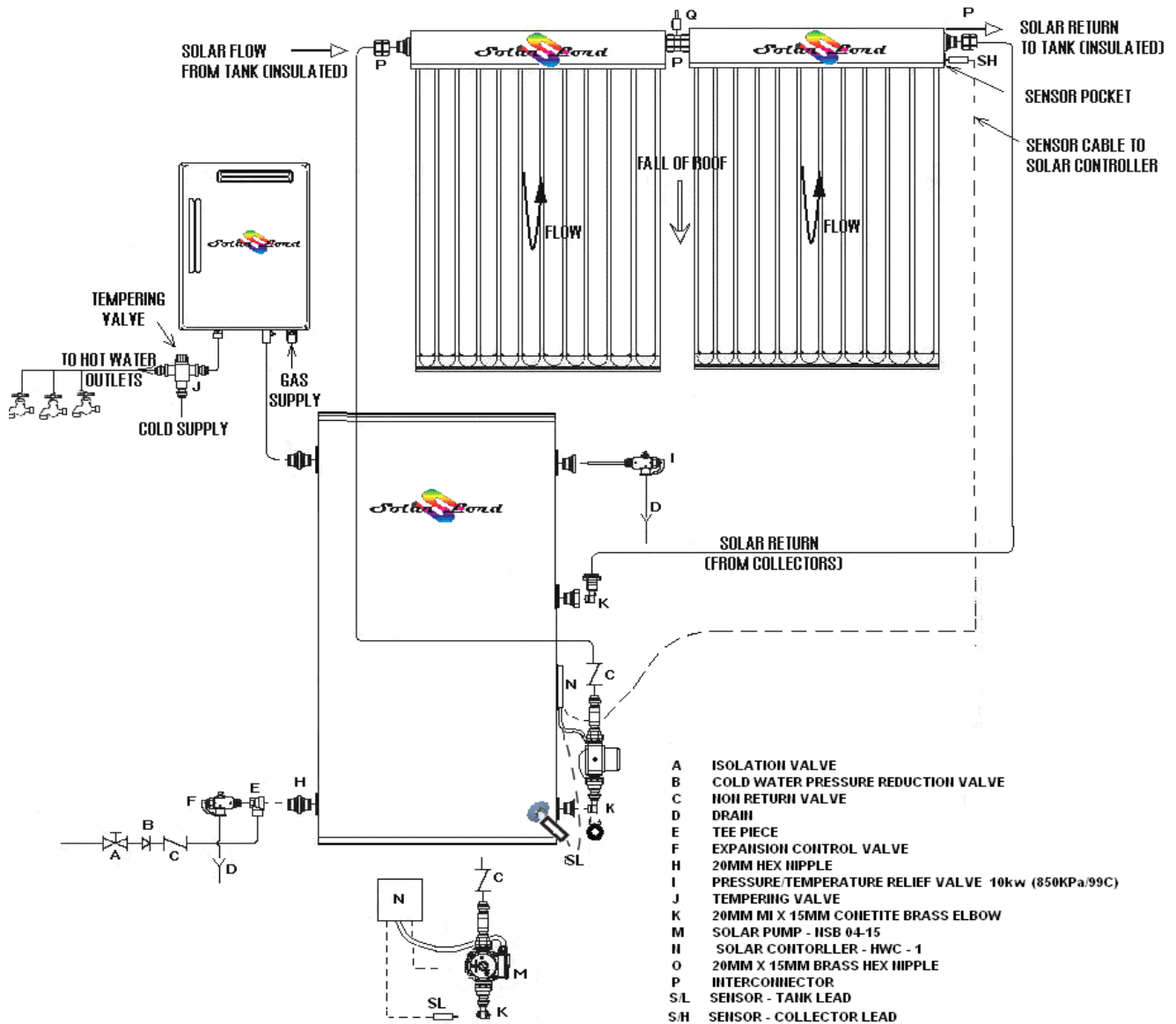
OPEN (DIRECT) CIRCUIT THE ELECTRIC BOOSTER SYSTEM

Model E450U45-O, E450U30-O, E340U15-O and E270U15-O
E450SH48-O, E450SH40-O, E340SH32-O, E270SH24-O and E180SH16-O



THE GAS BOOSTER SYSTEM

Model G450U45-O, G450U30-O, G340U15-O, G270U15-O and G2001-O
G450SH48-O, G450SH40-O, G340SH32-O, G270SH24-O and G180SH16-O



To Collector sensor pocket

General Installation

PIPING

Plumbing connections and pipe arrangement must be in accordance with the installation diagrams as noted in this manual and comply with the AS3500.4 (in Australia) and local water authority and building regulations.

All pipe work shall be copper and completed in a neat and economical layout, using long radius bends and less bends to ensure that the resistance to flow rate through the pipe work is minimised. Pipe work shall run straight at a constant grade.

To reduce the heat loss from the piping all hot water pipe work should be as short as possible and needs to be insulated by Armstrong, Armaflex or similar in thickness of 13mm. These should include solar flow-from tank to collector, solar return-from collector to tank and hot outlet from tank service to the end-user.

Pipe work shall be flushed out to ensure no foreign matter remains in and purged before attempting to operate the water heater. To check the leakage from the joints the pipe work shall be pressure tested to 1.5 times the working pressure of the system or 1000kPa, whichever is greater.

Approved flush must be kept when pipe penetrating the roof to water proof. All pipe work within the roof space should be securely clipped to prevent vibration. Drainpipes should be clear of any possible obstruction.

Under no circumstances should plastic piping be used and will void warranty if fitted.

Do not power up the controller until commissioning as it controls the pump. The pump must only be active after the solar circuit has been filled with water/fluid and air has been expelled. The pump chamber will automatically bleed the air out after a short period of operation.

For indirect system the Long pipe runs shall incorporate expansion loops or bends to allow for thermal expansion. These shall be installed horizontally to avoid forming air locks.

SOLAR COLLECTOR CONNECTIONS

SOLAR FLOW – from tank to collector/s

The solar flow line (from tank to collector) should be connected from the bottom of the storage tank where marked “to collector” to the “inlet” of the collector/s on the roof. Via a 20mm brass tee piece the circulation pump fit to the tank. An arrow on the pump indicates the way of water/fluid flow. Orient the pump upward to ensure the pump draws water from the tank and forces it up to the collectors. One way valve (non return valve) shall be fit after the pump **with the arrow pointing the same direction as the pump to stop back circulation.**

Fit the tank sensor into the tee for measuring fluid temperature at bottom of the tank. Please refer to page 15.

SOLAR RETURN-from collector to tank

The solar return line (from collector to tank) should be connected from outlet of the collector/s to the middle of the storage tank where marked “FROM COLLECTOR”.

Fit the collector sensor into the sensor pocket near the outlet of the collectors for measuring collector’s temperature. Secure the sensor wire by cable tie attached to the collector (refer to installation diagram) the sensor shall be fitted into the last collector of the flow if a few collectors are linked in series.

Both solar flow and return lines should be used copper pipe insulated by solar rated Armflex with minim 13mm wall thickness.

In low water pressure areas (<350kPa), an air bleed valve should be installed via tee at the hot outlet of the collector in the highest point of the system to avoid air blockage. The air release valves shall be left on the open position to ensure all the air can escape from the system. To open the valve: turn the valve clockwise till tight to close then turn anti-clockwise 360°. Use hand to tune the valve only, do not use tools.

TANK CONNECTIONS

Cold water supply

The storage tank has a pressure/temperature relief valve set at 850 kPa. The cold water inlet pressure should not exceed 650 kPa. A pressure reduction valve must be fitted adjacent to the cold water inlet if this is not the case. In some locations regulations require a pressure relief valve be fitted to the cold water supply. The cold water inlet is 20mm FI and located at the bottom of the tank marked "cold inlet". The cold water inlet requires an approved isolating/non return valve. As shown in the connection diagrams, the drain connection is incorporated in the cold water expansion control valve located at the cold water inlet for all the models.

The relief valve will discharge a small amount of water when the system is heating and should be checked every six months.

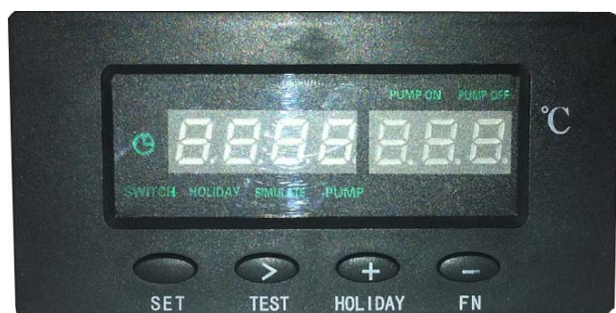
Hot water supply

The hot water outlet from the tank is located at the top of the tank with 20mmFI where labelled "Hot outlet". All the hot water pipes need to be insulated to prevent heat loss.

As required by the National Plumbing Code, an installer/plumber MUST fit a tempering valve to the heater to prevent the water temperature going to the home exceeding a preset safe maximum. The tempering valve should be connected to the hot water outlet lines. The valve must be fitted at the time of system installation or in retrofitting to existing systems.

SOLAR CONTROLLER

The solar controller operates on a difference of temperature which is measured by the two temperature sensors; tank sensor (fitted into bottom of the tank) and collector sensor (fitted into collector). The Solar controller



4°C = pump off

turns the circulating pump on or off according to the difference of temperature that has been preset. The pump is automatically turned on when the collector/s temperature is approximately 9°C higher than the tank. It then is turned off when the temperature differential is 4°C.

There differentials are preset at;
Operation 9°C = pump on

Over heated protection; the tank sensor has been pre-set to stop the pump circulation when its temperature gets 70°C.

The solar controller integrated with pump station which can be mounted on a wall near the tank or on the tank. Care must be taken to protect the roof sensor wire from damage where it penetrates the roof. Please match the colour of plug to the socket on the controller box.

Sensor wire

PLEASE DON'T WRAP THE WIRE ATTACHED TO THE COPPER PIPE WITHIN THE INSULATION (ARMFLEX)

The solar sensor wire will need to be run with return lines from collectors to tank. Make sure the sensor probe is inserted into the sensor pocket and fixed the position by tighten the sensor flange. Make sure the sensor wire is protected from damage. If this wire is cut or broken it will need to be rejoined soldered and shrink sealed. Ensure the sensor wire does not come into contact with solar circulation copper pipes, as very high temperatures can melt the insulation of the wire causing a short-circuit and controller malfunction.

System Temperatures

Solar systems are able to heat the water to very high temperatures. This leads to the following concerns,

- **temperature of water delivered from taps**

A tempering valve must be installed to limit the water temperature delivered at the taps. If there is already one installed, its correct operation should be confirmed and the valve replaced if there is any doubt over its operation and correct function. The function of this valve shall be regularly checked and be appropriately maintained.

- **damage to system components**

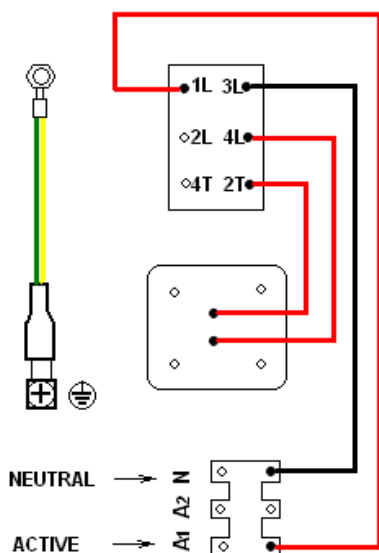
Some components installed in conventional hot water systems are not compatible with the high temperatures experienced in solar hot water systems. Of particular concern are;

1. Mains pressure hot water cylinders which, unless manufactured specifically for use in high temperature systems, have a recommended temperature limit. In many cases this will be between 70°C to 80°C.
2. The specification of the installed cylinder should be checked and a temperature limitation device installed to limit the temperature within the cylinder to within acceptable limits. The solar controller has this function and should be programmed to suit.

Pressure and Temperature Relief Valve

Pressure and temperature relief valve (850kPa, 10kw) and Outlet tee must be screwed to P&T valve of the tank. A drain pipe must be fitted to the relief valve to let the excess pressure and temperature escape when the system is heated. The pipe work from the relief valve to the drain should be as short as possible, and fall all the way from the water heater with no restrictions and frost-free. It should have no more than three right angles bend in it. The outline of the drain pipe must be in such a position that flow out of the pipe can be easily seen but the discharge will not cause injury, damage or nuisance (*refer to AS3500.4*).

ELECTRICAL CONNECTIONS



Electrical connections must be installed in accordance with AS3000 SAA wiring rules (in Australia) and local codes. All the electrical work must be undertaken by a qualified electrician. All solar hot water systems require a power outlet to run the pump. When using the gas booster an additional power outlet will be needed.

Electric Booster (for E series only)

All the electric booster systems are fit the same elements

3.6kW 15 AMP

Elements are bolt on type:

The above is a guide only and subject to local electrical authority and customer requirements.

THERMOSTAT

An adjustable thermostat is fitted and preset at 60°C. This can be adjusted to suit individual requirements. If a higher temp is required both the thermostat and the controller boost profile must be changed accordingly and pre-approved by Solar Lord.

CABLE

Connection to the element is via the entry hole of the electrical box at bottom of the cover. Remove the inspection cover and connect active, neutral and earth wires as marked. The connection diagram provided inside of the cover. Electrical cables should be closed in weatherproof conduit and fittings, where required. A separate supply cable from the electrical meter box to the booster element and off peak elements should be installed. Only use electrical cable/wiring with a temperature rating of >106°C to inside the appliance box.

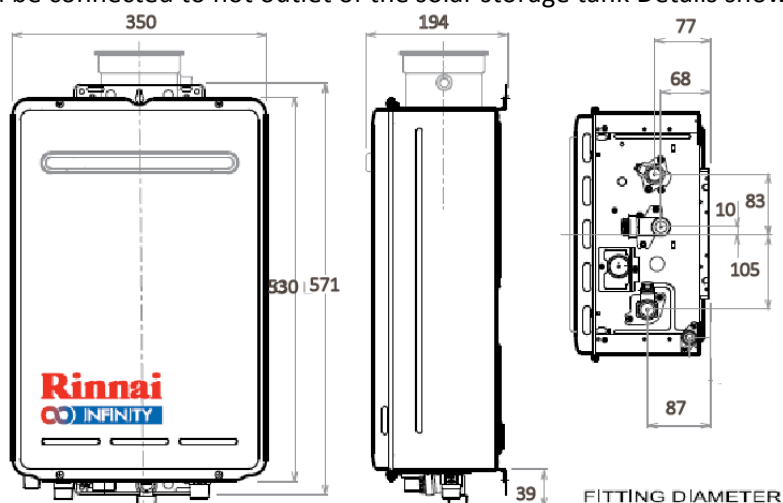
SWITCHES

An on-off switch for the solar system should be installed in the meter box. An existing unused on-off switch may be used provided it is of the correct current rating and is in sound condition.

GAS CONNECTIONS

Gas Booster (for G series only)

Solar Lord gas booster is an instantaneous gas heater designed for external use only. The cold inlet of the gas heater should be connected to hot outlet of the solar storage tank Details show at page 15.



SPECIFICATIONS

MODELS	18	20	24	26
Gas Input MJ/h	140	160	188	195
Inlet Pressure kPa – Nat. Gas	1.13 min. 2.75 max.	1.13 min. 2.75 max.	1.13 min. 2.75 max.	1.13 min. 2.75 max.
Inlet Pressure kPa - LPG	2.75 min./max.	2.75 min./max.	2.75 min./max.	2.75 min./max.
Water Supply Pressure kPa	150* min. 1200 max.	150* min. 1200 max.	150* min. 1200 max.	150* min. 1200 max.
Weight kg	14	14	16	16
Gas Connection mm	20 BSP	20 BSP	20 BSP	20 BSP
Water Connections	15 BSP	15 BSP	15 BSP	15 BSP
Ignition	Electronic	Electronic	Electronic	Electronic
Electrical Supply V	240 AC	240 AC	240 AC	240 AC

NOTES

- The appliance will operate at reduced performance below 340kPa
- For information relating to burner best point pressure and injector sizes refer to the appliance data plate located on the right hand side of the cabinet for each model.
- For information relating to overall dimensions and connection points refer to diagrams.

THE SOLAR COLLECTOR INSTALLATION

SOLAR COLLECTOR LOCATION

To get the full benefits of a solar water heater the collector/s must be installed at a facing north area with proper exposure to the sun without shading.

A tilt angle equal to the local latitude will maximize annual solar gains. It is usually acceptable to mount the collector/s flush on a pitched roof close to the optimal orientation as possible in order to reduce installation cost and improve aesthetics.

The installation of the solar collector/s must comply with the requirements of AS/NZS 3500 and all local codes and regulatory authority requirements.

The roof must be suitable to take the mass of the solar collector/s. Each panel weighs about 67kg when empty and 70 kg when full of water or glycol.

SET-UP THE SOLAR CIRCUIT

IMPORTANT:

EVACUATED GLASS TUBES ARE FRAGILE. GLOVES MUST BE WORN DURING THE COLLECTOR INSTALLTION. THE CARDBOARD MUST BE ON THE PANELS SOON AFTER THE TUBES ARE SLID ONTO THE COLLECTOR/S UNTIL THE INSTALLATION IS COMMISSIONED. FAILURE TO DO SO WILL VOID THE WARRANTY.

Roof Support Requirements

No extra roof supports are needed when installing a Solar Lord pumped system in most cases, as one collector weighs about 54kg-70 kg when full with water in 2.5 sqm area. Check the roof if broken or loose tiles and rusted or loose steel sheets and make it in good condition. Investigate the rafter prior to the collector/s installation. The collector shall be installed with a slight (10mm) slope upwards to the air vent. This will allow the air to automatically vent rather than airlock.

Safety

Solar hot water systems can be heavy so always use approved lifting devices when installing solar systems at heights. All Occupational Health and Safety issues must be adhered to.

Install On Tiled Roofs (Refer to installation diagrams as follows)

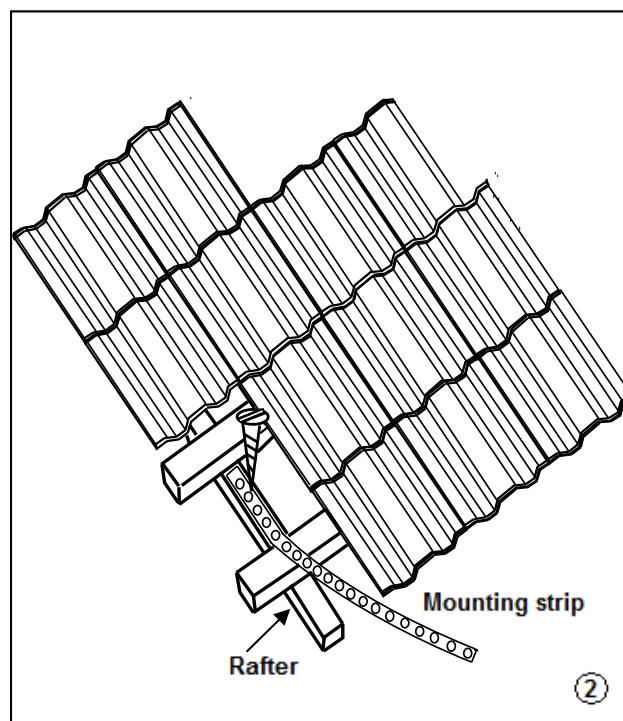
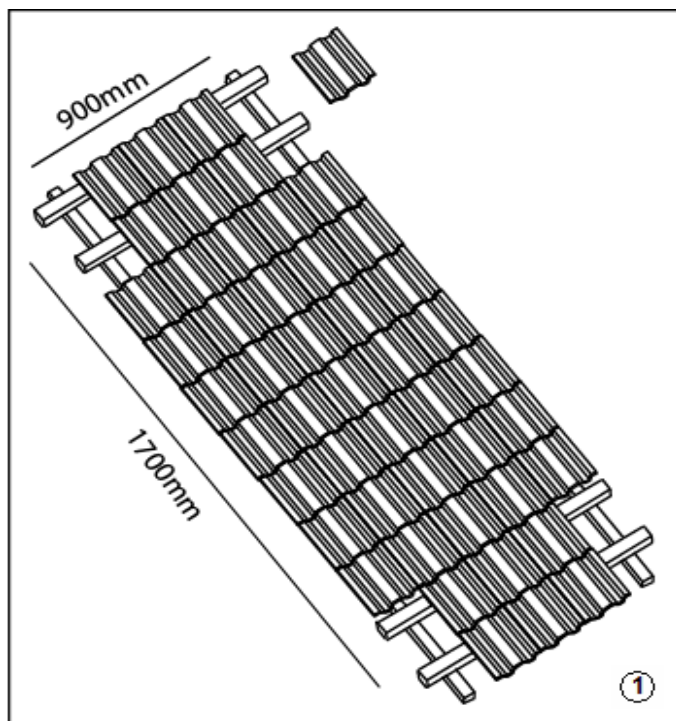
The manifold should be placed at highest point than other part of the collector. Refer to the model related to the collector size and number of collectors for the area needed for the collector/s. Measure down the required distance from where the manifold will be positioned and fix the stainless steel mounting strips on the rafters

underneath tiles where the four corners of the collector.

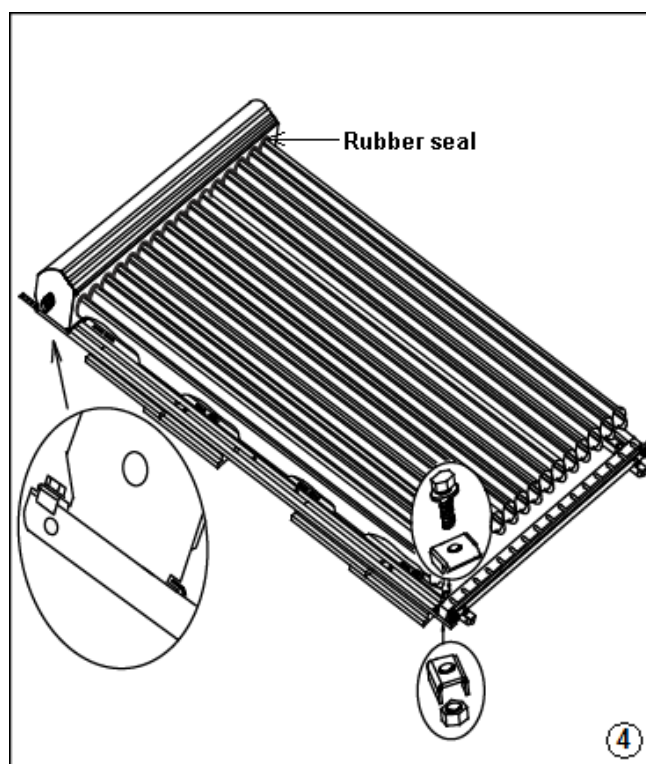
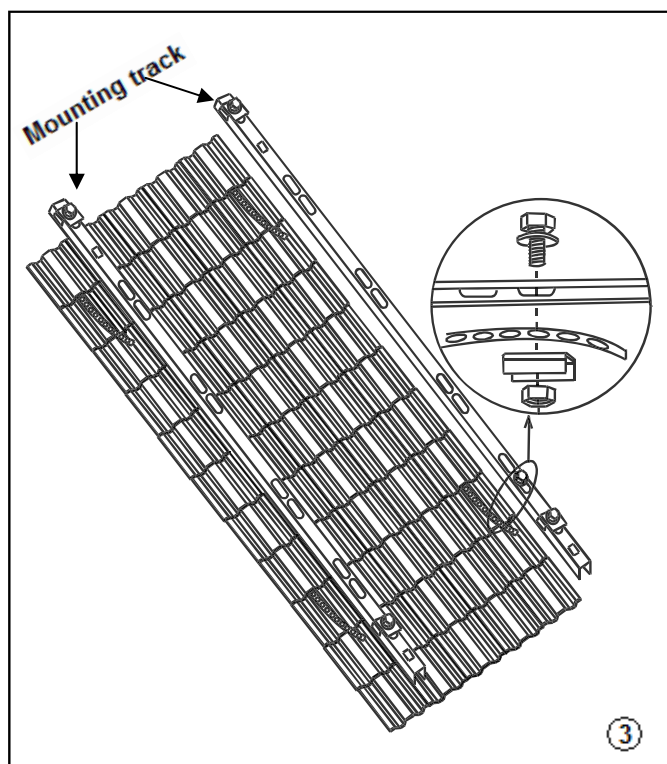
CAUTION! THE RAFTER MUST IN GOOD CONDITION (NO SIGN OF ANY DECAY) TO SECURE THE SCREW.

Adjust all the connecting points and let the panel sit evenly on the four corners of the collector then fasten them all. After checking the collectors have been securely fixed then slide all the tiles back.

U Tube collector installation

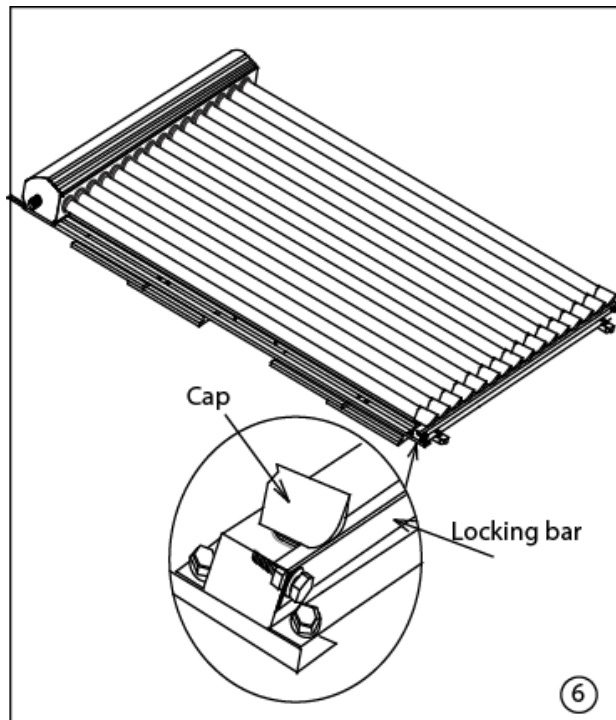
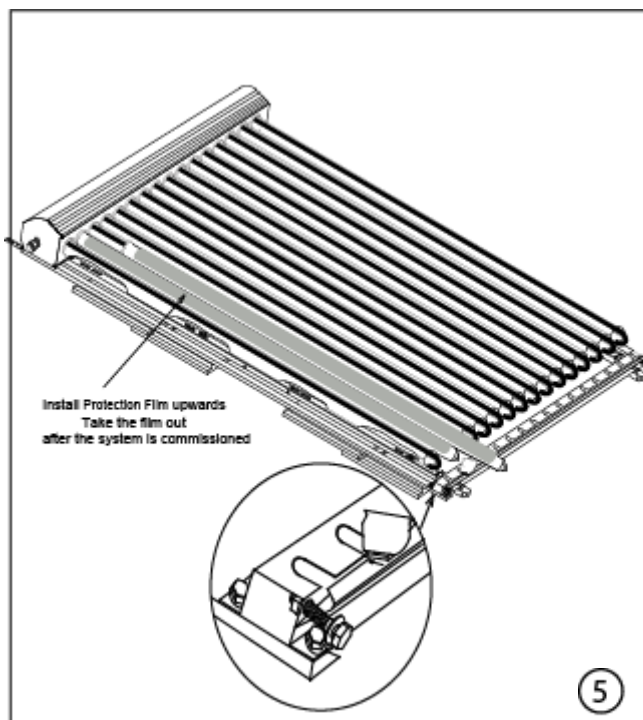


- 1) Lift Tiles approx 0.9m apart in width and 1.7 m apart in depth.
- 2) Use screws to fix stainless steel mounting strips to roof rafters.



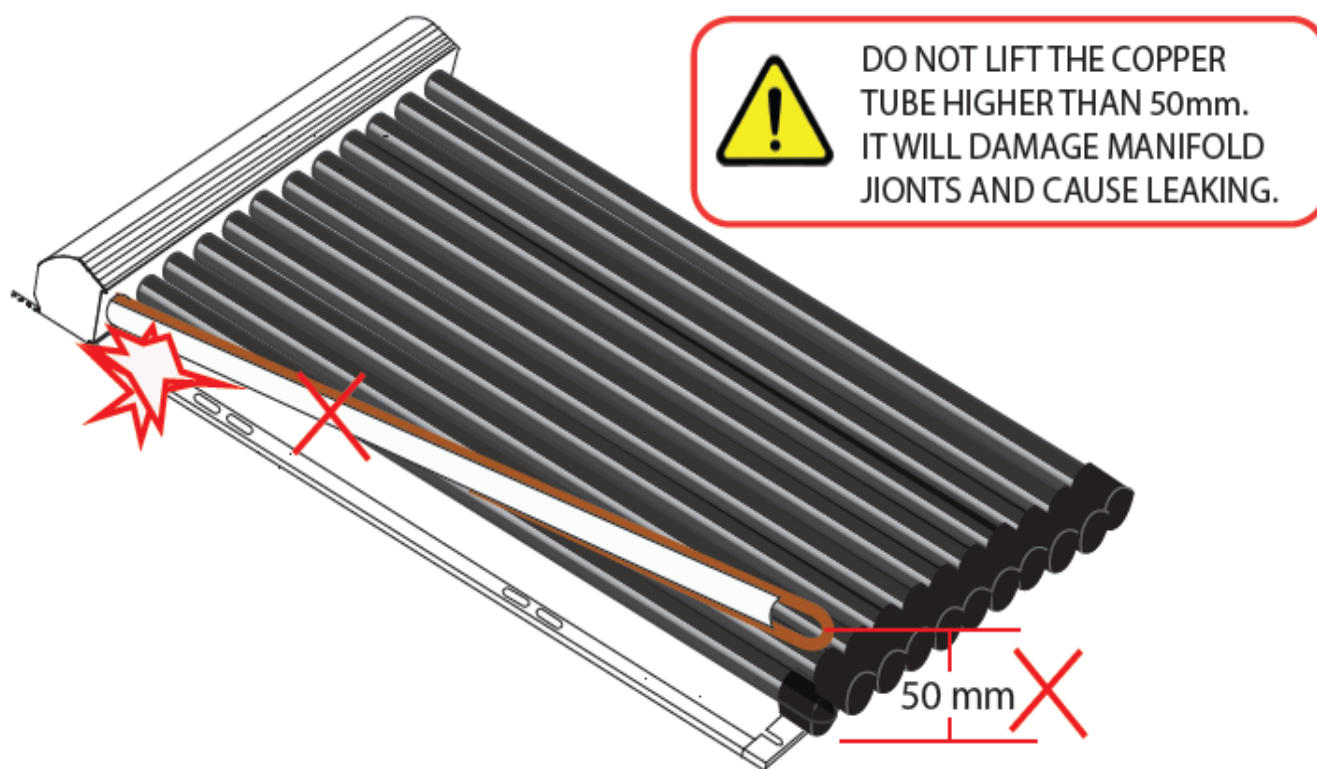
- 3) Replace tiles, then align stainless steel mounting tracks vertically and attach to roof mounting strips.

- 4) Mount the U-Tube collector skeleton onto stainless steel tracks. Mount the U-Tube collector skeleton onto stainless steel tracks.

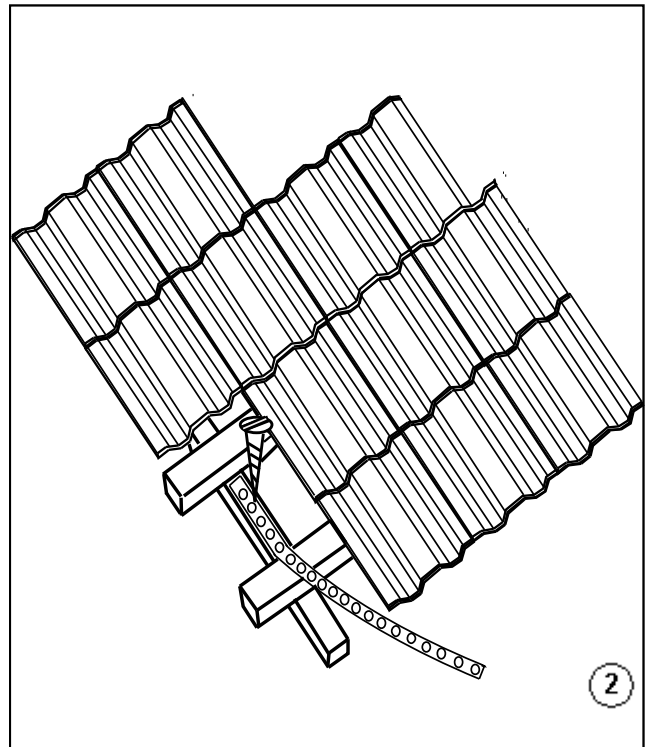
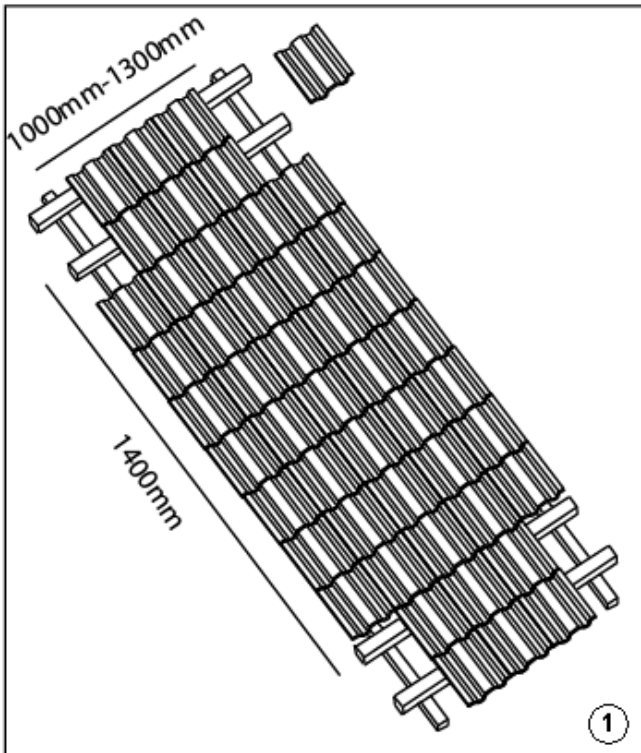


- 5) Remove timber supports and nylon ties. Loosen the nuts of the locking bar, carefully insert the evacuated glass tubes and place the protection film upwards to cover the U-tube copper channels. Spray water onto the rubber seal to lubricate it, and to help the tube slide into the manifold.
- 6) Slide the tube caps into the slots of the base bar at the bottom of each tube, and tighten the lock bar to secure the tubes into position.

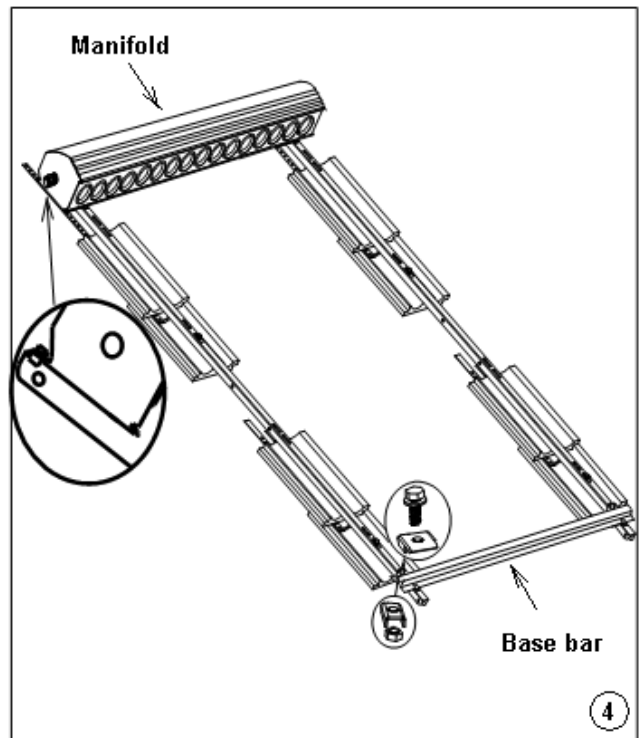
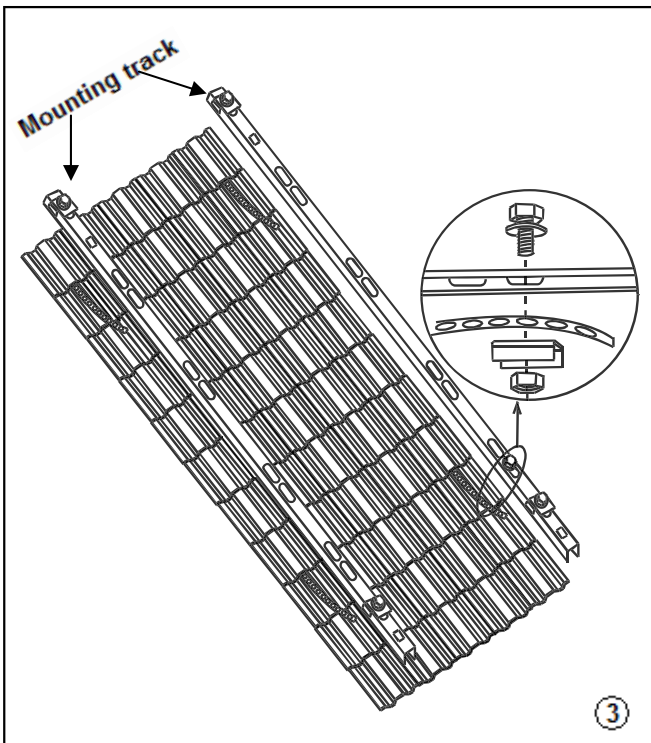
DO NOT LIFT THE COPPER PIPE TOO HIGH AS IT CAN DAMAGE THE COLLECTOR BEYOND REPAIR

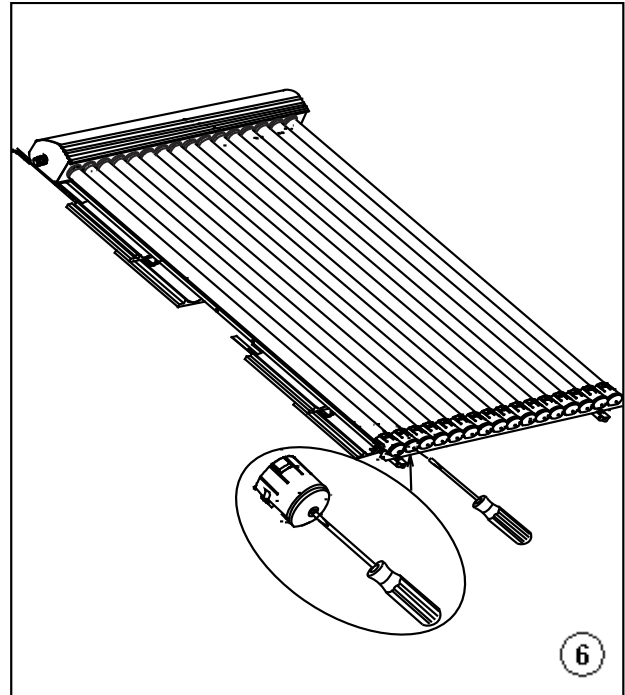
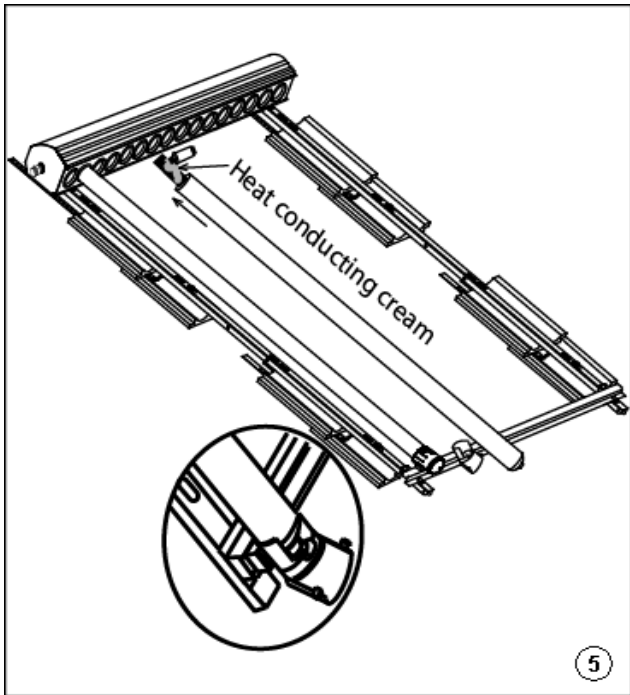


Heat Pipe collector installation



1. Lift Tiles approx 1.0m apart for 16 tube collector and 1.3m apart for 24 Tube collector. For both collectors lift tiles for 1.4m in depth.
2. Use screws to fix stainless steel mounting strips to roof rafters.





3. Replace tiles, then align stainless steel mounting tracks vertically and attach to roof mounting strips.
4. Fix the manifold and base bar across onto the stainless steel tracks.
5. Apply a thin layer of heat conducting cream to each heat pipe bulb prior to inserting the tube into the manifold. Install heat pipes into the manifold. Spray water onto the rubber seal to lubricate it, and to help the tube slide into the manifold.
6. Tighten the screws in the tube caps until they gently touch the aluminium cap on the ends of the tubes.

Installation on Inclined Metal Roofs

The process of installation is similar to tiled roofs except that the stainless steel strips can be screwed direct onto the roof and the battens underneath. Ensure the screws are tightly fastened onto the middle of the battens (the timber underneath of the metal sheets). Location of battens can be found by a horizontal line of screws on the roofs.

IMPORTANT: THE FASTEN SCREWS MUST BE FIXED ONTO MIDDLE OF THE BATTENS (THE TIMBER) NOT THE METAL SHEET.

Install On Flat Metal Roofs

It is recommended that collector be fitted onto a special raised pitch frame on angle as close to the appropriate latitude. The frames and associated instruction are available from Solar Lord.

Tank Sensor fitting



Step 1

Unscrew the gland nut from the fitting supplied in the tank and also remove locking gland.

Step 2

Slide locking nut onto tank sensor lead, then slide locking gland onto sensor.

Step 3

Slide tank sensor into sensor housing fitting until it reaches the end of the sensor fitting.

Step 4

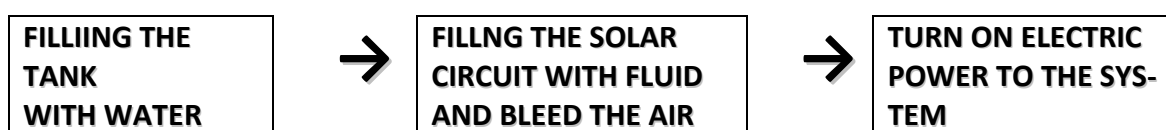
Lock the gland fitting and screw tight by hand till secure.

Step 5

Apply a small amount of pulling force to the lead to ensure it does not pull back from the gland fitting.

SET-UP CIRCUITS & COMMISSIONING

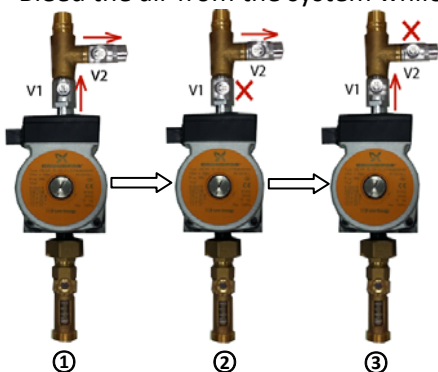
SET-UP FLOWCHART



WARNING: STRICTLY FOLLOW AS THE FLOWCHART ABOVE. FAILURE TO DO SO WILL VOID THE WARRANTY.

Open loop

Filling water to the solar system

1. Turn on all the hot water taps in the house (including the showers)
2. Turn on the main cold water to the storage tank.
3. Bleed the air from the system while water fills the pipes, tank and collectors. Procedures as below;


Step 1) Turn the ball valves to open position, fill the system with water until water steadily flows from the opened valve (V2).

Step 2) Turn off the valve adjoined to the pump (V1).

Step 3) Once water steadily flows out from the opened valve (V2) then close it and open the valve adjoined to the pump (V1).

The system is ready to operate.
4. As water begins to flow freely from the opening taps, the air will be forced out, then close them all.
5. After the system to build up to pressure, check all plumbing fittings and pipe joints and rectify if any leaking occur.

The system must be shut down for repairing the leaks if any appears.

6. Lift easing gear of pressure/temperature relief valve to check the valve is operating. Check cold water expansion control valve operation by lifting lever.
7. Ensure the storage tank is full of water and all the hot taps are turned off.

8. Turn on the solar controller and remove the **Protection Films** from the collector to let heat build up. According to the model installed, adjust the **flow rate** as the specifications in Page 11-13.
9. Press **TEST** button to check pump operation and the collector and tank temperature.

In a clear day the hot water should flow from solar return pipe to tank after the pump starts circulation.

Connecting electricity to the tank element

Ensure that the tank is completely full of water, then (turn on the solar controller and make sure it goes through its start up sequence) switch power on to the tank.

CHECKING THE SYSTEM OPERATION

Before handing over the system the installer must check and ensure that all requirements have been met and the full installation is tested and commissioned. This shall include the water and electrical systems. The following checking list must be completed.

CHECK LIST	RIGHT ANSWER
Air bled from all hot taps	Yes
Water leaking from pipe joints	No
Pressure/temperature relief valve functioning	Yes
Any blockage in drain pipes of P/T and expansion valves	No
The sensors being properly set into and secured in positions	Yes
Solar circulating pump working	Yes
Protective Film removed from the tubes	Yes
Pump working and hot water flows from the collector/s to tank (FROM COLLECTOR)	Yes

System handover

The owner shall be provided with the relevant instructions and shall be instructed on the correct operation and support required to obtain the most benefit from their installation.

The owner shall also be provided with copies of;

1. Installation Certificate
2. ORER Consignment Document for householder to sign and send back to Solar Lord
3. Operating and maintenance instructions
4. Manufacturers information
5. Installation and warranty registration

When satisfied that everything is working properly instruct the owner to the correct method of operation. Fill in MAINTENANCE RECORD (APPENDIX C) and forward this manual to the householder after completion of the installation.

ATTENTION: The system should produce enough hot water during a clear day and water from any hot tap should be purity and non odour. Call the householder after three days installation to check if system functions well and delivers enough hot water.

Solar water heaters not installed in accordance with the above advice will not be covered by the solar lord warranty

MAINTENANCE AND SERVICE

Should your Solar Lord water heater not provide sufficient hot water please undertake the following quick checks before requesting a service visit:

- 1) Check to ensure the collector/s is shaded free for all or most time during the day.
- 2) Do you use more hot water than normal?
- 3) Can you detect water leaking from within the plumbing system?
- 4) Is the booster or time-clock switched to ON?
- 5) Is the fuse for the Booster intact?
- 6) Does the electric or gas meter speed up when the booster switch is turned ON?

If the system is still not operating correctly, call your local solar Lord Service office on **1300 133 782**. Under no circumstances should non qualified people attempt to undertake service work.

General Service

WARNING:

THE INFORMATION IN THIS SECTION IS FOR THE USE OF QUALIFIED LICENSED TRADES PEOPLE ONLY.

The solar collector(s) must be covered before servicing the system to reduce the temperature of the fluid.

Six Monthly Service

Most water supply authorities require both the hot and cold water relief valves to be flushed every six months. To operate the valve easing gear on the pressure/temperature operated relief valves, simply hold the relief arm lever open for a few seconds.

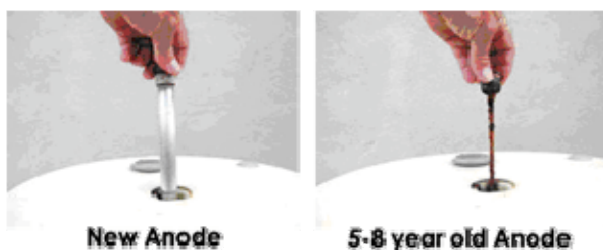
Major Service (Usually Every Five Years)

This service should be carried out every five years. Service the system every two years for poor water quality areas and closed loop system.

Storage Tank:

- 1) Turn off power.
- 2) Turn off cold water supply at stopcock.
- 3) Lift P/T (pressure/temperature relief) valve to release the excess pressure in the tank. Release the lever to create a vacuum on the tank ensuring the tank will not drain down completely.
- 4) Carefully inspect all connections for visible defects, pipe work, element and apparatus etc.
- 5) Check anode level and replace it if requested (refer to Anode replacement).
- 6) Disconnect hot and cold connection fittings. Remove washers and clear any debris from the joints. Change new washers and connect if needed.
- 7) Replace Pressure and Temperature relief valve and Cold Water Expansion valve.
- 8) Check Glycol liquid level and refill it if requested (Closed Loop systems only).
- 9) Undertake a visual check of the unit for any potential problems, e.g. broken tubes, shading, booster and pump operation etc.

Anode Replacement:



Solar Lord Enamel (glass) lined mains pressure hot water tank is fitted with a Sacrificial Anode, which protect the tank from corrosion. The Anode is “sacrificial”, meaning that it is a softer alloy than the cylinder and all corrosion will occur at the Anode and not your cylinder. Sacrificial anodes do not last much longer than the standard warranty period of the tank.

We recommend that they are checked and replaced every 3-4 years to ensure the maximum life of your tank.

In addition we recommend that your tank should be drained and flushed every 5 years.

The following table is a guide to anode replacement intervals.

Total Dissolved Solids (ppm) - Recommended anode replacement interval

0 - 1000 - 5 years

1,000 or more – 2-4 years.

We recommend the installation of water filter when using water heaters in areas with high levels of total dissolved solids, to maximise the efficiency of the water heater.

Solar Circuit:

1. Open the expansion valve on the top of the collector. Prepare a metal container under the filling valve on the tank. Open the filling valve. Allow the fluid to drain to the container (Closed Loop only).

Attention: The glycol fluid can be very hot. Care must be taken to avoid scalding. Discharged fluid should be disposed of in accordance with the relevant local authority (*refer to appendix A*)

2. Disconnecting solar flow and return pipes remove washers and clean any debris from fittings. Replace new washer on solar flow and return pipes and reconnect to the tank as before.
3. Remove the tile underneath the clips and visually inspect the braces are securely fixed to the rafters. Inspect the rafter for any signs of decay. If inspection reveals no deterioration replace the tile back. For metal roof visually inspect signs of decay and refit the collectors on the roof. Replace or secure the fastening as required.
4. Inspect the collectors for visible defects. Check any evidence of burning or gassing on collectors. A clear visual of the tube indicates its vacuum status. The silver barium layer at the bottom of the tube will turn white if the vacuum is ever lost. Check any cracking or breakage on surface of the evacuated glass tubes. Broken/damaged tube/s must be replaced (*refer to APPENDIX B*).
5. Unscrew the interconnections between the panels and clips at four corners of each panel and clean any debris.
6. Replace with new washers and re-connect.
7. Remove Sensor cable from sensor pocket and visually inspect for damage or corrosion, replace sensor arrangement.
8. Wash away dust/ birds droppings from the glass tubes with water if necessary.

DO NOT USE HIGH PRESSURE GUN WHICH MAY CAUSE GLASS TUBE CRACKING AND WILL VOID THE WARRANTY!

Drain the tank

First of all, turn off **check Valve** until tight to stop the water into the system.

Next release the P/T valve this will allow the water and the pressure to exit.

Use tools to loose the drain cap at the bottom of the tank. The water will escape from the tank. The water may be very hot, carefully and slowly turn the cap to avoid scalding.

Commissioning

After the checking procedure is complete and are satisfied that all the checking, replacing and necessary re-pairing has been completed, the system can operate (Refer to **CHARGE SOLAR CIRCULATION PG 26**).

Fill in MAINTENANCE RECORD (*appendix C*) and report on any additional repairs required.

OWNER'S MANUAL

Congratulations on your wise investment for choosing a Solar Lord hot water system. You will be rewarded for many years of monetary savings, and are helping provide a sustainable future for generations to come.

Understanding your system and how the system works will help you run your system efficiently. (Please refer to THE PRINCIPAL OF OPERATION on page 6)

Solar hot water is a slow heating system. Depending on the season, the system will initially take 2- 3 days to build up the water temperature. In the morning, if most of the hot water has been used the hot outlet on top of the tank will be cold. The water will be heated up gradually and get warmer then hot at the end of a clear day in summer.

For those existing houses there may be some minor changes

- **Water pressure reduced**

When a new hot water unit is installed, a Pressure limiting valve (PLV) is installed in accordance with AS/NZS 3500 National Plumbing and Drainage Code.

- **Hot water temperature**

Solar hot water can deliver water at temperatures which can cause scalding. To comply with Government health and safety regulation It is required that a temperature limiting device be fitted between the water heater and the hot water outlets.

Operating Your Solar Lord Water Heater

The systems performance and its energy savings will depend on your hot water usage pattern and the manner with which you are boosting your electric back up.

Solar Lord Systems are equipped with collector/s suiting the capacity of the tank in proportion to the annual solar radiation. Solar energy is the fuel of solar water heaters. Unlike other fossil power the solar energy varies daily and seasonally. The average solar energy in winter is a quarter of the solar energy in summer. Winter solar energy is much less than in summer. And the cold water temperature in winter is much lower than summer. Evacuated glass technology has greatly improved the collector performance in winter and significantly overcome the traditional flat panel's problems in winter. But systems still consume the small amount energy in winter due to the limited solar energy and larger energy requests. Therefore we recommend you turn your washing machine on cold wash in winter and warm/hot wash in summer.

Variations on energy demand and input

- **Solar energy changes**

Solar radiation is the fuel of all solar hot water and power systems. Sun radiation and sun hours reduce significantly with seasons. Once the system is installed the system performance reflects the solar energy conditions. Average solar radiation in winter is at least three times less than summer solar gain. In summer day it can achieve 33MJ/sqm (depending on location) but in winter sun radiation can drop to below than 4MJ/ sqm. So the energy input is 3-10 times different.

- **Cold water changes**

Cold water temperature of mains varies with seasons. In winter cold water temperature is about 8C-15C degrees (depending on area). In summer the cold water is about 20-25C. In winter to heat the water to 60C we need at least 30% more energy than in summer.

Hot water usage

Your solar system is designed to utilize a combination of solar energy and purchased energy, operating simultaneously, to maintain a minimum operating temperature of 60°C degrees (to kill bugs in system).

The stored solar hot water will quickly run out for the house using old shower heads or a bath tub, therefore more back up energy will be used. We highly recommend upgrading your shower heads to AAA which have a flow rate of 6 litres per minute rather than 12-15 L per minute on older heads. This DOUBLES your solar hot water capacity.

Back up

- **Instantaneous Gas Booster (Gas models)**

Nature Gas and LPG Instantaneous Gas Boosters are the most economical way to boost your Solar Hot Water, as they only utilize gas when hot water is drawn down. To prevent Legionella bacteria growth within water-heating appliance, Australian Standards requests the instantaneous gas booster to heat water up to 70°C. The booster only heats the solar pre-heat water to 70°C when it flows through and is able to deliver continuous hot water whenever you need.

- **Continuous Power (Electric models)**

The continuous connection will heat your tank at any time if there is no solar gain. Heating element is installed in middle of the tank to allow solar input during the day.

Your Solar Lord water heater is designed to utilize the annual solar energy to heat the water and fossil energy to booster the water temperature as requested. As such, we suggest that you leave your electric booster switch ON to ensure that adequate hot water is always available. Alternatively a time clock can be fitted to turn the booster ON at predetermined times accordance with your usage pattern. This method can further increase energy savings.

- **Off Peak Power (Electric models)**

If your Solar Lord water heater is connected to an 'Off Peak' (night rate) electrical supply, it is important to remember that the booster will only operate late at night and heat top half of the tank. On cloudy days the tank may only gain a small amount of solar energy. Careful planning & usage will be required to avoid running out of hot water if large quantities are used during the day. In areas where a 'Day Rate' electrical switch is permitted, the storage tank can be boosted manually to ensure hot water is available when you need at the end of the day.

If your family uses more hot water than average (ie takes long time to shower or uses old shower heads or bath) and intend to use hot water during the day, then continuous tariff should be connected to your hot water. The element

is controlled by thermostat which monitors the temperature of the top half tank and is switched on or off automatically and accordingly. When it turns on, the heating element will heat the pre-heated water of the top of the tank up to 60°C. Therefore it wouldn't use much energy. Also the thermostat prevents the tank overheating at 60°C degrees. If a dedicated line is used with on/off switch, please leave on unless away on holidays. It will only booster if there is no solar gain, NOT all the time.

FREEZE PROTECTION

The system has tested on AUS/NZS 2712 and accredited as level two freeze protection.

The system must be installed with the full length of insulated to the flow and return copper pipe lines to offer protection against freeze damage.

The anti freeze control is designed to recirculate a small amount of water from the solar storage tank through

the solar pipe work when ambient temperature drops below 1°C . This is to prevent the water inside the pipe work from freezing. It is essential that the electrical power supplied to the solar control unit in any circumstance.

Damage caused by freezing due to no power at the solar control unit, is not covered by the Solar Lord warranty.

Notes:

Solar Lord evacuated glass tube collector made a perfect nature insulation layer between two glass tubes be evacuated to prevent freeze damage. If a tube is broken in winter then there is a risk of freezing in those cold areas. It is necessary to have your plumber drain the solar collectors and solar flow and return pipe work immediate until a new tube to be replaced.

The system is not covered by warranty for a broken tube system.

**WARNING: NO ATTEMPT SHOULD BE MADE TO REMOVE COLLECTOR GLASS TUBE/S
SOLAR CONTROLLER MUST BE CONNECTED TO POWER IN ANY CIRCUMDANCE**

OVER-HEAT PROTECTION

Solar Lord Controller has built with over heat protection and holiday program which should be used when you away from home. The overheat protection system will be rendered inoperable if electrical power is not available at the solar control unit. Damage caused by over heat due to power fail to the solar control unit, is not covered by the Solar Lord warranty.

NOISE FROM THE SOLAR COLLECTORS

When the solar storage tank temperature reaches 65°C, the circulator pump will be turned off. The water in the solar collectors will continue to gain heat and increase in pressure during the rest of the day (when solar radiation is still available). When a hot tap is opened, this pressure is released and the high temperature water may turn to steam creating pressure fluctuation and result in a sudden and loud rumbling noise and even a rattling or banging noise of the collectors 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. The quick and easy ways to solve the problem are

- 1) turn off the power to the auxiliary heating (i.e. switch off the hot water element from the switch box for electric back up models or turn off the power point to the gas booster from power socket on the wall).
- 2) Draw more hot water during a summer clear day whenever you do wash thus to release the pressure to the system and prevent the impact to the collect by overheated.

Using Your Solar Lord system as a Preheater

In a number of circumstances, your Solar Lord system can be used as a preheater to an existing water heater, providing certain parameters are met by the existing system. In all situations where a preheater is being considered, discuss your options with your local Solar Lord expert, as some water heaters are not suited to this application.

Getting the best out of your system

Understand how solar water heaters operate and how the weather condition affect the energy supply to the system will help you achieve best benefits from Solar Lord hot water.

Solar Lord Water Heaters use evacuated glass tube collectors which engage the new technology of absorbing solar energy and heat preservation. The system has improved a shortage of other solar water heaters and can supply hot water for bathing even ambient temperatures under -30°C in winter. Each aperture square meter can produce 80~150kg hot water excess of 60°C per day in a clear day*.

Sufficiency of solar radiation is the critical for the system. The following guideline will assist you to get the best benefit from the solar energy and ensure the system runs economically and practically.

*depend on type of collector, sun radiation and the condition of installation.

SHADE FREE

Solar radiation is greater on sunny, clear days between 9am and 3pm. Ensure that the surroundings do not cast shadows on to the collector during this time is essential in winter. **It is recommended that you prune or cut tree/s or branches annually if trees are around the area.**

Partial shading by Buildings/Structures object, like chimneys, TV antennas, and roof erected fixtures, etc. during these hours is acceptable provided that it does not exceed 10% of the solar collectors. Shading created by new buildings should be checked. If system performance is affected, relocation of the system may be necessary. Consult your nearest Solar Lord dealer if relocation is required.

COLLECTOR CLEAN

Generally adequate rainfall should wash the dust away from the panels. However care must be considered for extremely dusty areas or areas subject to dusty/sand storms, the glass tubes of the collector should be washed with clean water at least every three to six (3-6) months.

DO NOT USE HIGH PRESSURE GUN WHICH MAY CAUSE GLASS TUBE CRACKING AND WILL VOID THE WARRANTY!

ON AN OVERCLOUDY-DAY

Insufficient sunlight on a cloudy or rainy day will make the system provide less or lukewarm water. Avoid heavy usage of hot water and spread hot water usage evenly throughout the day. In the continuous electrical booster models the thermostatically controlled supplementary booster will ensure the water temperature is heated to 60°C before the water is used. While off-peak models only booster at the midnight, if you use all the hot water in the morning, you may get lukewarm water during the day or evening in heavily overcast days.

WHEN HIGH SOLAR RADIATION

In a clear day, solar preheated hot water systems can produce hot water at temperatures far higher than the thermostat setting so very little or no electrical energy will be used.

ELECTRIC BOOSTER TIMER SETTING (E SERIES ONLY)

Tips

- During winter periods the human body generally prefers hot water above 40°C to show, so boosting is essential for comfort.
- Boosting late afternoon/early evening for the maximum use of solar energy during the day is taken advantage.
- Boosting overnight or early in the morning if your hot water heavy usage is requested in the morning.
- The high temperature boost times should be structured prior to heavy usage period, because the element cannot heat water efficiently if water is being drawn off.

FACTS YOU NEED TO KNOW ABOUT OPERATING YOUR SOLAR HOT WATER SYSTEM SAFELY

Collector Glass

It is recommended that your household insurance policy cover the collector glass and/or damage to the water heater, especially in cyclonic areas and in locations where hail in excess of 25 mm diameter is likely to occur.

Hot water scald

Although Solar Lord water heaters will generate hot water quickly and efficiently, all systems are temperature controlled and under normal family use will operate between 60°C and 70°C. However, water temperatures

over 45°C can scald and care needs to be taken to ensure that injuries do not occur through incorrect use of your water heater.

As required by the National Plumbing Code, a tempering valve **MUST** be fitted to the heater to prevent the water temperature going to the home exceeding a preset safe maximum. The tempering valve is connected to the hot water outlet lines. The valve must be fitted at the time of system installation or in retrofitting to existing systems.

WARNING – HOT WATER BURNS. AS A SAFETY PRECAUTION, YOUNG CHILDREN SHOULD NEVER BE ALLOWED TO OPERATE WATER HEATERS OF ANY TYPE.

When return from Holidays

If the water heater is left unused for two weeks or more a small quantity of hydrogen gas, which is highly flammable, may accumulate in the top of the water cylinder. To dissipate this gas safely it is recommended that a sink or bath hot tap be turned on to dispel a couple of litres of water. During this procedure there should be no smoking, open flames or any electrical appliances such as washing machines, dishwashers etc, operating nearby. If hydrogen is discharged through the tap it will make a sound like air escaping.

REGULAR CARE

Operating the temperature and pressure relief valve

The temperature and pressure relief valve is located on the top of the storage tank and is essential for system operation. The temperature and pressure relief valve is required to be flushed every six months. To release the pressure/temperature relief valve on the tank, simply hold the relief arm level open. The valve easing lever should be operated for several short periods to verify operation.

Keep temperature and pressure relief valve and COLD EXPANSION VALVE drain pipe block free

The temperature and pressure relief valve and cold expansion valve drain pipe must be clean and not be blocked in any way.

DANGER - FAILURE TO OPERATE THE RELIEF VALVE EASING GEAR AT LEAST ONCE EVERY 6 MONTHS MAY RESULT IN THE WATER HEATER EXPLODING. CONTINUOUS LEAKAGE OF WATER FROM THE VALVE MAY INDICATE A PROBLEM WITH THE WATER HEATER.

Keep the collectors clean

Dust on the surface of the glass tube will shelter the absorber inside of the tube from sunlight. Inspect for the sign of dust accumulate on the tubes every three to six (3-6) months. The collector should be washed with clean water (or household detergent) if needed.

<p>DO NOT USE HIGH PRESSURE GUN WHICH MAY CAUSE GLASS TUBE CRACKING AND WILL VOID THE WARRANTY!</p>
--

Inspect the flushing and collector mounting

Care must take on pipe flushing, collector mounting and glass tubes damaged. Call Solar Lord service if any sign of unusual.

Regular service every five years

It is recommended that a Solar Lord Service Technician carry out a regular service every five (5) years. Call Solar Lord Service to arrange the service every seven years after the system is installed. Additional service is also available for solar hot water systems installed in areas of high Calcium or hard water.

Caution

Under normal household use, the system will operate between 55°C and 65°C. However, during periods of high solar radiation, particularly in summer, temperatures may exceed this. As a safety precaution CHILDREN should not operate hot water outlets. Pay particular care and attention when returning from holidays or vacation.

COLD EXPANSION VALVE

In certain states of Australia this valve is a mandatory requirement by the local Water Authorities. The cold water expansion valve is set to operate at 700kPa due to thermal expansion of water while the system is heating up either by the sun or electrically. The water discharging from the valve is normal and ensures correct functioning. The discharge will be in the form of drips and it is possible to lose between 3 - 5% of the total storage capacity of the tank per day.

Despite the detail set out in this manual, it must be remembered that:

- Product designs, functions and specifications are constantly changing and although every effort has been made to ensure the information contained in this manual is correct and current at the time of printing it is always possible that the information will have changed in the meantime.
- This is necessarily a concise manual and it cannot cover every conceivable situation that might arise.
- No matter how much one can learn from reading information there is no substitute for the training and experience of a qualified tradesperson or hydraulic designer. For these reasons Solar Lord cannot accept any liability with respect to any alleged loss or damage that might arise if the information has become outdated or if the circumstances are such that it would have been prudent for the person concerned to have employed the services of someone expert and experienced in the field.

Water Quality

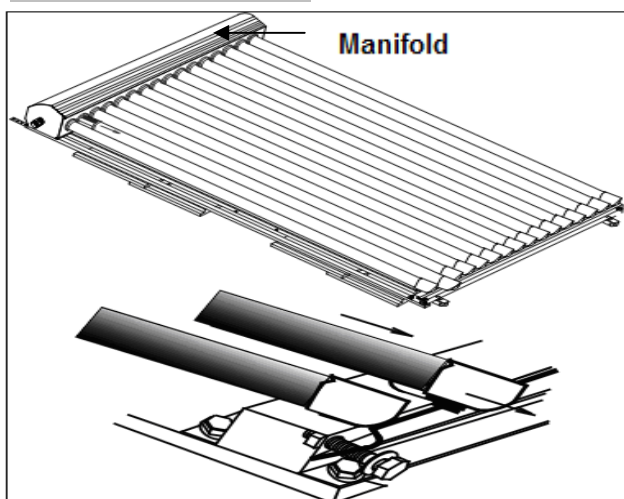
Water that contains a high percentage of foreign matter, is of poor or unacceptable quality or contains low chlorine concentrations can lead to blockages, corrosion or premature failure of the systems. Such failures are out of acceptable limits and are not covered by the warranty. Systems operating under such conditions should have their periodic maintenance increased to suit.

APPENDIX A

REPLACE AN EVACUATED GLASS TUBE OF SOLAR COLLECTOR

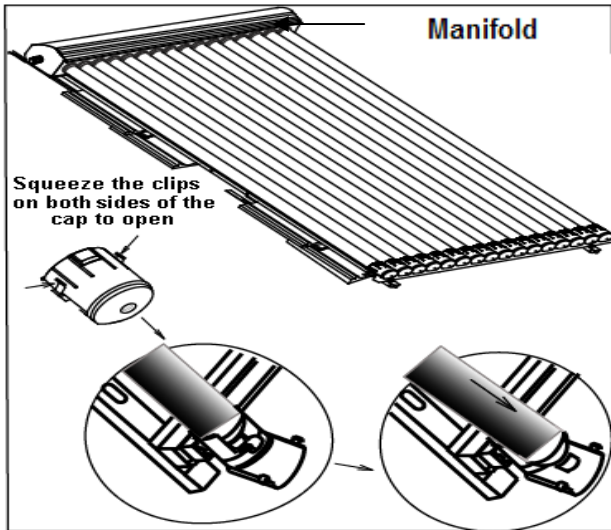
PERSONAL PROTECTION

LEATHER GLOVES WITH PROTECTIVE CUFFS AND SAFETY GOGGLES MUST BE WORN DURING PROCEDURES AS FOLLOWS



U Tube collector replacement

Loosen the nuts of the locking bar until it has enough play to allow the cap to be removed from the slot. Slide out the broken glass tube evenly downward from the manifold. Try to keep the internal aluminium fins tightly together when removing the tube away from the manifold (use clear sticky tape), making it easy to slide on the new glass tube. Please refer to [U tube collector installation](#) (page 24) to complete the replacement.



Heat pipe collector replacement

To open the tube cap, squeeze the clips on the both sides of the cap as shown on the drawing. Remove the broken tube form manifold. Please refer to [Heat pipe collector installation](#) (page 26) to complete the replacement.

APPENDIX B

MAINTENANCE RECORD

Installation

MODEL NO: _____ OWNER: _____

DATE OF INSTALL: _____ INSTALLER: _____

SERVICING DETAILS

DATE OF SERVICE: _____ BY (COMPANY) _____

COMMENTS: _____

TECHNICIANS SIGNATURE: _____

Maintenance

DATE OF SERVICE: _____ BY (COMPANY) _____

COMMENTS: _____

TECHNICIANS SIGNATURE: _____

DATE OF SERVICE: _____ BY (COMPANY) _____

COMMENTS: _____

TECHNICIANS SIGNATURE: _____

DATE OF SERVICE: _____ BY (COMPANY) _____

COM-
MENTS: _____

TECHNICIANS SIGNATURE: _____

APPENDIX C

REFERENCED DOCUMENTS

One or more of the following Standards is referred to in this manual:

NOTE: Standards are updated periodically. Current applicable Australian standards may have superseded the number(s) shown.

This list is not exclusive and all relevant new or revised standards as well as other appropriate standards should be taken as being applicable even though they are not listed below. These standards may be purchased or viewed at any Information Centre of Standards Australia.

AS 2712 - Solar and Heat Pump Water Heaters
AS 1056 - Storage Water Heaters
AS 1056.1 - Part 1: General Requirements
AS 1056.2 - Part 2: Specific requirements for Water Heaters with Single Shells
AS 1361 - Automatic Electric Heat Exchange Water Heaters
AS 1375 - Industrial Fuel Fired Appliances
AS 1571 - Copper - Seamless tubes for air conditioning and refrigeration
AS 3000 - SAA Wiring Rules
AS 3142 - Approval & Test Specification - Electric Water Heaters
AS 3500 - National Plumbing & Drainage Code
AS 3500.0 - Part 0 : Glossary of Terms
AS 3500.1 - Part 1 : Water Supply
AS 3565 - Meters for cold potable water
AS 3500.4 - Part 4 : Hot Water Supply Systems
AS 3666 - Air handling and water systems of buildings - Microbial control

WARRANTY

Collector Glass

It is recommended that your household insurance policy cover the collector glass and/or damage to the water heater, especially in cyclonic areas and in locations where hail in excess of 25 mm diameter is likely to occur.

This Solar Lord Water heater is warranted by the manufacturer, Solar Lord Pty Ltd (ACN 137 094 921), (Hereinafter called the company), which undertakes to perform the warranty listed below

WARRANTY PERIOD

(From date of installation or three months form purchased, whichever is the earlier)

WARRANTY COVER		
TANK	7 YEARS	7 YEARS
SOLAR COLLECTORS	7 YEARS	7 YEARS
PARTS	1 YEARS	1 YEARS
ELEMENT	1 YEARS	N/A
GAS BOOSTER	N/A	10 YEARS ON HEATER EXCHANGER
		1 YEARS ON LABOUR
LABOUR ON SYSTEM	1 YEAR	1 YEAR

*** AUSTRALIA ONLY**

**** FOR WHOLE SYSTEM ONLY. SOLAR COLLECTORS ARE WARRANTED FOR 1 YEAR AND TANKS ARE WARRANTED FOR ONE YEAR IF THEY SOLD SEPARATELY.**

7 Year Warranty

Solar Lord Solar Australia Pty Ltd warrants to and for the sole benefit of the original purchaser of water heaters sold by Solar Lord, will remain free from defects in material and workmanship under normal usage in accordance with the guidelines set in Solar Lord solar water heater literature. This warranty shall remain in effect for seven (7) **years after installation of the system to the original purchaser with respect to:**

- Storage Tanks
- Solar Collectors
- Mounting frames, brackets

The Solar Lord warranty will remain in effect to all other parts (including valves, elements and thermostats) for a period of twelve(12) months after such installation.

Solar Lord shall provide both the labour and the parts required to repair, or, at Solar Lord's option, Solar Lord shall replace any part of the system which upon examination by Solar Lord is determined by Solar Lord to have been defective during the applicable warranty period. The replacement component shall carry the balance of the original warranty period.

The water heater must be installed in accordance with Solar Lord's installation instructions along with relevant local and statutory requirements. Damage to buildings, chattels or any other consequential damage caused either directly or indirectly due to leakage of the water heater and breakage of collector glass due to vandalism or storms including hail are not within the scope of this warranty.

The term "original purchaser" as used in this warranty means the householder to whom this water heater was first installed for.

Except as otherwise provided by law, the warranty set forth herein is the complete and entire warranty made by Solar Lord and there are no other warranties, expressed or implied, whether of merchantability, fitness or particular purpose, or otherwise made by Solar Lord. In addition to this warranty the original purchaser is a consumer as defined by any relevant law such as the Trade Practices Act 1974 or similar State laws, then cer-

tain terms and rights will be implied for the benefit of the consumer which terms and rights and any liability of the supplier flowing from them, cannot be excluded, restricted or modified by any provision of this warranty.
Solar Lord P/L ABN **49 137 094 921**

WARRANTY CONDITIONS

WARRANTY EXCLUSIONS

The warranty will not apply if;

The system is not installed, operated, maintained or serviced in accordance with the instructions supplied with product by Solar Lord.

- Where it is found there is nothing wrong with the water heater;
- where the complaint is related to excessive discharge from the temperature and pressure relief valve due to high water pressure;
- where expansion/limit valve to 550 kPa max, check valve and strainer is not fitting in the cold inlet;
- where equipment supplied by Solar Lord, as part of the standard installation kit has not been installed;
- where the components not supplied by Solar Lord extended or implied warranties not formally provided by Solar Lord;
- where there is no flow of hot water due to faulty plumbing;
- where water leaks are related to plumbing and not the water heater components;
- where there is a failure of gas, electricity or water supplies;
- where the supply of gas, electricity or water do not comply with relevant codes or acts;
- where a system failure or lack of performance is deemed to be the result of an incorrect installation/commission resulting in a blockage in the copper tube/s in accordance with the required standards or Solar Lord guidelines;
- are the sole responsibility for the rectification lies with the Installer/Contractor.

The costs on materials and labour, incurred for rectifying / perceived faults not directly attributed to the Solar Lord solar hot water;
the external costs on labour or facilities (Cranes, lifting equipment, scaffold or harness) required to repairs;
all the consequential loss and damage arising from the defects in components supplied by Solar Lord including;

damage caused by incorrect installation/ commissioning/used (ie the solar controller has been turned off);

leakage from valves /devices not supplied by Solar Lord;
leakage from valves /devices supplied by Solar Lord used exceeds the limits specified in Solar Lord's installation and maintain manual or incorrectly installed.

Water hammer or banking noise from overheating /oversizes selection

Broken tubes after system complete installation

External rust on the storage tank or the collector/s

Insufficient hot water (less than 50°C) resulted from:

- i) The consumer turns off the auxiliary booster
- ii) an faulty tempering /mixing valve or incorrect setting
- iii) hot water demanding exceeds than recover capability of the auxiliary booster
- iv) low flow rate or pressure fail to meet operation condition(i.e. insufficient flow for gas booster)
- v) inadequate supply to the booster unit (i.e. undersized gas line or switches board /wiring)
- vi) incorrect selection of gas back up unit
- vii) debris blockage to the filter / the strainer /collector

The fitting of replacement part/additional parts, connection or attachments that are not either manufactured or approved by Solar Lord, or altering the hot water system in any way from its original specifications will render the Warranty void.

Gas System manufactured for installation where the actual gas supplied is not within the guidelines as set out in the ALPGA Specifications 2000.

Defects arising from misuse, accidental damage, neglect or operated without the appropriate fluid; or systems are flushed by a cleaning agent or product not recommended by Solar Lord.

Water hammer occurs in the cold or hot water pressure fluctuated above the standard valve settings.

Storage System installed within a 5 km radius of a water tower/reservoir must be fitted with a suitable air eliminator.

The wrong system for the area or water conditions is installed against Solar Lord published recommendations i.e. an Open circuit system used in poor water quality area.

The system installed in a low (<350kPa)/unstable pressure cold water supply. The system installed more than 8 metres ahead or flow/return lines is exceeding 15 metres.

The water quality does not meet those specifications as requested in the Quality guidelines. A Maxi Saver Conditioner can be purchased which may improve the water quality. The saturation index condition must still apply, as does the original warranty.

Items such as cleaning of glass tube, maintenance and service.

Damage is caused by hail or cyclone, fire, lightning, flood, earthquake, landslide, storm, or severe adverse weather conditions. Glass tube fitted to solar collector is not covered by this warranty. It may be claimed as fixed glass on your household insurance, check with your insurance provider.

When the system is installed outside of what is deemed by Solar lord as a standard installation i.e. limited access, excessive roof pitch or multiple storey, additional cost may be for the account of the owner.

Solar Lord Hot Water shall not be liable for any consequential damages, furniture, roofs/ceilings/walls or other structural damages, or any incidental expenses directly or indirectly due to any defects of its products.

Broken Glass Tube

The Solar Lord warranties DO NOT cover breakage of solar collector glass and leak damage. Check your household insurance policy covers collector glass breakage.

WARRANTY REGISTRATION

Warranty will only be given where proof of purchase e.g. original invoice and compliant certificate from a licence plumber are provided. To be eligible to make a claim under this warranty, customer must complete all the Warranty Registration Form within 4 weeks of the installation and send to Solar Lord (or register on line www.solarlord.com.au/warranty registration)

Please present proof of the date of purchase to any authorized service dealer should warranty service be required.

It is therefore in your own interest to register your warranty, retain your receipt and compliant certificate.

INSTALLATION & WARRANTY REGISTRATION

Congratulations on your completed the installation of a Solar Lord Hot Water System. Engaging the newest technology of absorbing solar energy and most efficiency collector, Solar Lord Hot Water will get best benefit from solar energy and economic run for you.

Please register your warranty and ensure the following details are provided correctly, then sign the original and post it to:



Solar Lord Pty Ltd
Unit 2, 21 Lionel Road,
Mt Waverley, Vic 3149

To be completed by the purchaser

Customer Details:

Owner's Name: Mr. Mrs. Ms. Surname: First name

Installation Address(not P.O. BOX please) _____ (Street)

Suburb/Town: _____ State& postcode _____

Telephone: H() _____ W() _____ Mob _____

Email: _____

System & Purchase Details:

Date of Purchase _____ Invoice No. _____

Dealer's Name _____

Dealer's Address _____

Model No. _____ Booster Type: Solar ☐ Electric ☐ Gas ☐

Type of Installation: New Home ☐ Replacing Existing: Solar ☐ Electric ☐ Gas ☐ Others ☐ _____

Tank Serial Number: _____

Collector Serial Numbers: 1 _____ 2 _____ 3 _____

Installer Details:

Installer's Name _____

Plumber's License/BSA No. _____ Electrician License No. _____

Date of Installation _____ / _____ / 20 _____

Customer Signature: _____ Date: _____

PLEASE KEEP A COPY OF THIS REGISTRATION FOR YOU REFERENCE.

NOTE: Our Service Agents act on their own behalf and are not empowered to commit or legally bind Solar Lord in any manner whatsoever. Systems designed for domestic use are only warranty when installed in single, family domestic premises. Contact Solar Lord dealer near you for commercial/industrial details if required.

Warranty applies inside of Australia only. Overseas buyer need contact head office of Solar Lord for warranty cover details.

All benefits offered by this warranty are in addition to all other statutory right and remedies which the consumer has in law in respect of the product.

Solar Lord reserves the right to discontinue items, modify designs and change specifications without incurring obligation. Whilst every effort is made to ensure that instructions, specifications and other information in this installation manual is correct, no warranty is given in respect thereof and company shall not be liable for any errors therein.